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New approach to explain Gravity or Theory of Everything

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Abstract- A new explanation of the nature of gravity is presented in this article. It interprets gravity as a property of mass to deform and absorb space cells around it, creating space flows towards any massive body. The notion of space flows can change perception not only of gravity but also of the many other phenomena of physics such as repulsion of particles or movement of peripheral parts of galaxies, strong or weak forcers, and so on. In the first part of this paper, proposed model of gravity is confirmed by a derivation of inverse square Newton's law for gravitational force using the basic principles of this theory. In the second part, this model of gravitation is developed further and complemented with the main equation of space cells movement, which links a speed of space cells with their linear size. This equation allows us to obtain a formula for time relativity and to define an influence of mass on a value of the speed of light. In the third part, the space flows are used to explain an effect of gravitational repulsion on a micro level. The notion of space flows also is used to describe forces of strong and weak interactions. The fourth part is about particles. An important role of antimatter in a particles' internal structure and a few schemes of elementary particles' transformations are proposed there. This theory of gravity suggests that antimatter emits the space cells.

Index Terms- antimatter, gravity, red shift, space cells, space flows

I. INTRODUCTION

The purpose of this article is to present the proposed theory of gravity without diversions for discussion of existing models or theories. This theory can be considered as a thought experiment based on a sequence of assumptions, which leads to some interesting conclusions and unexpected explanations of otherwise usual phenomena.

II. PART I. GRAVITATION

Main hypothesis

Matter does not only deform space but also absorbs it. Antimatter emits space. The deformations of space by matter and antimatter are the same.

There are a few more assumptions in the development of the main hypothesis

Space consists of separate cells. These cells can be strained by the force of gravity; can move regarding each other or regarding massive objects; and their movements form flows of space.

It is necessary to say that the deformation of space and its absorption by mass are quite similar notions. This proposed model of gravity suggests that space cells are gradually squeezed by gravity while they are approaching a particle of matter, and this process is similar to a deformation of space described by the General Theory of Relativity. Because, if we accept that it's possible to squeeze a cell to its complete disappearance and that this process is developing in time, then deformation of space can be considered as a part of a space absorption process. The absorbed cells will be replaced with the new cells of space that are physically moving towards a massive object, creating space flows.

If we accept the idea that matter continuously absorbs space, then it's logical to suggest that movement in a certain direction requires extensive absorption of space in that direction. It leads to a conclusion that the maximum speed of motion will be limited by the speed of space absorption. But we also know that the speed of any object can't be higher than the speed of light, which means that the speed of space absorption and the speed of light must be the same or very similar by value.

The best candidate for the role of object that can absorb space with the speed of light is a Black Hole. If we assume matter is composed of particles with elementary mass, which consume space, then these elementary particles could be called Small Black Holes (SBH). Using the same logic for antimatter, we can assume the existence of Small White Holes (SWH), which emit space. The name "Small Black Hole" is already assigned to an object with different properties, but, in this paper, Small Black Holes consume space, not matter.

Space absorption by matter

Newton Equation

One way to check the validity of this theory is to obtain Newton's equation using the terms of the proposed model of gravity.

The described theory of gravitation assumes existence of space flows, which are created as a result of space being consumed by matter. It is also possible to suggest that a stationary object placed in the flow of accelerating space will be exposed to the same force as it would be moving with acceleration in a static space. The equation for the movement of space obtained from the conditions of this proposed theory must exactly coincide with Newton's Equation for Gravity acceleration.

The relation of space acceleration to the distance from a massive object is mainly defined by the rate of volume of space cells' change while they are moving towards the center of the mass. For example, if the size of cells remains unchanged, then acceleration will be proportional to the mass in second degree

and to distance in a minus fifth degree. Let's consider the following equation for the cell's volume, assuming the volume of the cell is decreasing on its way to the mass:

$$v = v_0 \sqrt{\frac{\rho_h}{\rho}} \qquad (1.1)$$

Where:

ρ – The mass density at the distance R from the center of mass

ρ_h - density of the SBH which is considered a constant

v - volume of the space cell at the distance R from the center of mass, and

v_0 - minimal volume of space cell, which is equal to the volume of SBH. When the value of ρ will be equal ρ_h, then v is going to be as small as v_0.

The volume of space consumed by the particle with the mass M in one act of absorption:

$$v_m = 2 * \frac{M}{m_0} * v \qquad (1.2)$$

Where:

m_0 – elementary mass

M – mass of the particle

As it will be shown in the third part of this article, the elementary mass has two lines of space absorption and therefore the number of consumed space cells will be proportional to the doubled specific mass of the particle.

The flow of space absorbed by the particle of matter is defined by the amount of space consumed in one unit of time. If we assume the act of absorption occurs in a certain quantum of time (q_{t0}) then the equation for space flow can be written as following:

$$W = \frac{2v_0 M}{q_{t0} * m_0} * \sqrt{\frac{\rho_h}{\rho}} \qquad (1.3)$$

$\frac{m_0}{v_0}$ can be replaced with ρ_h - the density of SBH, and the density of mass ρ at the distance R can be presented as $\frac{3M}{4\pi R^3}$, then the equation (I.3) can be rewritten:

$$W = \frac{2M}{q_{t0} * \sqrt{\rho_h}} * \frac{\sqrt{4\pi R^3}}{\sqrt{3M}}$$

We can use the expression above to create the equation for the space flow through the sphere with radius R:

$$4\pi R^2 * v = \frac{2M}{q_{t0} * \sqrt{\rho_h}} * \frac{\sqrt{4\pi R^3}}{\sqrt{3M}}$$

Where v is speed of the space cells at distance R from the center of mass M

From the equation for space flow, we can get the relation of the space cell speed on the distance R from the center of the mass:

$$v = \frac{1}{q_{t0}\sqrt{3\pi\rho_h}} * \left(\sqrt{\frac{M}{R}}\right) \qquad (1.4)$$

Using the expression for speed we can get the equation for acceleration:

$$a = \frac{dv}{dt} = -\frac{1}{2}\sqrt{\frac{M}{R^3}} * \frac{1}{q_{t0}\sqrt{3\pi\rho_h}} * \frac{dR}{dt}$$

Replacing $\frac{dR}{dt}$ with the expression for v:

$$a = -\frac{1}{2}\sqrt{\frac{M}{R^3}} * \frac{1}{q_{t0}\sqrt{3\pi\rho_h}} * \sqrt{\frac{M}{R}} * \frac{1}{q_{t0}\sqrt{3\pi\rho_h}}$$

At the end we have the equation for acceleration:

$$a = -\frac{1}{6\pi\rho_h * q_{t0}^2} * \frac{M}{R^2} \qquad (1.5)$$

We can see the derived equation for acceleration is very similar to the Newton law of universal gravitation:

Gravitational constant G:

$$G = \frac{1}{6\pi\rho_h * q_{t0}^2} = 6.67 * 10^{-11} \text{ m}^3/(\text{kg}*\text{s}^2)$$

$$a = -G * \frac{M}{R^2} \qquad v = \sqrt{\frac{2G * M}{R}} \qquad (1.6)$$

III. THE MAIN EQUATION OF SPACE CELLS MOVEMENT

We have to return to the statement that the volume of space cells at a certain distance is inverse dependent on the square root of mass density (1.1).

$$v = v_0 \sqrt{\frac{\rho_h}{\rho}}$$

Below we'll try to obtain a relation of the linear size of a space cells from their speed of motion when they move towards a massive particle driven by the force of gravity.

$$v = v_0 \sqrt{\frac{\rho_h}{\rho}} \Rightarrow l = 2r_0 \sqrt[6]{\frac{m_0}{M}} * \sqrt{\frac{R}{r_0}}$$

$$l = 2\sqrt[6]{\frac{m_0}{M}} * \sqrt{Rr_0} \qquad (2.1)$$

Where:

l – linear size of the space cell

r_0 – SBH radius

The coefficient 2 in the right part of the equation appears because the linear size of the cell is equivalent to the diameter of SBH, not radius.

Speed of the cell depends on the distance to mass (1.4):

$$v = \frac{1}{q_{t0}\sqrt{3\pi\beta_h}} * \sqrt{\frac{M}{R}} = \frac{\sqrt{4\pi/3}}{q_{t0}\sqrt{3\pi}}\sqrt{\frac{r_0^3}{R}}\sqrt{\frac{M}{m_0}}$$

We can get the third equation out of two above:

$$v * l = \frac{2\sqrt{4\pi/3} * r_0^2}{q_{t0}\sqrt{3\pi}}\sqrt[3]{\frac{M}{m_0}} = \frac{4r_0^2}{3q_{t0}}\sqrt[3]{\frac{M}{m_0}}$$

We can replace the radius of SBH in the formula above to the linear size of the last space cell which is absorbed on the surface of the SBH. We can calculate an adjustment coefficient:

$$\frac{4r_0^2}{3} = l_0^2 => l_0 = r_0 * \sqrt{4/3}$$

Let us define the notion of the speed of space absorption - c_a as:

$$\frac{l_0}{q_{t0}} = c_a \quad (2.2)$$

Then the main equation of space cell movement is going to look like the following:

$$l * v = l_0 * c_a\sqrt[3]{\frac{M}{m_0}} \quad (2.3)$$

Therefore, when the $M = m_0$ the following equation will take place:

$$l * v = l_0 * c_a$$

The full equation of space cells motion, by the force of gravity of the object with mass M, is going to look like the following:

$$\frac{l * v}{\sqrt[3]{M}} = \frac{l_0 * c_a}{\sqrt[3]{m_0}} = K \quad (2.4)$$

$$l * v = K\sqrt[3]{M} \quad (2.5)$$

Where K is a global constant, which has yet to be defined.

The size of the last cell on the surface of SBH will be bigger for the bigger mass.

The same equation can be presented in a different form:

$$l * v = l_0 * c_a\sqrt[3]{M_s} \quad (2.5.1)$$

Where M_s – is the specific mass.

The equation above shows that the speed of a cell multiplied by its linear size is a constant for a certain mass. This equation can be called a main equation of space cells.

Performing a simple analysis of the main equation of space cells, we can get some interesting conclusions about the relation between time and the speed of the moving object.

Figure 2.1: Scheme of the space absorption by SBH

We can consider the space cell with the linear size l_s on the surface of SBH as shown in Figure 2.1 above. The vertical wave line represents the border of the space consumption. The speed of space through this border is constant and equal c_a. The border itself can move in space with the speed v_p – equal to the speed of the particle to which this border belongs.

Assumption:

The speed of space absorption c_a is the ultimate speed for a space cell and cannot be exceeded by it. When the space cell accelerated by the force of gravity reaches the speed c_a, it collapses on the surface of SBH.

Taking into account that the absolute speed of cells through the SBH border is a constant equal c_a, and that a particle's speed isn't zero but equal v_p, then the maximum speed of space cell towards the particle on the SBH surface is going to be less than c_a and equal to $c_a - v_p$.

This means that the size of the last cell l_s will be bigger for the moving particle.

$$l_s = \frac{c_a}{c_a - v_p} l_0 * \sqrt[3]{\frac{M}{m_0}} \quad (2.6a)$$

$$l_s = \frac{\sqrt[3]{M}}{c_a - v_p} * K \quad (2.6)$$

From the equation (2.6), we can see that the linear size of a space cell at the surface of the SBH l_s is growing with the bigger mass and the higher speed of particle.

Size of background space cells

Considering the initial equation of the volume of space cells and its dependence on mass density, we can conclude that size of the space cells will grow with the growing distance from a massive particle.

$$\frac{l_1}{l_2} = \sqrt{\frac{R_1}{R_2}}$$

This growth of the size of cells with distance doesn't mean that cells will grow limitlessly. The influence from the next level of space and mass exists everywhere in space besides the gravitational influence from the nearest particle. Collective influence of the big mass behind the scene will limit the size of the space cells and force them to move with certain speed in the direction of the center of mass of the external system. Let's call this effect on space from external mass a **background influence**. For the particles in any material object, the next level of gravitational influence will be the material object itself. For example, for molecules of water in the ocean, the background size of space will be defined by the density of mass in the surrounding water. On the surface of the Earth, the mass of the planet will define the size of the space cells. Out of the zone of influence of our planet, the sun will be responsible for background size of space, then the galaxy and groups of galaxies and at the end the Universe itself will restrict the space cells' size. It is possible that there are some other limits to the size of space cells, and it may happen that after reaching a certain size the cell will split or stop growing.

Considering the existence of the background mass influence, which limits the maximum size of background space cells, we can define the minimal but nonzero speed of space cells v_b with which the cell will move towards the absorbing particle. It means that speed of light c, which can be also called the *maximum speed of movement* (MSM), will be equal to the difference between the speed of space absorption and background speed.

$$c = c_a - v_b \quad (2.7)$$

It means that the speed of light is not the ultimate speed. It is always going to be less than the speed of space absorption, and only in an extreme case, when a particle is moving at infinite distance from all other masses, can these two speeds became the same. As we will see further, the speed of light is not a constant even in a vacuum. It depends on the mass of the moving object and on the background influence of gravitation.

The speed of the background space cell towards the consuming particle can be obtained from the equation (2.5):

$$v_b = K * \frac{\sqrt[3]{M}}{l_b} \quad (2.8)$$

Considering the last equation, the background speed will depend on the mass of the particle to which this cell is moving towards. The same-size cells will correspond to the higher speed for the bigger mass. Starting from a certain distance the speed of a space cell will be defined by only one particle, which is going to absorb this cell.

Particle's zone of gravitational influence

For every massive particle, it is possible to distinguish a sphere or a zone of gravitational influence where the main equation of space movement (2.5) is applicable. The boundary of this zone will be defined by the size l_b of background space cells or by background speed v_b. The size of gravitational zone for the particles with the same mass will be smaller in a case of the smaller size of background cells. This zone will have the shape of sphere when the particle is motionless.

Out of the zone of gravitational influence, the speed of cells' movement will not comply with the main equation of space movement $v * l = K\sqrt[3]{M}$ where M is the mass of the closest particle. Their size, and therefore their speed, will be defined by the distance from the remote or background mass.

Assuming the size of background cells as a constant in a scale of one particle, we can obtain the relation of the size of influence zone with the particle's mass. Using the equation (1.6) for speed of space cell:

$$v = \sqrt{\frac{2G * M}{R}}$$

For two particles with the masses M_1 and M_2, we can write:

$$l_b * v_1 = l_b \sqrt{\frac{2G * M_1}{R_1}} = K * \sqrt[3]{M_1}$$

$$l_b * v_2 = l_b \sqrt{\frac{2G * M_2}{R_2}} = K * \sqrt[3]{M_2}$$

Dividing one equation to another we will get the following formula:

$$\frac{R_2}{R_1} = \sqrt[6]{\frac{M_2}{M_1}} \quad (2.9)$$

This last equation means that the spot of the influential zone will be bigger for more massive particle, but the cell's size at the same distance from more massive particle is going to have an inverse relation, as shown from equation (2.1).

$$\frac{l_1}{l_2} = \sqrt[6]{\frac{M_2}{M_1}}$$

If we draw the proton and electron in the same background space, then the proton's influence zone is going to be bigger than the electron's, but the size of space cells at the same distance from the center of the particles is bigger for the electron.

Figure 2.2: Zones of gravitational influence for proton and electron

Maximum Speed of Movement

We know that the maximum speed of any particle is less than the speed of space absorption (2.7):

$$c = c_a - v_b$$

We can replace v_b with (2.8):

$$c = c_a - K * \frac{\sqrt[3]{M}}{l_b}$$

Or using (2.4) to replace K:

$$c = c_a \left(1 - \frac{l_0}{l_b} * \sqrt[3]{M_s} \right) \quad (2.10)$$

The equation (2.10) shows that the maximum speed of movement (the speed of light) depends on the size of background space. When a particle is moving in space with smaller cells, then its maximum speed is decreasing, and, vice versa, when a particle goes to the space with bigger l_b, the maximum speed of movement increases. The smaller space size in a liquid or solid material corresponds to the higher density of mass and the higher refractive index, assuming inertial mass of photon as nonzero.

Time relativity

Assumption:

Everything exists in the present, but time is passing with different speed for every particle. Each particle is measuring time by the number of cycles of space cells absorption which depends on the particle's speed and mass.

One cycle of absorption is a quantum of time. We know that the size of space cells on the surface of SBH - l_s depends on the particle's speed and therefore the quantum of time relate to the particle's speed:

$$q_t = \frac{l_s}{c_a}$$

Relation of l_s with the particle's speed is defined by the equation (2.6a):

$$l_s = \frac{c_a}{c_a - v_p} l_0 * \sqrt[3]{M_s}$$

Then the quantum of time will look like:

$$q_t = \frac{l_s}{c_a} = \frac{c_a l_0 * \sqrt[3]{M_s}}{c_a (c_a - v_p)}$$

Or:

$$q_t = \frac{l_0 * \sqrt[3]{M_s}}{c_a - v_p} \quad or \quad q_t = \frac{K \sqrt[3]{M}}{c_a (c_a - v_p)} \quad (2.11)$$

The equation (2.11) shows that higher speed corresponds to the longer quantum of time. Therefore, time measured as the number of quantum passed between two events is going to be shorter for the faster moving and more massive particle.

IV. INTERACTIONS BETWEEN PARTICLES

Movement of particles in space and interactions with other particles

Movement and interactions of particles are interrelated notions because particles always move in a close or remote neighborhood with other particles. Depending on its mass, every particle absorbs a certain amount of space in a certain period of time. To move freely in space, particles must have enough space cells to absorb.

When do the particles start to compete for space? What does the collision of particles mean?

We can visualize the structure of the zone of gravitational influence of the particle as a set of contiguous levels or layers filled with space cells of a certain size. The first layer is the closest to the particle and has the smallest space cells. Each of the subsequent layers is filled with bigger-size cells and so on until cells reach the size of background space. Zone of gravitational influence is some sort of a place where space cells accelerate from the background speed v_b to the speed $c_a - v_p$. Photon doesn't have the accelerating zone because it moves with the speed of light $c = c_a - v_b$. Linear size of cells depends on the distance from the center of mass by the following equation (2.1):

$$l = 2 \sqrt[6]{\frac{m_0}{M}} * \sqrt{Rr_0}$$

The concept that every level of influence zone is filled with the same size of space cells doesn't mean that all cells are moving simultaneously from upper to lower levels. The process of gravitational absorption can be described as consumption of space cells from the level contiguous to SBH and their replacement by the cells from the upper levels.

The area of a space cell cross-section s_c is equal:

$$s_c = l^2 = \sqrt[3]{\frac{m_0}{M}} * 4Rr_0 = \frac{4Rr_0}{\sqrt[3]{M_s}}$$

From the expression above we can see linear relation of the growth of space cell cross-section with the increase of the distance R from the particle. We know that the area of the

surrounding sphere is growing proportionally to the R square. It is becoming obvious that the amount of cells not involved in the immediate consumption process will increase on every next level.

This means that the ratio of free cells considerably increases, especially outside the zone of gravitational influence. It is quite possible that particles moving in the background space won't actively interact with each other through the gravity forces.

Active gravity interactions or Collisions of particles

Active gravity interaction between particles occurs when zones of influence of two particles cross each other or/and when there are not enough space cells for consumption around the particles. Active interaction will appear in competitive action of the couple of particles which are trying to absorb the same cells located in a zone of their common influence. The interacting particles can move with the different speeds and have different masses.

Figure 3.1: Competitive actions from two particles on one space cell (a)

Two particles with intersecting zones of influence which are moving towards each other are shown in Figure 3.1 above. At some point, both particles can start absorbing the same space cell (a) by trying to pull it to the opposite directions. Obviously the attempt to move one cell in two opposite directions can result either in accelerated convergence of the particles or in expansion of the space cells between them. Any acceleration of the particles is associated with physical changes of the space consumption profile and requires an outlay of energy.

We can assume that the result of the competitive action from two particles is going to be the growth of the space cell between them. The growth of the cell (a) is also coming out from the main equation of the space movement because the result of the competitive action to one cell will be decreasing its speed of movement. In a case of collision of two particles with the same masses, we can expect a complete halt of the cell relative to both particles. The cell will start growing with the speed equal to the total speed of absorption from each particle.

As it shown on the Figure 4 below, the expansion of space cell is going to be uniform in all directions assuming the isotropy of the space cells.

Figure 3.2: Isotropic expansion of a space cell

We can consider two possible consequences of the space cell expansion depending on the total speed of gravitational pull.

Figure 3.3: Two sectors of interaction in a zone of gravitational influence

The first sector of interaction is placed between background speed and a half of the speed of space absorption.

In the first sector, a speed of expansion of the space cell is equal to a total speed of attraction from two particles and will never exceed the speed of absorption c_a. The result of this type of interaction is going to be a repulsion of particles. In Figure 3.4, we can see a situation when the expansion of one cell can lead to distortion of space on a line between two particles. It was mentioned above that to move in a certain direction the particle must absorb more space in that direction. The result of the competitive actions on one cell from two moving towards each other particles is the creation of a space bubble that considerably increases the spatial angle of a single line of space absorption which connects centers of particles. This kind of blocking of space absorption ahead of each particle will lead to the displacement of other lines of space absorption to the opposite direction from the space bubble. The deformation of the absorption profile will result in a change of speed of the particle's movement and a possible change in the direction of that movement. An example in Figure 3.4 shows the case when both particles will start moving in opposite directions after collision.

Figure 3.4: Repulsion of particles

The second sector on the space movement scheme covers cells with a speed exceeding half of the speed of space absorption.

The upper limit of this sector is defined by the space speed on the surface of a particle. The excess of the half of absorption speed is very important for initiation of qualitative changes in particles interactions. Beginning from the lower limit of this sector, the total speed of growth of space bubble produced by the common efforts of two particles will exceed the speed of space absorption.

Assumption:

The space cell splits into separate SBH and SWH when the speed of the space cell deformation exceeds the speed of space absorption (SSA). In a case of cell squeezing, the newly born SBH will start to compensate for the compressing flows of space and will be engaged into bond between particles that produce deformation. SWH becomes a part of a bond between particles when interacting particles create expansion of the space cell. In both cases, the second elementary mass, or anti mass, will be emitted from a zone of reaction with the kinetic energy equal to the total energy of a space cell minus energy of the newly created bond.

It is necessary to remember that to get into the second sector of interactions the particles must overcome the first sector of repulsion.

There are two examples of gravitational interaction with the speed of cell expansion exceeding SSA.

Example 1. Strong interaction

Figure 3.5: Strong interaction

Strong interaction is the force that binds the protons and neutrons together to form the nucleus of an atom. As a result of strong interaction the total mass of nucleons will decrease and the emitted energy is going to equal $E = \Delta m c^2$ where Δm is the mass loss. The proposed model of gravitational interaction can explain the loss of mass and the amount of emitted energy.

We can suggest that strong interaction takes place in the second sector of the space movement scheme where speed of cell's growth exceeds SSA. As the result of this interaction, a certain amount of antimatter is going to be created. Space cells emitted by antimatter will compensate the flows of space towards the matter. This compensation of space flows between interacting particles eliminates repulsion between them. The system matter – antimatter stabilizes. Antimatter in this scheme plays the role of glue, which keeps interacting particles of matter together.

Linked particles will absorb less space than they absorbed by themselves because some space is now emitted by the binding antimatter. This effect will be observed as a mass loss of the linked particles.

Important addition:

It is necessary to be sure that the speeds of interacting particles do not exceed a half of SSA to implement the gravitational interaction with the creation of antimatter. This conclusion is coming from the definition of the upper limit of second sector, which is equal to $c_a - v_p$. It means that in the case when the particle's speed exceeds half of SSA, the upper limit will become lower than the lower limit and the sector II will cease to exist. In other words, to perform the reaction of fusion, the speed of nucleus must be lower than the half of SSA.

It is interesting to mention that if it will be possible to create conditions when background speed v_b is equal to half of SSA then every collision of particles will lead to the creation of nuclear bonds. These conditions may exist on a neutron star.

Example 2. Weak interaction; electron's capture.

Figure 3.6: Weak interaction

One of the classic examples of weak interactions is the beta decay of the nucleus. During beta decay the neutron emits W^- boson and proton. W^- boson after a short delay decays to the electron and antineutrino.

$$n^0 \rightarrow p^+ + e^- + \bar{v}_e$$

The electron's capture is one of the types of beta decay. In electron's capture, one of the protons of a nucleus captures an electron from the nearest orbit and turns into a neutron. Electron neutrino is emitted as a result of electron's capture reaction.

$$p^+ + e^- \rightarrow n^0 + v_e$$

We can consider the electron's capture using the proposed model of particles interaction. It is an example of interaction between particles with very different masses. In many aspects, this type of interaction is similar to the strong interaction described above. We can suggest that this interaction is also located in the second sector of the scheme of space movement where the speed of space cells exceeds half of SSA.

As a result of the electron's capture we can expect formation of an antiparticle – antineutrino which will glue two particles of matter. It is very important that at the result of this reaction it is also possible to register a neutrino. This fact supports the notion that the formation of one type of an elementary particle that participates in the nuclear bond leads to emission of the other type of a particle.

The weak interaction can be distinguished from strong interaction because of significant difference in the density of absorption lines of the heavier proton compared to the density of the electron's lines. Because of this, we can't expect multiple coincidences of the absorption lines when the particles collide. The only direction where competitive absorption can take place is the line between centers of interacting particles. More than this, the lines of absorption in other directions can create the space bubbles which will cause repulsion. Continuous repulsion will result in an inevitable destruction of a single bond which keeps the couple of particles together.

The fact of antineutrino's registration as a result of beta decay is very important for further development of this theory of gravity. If it's possible for antimatter to bind the particles of matter, then it's possible to assume antimatter as a natural part of the internal structure of basic particles of matter such as electrons or protons.

We can consider annihilation as a process in which the balance of the bonds between matter and antimatter within particles are breaking. This leads to the destruction of the particles down to the elementary building blocks. We know that the main products of annihilation are neutrino, antineutrino, and photons. It may mean that all the particles are built out of these basic elements.

V. PARTICLES

Neutrino model of particles' structure

Elementary particles

Considering the model of gravitation described in previous sections of this article we can suggest that simple neutrinos and antineutrinos may be the basic components of the matter and antimatter, but probably not the only ones.

We assumed elementary particles as the cells of space converted under external forces into the matter and antimatter of the minimal size and minimal mass but maximum density. If elementary particles can be defined as small black holes (SBH) and small white holes (SWH), then simple neutrino and simple antineutrino are the simplest SBH and SWH which have no other properties but mass.

Both simple neutrino and antineutrino have two lines of space movement but neutrino as the matter consumes space and antineutrino as antimatter emits it. Existence of two lines of space movement allows neutrinos to serve as the gluing components between particles of the opposite type.

Figure 4.1: Simple neutrino and antineutrino

Lines of space movement of neutrino and antineutrino can consume or emit space in any possible direction, and this flexibility allows them to move with any speed to any direction or stay motionless. However, it's obvious that having only these two particles is not enough to build everything else in this world. It would be necessary to at least have elementary particles responsible for the electrical charges to complete the neutrino's model of matter.

Description of the positive and negative elementary charges

Considering the concept of mutual complementarity of matter and antimatter in the construction of complex particles, we can suggest that elementary charges will also belong to the different types of matter. But in contrast to the simple neutrino and antineutrino, which can only consume or emit space, the elementary charges must have some other properties that could help us to explain their special capabilities.

Assumptions:

- Negative elementary charge corresponds to the matter and positive charge to antimatter. It means that the negative charges absorb space cells and that positive charges emit them.
- SBH and SWH of charged particles are the space eddies with accretion discs. Lines of space consumption of SBH and space emission of SWH coincide with their rotation axes.

- The axes of rotation coincide with the lines of electric field created by the particle.
- Accretion disks of SBH and SWH are the looped space flows which do not participate in consumption or emission of the space cells. They are responsible for magnetic properties of the particles.
- Linear speed and linear size of the space cells in accretion disks are following the main equation of the space movement $v * l = K\sqrt[3]{M}$.

There are few options for the movement of space cells under the influence of the gravity. The space cell can move to the particle if the particle is matter. It can move out of the particle if the particle is antimatter. The space cell will rotate around the particle when it is moving in accretion disk of an elementary charge. The space cell will move to or out of particle rotating around its own axis when it's moving along the electric field line of an elementary charge.

Creation of elementary charges

The speed difference between contiguous magnetic flows can cause a rotation of space cells located between them. Rotation of the space cells creates pairs of charge germs inside each of these rotating cells, and axes of rotation coincide with electrical field lines. At some value of the speed difference, the distance between charge germs can exceed the cell's size, and two independent elementary charges will be formed.

The creation of elementary charges happens along the line of the electrical field. If the speed difference of magnetic flows will be not enough for creation of elementary charge particles then the pair of charge germs will recombine to the initial state and transfer the rotating energy to the neighbor cell. In that case, the electromagnetic wave will propagate in the direction perpendicular to the vectors of magnetic and electrical fields.
Creation of elementary charge particles leads to formation of their accretion disks, which means creation of their own magnetic space flows. Rotation of SBH or SWH of the elementary charges is responsible for a spin or angular momentum of the charged particles.

Figure 4.3: Positive and Negative elementary charges

Origin of Particles

At this point we have two sets of elementary particles which can be considered as universal building blocks for all other more-complex particles. Elementary charges besides a charge and magnetism also have an elementary mass. Actually, both types of particles are the same SBH or SWH but in the different states. Admitting this, we could start the chapter about origin of particles from Small Black and Small White Holes which represent elementary particles of matter and antimatter. But if we

recall that all elementary particles are created from the space cells then we can conclude that the initial component of everything around us is the space cell. We can even suggest that the space cell has always contained two recombined elementary mass and anti-mass particles and that deformation of space just separates this pair. Releasing one particle always results in releasing another one. It means that at the very root of the genealogical tree of the particles must lay a space cell.

Stage I. Creation of elementary masses and charges

Figure 4.4: First step of space cell transformation

Gravitation and magnetic field do not create but only release the elementary particles of the matter and antimatter from the space cells conserving the quantitative symmetry of the particles of both types. The internal energy of each space cell is equal to the total energy of the neutrino – antineutrino pair ($2m_0 c_a$). For example, in the case of strong interaction, the total energy of split space cells will be shared equally between energy of emitted particles and the energy of antiparticles participating in nuclear bonds.

Stage II. Formation of photons

As it was mentioned before, the alternating magnetic field can split a space cell creating a pair of elementary charges when the certain speed of magnetic field change is reached. What will happen with the space cell when the speed of the changing field will exceed the speed of cell splitting? In this case conditions to form elementary particles of charge will be created and recombination of magnetic eddies won't be possible. Another space cell can be split in an attempt to pull away two newly created elementary charges and elementary neutrino – antineutrino bonds can be formed.

Figure 4.5: Elementary photon

Elementary photon is shown on the picture above. Its energy is minimal, but it will move with the speed of light and will have the gravitational mass equal to zero which is typical to photons of any energy. Elementary photon is a particle with the smallest inertial mass, and its charge is equal to zero and its antiparticle for itself. This photon has one of two possible directions of the rotation of the frontal negative eddy, and the positive charge will always rotate in inverse direction to the negative one.

Note:
Gravitational mass of the complex particle can be defined as the total sum of free lines of space movement, taking lines of emission with minus. In this work the

gravitational and inertial masses are not the same and should be calculated differently. The inertial mass can be evaluated as the total number of free lines of space movement independent of their belonging to the matter or antimatter because as for matter as for antimatter it is necessary to apply a force to change direction of the space lines. The absolute mass of a particle, which is equal to the total mass of all included elementary particles, is always bigger than gravitational or inertial mass because in a complex particle some lines of space movement are always engaged in internal bonds.

It has to be mentioned that the alternating magnetic field is not the main source of photons. The main producers of photons are electrons as it will be shown below. But strong magnetic fields are common on the surface of any star, and we can suggest that plenty of elementary photons are also produced by the stars' magnetic fields.

Figure 4.6: Photon's structure

Regular photon is shown on the picture above. This photon is the combination of many elementary photons gathered in a single cluster. The energy of this photon is equal to the total energy of all elementary photons in the cluster.

$$E_f = n * E_{f0}$$

Where

E_f- energy of photon; E_{f0}- energy of elementary photon; n – number of elementary photons

Stability of this particle is secured by two main reasons. First of all, it is the attraction of simple neutrinos and antineutrinos due to deformation of space. In the first part of this article, a lot of attention was paid to explain an effect of gravitational repulsion between particles as a result of competitive consumption of space. In our case, all internal lines of space consumption or emission are engaged in bonds between photons' components, but deformation of space around every elementary particle still exists. The second reason which keeps the particles together in a photon is the force of magnetic attraction between elementary eddies of the same charge. A regular photon collects only elementary photons with the same directions of eddies' rotation for each type of charge.

Besides the forces which keep a photon together, there is also a force directed to rip the bonds between two parts of a photon. This is the force of magnetic repulsion between bunches of positive and negative elementary charges, which magnetic space flows have opposite directions.

Figure 4.7: Magnetic repulsion between positive and negative parts of photon

It is important to note that the force of magnetic repulsion between groups of elementary charges will grow with the increasing number of elementary photons in a bunch.

Notes:

Red shift of photons. Existence of the force directed to a photon's destruction can become a reason of its spontaneous decay, and probability of this decay will directly relate to the photon's energy. When the energy of photon decreases, the force of repulsion becomes weaker and decay happens less often and with the smaller energy of the fragments. It will be possible to use the red shift value to calculate distance to remote objects when relation of decays' frequency with photons' energy and time are determined.

Cosmic microwave radiation. Decay of the high energy photons means losing small fragments consisting of a few elementary photons. The fragments of the decay are photons with the big "length of waves" which could be registered as a cosmic microwave background radiation. We can even suggest that the number of background photons will exceed the number of the parent photons because the photon can decay several times on its way to Earth. Direction of movement of the fragment and the parent photon must be the same as well as a total energy and impulse. The beginning of the CM spectrum can't be continuous because it starts from the single photon.

The format of this article doesn't allow discussing the properties of the particles thoroughly, but some conclusions about photons' properties are coming out of its structure. It is necessary to say that all notions about length of wave for photons have no real sense in the context of this article. The structure of photons implies discreet deviation from the trajectory of movement. The increase of photon energy or its inertial mass can be observed as a decrease of the distances between single-sleet diffraction maximums.

In a case of dispersion the violet light will deflect more than the red light as it follows from the equation for speed of light (for the same l_b the bigger mass will move slower):

$$c = c_a \left(1 - \frac{l_0}{l_b} * \sqrt[3]{M_r} \right)$$

The construction of photons can be described as a frame with two separate pull and push engines. The movement of the particle like this will depend on the direction of its pushing and

pulling components. Rotation or sideways moves can be expected in certain conditions.

Behavior of photons can be discussed more in a separate article.

Stage III. Formation of Electrons and Positrons

In the previous chapter, we talked about photons and about forces which keep the components of photons together. It was also mentioned that there is a force of magnetic repulse between positive and negative parts of photons which tries to tear them apart. The magnitude of the repulsive force will increase with growth of photons' energy which directly corresponds to a number of elementary photons embedded into photon structure.

Figure 4.8: Photon of the maximum energy

It can be expected that energy of a particle cannot grow endlessly if it leads to the growth of force directed to destroy this particle. Maximum value of magnetic repulsion will be reached when the positive and negative parts of the photon become hemispheres. In this case, the accretion disks of the positive and negative parts of the photon will lie in the same plane, and the force of magnetic repulsion will be the highest. The increased magnetic repulse force will break the bonds between neutrino and antineutrino centers of the photon.

Neutrino and antineutrino nucleuses of the split photon obtain free lines of absorption and emission correspondently which can interact with the space cells between them, tearing those cells apart and creating eddies of elementary charges. Every free line of neutrino will link with the positive eddy of antimatter and antineutrino and will take the negative eddy of the matter. The hemispheres of the positive and negative parts of photon will be restored to the full spheres.

Figure 4.9: Positron and electron

The rupture of a maximum energy photon will result in a formation of two separate particles – positron and electron. Photons of such energy can be obtained by the strong magnetic fields or produced by a combination of two photons when gamma quant captures a weak photon of the cosmic microwave radiation.

Positrons and electrons are unique particles in a certain sense because they can't move in any direction without changing their internal structure. The density of elementary charges in both particles is the highest and cannot be increased any further. To increase consumption of space from any side of electron or positron, some bonds of these particles should be stretched in length. These deformations will result in increasing consumption of space at one side of a particle and decreasing absorption at the other side.

Figure 4.10: Structural changes in the moving electron

As we can see in the picture above, the bonds between central antineutrino nucleus and negative eddies are stretching to the length of a simple neutrino-antineutrino pair. Space released from the extended eddies is filled with elementary charges moved from the backside of the particle. We can assume that the speed of electron will be defined mainly by the size of the hole at its backside.

$$Cos\,(\alpha/2) = 1 - v\,/\,c_a$$

The equation above shows that the maximum speed of movement c which is always lower than c_a can be reached when the angle α is even smaller than π (stage II on the Figure 4.10).

Electrons can be accelerated by a few ways: absorption of photon, electric field, or collision with another particle.

The mechanism of photon absorption by electron is based on recombination of the positive part of elementary charges of photon with negative elementary charges of electron.

Assumption:

Recombination of the matter and antimatter. Out of two pairs of elementary particles of matter and antimatter, only elementary charges of different type and different spin can recombine back into a space cell. The simple neutrino and antineutrino cannot recombine into a space cell, but instead of recombination they produce an elementary photon.

In the process of the photon – electron interaction, we can assume recombination of the positive part of the photon with the negative charges of the electron. Such integration of the particles can be possible only when spins of the negative elementary charges of the electron and photon coincide. Taking into account that the rotation of the positive and negative eddies in the photon are opposite in direction, we can see that when condition of recombination is fulfilled then automatically fulfilled the condition of incorporation of the negative part of the photon to the common magnetic flow of the electron.

Recombination of eddies into a space cell is looking like the disappearance of two elementary charges and one bond between elementary particles. At the result of recombination, the photon will be sucked into the electron on the length of one bond, leaving two bonds and one elementary negative charge outside. Acceleration of electron by collision with another particle or by the electric field results in an increase of density of charge eddies on the side of movement. When compression of eddies reaches a critical value some elementary eddies will move out of the surface of the particle, extending their bonds to the central nucleus with the standard neutrino – antineutrino bonds.

Motion and braking of electron

Whatever way an electron is accelerated, the result of acceleration can be seen in a changed structure of the particle. In Figure 4.10 we can see that the electron stretches in the direction of movement with the growth of speed by embedding elementary photons in its structure. At the same time, it is possible to pump up the energy of the electron, increasing its absolute mass without increasing its speed when the maximum speed is reached already.

The movement of any particle implies deviations from the strait line trajectories, accelerations, and braking. The structure of the electron as the structure of its parental photon allows only discreet changes in the direction of its movement. The zone of higher absorption of the electron must physically move from one place to another to perform a deviation from the strait line, and all stretched bonds will have to be recreated again. It may be possible that very small deviations from the main direction can be performed by correction of angles of the stretched parts of elementary charges, but when direction is changing essentially then extended bonds are breaking.

The breaking of every long bond occurs simultaneously with the creation of the pair of eddies which are needed to complete bonds of electron and photon. When the electron brakes or sharply changes direction of movement, the number of created elementary photons can be quite high. The energy of the resulted photon will be defined by the number of truncated bonds, and in some cases the electron can just stop moving if the gamma quantum will take all embedded elementary photons.

The process of changing direction can be described in general as a consequent truncation of the long bonds from the side where absorption of space decreases and displacement of elementary charges to the side where absorption increases. Truncation of bonds on every stage of the turn will be manifested by emission of photons, loss of energy, and decrease of speed.

Everything about the electron behavior when it turns or brakes is applicable to the positron with the only difference being that the neutrino nuclear of the positron is going to move ahead of elementary charges.

Figure 4.11: Movement of positron

It would be interesting to calculate the inertial mass of the electron or positron during acceleration under external forces and changing their structure while increasing kinetic energy. As we can see from the Figure 4.10, the gravitational mass of the non-moving electron equals only a third part of its absolute mass. If we assume that total mass of all elementary charges of the electron is equal to 1 then absolute mass of the stationary electron will be 1.5. On the third stage in Figure 4.10, the electron has total mass equal to 3.5, which is 2.33 bigger than total mass of a stationary electron. On the last stage of the figure above, every bond of electron extends on 4 standard bonds of neutrino – antineutrino which increases total mass to 5.5.

Stage IV. Formation of Protons

The model of electron and positron structure defines the value of their electrical charge as a certain number of elementary charges explicitly determined by the geometry of the photon. This restriction ensures a stable value of the total charge of the created particles independent on the way of obtaining of photons, but it also requires a strict sequence of transformations to create any charged particle. This sequence must always include transformation of photon into positron and electron.

Formation of proton as a positive particle should always go through the transformations which include positron. At the same time, we know that proton is an extremely widespread and stable particle which implies that its way of transformations must be the most probable and reproducible in the conditions of electron – positron pairs' formation.

Positron Pairs

To describe the formation of protons it is necessary to return to the description of positrons and electrons. Both particles are characterized by the changes of internal structure when their speed changes. If the main type of interaction between particles of the same charge at the low speed is electric repulsion, then at the speed of light, the nature of interaction changes dramatically because of a new structure of particles.

Let's consider the interaction between positrons at the speed equal to the maximum speed of movement. In the picture below, we can see two possible configurations of positron pairs which are moving in the same direction with the speed of light. We can assume the most stable configurations of moving positrons are those where all eddies are gathered in a single group.

It is more interesting for us to consider the case of interaction between two parallel moving positrons with opposite direction of magnetic flows Figure 4.12 (II). Unlike the positrons in a previous example, the interaction between opposite magnetic flows will try to turn the particles towards each other where directions of their magnetic flows will coincide.

Figure 4.13: Second stage of interaction of positrons

When the centers of positrons stick together, the magnetic repulsion of elementary charges will change to the attraction of the tilted magnetic flows. The magnetic pull may be strong enough to remove the outer layer of elementary eddies and form a ring on the equator of the coupled positrons. Repulsion of the equator ring and the rest of the elementary charges can stop movement of the combined particle by shifting the bundles of eddies to the opposite positions as is shown on Figure 4.13 (II). The coupled nucleuses of a combined pair of positrons can serve as a pivot joint. The complete halt of two particles can lead to the transformation presented on Figure 4.14. Both positrons will be linked together while trying to move toward each other with the speed of light. The forces between neutrinos nucleuses of two particles can start splitting the space cells and creating neutrinos and antineutrinos. Newly created neutrinos will stick to the existing positron nucleus but antineutrinos will be removed from the neutrino's space pit, taking away the energy of the reaction.

Figure 4.12: Interaction of positrons

In Figure 4.12, we can see two couples of positrons with the internal bonds extended 3 times. The interaction of positrons which are moving at the speed of light on parallel trajectories will be defined by the magnetic interaction of elementary charges and by attraction of neutrino nucleuses of moving positrons. The positron's groups of elementary charges can attract or repulse each other depending on concordance of their spins. Neutrinos nucleuses are always attracting. Two positrons with the same direction of magnetic flows will attract each other by both magnetic and gravitational forces. As the result of this attraction, we can expect integration of positrons in a new particle which will have a similar structure as any positron moving with the light speed, but it will have a double charge. This particle will continue moving at the same direction as the initial pair of positrons until it collides with some other particles and decays back into two positrons and some photons.

Figure 4.14: The stages of positron – proton transformation.

The generation of mass will continue until conditions allow this transformation. Newly created particles of matter will start absorbing space and this process can be restricted by the geometry of the coupled positrons. At the same time, the

increasing mass will lead to changes of the space cells' size and consequently to the length of bonds, the size of accretion discs, and even to the size of neutrino nucleuses. All geometrical changes will affect the upper limit of the mass growth. When the coupled positrons reach the limit of possible mass growth, they will split apart from each other sharing accumulated neutrinos between themselves. It will be the end of the positron – proton transformation. Protons will curl into spheres after emitting excessive photons.

Shortage of positrons

We can only guess which set of transformations of positrons will lead to the formation of protons, but the idea that protons are formed from positrons and that this transformation is taking place in practically the next moment after the generation of the positrons seems very possible. On one hand, we know that the strong magnetic fields that are abundant at the star's corona can create plenty of electron – positron pairs. On the other hand, we also know that the free positrons can easily find electrons for annihilation and collapse into photons and neutrinos. So if there is transformation from positron to proton then it must take place immediately after the creation of positrons.

Positron – electron formation or annihilation processes are applicable only to the positron – electron pairs but not to positrons alone. These paired transformations guarantee fulfillment of the law of charge conservation and at the same time they must ensure quantitative parity of electrons and positrons in the Universe. *The positron paradox* is that there is no parity between positrons and electrons. In the real world, we have plenty of electrons but almost no positrons and charges of electrons are compensated by protons. But could it happen that we've got exactly as many protons as we have electrons if protons were not converted from positrons?

VI. CONCLUSION

Stars produce both positrons and electrons in pairs, but if for electrons all transformations are over at this stage then for positrons it is only beginning – the first step in the further conversion to protons. Transformation of space to matter and antimatter is the main mechanism to produce all necessary ingredients to maintain stars burning. Stars do not consume but produce mass and anti-mass out of space. Space is an unlimited source of energy and matter.

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Systematic Analysis of Astracantha Species Spread in the Flora of Nakhchivan Autonomous Republic

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Abstract- In the article the systematic analysis of Astracantha species spread in the flora of Nakhchivan Autonomous Republic has been investigated. Our aim is to make known the works of investigators who has less or more roles in investigation of Astracantha species till now, to base on them, to define the direction of our further investigations correctly.

Index Terms- A*stracantha*, species, genus, flora, toxonomic

I. INTRODUCTION

Flora of Nakhchivan Autonomous Republic, its vegetable world in detail systematic, bio-morphological, bio-ecological, phytocenological, plant reserves have been investigated in complex in bio-chemical directions. But the species belonging to Astracantha genus have not been invastigated according to scientific basis. Also it is known that the results of researches are getting older from time to time, new species appear or new species migrate to this area from neighbouring countries.That's why there is a great need of searching them periodically and investigating their newly formed features. For this reason spreading of the species belonging to Astracantha genus and their species content spread in this area have been precisely defined. In the given article our aim is to make known the works of investigators who has less or more roles in investigating them till now, to base on them, to define the direction of our further investigations correctly.

II. MATERIAL AND METHOD

In the carried out work, searching flora and plant cover there has been used from generally accepted floristic, systematic, ecological, geographical, geo-botanic, plant reserves methods, "Flora of SSSR", "Flora of Caucasus" by A.A.Grossheym, a number of other modifiers, works of L.I.Prilipkon, methodical instructions, [3, 5], Flora of Iran and Turkey, also from works of Azerbaijani botanists, from their methodical instructions.
In the determination of species and in the spesification of their names nomenclatural changes have been carried out using "Flora of Azerbaijan", S.K.Cherapanov, "Conspect of Caucasus Flora", by A.M.Asgarov, "Taxonomic spectrum of Nakhchivan Autonomous Republic" [1, 2, 4, 6] .

III. EXPERIMENTAL PART

According to the literary material it is noted that 16 kinds belonging to *Astracantha* species have spread in the area. But, *Astracantha alexeenkoana* of those species has not been determined during our investigations. But *Astracantha pycnophullus* has been included to the other species. Below it has been shown the systematic analysis of *Astracantha* species spread in the flora of Nakhchivan Autonomous Republic.

1. *A. Andreyi* Rzazade Reports of ANSA, № 7, 407 (1953). – Andrey astracantha

It is a shrub. 80-150 cm , blooming VI-VII. Cserophit . Geographical type: Atropatan. In the low mountainous zone, pebbly, clayey slopes.

Species has been described from Azerbaijan (Samukh).
General spreading: The Caucasus

2. *A. Gudrathi* Theod., Fed. et Rzazade Bot.Materials of Herbarium Botanical Institute of AS of the USSR, XVI (1954).- Gudrat astracantha

It is a shrub. 25 cm, blooming VII-VIII. Cserophit. Geographical type: Northern Iran. In the high mountainous zone, stony slopes.

Species has been described from Azerbaijan (Gapicig).
General spreading: The Caucasus (Southern Transcaucasia)

3. *A. microcephalus* Willd., Sp. pl., III, 332 (1800); A. Borisov in the Flora of SSSR, XII, 335 (1946); A. Grossgame, Plant cover of the Caucasus 130. – Smallheaded astracantha

It is a shrub. 60 cm , blooming VI-VII. Cserophit. Geographical type: Small Asia. In the middle or sometimes high mountainous zones, dry slopes.

Species has been described from Small Asia.
General spreading:Iran

4. *A. Insidiosa* Boriss. In the Flora of the USSS, XII, 351 (1946); A. Grossgame, Flora of Caucasus., V, 289, (1952); Plant cover of the Caucasus, 126. – Bitter astracantha

It is a shrub. 2-3,5 cm , blooming VII. Cserophit . Geographical type: Atropatan. In the sub-alp and alp zones, dry, stony slopes.

Species has been described from Azerbaijan (Urmus).
General spreading: The Caucasus (Southern Transcaucasia)

5. *A. Meyeri* Boriss., Diagn, ser, I, 9, 88 (1849); Fl. or., II, 349; A. Borisova in the Flora of the USSR, XII, 366 (1946); A. Grossgame, Plant cover of the Caucasus, 130- Meyer astracantha

It is a little shrub. 10-15 cm, blooming VII. Cserophit . Geographical type: Northern Iran. In the middle, sometimes high mountainous zones, stony slopes, bare areas without soil.

Species has been described from Zuvanda
General spreading: Iran

6. *A. barba-carpina* Al.Theod., Fed. et   Rzazade Bot Materials of Herbariu of Botanical Institute of AS USSR, XVI (1954).- Goat-beard astrakantha

It is a shrub. 50-70 cm, blooming VII. Cserophit . Geographical type: Northern Iran. In the low mountainous zone, dry southern slopes in the 1400-1500 m high, stony areas

Species has been described from Azerbaijan (Turkesh).

General spreading: The Caucasus (Southern Transcaucasia)

7. *A. vedica* Takht. Materials of Botanical Instiute, Tibilisi, 9, 23 (1940); A. Borisova in the Flora of the USSR, XII, 378 (1946); A. Grossgame, Plant cover of the Caucasus, 129.- Astracantha of Vedi

It is a little shrub. 5-15 cm, blooming VI-VII. Cserophit . Geographical type: Atropatan. In the middle mountainous zones, stony slopes

Species has been described from Vedi

General spreading: The Caucasus (Southern Transcaucasia)

8. *A. karjaginii* Boriss. In the Flora of the USSR, XII, 377 (1946); A. Grossgame, Plant cover of the Caucasus, 130.- Astracantha of Karyagin

It is a shrub. 20-40 cm, blooming VII-VIII. Mezo-cserophit. Geographical type: Northern Iran. It is an endemy. In the middle mountainous zone, stony slopes.

General spreading: Iran

9. *A. jucunda* Theod., Fed. et Rzazade Bot. Materials of the AS of USSR, XVI (1954).- Happy astracantha

It is a little shrub. 5-15 cm, blooming VII. Cserophit . Geographical type: Atropatan. In the mid- mountainous zone, slopes containing lime

Species has been described from Nakhchivan (Garagush)

General spreading: The Caucasus (Southern Transcaucasia)

10. *A. aurea* Willd. in Act. Berol., 29, t. L, f 3 (1794; A. Borisova in the Flora of SSSR, XII, 379 (1946); A. Grossgame, Plant cover of the Caucasus, 129.- *A. pseudo tragacantha* Pall., M.B., III, 499; Ledeb., I, 641 p. p- Golden astracantha

It is a shrub. 10-25 cm, blooming VII-VIII. Cseromezophit. Geographical type: Atropatan. It is an endemy. In the middle, high mountainous zone, alp lawns

Species has been described from Armenia

General spreading: Little Asia

11. *A. flavirubens* Theod., Fed. et Rzazade Bot. Materiajs of Herbarium of the Botanical Institute of AS of USSR, XVI (1954).- Yellow-red astracantha

It is a shrub. 25 cm, blooming VIII. Cserophit. Geographical type: Atropatan. It is an endemy. In the middle mountainous zone of the 1700-1800 m high, stony dry slopes

Species has been described from Nakhchivan (Gapicig)

General spreading: The Caucasus (Southern Transcaucasia)

12. *A. oleifolia* D. C., Astrag., 192 (1802); A. Borisova in the Flora of SSSR, XII, 381 (1946); A. Grossgame, Plant cover of the Caucasus, 130.- Olive-leafy astracantha

It is a little shrub. 25 cm, blooming VI-VII. Cseromezophit . Geographical type: Small Asia-Iran. In the middle mountainous zone, dry, stony sometimes more or less humid slopes

Species has been described from the East

General spreading: Balcans – Small Asia

13. *A. karabaghensis* Bge Astrag., geront., I, 93 (1868); A. Borisova in the Flora of SSSR, XII, 378 (1946); A. Grossgame, Plant cover of the Caucasus, 129.- *A. araxinus* Lipsky, Flora of the Caucasus, 306 (1899). – Astracantha of Garabagh

It is a little shrub. 7-20 cm, blooming V-VI. Cserophit . Geographical type: Northern Iran. In the low and middle mountainous zones, stony slopes and slopes containing lime
Species has been described from Azerbaijan

General spreading: Iran

14. *A. stenonychioides* (Freyn & Bornm.) Diagn., ser. 1, 9, (1849); A. Borisova in the Flora of USSR, XII, 374 (1946); A. Grossgame, Plant cover of the Caucasus, 130. Straight-leafy astracanta

It is a little shrub. 20-30 cm, blooming VI-VII. Cserophit . Geographical type: Northern Iran. In the middle and high mountainous zones, slopes containing lime

Species has been described from Talagon

General spreading: The Caucasus (Southern Transcaucasia)

There is not doubt that these species don't completely represent all the *Astracantha* species of the region. In the future reserches it is expedient to investigate the species of *Astracantha* generally.

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Formation of Vegetation on the Screes and Rocks, Especially Reserved Territories of Eastern Regions of Azerbaijan

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I. INTRODUCTION

In the eastern highlands of the Lower Caucasus screes and rocks are the landscape of vegetation. They take about one third part of the total highland territory. We have determined the type composition of petrophits and objective laws of their geographical spreading. Studying of the highlands primary-naked substrata is usually carried out beginning with investigation of the highland vegetation. On the screes and rocks 2500-3200 m. higher sea level, floral composition consists of 183 flourishing species. Special edaphic and microclimatic conditions of the screes and rocks made it possible to save there lots of species of the past climatic time. The highland screes and rocks served as shelters for the ancient plants in the unpleasant climatic conditions. Studying of these plants (their biology, ecology, systematic characters) in the nature and cultivation, elucidates the basis and ways of formation of flora and characteristics of climate in present epoch.(9) According to the types of vegetation of screes and rocks we find out a group of petrophits on the primary- naked limy edges, on the gravelly lays of crumbly substrata, in the lower parts of all steeps of highlands where the plants usually don't make thick vegetation (7). By their origin and ways of formation the vegetation of screes and rocks differ between themselves. In this case usually much attention is paid to the vegetation of screes and rocks. We have defined type composition, ecology and objective laws of geographical spreading of petrophits. Investigations of vegetation of primary-naked substrata are usually carried out within general investigations of highlands' vegetation.

Formation of the scree vegetation. Screes are characterized by lots of unpleasant factors as: moving and unsteadiness, lack of soil, unexpected cover driven by the wind or shower, everyday temperature of the highlands etc.(8) In the conditions of land-slide the cracks are formed on severe dislocated parts of the highlands. Such kinds of cracks are usually met in the narrow passages of the river valleys. At the result of any natural cases the cracked parts divide into small pieces and driven down by the strong winds or by the rains. Accumulation of these pieces under the rocks form mountain deposits that called screes. Big pieces of the cracks gather underneath and the smaller parts (gravel, sand) gather and cover over them. Scree vegetation cover about one third part of the rocks and screes and they usually followed by meadows, shrubberies and forests. By the features of situation the screes are divided into movable and immovable ones. Both features are useless for massive dislocation of plants and formation of thick vegetation on them. On the definite height their floristic composition changes. The scree vegetation of the Lower Caucasus has not investigated perfectly yet. Besides of all, this subject attracts attention by the point of studying the adaptation of the plants to the moving situation of the soil substrata and influence of that great role of vegetation for fastening of the screes. Screes and alluvials arrange special environment for the plants. In the friable gravelly environment permanent humid is gathered underneath and thermal conditions arranged over them. So the roots of the scree plants pierce through the depth of the soil. Their roots are stringy, firm and reeling. They twine round the scree materials very well. These valuable features have great role for firming of the screes and for growing the vegetation (7). The plants themselves are sprawling and grow in small groups as patches and in separate species. So it is difficult to divide them into formation. In the less moving parts of the screes, in the reliable midlines and in the moving parts we can meet the plants as *Vicia alpestris, Trogonocaryum involucratum, Silene caucasica, Nonea alpestris.On the screes of the alpine lines of the highlands Nepeta supine, Lamium tomentosum, Scrophularia minima, Veronica minuta, Alrees lium oreophilum, Cerastium cerastoides, Didymophysa aucheri are met.* Unslipping screes are overgrown with lots of species. *Vicia alpestris, Chamaesciadium acaule, Silene caucasica, Anthemis cretica, Nepeta cyanea distinguish among them. Much more of the scree vegetation are shown in the table №1 according to the descriptions of two experimental areas 50 sq. m. each.*

Description №1 (20.06.2013) of screes on the stream sources around the village Khoshbulag, Dashkesan region. Eastern slopes of the Koshkar mountain massif. (height 2250-3200 m. higher sea level). Grey sand like schist go out and cover the area unceasingly.

Description №2 (10.8.2013)of expositions of northern slopes of the Main Mountain Range at the source of the Koshkarchay river, height 2500-3000 m. higher sea level.

Table 1
Floral composition of species of screes and alluvials of eastern highland parts of the Lower Caucasus

Names of the plants	Abundance of phenophases			
	1	2	1	2
	2	3	4	5
Betonica nivea Stov.	1	-	Shr	-
Nepeta lamiifolia Willd.	1	-	Shr	-
Nepeta supina Stev.	1	1	Veg	Blooming
Nepeta cyanea Stev.	-	1	-	Blooming
Draba siliquosa Bieb.	1	-	Blooming	-
Asperula alpine Bieb.	1	2	Veg	Blooming
Chaerophyllum humile Steven ex Bieb.	2	-	Shr	-
Cirsium tomentosum C.A.Mey.	1	-	bud	-
Cirsium macrocephalum C.A.Mey.	1	-	Blooming	-
Silene depressa Bieb.	3	1	Blooming	Blooming
Silene ruprechtii Schischk.	-	1	-	Blooming
Silene caucasica (Bunge) Boiss.	-	1	-	Blooming
Scrophularia olympica Boiss.	1	-	Veg	Blooming
Scrophularia minima Bieb.	1	2	-	Blooming
Lamium tomentosum Willd.	2	-	Shr	-
Jurinella moschus(Hablitz) Bobr.	1	2	Veg	Blooming
Sedum oppositifolium Sims.	1	1	Veg	Blooming
Sedum tenellum Bieb.	1	-	Veg	-
Vicia alpestris Stev.	2	1	Shr	Blooming
Symphyoloma graveolens C.A.M.	-	1	-	Blooming
Didymophysa aucheri Boiss.	-	2	-	Blooming
Dracocephalum botryoides Stev.	-	1	-	Blooming
Veronica minuta C. A. Mey	-	1	-	Blooming
Veronica petraea (Bieb). Stev.	-	1	-	Blooming
Allium kunthianum Vved.	-	2	-	Blooming
Allium oreophilum C.A.Mey.	-	1	-	Blooming
Ranunculus arachnoideus C.A.M.	-	1	-	Blooming
Cerastium cerastoides (L.) Britt	-	2	-	Blooming
Cerastium multiflorum C.A.Mey	-	3	-	Blooming
Anthemis cretica L. Subsp.iberica (Bieb.) Grierson	-	1	-	Blooming
Chamaesciadium acaule (Bieb.) Boiss.	1	-	Blooming	-
Alyssum andinum Rupr	-	1	-	Blooming
Trigonocaryum involucratum (Stev.) Kusn	-	1	-	Blooming
Nonea alpestris (Stev.) G.Don	-	1	-	Blooming
alpestris Stev.	-	1	-	Blooming
Cerastium dagestanicum Schischk.	2	1	Blooming	

Rock vegetation has been formed by lots of species, concerning to different life forms. But they have cserophit features and were introduced as sparse groups, as well as separate species of small shrubbery, pillow-shaped plants and grass.

On the mountain ranges, river canyons and highlands the rocks resemble forehead and in some areas they look terrace shaped planes. By first sight they seem absolutely lifeless, deprived from soil. Formation of vegetation on the rocks, stones and ruins have thick ties with origin of biogenic environment and soil (1). Microorganisms –autotrophy bacteria, aquatic plants, mushrooms, lichens, that secrete organic acids assisting destruction of the mountainous species and accumulation of fine earth, have primary role on formation of the primitive soil cover over the limy-schist substrates (6).

In the case their dying off there happens accumulation of organic substances which mix with fine earth and make conception of soil. By this way microorganisms and inferior plants prepare environment for the plants of highest quality.

Rocks differ by availability of their original ecological conditions, for adaptation of growing plants and the plants gain special adaptation – rapture of the roots, vegetative organs with large amount of vein and advanced transpiration structure, pillow-shape forms.

Rock complexes, stony areas and accumulation of rock wreckages at the skirts of mountains,(screes), accumulation of soft wreckages, (alluvials) and softer forms of relief in the cup-shape excavations, ravines, dells, narrow grooves are the landscape making elements of the breaking points of the highlands. At the end of spring they deliver from melting snow of which icy water flow down slowly. At the lower levels the water of melting snow, rain and springs run down impetuously, stormy streams that soak and wash down breaking points of highlands form narrow valleys on the highlands (3, 5).

We can meet following rock plants on the borders of alpine meadows of the highlands: *Valeriana alpestris , Aster alpinus, Dianthus caucaseus, Sempervivum caucasicum, Silene pygmaea, Campanula petrophila, C. Saxifraga, C. Ciliata, Draba bruniifolia, D. mollissima, Saxifraga adenophora, S.exarata, Cystopteris fragilis, Asplenium viride, Draba incompta, Saxifraga moschata.*

On the limy rocks we can meet species as- Campanula alliariifolia, C. Tridentata, Jurinella moschus, Asperula alpine.* Some kinds of bushes that flattened against the rocks- the *Rhamnus depressa* and others have adapted to the existing situation. Composition of the rock vegetation changes according to the height.   There are more decorative species in this composition. The species as *Draba siliquosa, Betonica nivea, Campanula saxifraga* and others distinguish according to the sweetnees of their flowers. On the alpine zone and high rocks the vegetation composition changes slowly. These species get adapted to the conditions of dry climate of the subnival zone.
On the screes and rocks, 2500-3200m higher sea level, floral composition consists of 183 flourishing species. Lichen groups play essential role on growing of some species on the lifeless rocks and screes of subnival zones of the Lower Caucasus. Important role of Lichens rise on the lifeless rocks and screes of highlands of the Lower Caucasus that occupy large area. We make the formation scheme of vegetation on the naked rocks of the highlands:

Microorganisms - *Lecidella anomaloides + Rhizocarpon geographicum + R. geminatum + Lecanora polytropa + Aspicilia cupreoatra + A.alpina + Haematomma ventosum + Umbilicaria cylindrica + U.deusta + U.polyphylla + Parmelia saxatilis + Sterecaulon alpinum + Leprocaulon microscopicum + Cladina stellaris + Cetraria islandica + C.cucculata* The following species - *Saxifraga pseudolaevis, Cerastium cerastoides, C.multiflorum, Alchimilla sericea, Saxifraga pseudolaevis, Cerasticum multiflorum, Minuartia circassica, Alopecurus laquroides* and others grow for the first time. The plants types named above are met on the most parts of the Greater and Lower Caucasus mountain ranges (6).

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Perceived stressors among undergraduate Nursing Students, University of Peradeniya, Sri Lanka

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 Abstract- Nursing education is one of the main disciplines in Sri Lankan university system. The major purpose of nursing education is to prepare nurses to meet the health care needs of the community. It has increasingly been restructured to respond the rapidly changing demands. The nursing education has long been perceived that nursing students experience higher levels of stress than other students. Its effects could be reflected in student's social, mental health and academic performance. This cross sectional descriptive study aimed to identify symptoms of stress and stressors in academic work of nursing students in University of Peradeniya, Sri Lanka during July to November, 2013. A pretested questionnaire was used to collect information from randomly selected 100 nursing students. Out of these, 78.6% were female. Among the participants, 28.6%, 33.9%, 23.2% and 14.3% were in first year, second year, third year and fourth year respectively. The highest mean score of the symptoms of stress were having trouble concentrating on what they are doing and unable to stop thinking about their concerns at night or on weekends long enough to feel relaxed and refreshed the next day. The least symptom of stress the students having been taking over-the-counter medications or prescription drugs to relax. All first, second and third year students reported that they eat, drink, or smoke in response to anxiety producing situations while only fourth year students reported experience, anxiety or nervous indigestion most of the time. Among the stressors perceived by both male and female students, they perceived workload as the most stressful factor. Competition with fellow students, inadequate resources to do assignments were perceived as high stressors among first and second year students. Both third and fourth year students perceived high expectations from   parents as their most stressful factor. The results suggest the importance of maintaining proper academic environment for better learning. Also, the university has the responsibility to address probable sources of stress effectively to promote health being of the students.

 Index Terms- stressors, nursing students, university nursing students

I.   INTRODUCTION

Stress is a natural phenomena and it is the perception of discrepancy between environmental demands (stressors) and individual capacities to fulfill these demands. It has become an important issue in a variety of social, employment, and academic settings. University is a stressful time for many students as they go through the process of adapting to new educational and social environments. Transition of students from school environment to university environment could cause a psychological, academic and social shock to them, since this educational system has huge differences: the student will face new methods of teaching, new academic requirements, new type of relations between students and faculties and even new relations among students themselves [1], [2].

Nursing education is one of the main disciplines in Sri Lankan university system. The major purpose of nursing education is to prepare nurses to meet the health care needs of the community. It has increasingly been restructured to respond the rapidly changing demands[3]. The nursing education has long been perceived that nursing students experience higher levels of stress than other college students [4]. Its effects could be reflected in student's social, mental health and academic performance [5], [2], [6]. Although many research studies have been conducted internationally, there is lack of studies on identifying stressors among university nursing students in Sri Lanka. Therefore, this study aimed to identify symptoms of stress and stressors in academic work of nursing students in University of Peradeniya, Sri Lanka.

II.   MATERIAL AND METHOD

This cross sectional descriptive study aimed to identify symptoms of stress and stressors in academic work of nursing students in University of Peradeniya, Sri Lanka during July to November, 2013. Ethical approval was granted from the Research Ethics Review Committee of the University. A pretested questionnaire based on literature review and Agolla and Ongori [5] was used to collect information from randomly selected 100 nursing students. Descriptive statistic used to analyze the data which was run in SPSS 16.0.

III.   RESULTS

Among the participants of the study, 78.6% were female and 28.6%, 33.9%, 23.2% and 14.3% were in first year,   second year, third year and   fourth year respectively.

Table I: Symptoms of stress among students

Symptoms	Mean	SD
Have trouble concentrating on what I'm doing, because of worrying about other things	2.12	0.61
Can't stop thinking about my concerns at night or on weekends long enough to feel relaxed and refreshed the next day	2.12	0.66
People at home or school make them feel anxious	2.04	0.47
Feel tense, experience pain in the neck or shoulders, and suffer from migraine headaches, or have difficulty in breathing	2.02	0.59
Experience, anxiety or nervous indigestion	1.98	0.52
Eat, drink, or smoke in response to anxiety producing situations	1.41	0.65
Take over-the-counter medications or prescription drugs to relax	1.25	0.55

The major symptoms of stress in students were having trouble concentrating on what they are doing and unable to stop thinking about their concerns at night or on weekends long enough to feel relaxed and refreshed the next day. The least symptom of stress the students having been taking over-the-counter medications or prescription drugs to relax.

All first, second and third year students reported that they eat, drink, or smoke in response to anxiety producing situations while only fourth year students reported experience, anxiety or nervous indigestion most of the time.

Table II: Perceived stressors among students

Perceived Stressors	Mean	SD
Inadequate resources to do assignments	2.41	0.63
Low motivation	2.41	0.68
Unfair treatment by boyfriend/girlfriend	2.34	0.75
Continuous poor Performance	2.32	0.64
High expectations from parents	2.25	0.72
Poor performances	2.25	0.73
Conflict with lecturers	2.06	0.84
Competition with fellow students	2.05	0.7
Conflict with fellow students	2	0.79
Not attending lectures	1.86	0.82

Among the stressors perceived by both male and female students, they perceived workload as the most stressful factor. Competition with fellow students, inadequate resources to do assignments were perceived as high stressors among first and second year students. Both third and fourth year students perceived high expectations from parents as their most stressful factor.

IV. DISCUSSION

In this study, both male and female students perceived their symptoms of stress as having trouble concentrating on what they are doing and unable to stop thinking about their concerns at night or on weekends long enough to feel relaxed and refreshed the next day. The probable reason for these may be due to worrying about other things such as following lots of extra courses during their university life.

The study reveals that the nursing students do not take to drugs or alcohol as coping strategies when they stressed and that may be because of knowing side effects of drugs and alcohol which alters the healthy life of students. Further, this finding is consistent with the findings of the study conducted by Agolla and Ongori [5].
All students except the final year experienced of eat, drink, or smoke in response to anxiety producing situations. This finding is consistent with the earlier findings of the scholars which revealed that, people tend to resort to drinking as coping strategies whenever confronted with complex situations in their lives.

The fourth year students reported experience, anxiety or nervous indigestion most of the time. The finding is consistent to previous studies conducted by Ahmed et al [8] reflecting most of the students are experiencing stress in their daily academic activities. This may be due to the fear of final examinations and uncertainty of getting jobs after graduation from the university.

Work load has become the major stressor among students. The semester system needs to cover all lecturers, multiple subjects, continuous assessments, clinical experience and all end semester examinations within a limited time period. They need to travel for getting their clinical training to the hospital which is very far away from the university. The similar results could be seen in the study done by Prabhakar and Gowthami [7].

All the students entered to the university after getting through a highly competitive examination called advanced level. Therefore, the students who are in the first and second year may think of the similar situation in the university system. Because of that they may perceive competition with fellow students as a stressor. This finding is consistent with the previous study conducted by Agolla and Ongori [5]. Also, these students pointed out that their stress is aggravated by the inadequate resources which could not meet their needs.

However, both third and fourth year students perceived high expectations from parents as their most stressful factor. These students are in the final year of three year and four year degree programs and thinking of their families. Research studies have highlighted that the effect of parental and peer pressure to perform cannot be ignored [4].

V. CONCLUSION

The study revealed the most stressful symptoms of stress experienced by the university nursing students and their perceived stressors during their university life. Therefore, it draws the attention of administrators as well as academic community regarding the importance of maintaining proper academic environment for better learning. Also, the university has the responsibility to address probable sources of stress effectively to promote health being of the students. Academics have the responsibility to impact the development of their students as they transition into nurses capable of handling the rigors of the profession.

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Detection of Charantin in the leaves and fruits of Momoridca tuberosa (Cogn) Roxb and Momordica dioica (Roxb Ex Wild) by Analytical HPTLC

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Abstract- Analytical HPTLC analysis of ethanolic extracts of leaf and fruits of *Momordica tuberosa* and *Momordica dioica* (Cucurbitaceae) showed the presence of charantin with Rf value 0.31at 536nm. Maximum amount of Charantin was found in the leaves of *M. dioica* than the fruits. Comparatively less amount of charantin was detected in the leaves and fruits of *M. tuberosa* Apart from charantin other saponins and unknown compounds were also detected in the leaf and fruit.

Index Terms- *Momordica tuberosa*, *Momordica dioica*, Cucurbitaceae, Charantin

I. INTRODUCTION

Diabetes mellitus is a chronic disorder which prevails throughout the world. Present day drugs to treat diabetes are insufficient and there is a need for alternative medicine. Herbal based medicines are given much importance as they do not produce side effects. Many vegetables used in our daily life are considered as antidiabetic in nature due to the presence of specific phytochemicals. The fruits of *Momordica charantia* (Cucurbitaceae) are not only used as vegetable but also said to possess antidiabetic property. This is mainly due to the presence of charantin, a steroidal saponin which has reduced blood glucose levels in both normal and diabetic rabbits (Raman and Lau, 1996). Wild relatives of cultivated species also serve as an important source of many phytoconstituents.   Earlier reports showed that charantin had been isolated from the ethanol/ water extracts of leaves and fruits of *M. charantia* by HPTLC and TLC (Chanchai, 2003; EI- said and Al– Barak, 2011; Sanda and Htin, 2005).   Patel *et al*., (2006) separated charantin from the Chloroform extract of dried fruits of *M. charantia* by HPTLC. Other than *M. charantia*, six wild species have been reported from India. Of these *Momordica tuberosa* Cogn (Roxb) *(= Luffa tuberosa*) and *Momordica dioica* are selected for the present investigation and whose fruits are used as vegetables by the local communities of Tamil Nadu and Kerala respectively. There are no reports on the phytochemical and medicinal properties of the wild species. Hence it was prompted to study the charantin profile of the wild species of *Momordica* by analytical HPTLC.

II. MATERIALS AND METHODS

Fresh leaves and fruits of *Momordica tuberosa* were collected during the months of September to November, 2010 (Temperature 28 ±2°c), from Coimbatore, Tamil Nadu while that of *M. dioica* were collected from Calicut, Kerala during the months of November and December, 2010. The materials were dried in the shade, powdered and stored in airtight containers.

III. PROTOCOL

Extraction process

About 15gms of dry powder of leaves and fruits of   *M. tuberosa* and *M. dioica*, were subjected to successive solvent extraction in a soxhlet apparatus for 8hrs using ethanol to get concentrated extract. The filtrate was subjected to evaporation and dried extract was collected and used for Analytical HPTLC analysis. Standard Charantin (Sigma) was used as reference marker. The leaf and fruits powders of *M. dioica* were tested for the presence of saponins following the methods of Harbone (1973).

IV. PROCEDURE

Ethanolic extract of leaves and fruits of *M. tuberosa* and *M. dioica*, were centrifuged at 3000 rpm for 3 minutes and the supernatant was used as test solution for HPTLC analysis. 2µl of the test solution and 2µl of standard charantin were loaded as 6mm band length in the 3×10 silica gel 60f 254 TLC plates using Hamilton syringe and Camag Linomat 5 instrument. Sample loaded plates were kept in TLC twin trough developing chamber. Benzene:methanol (8:2) were   used as mobile phase. The developed plate was dried by hot air to evaporate solvents from the plate. Then plates were kept in photodocumentation chamber (Camag Reprostar 3) and the images were captured at light, UV 254 nm and UV 366 nm. The developed plates were sprayed 10% sulphuric acid in ethanol with and dried at 100°c in hot air oven. The plate was fixed in scanner stage (Camag TLC scanner 3) and scanning was done at 536nm. (Patel *et al*., 2006)

V. RESULTS AND DISSCUSION

Preliminary phytochemical screening of the leaves and fruits of *M. tuberosa* and *M. dioica* confirmed presence of saponins (Shanmugapriya, (2009) and present investigation respectively) . Hence it is quite relevant to analyse the samples for the detection of charantin by analytical HPTLC. High performance Thin Layer Chromatography is valuable tool for the evaluation of phytochemicals due to its simplicity and minimum sample clean up requirement. In the present investigation the leaves of *M.*

tuberosa and *M. dioica* showed the presence of charantin with a Rf value of 0.31 at 536nm (Fig.1 & 2) which on further derivatization gave blue fluorescence on longer wavelength of UV at 366nm (Fig.2a & b). Violet spot appeared when the TLC plate was sprayed with 10% sulphuric acid in alcohol and heated at 100°C for 2-3 minutes. Appearance of violet spot confirms the presence of charantin in the leaves of *M. dioica*. The peak area showed that in *M. dioica* the leaves contain more charantin (6257 AU) than *M. tuberosa* (5077.1 AU) (Table 1& 2: Figs. 4a, b & 5a, b).

The chromatogram of fruits showed that charantin in the fruits of *M. tuberosa* was absorbed at Rf of 0.31 whereas that of *M. dioica* was absorbed at Rf 0.32. Here also charantin on further derivatization gave blue fluorescence at 366nm of UV(Figs 6a &b: Figs 7a &b). The fruits of *M. dioica* contain more charantin (6257.0 AU) than the fruits of *M. tuberosa* (4869AU, Table 3 & 4; Figs 7a &b & 8a &b). Appearance of violet spot after spraying with 10% sulphutic acid in alcohol at 130°C confirms the presence of charantin. Hence in the present investigation charantin had been detected from the leaves and fruits of *M. tuberosa* and *M. dioica*.

In both the species apart from charantin, other saponins and unknown compounds have also been detected. In *M. tuberosa,* 8 saponins and 3 unknown compounds were detected from the leaves, and 5 saponins from the fruits. In *M. dioica* 3 saponins and 5 unknown compounds were detected from the leaves, and 6 saponins and 1 unknown compound were detected from the fruits.

VI. CONCLUSION

It can be concluded that two wild species also contain charantin. Among the two species, the fruits of *M. dioica* contain more charantin. The fruits of *M. tuberosa* and *M. dioica* can be considered as potent nutraceuticals for the treatment of diabetes. Further investigations on the antidiabetic property and the unknown saponins and compounds are in progress.

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Table - 1 Analytical HPTLC analysis of leaf of *Momordica tuberosa*

Particulars	Rf	Height	Area(AU)	Assigned substance
Charantin (Standard)	0.31	376.2	8064.6	Charantin
M. tuberosa				
Peak 1	0.04	118.6	2642.4	Saponin 1
2	0.25	62.7	1643.3	Unknown
3	0.30	140.7	3689.8	Saponin 2
4	0.31	231.5	5077.1	Charantin
5	0.35	293.1	6717.8	Saponin 3
6	0.40	69.0	1248.8	Saponin 4
7	0.50	29.2	619.6	Saponin 5
8	0.55	68.7	1981.1	Saponin 6
9	0.61	41.9	1426.0	Saponin 7
10	0.73	52.2	3170.9	Saponin 8
11	0.83	40.6	1168.2	Unknown
12	0.91	73.4	3912.0	Unknown

Table – 2: Analytical HPTLC analysis of leaf of *Momordica dioica*

Particulars	Rf	Height	Area(AU)	Assigned substance
Charantin (Standard)	0.31	376.2	8064.6	Charantin
M. dioica				
Peak 1	0.06	35.0	1208.6	Saponin 1
2	0.24	51.9	1372.5	Saponin 2
3	0.31	149.7	6257.0	Charantin
4	0.35	15.7	154.5	Unknown
5	0.41	13.5	440.3	Unknown
6	0.67	28.2	281.7	Saponin 3
7	0.69	32.8	966.1	Unknown
8	0.88	10.6	192.4	Unknown
9	0.95	32.8	1285.9	Unknown
10	0.98	49.5	892.2	Unknown

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Day light   UV 254 nm   UV 366 nm

a. Before derivatization

Day light   UV 366 nm

b. After derivatization

Figure – 1: Chromatogram of leaf of M. *tuberosa* showing the presence of charantin

Day light   UV 254 nm   UV 366 nm

a.   Before derivatization

Day light   UV 366 nm

b. After derivatization

Figure – 2: Chromatogram of leaf (L) of M. *dioica* showing the presence of charantin(CHN)

Figure -3a: Baseline display standard Charantin (Scanned at 536nm)

Figure -3b: Densitogram display of standard Charantin (Scanned at 536nm

Figure 4 a-:Baseline display of the leaf of *M. tuberosa* (Scanned at 536nm)

Figure 4b: Densitogram of the leaf of *M. tuberosa* showing the presence of Charantin (Scanned at 536nm)

Figure 5 a: Baseline display of the leaf of *M. dioica* (Scanned at 536nm)

Figure 5b: Densitogram display of the leaf of *M. dioica* Peak (Scanned at 536nm)

Table - 3 Analytical HPTLC analysis of fruit of *Momordica tuberosa*

Particulars	Rf	Height	Area(AU)	Assigned Substances
Charantin (standard)	0.31	376.2	8064.6	Charantin
M. tuberosa				
Peak 1	0.03	56.7	1122.1	Saponin 1
2	0.10	59.8	2005.9	Saponin 2
3	0.31	198.3	4869.9	Charantin
4	0.37	147.5	4550.7	Saponin 3
5	0.42	51.5	899.0	Saponin 4
6	0.75	66.0	2084.6	Saponin 5

Table - 4 Analytical HPTLC analysis of fruit of *Momordica dioica*

Particulars	Rf	Height	Area(AU)	Assigned substances
Charantin (standard)	0.31	376.2	8064.6	Charantin
M. dioica				
Peak 1	0.02	169.3	1208.6	Unknown
2	0.17	56.7	1122.1	Saponin 1
3	0.28	87.7	1822.8	Saponin 2
4	0.30	109.1	2797.7	Saponin 3
5	0.32	209.2	6748.1	Charantin
6	0.40	188.8	9254.6	Saponin 4
7	0.78	147.4	4550.7	Saponin 5
8	0.93	66.0	2048.6	Saponin 6

Day light   UV 254nm   UV 366nm   Day light   UV 366nm

a. Before derivatization   b. After derivatization

Figure – 6: Chromatogram of fruit of *M. tuberosa* showing the presence of charantin

Day light   UV 366nm   UV 254nm   Day light   UV 366nm

a. Before derivatization   b. After derivatization

Figure – 7 : Chromatogram of fruit of *M. dioica* showing the presence of charantin

Figure 8a - Baseline display of *M. tuberosa* (Scanned at 536nm)

Figure 8b - Densitogram display of fruit of *M. tuberosa*

Figure 9a - Densitogram display of fruit of *M. dioica* (Scanned at 536nm)

Figure 9b - Densitogram display of fruit of *M. dioica* (Scanned at 536nm)

Palm Oil Mill Effluent (POME) Treatment "Microbial Communities in an Anaerobic Digester": A Review.

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Abstract- Industrialization is vital to a nation's socio – economic development. It provides ready employment opportunities for a good percentage of the population. Although industrialization is inevitable, various devastating ecological and human disasters which have continuously occurred, implicate industries such as palm oil industry as major contributors to pollution problems and environmental degradation of various magnitude. As a result environmental problems have increased in geometric proportion over the last three decades with improper practices being largely responsible for the gross pollution of the aquatic environment with concomitant increase in waterborne diseases. Pollution of the environment with palm oil mill effluent (POME) is generated during palm oil processing which is carried out in mills where oil is extracted from the palm fruits. Large quantities of water are used during extraction of crude palm oil from the fresh fruits and about 50% of the water results in palm oil mill effluent. Palm oil mill effluent (POME) is an important source of inland water pollution when released into local rivers or lakes without treatment because it is a highly polluted wastewater that pollutes the environment if discharged directly due to its high chemical oxygen demand (COD) and biochemical oxygen demand (BOD) concentration. Anaerobic digestion treatment of palm oil mill effluent has been considered to have a number of advantages over the conventional aerobic process. It saves the energy needed for aeration, converts organic pollutants into methane gas, a readily useable fuel, needs low nutrient requirement and produces low biomass. This technology in recent years has been applied for the treatment of many high-strength industrial wastewaters. This review discusses the various ongoing anaerobic digestion treatment of POME including their advantages and disadvantages, other related treatment technologies currently practice in palm oil mill industries, the potential of using the molecular biology techniques to provide detailed profile of the microbial community structure and establish the phylogenetics of microorganisms in bioreactors used for POME treatment and given insight into the microbial communities of wastewaters using the modern molecular biology techniques including their merits and demerits with emphasis on biological wastewater treatment processes that exploit an environment devoid of oxygen, inhibition of methanogenesis including anaerobic process and the potential uses and utilization of POME.

Index Terms- Anaerobic digestion, Effluent, Microbial communities, Molecular biology techniques, POME, Treatment, Wastewater.

I. INTRODUCTION

Oil palm (*Elaeis guineensis*) is one of the most versatile crops in the tropical world. The production of palm oil, however, results in the generation of large quantities of polluted wastewater commonly referred to as palm oil mill effluent (POME) (Najafpour *et al*., 2006). Typically, 1 t of crude palm oil production requires 5–7.5 t of water; over 50% of which ends up as POME. This wastewater is a viscous, brownish liquid containing about 95–96% water, 0.6–0.7% oil and 4–5% total solids (including 2–4% SS, mainly debris from the fruit). It is acidic (pH 4–5), hot (80–90 ^{0}C), nontoxic (no chemicals are added during oil extraction), has high organic content (COD 50,000 mg/L, BOD 25,000 mg/L) and contains appreciable amounts of plant nutrients (Singh *et al*., 1999 ; Borja *et al*.,1996). Palm oil mill effluent (POME) is an important source of inland water pollution when released into local rivers or lakes without treatment. POME contains lignocellulolic wastes with a mixture of carbohydrates and oil. Chemical oxygen demand (COD) and biochemical oxygen demand (BOD) of POME are very high and COD values greater than 80,000 mg/L are frequently reported. Incomplete extraction of palm oil from the palm nut can increase COD values substantially (Oswal *et al*., 2002). POME has generally been treated by anaerobic digestion resulting in methane as a value added product (Sinnappa, 1978a; Borja *et al*., 1995; Zinatizadeh *et al*., 2006; Busu *et al*.,2010; Baharuddin *et al*., 2010; Chotwattanasak and Puetpaiboon, 2011).

Anaerobic treatment is the most suitable method for the treatment of effluents containing high concentration of organic carbon(Perez *et al*.,2001). Considering the high organic character of POME, anaerobic process is the most suitable approach for its treatment. Interest in anaerobic hybrid technology (combination of different anaerobic systems into a single bioreactor) has grown as it couples the recovery of usable energy with good process efficiency and stability (Zinatizadeh *et al.*, 2006). The up-flow anaerobic sludge fixed film (UASFF) bioreactor as an anaerobic hybrid reactor, is a combination of an up-flow anaerobic sludge blanket (UASB) reactor and an immobilized cell or fixed film (FF) reactor (Metcalf and Eddy,2003). The fixed film (FF) reactor or immobilized cell whose portion is positioned above the UASB section prevents sludge washout and helps in retaining a high biomass concentration in the reactor. Several researchers have successfully used the UASFF reactor to treat various kind of wastewaters such as starch, swine, slaughterhouse (Shaji, 2000; Suraruk *et al.*, 1998; Borja *et al.*, 1998).

Anaerobic treatment of wastewater has been considered to have a number of advantages over the conventional aerobic process. It saves the energy needed for aeration, converts organic pollutants into methane gas, a readily useable fuel, needs low

nutrient requirement and produces low biomass. The technology in recent years has been applied to the treatment of many high-strength industrial wastewaters (Herbert and Chan, 1997; Faisal and Unno, 2001).

Anaerobic digestion has been employed by most palm oil mills as their primary treatment of POME (Tay, 1991). More than 85% of palm oil mills in Malaysia have adopted the ponding system for POME treatment (Ma *et al.*, 1993) while the rest opted for open digesting tank (Yacob *et al.*, 2005). These methods are regarded as conventional POME treatment method whereby long retention times and large treatment areas are required (Poh andChong,2009). High-rate anaerobic bioreactors have also been applied in laboratory-scaled POME treatment such as up-flow anaerobic sludge blanket (UASB) reactor (Borja and Banks, 1994a); up-flow anaerobic filtration (Borja and Banks, 1994b); fluidized bed reactor (Borja and Banks, 1995a,b) and up-flow anaerobic sludge fixed-film (UASFF) reactor (Najafpour *et al.*, 2006). Anaerobic contact digester (Ibrahim *et al.*, 1984) and continuous stirred tank reactor (CSTR) have also been studied for treatment of POME (Chin, 1981).

Other than anaerobic digestion, POME has also been treated using membrane technology (Ahmad *et al.*, 2006, 2007), aerobic activated sludge reactor (Vijayaraghavan *et al.*, 2007), and evaporation method (Ma *et al.*, 1997).

The environment is becoming more polluted due to the various wastes discharged from wide range of industrial applications. The economic growth in developing and developed countries has resulted in significant increase in production which in turn generates huge amount of undesirable wastes (Yuliwati *et al.*, 2012). Palm oil mill effluent (POME) is undoubtedly the largest waste generated from the oil extraction process (Yacob *et al.*, 2006).

According to Prasertsan and Prasertsan (1996), during processing in the palm oil mill more than 70% (by weight) of the processed fresh fruit bunch (FFB) was left over as oil palm waste. According to Pleanjai *et al.* (2004), fiber, shell, decanter cake and empty fruit bunch (EFB) accounts for 30, 6, 3 and 28.5% of the FFB respectively. According to Yacob *et al.* (2006), 381 palm oil mills in Malaysia generated about 26.7 million tonnes of solid biomass and about 30 million tonnes of palm oil mill effluent (POME) in 2004. Discharging the effluents or by products on the lands may lead to pollution and might deteriote the surrounding environment. There is a need for a sound and efficient management system in the treatment of these by- products in a way that will help to conserve the environment and check the deterioration of air and river water quality (Rupani *et al.*, 2010). Treatment of POME is essential to avoid environmental pollution. Thus, there is an urgent need to find an efficient and practical approach to preserve the environment while maintaining the sustainability of the economy.

The present review discusses comprehensively the various ongoing aspects of anaerobic digestion methods for palm oil mill effluent (POME) treatment including their advantages and disadvantages, given insight into the microbial communities of wastewaters using the modern molecular biology techniques which include cloning of 16S rDNA, Denaturant gradient gel electrophoresis (DGGE) and Fluorescent in situ hybridization (FISH) which provides very precise taxonomical information, characteristic band patterns for different samples and make possible to identify microorganisms at any desired taxonomical level, depending on the specificity of the probe used respectively and other related treatment technologies currently practice in palm oil mill industries, the future promise and potential of using the molecular biology techniques to provide detailed profile of the taxonomical microbial community structure and establish the phylogenetics of microorganisms in bioreactors used for POME treatment with emphasis on biological wastewater treatment processes that exploit an environment devoid of oxygen, inhibition of methanogenesis including anaerobic process and the potential uses and utilization of POME.

II. PALM OIL MILL EFFLUENT (POME)

Palm oil is one of the two most important vegetable oils in the world's oil and fats market following Soya beans (Harley, 1988). Oil palm (*Elaeis guineensis*) is the most productive oil producing plant in the world, with one hectare of oil palm producing between 10 and 35 tonnes of fresh fruit bunch (FFB) per year (Harley, 1988; Ma *et al.*, 1996). The palm has a life of over 200 years, but the economic life is 20-25 years (nursery 11-15 months, first harvest is 32-38 months from planting and peak yield is 5-10 years from planting) (Igwe and Onyegbado, 2007). Usually, the harvested part is the fruit "fruit bunch"whereby oil is obtained from the fleshy mesocarp of the fruit. Oil extraction from flesh amounts to at least 45-46% while kernel accounts for at least 40-50%. The palm has a highly varied nutrient demand which depends mainly on the yield potential determined by the genetic make-up of the planting material and on yield limit set by climatic factors such as water, effective sunshine and temperature (Igwe and Onyegbado, 2007).

Crude palm oil contains fatty acid ester of glycerol commonly referred to as triglycerides, therefore, contributing to the worlds need of edible oil and fats. It is composed of approximately 50% saturated fats (primarily palmitic acid) and 40% unsaturated fats (principally linolenic and oleic acid); a unique composition if compared with other major fats (Usoro, 1974). The distinctive colour of the oil is due to the fat soluble carotenoids (pigment) which are also responsible for its vitamins E (tocopherols and tocotrienols) content (Igwe and Onyegbado, 2007). Despite the importance of the edible oil and fats extracted from the palm fruits, the POME contains residual oil which effect on the environment cannot be ignore. Treatment and disposal of oily wastewater, such as palm oil mill effluent is presently one of the serious environmental problems contributors. Palm oil mill wastes have existed for years but their effects on environment are at present more noticeable. The oily waste has to be removed to prevent interfaces in water treatment units, avoid problems in the biological treatment stages, and comply with water-discharge requirements (Ahmad *et al.*, 2005). Oily wastewater containing oil and grease are considered as hazardous pollutants particularly in the aquatic environments, because they are highly toxic to the aquatic organisms.

Characteristics of palm oil mill effluent depend on the quality of the raw material and palm oil production processes in palm oil mills. The extraction of crude palm oil from fresh fruit bunches (FFB) requires huge amounts of water (Rupani *et al.*, 2010). It has been estimated that 5- 7.5 tonnes of water is

required for producing 1 tonne of crude palm oil and more than 50% of the water ends up as palm oil mill effluent (POME) (Ma,1999a, Ma.1999b, Ahmad *et al.*, 2003). Sethupathi (2004) has categorized three major processing operations responsible for producing the POME. Sterilization of FFB, clarification of the extracted crude palm oil (CPO), hydrocyclone separation of cracked mixture of kernel and shell hydrocyclone contributes about 36, 60 and 4% of POME respectively in the mills. Lorestani (2006) estimated that in Malaysia about 53 million m^3 POME is being produced every year based on palm oil production in 2005 (14.8 million tonnes). Yacob *et al.* (2005) estimated that about 0.5- 0.75 tonnes of POME will be discharged from mill for every tonne of fresh fruit bunch.

Wastewater composition depends mainly on the season, raw matter quality and the particular operations being conducted at

any given time. Typically, palm oil mill wastewater is low in pH because of the organic acids produced in the fermentation process, ranging about 4-5. It also contains large amounts of total solids (40,500 mg/L), oil and grease (4000 mg/L) (Ma, 2000) Wastewater includes dissolved constituents such as high concentration of protein, carbohydrate, nitrogenous compounds, lipids and minerals, which may be converted into useful materials using microbial processes. The effluents from palm oil mill can cause considerable environmental problems, if discharged untreated (Singh *et al.*, 2010; Davis and Reilly.1980). Therefore, the challenge of converting POME into an environmental friendly waste requires an efficient treatment and effective disposal technique.

Table 1: Characteristics of Raw Palm Oil Mill Effluent (POME)

Parameters	Value
Temperature (°C)	80-90
pH	4.7
Biochemical Oxygen Demand BOD3; 3days at 30 °C	25,000
Chemical Oxygen Demand	50,000
Total Solids (T.S)	40,500
Total Suspended Solids (T.S.S)	18,000
Total Volatile Solids (T.V.S)	34,000
Oil and Grease (O&G)	4,000
Ammonia-Nitrate (NH$_3$-N)	35
Total Kjeldahl nitrogen (TKN)	750

*All values, except pH and temperature, are expressed in mg/L Source: Ma (2000).

Table 2: Effluent Discharge Standards for Crude Palm Oil Mills (Environmental Quality Act 1974, 2005)

Parameter	Unit	Parameter Units (second schedule)	Remarks
Biochemical Oxygen Demand BOD; 3days-30°C	mg/L	100	
Chemical Oxygen Demand (COD	mg/L	*	
Total Solids	mg/L	*	
Suspended Solids	mg/L	400	
Oil and Grease	mg/L	50	
Ammoniacal Nitrogen	mg/L	150	Value of filtered sample
Total Nitrogen	mg/L	200	Value of filtered sample
pH	-	5-9	
Temperature	°C	45	

* No discharge standard after 1984 Source: Pierzynski (2005).

III.   CHARACTERISTICS OF PALM OIL MILL EFFLUENT (POME)

Huge quantities of waste are produced in the palm oil mill industry. The process of oil extraction results in generation of liquid waste commonly named as palm oil mill effluent (POME)(Rupani *et al.*, 2010). Palm oil mill effluent is generated mainly from oil extraction, washing and cleaning processes in the

mill and these contains cellulosic material, fat, oil and grease etc (Agamuthu, 1995). Palm oil mill effluent also contains substantial quantities of solids, both suspended solids and total dissolved solids in the range of 18,000 mg/L and 40,500 mg/L respectively (Table 1). These solids are commonly named palm oil mill sludges (POMS). The solid waste that are produced in the process of extraction are the leaves, trunk, decanter cake, empty fruit bunches, seed shells and fiber from the mesocarp (Rupani *et al.*, 2010).

Fresh POME is a hot, acidic (pH between 4 and 5), brownish colloidal suspension containing high concentrations of organic matter, high amounts of total solids (40,500 mg/L), oil and grease (4,000 mg/L) COD (50,000 mg/L) and BOD (25,000 mg/L) (Ma, 2000). The characteristics of typical POME is given in Table 1. According to Vairappan and Yen (2008), 66.8 million tonnes of POME was generated in year 2005. The raw or partially treated POME has an extremely high content of degradable organic matter. As no chemicals were added during the oil extraction process, POME is considered as non toxic, but it is identified as a major source of aquatic pollution by depleting dissolved oxygen when discharged untreated into the water bodies (Khalid and Wan Mustafa, 1992). However it also contains appreciable amounts of N, P, K, Mg and Ca (Habib *et al.*, 1997 and ,Muhrizal *et al.*, 2006), which are the vital nutrient elements for plant growth. Due to the non toxic nature and fertilizing properties, POME can be used as fertilizer or animal feed substitute, in terms of providing sufficient mineral requirements. Agamuthu *et al.* (1986) has also reported the increase of organic nitrogen leading to the production of a better fertilizer in POME.

Muhrizal, (2006) reported that POME contains high content of Al as compared to chicken manure and composted sawdust. According to Habib *et al.* (1997) toxic metals, such as Pb, can also be focused in POME, but their concentrations are usually below sub lethal levels (> 17.5 μg /g) (James *et al.*, 1996). According to James *et al.* (1996), Pb is found in POME as a result of contamination from plastic and metal pipes, tanks and containers where Pb is widely used in paints and glazing materials. The effluent discharge standards for crude palm oil mills (Environmental Quality Act 1974, 2005) are presented on Table 2.

IV. ANAEROBIC DIGESTION

Anaerobic digestion is the degradation of complex organic matters under the absence of oxygen. This process is time consuming as bacterial consortia responsible for the degradation process requires time to adapt to the new environment before they start to consume on organic matters to grow (Poh and Chong,2009).

In the process of degrading POME into methane, carbon dioxide and water, there is a sequence of reactions involved; hydrolysis, acidogenesis (including acetogenesis) and methanogenesis (Gerardi, 2003). Hydrolysis is where complex molecules (i.e., carbohydrates, lipids, proteins) are converted into sugar, amino acid and etc. In the step of acidogenesis, acidogenic bacteria will break down these sugar, fatty acids and amino acids into organic acids which mainly consist of acetic acid (from acetogenesis) together with hydrogen and carbon dioxide. Hydrogen and carbon dioxide will be utilized by hydrogenotropic methanogens while acetic acid and carbon dioxide will be utilized by acetoclastic methanogens to give methane as a final product(Gerardi,2003).

Methanogenesis is the rate limiting step in anaerobic digestion of POME (Ibrahim *et al.*, 1984). As such, conventional anaerobic digesters require large reactors and long retention time to ensure complete digestion of treated influent. Nonetheless, high-rate anaerobic bioreactors have been proposed (Borja and Banks,1994a,b, 1995a,b; Najafpour *et al.*, 2006; Ibrahim *et al.*, 1984) to reduce reactor volume, shorten retention time as well as capture methane gas for utilization.

Table 3: Advantages and Disadvantages between Anaerobic and Alternative Treatment Methods

Treatment Types	Advantages	Disadvantages	Reference
Anaerobic	Low energy requirements (no aeration), producing methane gas as a valuable end product, generated sludge from process could be used for land applications.	Long retention time, slow start-up (granulating reactors), large area required for conventional digesters.	Metcalf and Eddy (2003), Borja *et al.* (1996a).
Aerobic	Shorter retention time, more effective in handling toxic wastes.	High energy requirement (aeration), rate of pathogen inactivation is lower in aerobic sludge compared to anaerobic sludge, thus unsuitable for land applications.	Leslie Grady *et al.* (1999), Doble and Kumar (2005).
Membrane	Produce consistent and good water quality after treatment, smaller space required for membrane treatment plants, can disinfect treated water.	Short membrane life, membrane fouling, expensive compared to conventional treatment.	Ahmad *et al.* (2006), Metcalf and Eddy (2003.

| Evaporation | Solid concentrate from process can be utilized as feed material for fertilizer manufacturing. | High energy consumption. | Ma *et al.* (1997). |

Source: Poh and Chong (2009).

V. ANAEROBIC AND ALTERNATIVE POME TREATMENT METHODS.

Aerobic treatment, membrane treatment system and evaporation method are the currently available alternative methods for POME treatment (Poh and Chong,2009). The advantages and disadvantages for anaerobic and alternative treatment methods are shown in Table 3. In terms of energy requirement for POME treatment operation, anaerobic digestion has a stronger advantage over other alternative methods as it does not require energy for aeration. Furthermore, anaerobic POME treatment produces methane gas which is a value-added product of digestion that can be utilized in the mill to gain more revenue in terms of certified emission reduction (CER) (Poh and Chong, 2009;).For instance the open digesting tank for POME treatment without land application, capital cost quoted by Gopal and Ma (1986) for a palm oil mill processing 30 tons FFB/h is RM 750,000. Based on the Chemical Engineering Plant Cost Index in 2006, (Ullrich and Vasudevan 2004) the capital cost for this system is estimated to be RM 1,147,842 in 2006. Comparing this to the capital cost for a membrane system in POME treatment for a palm oil mill processing 36 tons FFB/h at RM 3,950,000 (Chong, 2007), it is obvious that the former anaerobic treatment has better advantage over other treatment methods in terms of capital cost. The only two significant drawbacks of anaerobic treatment are long retention times and long start-up period. However, the problem of long retention times can be rectified by using high-rate anaerobic bioreactors while the long start-up period can be shortened by using granulated seed sludge (McHugh *et al.*, 2003), utilizing seed sludge from same process (Yacob *et al.*, 2006b) or maintaining suitable

pH and temperature in the high-rate anaerobic bioreactor for growth of bacteria consortia (Liu *et al.*, 2002). Untreated wastewater with BOD/COD ratio of 0.5 and greater can be treated easily by biological means (Metcalf and Eddy, 2003). With reference to the published values of BOD and COD in Data for Engineers: POME (2004), aerobic and anaerobic treatment is suitable for POME treatment since the BOD/COD ratio is of 0.5. In comparison of these two treatment methods, the anaerobic treatment can be regarded to be more suitable for POME treatment due to its lower energy consumption while producing methane as a value-added product in the process (Poh and Chong, 2009).

VI. TYPES OF ANAEROBIC TREATMENT METHODS

A. Conventional treatment systems

Ponding system is the most common treatment system that is employed in palm oil mills for the treatment of POME with more than 85% of the mills having adopted this method (Poh and Chong, 2009). Ponding system comprises of de-oiling tank, acidification ponds, anaerobic ponds and facultative or aerobic ponds (Chan and Chooi, 1984). Number of ponds varies according to the capacity of the palm oil mill. Facultative or aerobic ponds are necessary to further reduce BOD concentration in order to produce effluent that complies with Federal Subsidiary Legislation, 1974 effluent discharge standards.

A typical size of an anaerobic pond in a palm oil mill which has a processing capacity of 54 tons per hour is 60.0 x 29.6 x 5.8 m (length x width x depth which is approximately equivalent to half the size of a soccer field. Size of pond depends on the capacity of the palm oil mill as well as the area available for ponds) (Yacob *et al.*, 2006a). Anaerobic ponds have the longest retention time in ponding system which is around 20–200 days (Chan and Chooi, 1984). Investigations by Yacob *et al.* (2006a) showed that anaerobic pond had a higher emission of methane with an average methane composition of 54.4% compared to open digester tank. In addition to that, the methane composition from anaerobic ponds was also found to be more consistent in the gaseous mixture. Methane emission in anaerobic ponds is influenced by mill activities and seasonal cropping of oil palm (Yacob *et al.*, 2006a). Open digesting tanks are used for POME treatment when limited land area is available for ponding system (Poh and Chong, 2009). Yacob *et al.* (2005) investigated on the methane emission from open digesting tanks where each tanks was half the capacity of anaerobic ponds (3600 m3) with retention time of 20 days. Emission of methane gas from open digesting tank was found to be less than anaerobic pond with an average methane composition of 36.0%. Lower methane composition is due to the transfer of oxygen into the tank when feed is induced into the tank. Mixing in digesting tanks improves the digestion process as bacteria consortia are brought into more contact with food (Leslie Grady *et al.*, 1999). Nevertheless, mixing in open digesting tank only depends on slow bubbling and eruption of biogas which causes low conversion of methane gas (Poh and Chong, 2009).

B. Anaerobic Filtration

Anaerobic filter has been applied to treat various types of wastewater including soybean processing wastewater (Yu *et al.*, 2002a), wine vinases (Nebot *et al.*, 1995; Pérez *et al.*, 1998), landfill leachate (Wang and Banks, 2007), municipal wastewater (Bodkhe, 2008), brewery wastewater (Leal *et al.*, 1998), slaughterhouse wastewater (Ruiz *et al.*, 1997), drug wastewater (Gangagni Rao *et al.*, 2005), distillery wastewater (Acharya *et al.*, 2008), beet sugar water (Farhadian *et al.*, 2007) and wastewater from ice-cream manufacture (Hawkes *et al.*, 1995; Monroy *et al.*, 1994). Borja and Banks (1994b, 1995b) have also utilized anaerobic filter for POME treatment. The packing allows biomass to attach on the surface when raw POME feed enters from the bottom of the bioreactor while treated effluent together with generated biogas will leave from the top of the bioreactor. Anaerobic filter is selected for wastewater treatment because (i) it requires a smaller reactor volume which operates on a shorter hydraulic retention times (HRTs) (ii) high substrate removal efficiency (Borja and Banks, 1994b), (iii) the ability to maintain high concentration of biomass in contact with the wastewater

without affecting treatment efficiency (Reyes *et al.*, 1999; Wang and Banks, 2007), and (iv) tolerance to shock loadings (Reyes *et al.*, 1999; Van Der Merwe and Britz, 1993). Besides, construction and operation of anaerobic filter is less expensive and small amount of suspended solids in the effluent eliminates the need for solid separation or recycle(Russo *et al.*, 1985).

However, filter clogging is a major problem in the continuous operation of anaerobic filters (Bodkhe, 2008; Jawed and Tare, 2000; Parawira *et al.*, 2006). So far, clogging of anaerobic filter has only been reported in the treatment of POME at an organic loading rate (OLR) of 20 g COD/l/day (Borja and Banks, 1995b) and also in the treatment of slaughterhouse wastewater at 6 g COD/l/day. This is due to the fact that other studies were conducted at lower OLRs which had lower suspended solid content compared to POME. In general, anaerobic filter is capable of treating wastewaters to give good effluent quality with at least 70% of COD removal efficiencywith methane composition of more than 50% (Poh and Chong,2009).

Investigations have been done to improve the efficiency of anaerobic filtration in wastewater treatment. For instance, Yu *et al.* (2002a) found that operating at an optimal recycle ratio which varies depending on OLR will enhance COD removal. However, methane percentage will be compromised with increase in optimal recycle ratio. Higher retention of biomass in the filter will also lead to a better COD removal efficiency. In order to optimize the retention of biomass on the filter media surface and trapped suspended biomass within the interstitial void spaces, Show and Tay (1999) suggested the use of support media with high porosity or open-pored surfaces. It was also suggested that continuously fed system gives better stability and greater degradation efficiency in anaerobic filters (Nebot *et al.*, 1995).

 C. Anaerobic Fluidized Bed Reactor
Fluidized bed reactor exhibits several advantages that make it useful for treatment of high-strength wastewaters. It has very large surface areas for biomass attachment (Borja *et al.*, 2001; Toldrá *et al.*, 1987), enabling high OLR and short HRTs during operation (Garcia-Calderon *et al.*, 1998; Sowmeyan and Swaminathan,2008). Furthermore, fluidized bed has minimal problems of channeling, plugging or gas hold-up (Borja *et al.*, 2001; Toldrá *et al.*,1987). Higher up-flow velocity of raw POME is maintained for fluidized bed reactor to enable expansion of the support material bed. Biomass will then attach and grow on the support material. In this way, biomass can be retained in the reactor (Poh and Chong, 2009). Investigations have been done on the application of fluidized bed to treat cutting-oil wastewater (Perez *et al.*, 2007); real textile wastewater (Sen and Demirer, 2003); wine and distillery wastewater (Garcia-Calderon *et al.*, 1998; Sowmeyan and Swaminathan, 2008); brewery wastewater (Alvarado-Lassman *et al.*, 2008); ice-cream wastewater (Borja and Banks, 1995a; Hawkes *et al.*, 1995); slaughterhouse wastewater (Toldrá *et al.*, 1987); pharmaceutical effluent (Saravanane *et al.*, 2001) and POME (Borja and Banks, 1995b). Inverse flow anaerobic fluidized bed is capable of tolerating higher OLRs compared to up-flow configuration. Alvarado-Lassman *et al.* (2008) showed that inverse flow fluidized bed shows excellent stability when overload is applied. It was found that in general, anaerobic fluidized bed is able to operate at

higher OLRs, implying that less reactor volume will be required to operate at lower OLRs (Poh and Chong ,2009).

The type of support material in the fluidized bed plays an important role to determine the efficiency of the entire treatment system (Garcia-Calderon *et al.*, 1998; Sowmeyan and Swaminathan,2008) for both inverse flow and up-flow systems. Studies using fluidized bed to treat ice-cream wastewater showed different COD removal efficiencies when different support materials were used. Hawkes *et al.* (1995) found that fluidized bed using granular activated carbon (GAC) gave about 60% COD removal while Borja and Banks (1995a) obtained 94.4% of COD removal using ovoid saponite. Thus suitable support material needs to be selected to obtain high COD removal efficiency in the system.

In POME treatment, fluidized bed was found to be a better treatment method compared to anaerobic filter due to its ability to tolerate higher OLRs and its better methane gas production. Shorter HRT (6 h) also proved to be an advantage of fluidized bed over anaerobic filter (1.5–4.5 days) in POME treatment (Poh and Chong, 2009).

 D. Anaerobic Contact Digestion
Contact process involves a digester and a sedimentation tank where sludge from digester effluent is left to settle and the effluent is recycled back into the digester. This process has been implemented in POME (Ibrahim *et al.*, 1984); ice-cream wastewater,alcohol distillery wastewater (Vlissidis and Zouboulis, 1993) and fermented olive mill wastewater treatment (Hamdi and Garcia, 1991).Concentrated wastewaters are suitable to be treated by anaerobic contact digestion since relatively high quality effluent can be achieved (Leslie Grady *et al.*, 1999). In the study of fermented olive mill wastewater treatment, anaerobic contact was capable of reaching steady state more quickly compared to anaerobic filter; however, more oxygen transfer in the digester (due to mixing) causes this process to be less stable (Poh and Chong. 2009 ; Hamdi and Gracia,1991)). While scum formation was reported in POME treatment pilot plant (Ibrahim *et al.*,1984), instability was not reported in other treatment systems. Despite the problems that might be encountered in anaerobic contact, this system has been able to remove COD efficiently, achieving up to 80% removal efficiency (Vlissidis and Zouboulis,1993).

 E. Continuous Stirred Tank Reactor (CSTR)
CSTR is equivalent to a closed-tank digester with mixer. The mechanical agitator provides more area of contact with the biomass thus improving gas production. In POME treatment, CSTR has been applied by a mill under Keck Seng (Malaysia) Berhad in Masai, Johor and it is apparently the only one which has been operating continuously since early 1980s (Tong and Jaafar, 2006). Other applications of CSTR on wastewater treatment include dilute dairy wastewater (Chen and Shyu, 1996); jam wastewater (Mohan and Sunny, 2008) and coke wastewater (Vázquez *et al.*, 2006) where coke wastewater was treated in aerobic conditions.

The CSTR in Keck Seng's palm oil mill has COD removal efficiency of approximately 83% and CSTR treating dairy wastewater has COD removal efficiency of 60%. In terms of methane composition in generated biogas, it was found to be

62.5% for POME treatment and 22.5–76.9% for dairy wastewater treatment (Poh Chong. 2009). Another study on POME treatment using CSTR has been investigated by Ugoji (1997) where results indicated that COD removal efficiency is between 93.6–97.7%. The difference of COD removal efficiency between the two published results by Keck Seng and Ugoji is due to the different operating conditions where the latter study was done in laboratory scale. In the plant scale POME treatment at Keck Seng's palm oil mill, the treated wastewater could not be assumed to be well mixed due to the large volume of feed which might affect the overall efficiency of the COD removal.

Ramasamy and Abbasi (2000) attempted to upgrade the performance of CSTR by incorporating a biofilm support system (BSS) within the existing reactor. Low-density nylon mesh were rolled into cylinders and inserted into the CSTR. This BSS functions as a support media for growth of biomass. From this study, it was found that efficiency of CSTRs can be improved without biomass recycling.The implementation of BSS into CSTR can be useful to increase COD removal efficiency as well as biogas production in POME treatment.

F. Up- Flow Anaerobic Sludge Blanket (UASB) Reactor

UASB was developed by Lettinga *et al.* (1980) whereby this system has been successful in treating a wide range of industrial effluents including those with inhibitory compounds. The underlying principle of the UASB operation is to have an anaerobic sludge which exhibits good settling properties (Lettinga, 1995). So far, UASB has been applied for the treatment of potato wastewater (Kalyuzhnyi *et al.*, 1998; Lettinga *et al.*, 1980; Parawira *et al.*,2006); domestic wastewater (Barbosa and Sant'Anna, 1989; Behling *et al.*, 1997); slaughterhouse wastewater (Sayed *et al.*, 1984); ice-cream wastewater (Hawkes *et al.*, 1995); POME (Borja and Banks, 1994c); pharmaceutical wastewater (Stronach *et al.*,1987); instant coffee wastewater (Dinsdale *et al.*, 1997); sugar-beet wastewater (Lettinga *et al.*, 1980). UASB has a relatively simple design where sludge from organic matter degradation and biomass settles in the reactor. Organic matter from wastewater that comes in contact with sludge will be digested by the biomass granules.

In general, UASB is successful in COD removal of more than 60% for most wastewater types except for ice-cream wastewater. Hawkes *et al.* (1995) suggested that the lower COD removal percentage from ice-cream wastewater was due to design faults in the reactor's three phase separator and high contents of milk fat that were hard to degrade.

POME treatment has been successful with UASB reactor, achieving COD removal efficiency up to 98.4% with the highest operating OLR of 10.63 kg COD/m³day (Borja and Banks, 1994c). However, reactor operated under overload conditions with high volatile fatty acid content became unstable after 15 days. Due to high amount of POME discharge daily from milling process, it is necessary to operate treatment system at higher OLR. Borja *et al.* (1996a) implemented a two-stage UASB system for POME treatment with the objective of preventing inhibition of granule formation at higher OLRs without having to

remove solids from POME prior to treatment.This method is desirable since suspended solids in POME have high potential for gas production while extra costs from sludge disposal can be avoided. Results from this study showed the feasibility of separating anaerobic digestion into two-stages (acidogensis and methanogenesis) using a pair of UASB reactors.The methanogenic reactor was found to adapt quickly with the feed from the acidogenic reactor and also tolerate higher OLRs. It was suggested that OLR of 30 kg COD/m³day could ensure an overall of 90% COD reduction and efficient methane conversion.

UASB reactor is advantageous for its ability to treat wastewater with high suspended solid content (Fang and Chui, 1994; Kalyuzhnyi *et al.*, 1998) that may clog reactors with packing material and also provide higher methane production (Kalyuzhnyi *et al.*,1996; Stronach *et al.*, 1987). However, this reactor might face long start-up periods if seeded sludge is not granulated. A study by Goodwin *et al.* (1992) has proved that reactors seeded with granulated sludge achieved high performance levels within a shorter start-up period. It could also adapt quickly to gradual increase of OLR (Kalyuzhnyi *et al.*, 1996).

G. Up-Flow Anaerobic Sludge Fixed-Film (UASFF) Reactor

UASB and anaerobic filter has been integrated to form a hybrid bioreactor – UASFF. This hybrid reactor combines the advantages of both reactors while eliminating their respective drawbacks. As such, UASFF is superior in terms of biomass retention, reactor stability at shock loadings and operation at high OLRs while eliminating the problems of clogging and biomass washout in anaerobic filter and UASB (Poh and Chong, 2009). Ayati and Ganjidoust (2006) has proven that UASFF is more efficient compared to UASB and anaerobic filter in the treatment of wood fiber wastewater.Other investigations of wastewater treatments using UASFF includes sugar wastewater (Guiot and van den Berg, 1985); dairy wastewater (Córdoba *et al.*, 1995); slaughterhouse wastewater (Borja *et al.*, 1995c, 1998; Lo *et al.*, 1994); wash waters from purification of virgin olive oil (Borja *et al.*, 1996b); coffee wastewater (Bello-Mendoza and Castillo-Rivera, 1998); brewery wastewater (Yu and Gu, 1996) and POME (Najafpour *et al.*, 2006). This hybrid reactor is generally capable of tolerating OLRs higher than UASB and anaerobic filter. Clogging is not reported in studies on the performance of hybrid reactor. UASFF is also able to achieve COD removal efficiency of at least 70% and above except for wood fiber wastewater as wood fiber is harder to degrade. Methane production for UASFF is also at a satisfactory level. In the treatment of POME, Najafpour *et al.* (2006) found that internal packing and high ratio of effluent recycle are both vital to control the stability of the UASFF reactor. Internal packing effectively retained biomass in the column while effluent recycle produced internal dilution to eliminate effects of high OLR. The advantages and disadvantages of each of the anaerobic treatment methods aforementioned are showed in Table 4.

Table 4: Advantages and disadvantages of various types of anaerobic treatment methods

	Advantage	Disadvantages	References
Conventional anaerobic digestion (pond and digester)	Low capital cost. Low operating and maintenance cost. Able to tolerate big range of OLR (pond) thus can easily cope POME discharge during high crop season. Recovered sludge cake from pond can be sold as fertilizer.	Large volume for digestion. Long retention times. No facilities to capture biogas. Lower methane emission.	Chan and Chooi (1984).
Anaerobic filtration	Small reactor volume. Producing high quality effluent. Short hydraulic retention times. Able to tolerate shock loadings. Retains high biomass concentration in the packing.	Clogging at high OLRs. High media and support cost. Unsuitable for high suspended solid Wastewater.	Borja and Banks (1994b, 1995b)
Fluidized bed	Most compact of all high-rate processes. Very well mixed conditions in the reactor. Large surface area for biomass attachment. No channeling, plugging or gas hold-up. Faster start-up.	High power requirements for bed Fluidization. High cost of carrier media. Not suitable for high suspended solid wastewaters. Normally does not capture generated biogas.	Leslie Grady *et al.* (1999).
UASB	Useful for treatment of high suspended solid wastewater. Producing high quality effluent. No media required (less cost). High concentration of biomass retained in the reactor. High methane production.	Performance dependant on sludge settleability. Foaming and sludge floatation at high OLRs. Long start-up period if granulated seed sludge is not used. Granulation inhibition at high volatile fatty acid concentration.	Lettinga (1995), Kalyuzhnyi *et al.* (1998), Goodwin *et al.* (1992).
UASFF	Higher OLR achievable compared to operating UASB or anaerobic filtration alone. Problems of clogging eliminated. Higher biomass retention. More stable operation. Ability to tolerate shock loadings. Suitable for diluted wastewater.	Lower OLR when treating suspended solid wastewaters.	Ayati and Ganjidoust (2006).
CSTR	Provides more contact of wastewater with biomass through mixing. Increased gas production compared to conventional Method.	Less efficient gas production at high treatment volume. Less biomass retention.	

Anaerobic contact process	Reaches steady state quickly. Short hydraulic retention time. Produces relatively high effluent quality.	Less stable due to oxygen transfer in digesting tank. Settleability of biomass is critical to successful performance.	Hamdi and Garcia (1991).

Source: Poh and Chong (2009).

VII. FACTORS AFFECTING ANAEROBIC DIGESTER PREFORMANCE

The few major factors that greatly influence digester performances in POME treatment are pH, mixing, operating temperature, and organic loading rates into the digester.

A. pH

The microbial community in anaerobic digesters are sensitive to pH changes and methanogens are affected to a greater extend (Leslie *et al.*, 1999). An investigation by Beccari *et al.* (1996) confirmed that methanogenesis is strongly affected by pH. As such, methanogenic activity will decrease when pH in the digester deviates from the optimum value (Poh and Chong, 2009). Optimum pH for most microbial growth is between 6.8 and 7.2 while pH lower than 4 and higher than 9.5 are not tolerable (Gerardi, 2006).Several cases of reactor failure reported in studies of wastewater treatment are due to accumulation of high volatile fatty acid concentration, causing a drop in pH which inhibited methanogenesis (Parawira *et al.*, 2006; Patel and Madamwar, 2002). Thus, volatile fatty acid concentration is an important parameter to monitor to guarantee reactor performance (Buyukkamaci and Filibeli,2004). It was found that digester could tolerate acetic acid concentrations up to 4000 mg/l without inhibition of gas production (Stafford, 1982). To control the level of volatile fatty acid in the system, alkalinity has to be maintained by recirculation of treated effluent (Najafpour *et al.*, 2006; Borja *et al.*, 1996a) to the digester or addition of lime and bicarbonate salt (Gerardi, 2003).

B. Mixing

Mixing provides good contact between microbes and substrates, reduces resistance to mass transfer, minimizes buildup of inhibitory intermediates and stabilizes environmental conditions (Leslie Grady *et al.*, 1999). When mixing is inefficient, overall rate of process will be impaired by pockets of material at different stages of digestion whereby every stage has a different pH and temperature (Stafford, 1982). Mixing can be accomplished through mechanical mixing, biogas recirculation or through slurry recirculation (Karim *et al.*, 2005a).Investigations have been done to observe the effects of mixing to the performance of anaerobic digesters. It was found that mixing improved the performance of digesters treating waste with higher concentration (Karim *et al.*, 2005b) while slurry recirculation showed better results compared to impeller and biogas recirculation mixing mode (Karim *et al.*, 2005c). Mixing also improved gas production as compared to unmixed digesters (Karim *et al.*,2005b). Intermittent mixing is advantageous over vigorous mixing (Kaparaju *et al.*, 2008; Stafford, 1982), where this has been adopted widely in large-scale municipal and farm waste digesters (Stafford, 1982). Rapid mixing is not encouraged as methanogens can be less efficient in this mode of operation (Gerardi, 2003). However, Karim *et al.* (2005b) mentioned that mixing during start-up is not beneficial due to the fact that digester pH will be lowered, resulting in performance instability as well as leading to a prolonged start-up period. Mixing in palm oil mills which depend on biogas produced (Ma and Ong, 1985) are less efficient compared to mechanical mixing as digesters are not perfectly mixed. Further investigation on effects of mixing on POME should be undertaken to obtain a suitable mode of mixing for the best digester performance.

C. Temperature

POME is discharged at temperatures around 80–90 ^{0}C (Zinatizadeh *et al.*, 2006) which actually makes treatment at both mesophilic and thermophilic temperatures feasible especially in tropical countries like Malaysia. Yet, anaerobic POME treatments in Malaysia are conducted only in the mesophilic temperature range. Various studies have been conducted to investigate the feasibility of operating wastewater treatment systems in the thermophilic temperature range such as sugar, high-strength wastewater (Wiegant *et al.*, 1985; Wiegant and Lettinga, 1985) and POME (Cail and Barford,1985; Choorit and Wisarnwan, 2007). These studies have reported successful system operation in the thermophilic temperature range, with POME treatment having treatment rates more than four times faster than operation in the mesophilic temperature range (Cail and Barford, 1985). Similarly, high production of methane was also observed from the treatment of sugar wastewater in this higher temperature range .

Effect of temperature on the performance of anaerobic digestion was investigated. Yu *et al.* (2002b) found that substrate degradation rate and biogas production rate at 55 ^{0}C was higher than operation at 37 ^{0}C. Studies have reported that thermophilic digesters are able to tolerate higher OLRs and operate at shorter HRT while producing more biogas (Ahn and Forster, 2002; Kim *et al.*, 2006; Yilmaz *et al.*, 2008). However, failure to control temperature increase can result in biomass washout (Lau and Fang, 1997) with accumulation of volatile fatty acid due to inhibition of methanogenesis. At high temperatures, production of volatile fatty acid is higher compared to mesophilic temperature range (Yu *et al.*, 2002b). Many operators prefer to have digesters operating in mesophilic temperature due to better process stability. Nevertheless, investigation on digester stability by Kim *et al.* (2002) proved that disadvantages of thermophilic digesters can be resolved by keeping microbial consortia in close proximity.

A cost benefit analysis done on anaerobic POME treatment system with biogas recovery for heat generation and digester effluent for land application indicated that operation in the thermophilic range provide the fastest payback to investment(Poh and Chong, 2009). The cost benefit analysis for POME treatment system that utilizes biogas for electricity generation and digester effluent for land application also showed a faster payback (Yeoh, 2004).Yeoh (2004) also stated that if all POME in Malaysia is to be treated at thermophilic temperature where recovered biogas is fully utilized for electricity energy

generation, it would generate 2250 million kWh which contributes approximately 4% of national electricity demand in 1999. This shows the potential of operating POME treatment systems in thermophilic temperature.

D. Organic Loading Rates

Various studies have proven that higher OLRs will reduce COD removal efficiency in wastewater treatment systems (Torkian *et al.*, 2003; Sánchez *et al.*, 2005; Patel and Madamwar, 2002) However, gas production will increase with OLR until a stage when methanogens could not work quick enough to convert acetic acid to methane. OLR is related to substrate concentration and HRT, thus a good balance between these two parameters has to be obtained for good digester operation. Short HRT will reduce the time of contact between substrate and biomass (Poh and Chong, 2009).

VIII. OTHER RELATED TREATMENT TECHNOLOGIES FOR POME

A. Tank Digestion and Facultative Ponds

In this system, raw effluent after oil trapping is pumped to a closed tank which has a retention time of about twenty days. The liquid is mixed by means of horizontal stirrers.

The methane gas (CH4) generated is flared off into the atmosphere, but the flaring of the CH4 is unacceptable and calls for improvement on this method. (Igwe and Onyegbado,2007). Digested liquid is discharged into a holding pond before it is disposed on land (Songehe, 1974). Tony and Bakar Jaafar, (2004) ; Hassan *et al.*(2009) have also investigated POME treatment using closed anaerobic digestion tanks.

B. Tank Digestion and Mechanical Aeration

This group consists of cooling/acidification ponds, an anaerobic digestion tank and an aeration pond. Raw effluent after oil trapping is pumped to the acidification pond through a cooling tower and retained for one to two days. It is then mixed with an equal volume of liquid from the anaerobic digester before it is fed back to the digester and the achievement recorded indicates that the effluent water has been treated (Igwe and Onyegbado,2007). The hydraulic retention time of the digester is about twenty days. The digested liquid is discharged to an aeration pond with two floating aerators. The liquid is aerated for twenty days before it is discharged (Karel *et al.*, 1974). Yacob et al .(2009) and Poh and Chong, (2009) have also reported the use of open digestion tanks for POME treatment.

C. Decanter and facultative ponds

In a few mills, decanters are used to separate the fruits juice after pressing into liquid and solid phase, the liquid which is mainly oil is fed to the conventional clarification process. The water resulting from the clarification station is recycled (Igwe and Onyegbado,2007). The solid is either disposed off on land or is dried in a rotary drier to about 10% moisture and then used as fuel. Thus, the effluent which consists of only the sterilizer condensate and waste from the hydrocyclone is greatly reduced in volume and is treated in a series of ponds (Wood, 1984). Chan and Chooi, (1984) elucidated that ponding systems also comprises of facultative or aerobic ponds used in the treatment of POME. Chin *et al.* (1996) have treated POME using a pond system.

D. Anaerobic and facultative ponds

This system consists of a series of ponds connected in series for different purposes. The effluent after oil trapping is retained in an acidification buffering pond for about two or three days, the resulting effluent is then treated in an anaerobic pond with a hydraulic retention time of thirty to eighty days depending on the mills (Igwe and Onyegbado,2007).This digested liquid is further treated in a series of facultative ponds before it is discharged. In some cases, part of the digested liquid is recycled to the acidification and buffering pond. The total hydraulic retention time of the system ranges from 75 to 120 days (Donne, 1981). Technologies currently undergoing intensive research and development include fluidized bed reactor (Idris *et al.*, 2003), up-flow anaerobic sludge blanket (UASB) reactor (Borja *et al.*, 1996; Chaisri *et al.*, 2007), up-flow anaerobic sludge fixed-film (UASFF) reactor (Zinatizadeh *et al.*, 2006a,b, 2007a,b) and membrane technology (Ahmad *et al.*, 2006a,b, 2009; Wu *et al.*, 2007). Other treatment system consists of a combination of mechanical chemical process and ponds (Sinnappa, 1978b). The raw effluent after oil trapping is separated into water and solid phases using a three- phase decanter. The oil is returned to the main line while the solid is dried in a rotary drier after the filter press. The water containing dissolved and suspended solids is treated with coagulants and flocculants to remove as much solids as possible before it is fed to an anaerobic digester which has a hydraulic retention time of about ten days. The digested liquid is further treated in an aeration tower and then oxidized (Sinnappa, 1978b).

IX. POTENTIAL USES AND UTILIZATION OF POME

Due to the huge quantities of POME generated by the oil palm industry, it is not a good practice to discharge the wastewater into the environment without utilizing it properly. Recently, the infiltration of POME into the groundwater tables and aquifer systems, which constitutes an accumulative, threatening and detrimental deterioration to the survival of aquatic life forms, the ecology and the food chains, is interpreted as one of the most intransigent paradoxes around the world (Yusoff and Hansen, 2007). In view of the aforementioned, the sustainability of the conversion of POME into useful substitutes for animal feed, fertilizers and carotene have attracted a huge energetic focus, mainly attributed to its abundant accessibility and low price (Hii *et al.*, 2012).

A. POME AS FEED FOR ANIMAL AND AQUACULTURAL ORGANISMS

Due to the rich content of organic matter, POME was used as a dietary substitute for pigs, poultry and small ruminants as well as aquacultural organisms (Wu *et al.*, 2009; Devendra, 2004). Generally, POME itself cannot be applied as food for animals. It always serves as a replacement of a regular diet constituent. In pig and poultry (i.e. chicken) farming, POME has proved to be an economical replacement for maize (regular diet constituent) and soybean meal, showing the same good feeding results (Devendra, 2004; Hutagalung *et al.*, 1977; Ho, 1976; Yeong *et al.*,1980). The Malaysian Agricultural Research Development (MARDI) even proved that POME can be used as the supplementary food for sheep and goats (Devendra and Muthurajah, 1976). Further researches using grass supplemented with dried POME or treated with POME also showed better

forage intake and better food digestion than with grass alone (Vadiveloo, 1988; Agamuthu *et al.*, 1996; Phang and Vadiveloo, 1991).Meanwhile, POME has also played a role in serving as food for fish (Babu *et al.*, 2001) and aquacultural organisms, such as chironomid larvae, also known as ''bloodworms'' (Habib *et al.*,1997). The reports showed that production of the chironomid larvae was significantly higher in POME than in algal cultures (Hii *et al.*, 2012). This described POME as a good source of nutritional supplement for aquacultural organisms. These chironomid larvae, in turn, can present valuable live food for fish or cultured invertebrates (Shaw and Mark 1980; Yusoff *et al* ., 1996).

X.   MOLECULAR BIOLOGY TECHNIQUES AND THEIR USES IN   WASTEWATER TREATMENT

Identification of microorganisms by conventional methods requires the isolation of pure cultures followed by laborious characterization experiments. These procedures are therefore inadequate for study of the biodiversity of a natural or engineered ecosystem. A new set of molecular techniques developed during the 1990s revolutionized microbial ecology research. The possibility of identifying specific populations of microorganisms in their native habitat/niche or environment without the need to isolate them is revolutionizing microbial ecology and giving rise to various new applications in numerous research fields.

In wastewater treatment, microbial molecular ecology techniques have been applied mainly to the study of flocs (activated sludge) and biofilms that grow in aerobic treatment systems (trickling filters) (Sanz and Kochling, 2007).These techniques include: Denaturant Gradient Gel Electrophoresis (DGGE), Fluorescent in situ Hybridization (FISH) and Cloning of 16S rDNA.

A.   CLONING of 16S rDNA

Cloning and sequencing of the gene that codes for 16S rRNA is still the most widely used in the field of microbial ecology. This methodology implies the extraction of nucleic acids, amplification and cloning of the 16S rRNA genes, followed by sequencing and finally identification and affiliation of the isolated clone with the aid of   phylogenetic software (Sanz and Kochling, 2007).

Several examples of cloning of 16S rDNA illustrate its potential in the wastewater treatment area. Cloning was employed to establish with precision the phylogenetic position of filamentous bacteria in granular sludge that were previously affiliated, by in situ hybridization, to the division of green non-sulfur bacteria (Sekiguchi *et al.*, 2001); or to determine the prevalent sulfate reducing bacteria in a biofilm (Ito *et al.*, 2002). The microbial communities residing in reactors for treating several types of industrial wastewater have also been determined by means of 16S rDNA cloning and sequencing (Sanz and Kochling, 2007). Egli *et al.* (2003) examined the microbial composition and structure of a rotating biological contactor biofilm for the treatment of ammonium-contaminated wastewaters. In their 16S rDNA clone libraries, they found the sequences of several previously undetected and uncommon microorganisms, as well as others that were confirmed to be associated with the process by FISH analysis. The study also confirmed the predicted functional structure of a mixed aerobic/anaerobic biofilm developed in the presence of high ammonium concentrations (Sanz and Kochling, 2007). A description of the microbial communities responsible for the anaerobic digestion of manure and manure/lipid mixtures in continuously stirred tank reactors (CSTR) was published in 2003 by Mladenovska *et al.* (2003). Phylogenetic analysis of the sequences obtained showed a narrow range of diversity, with most of the screened microorganisms belonging to the Methanosarcina genus (Sanz and Kochling, 2007).

Zhang *et al.* (2005) investigated the cloning approach in systems dedicated to the degradation of organic compounds. Working with a methanogenic reactor adapted to phenol degradation, the researchers used cloning in conjunction with in situ hybridization analysis to give a detailed picture of the population, as well as to identify the species responsible for phenol transformation (Sanz and Kochling, 2007). Using the cloning of 16S rDNA technique, several researchers (Hata *et al.*, 2004; Ferrera *et al.*,2004; Chen *et al.*, 2004) have investigated the microbial community structure and established   the phylogenetics of microorganisms in various bioreactors for wastewater treatment.

In general, cloning and rRNA gene library construction have been applied in combination with other techniques in wastewater treatment. Cloning of the whole gene yields far more exact phylogenetic information than other molecular techniques such as FISH and DGGE (Sanz and Kochling, 2007).

B.   DENATURANT   GRADIENT   GEL ELECTROPHORESIS (DGGE)

Denaturant gradient gel electrophoresis is based on the differing mobility on a gel of denatured DNA-fragments of the same size but with different nucleic acid sequences, thus generating band patterns that directly reflect the genetic biodiversity of the sample. The number of bands corresponds to the number of dominant species. Coupled with sequencing and phylogenetic analysis of the bands, this method can give a good overview of the composition of a given microbial community (Sanz and Kochling, 2007).

DGGE method has been employed in the characterization of a wide array of habitats, such as soil, bacterioplankton, hot springs, continental waters, etc (Sanz and Kochling, 2007).The technique is less widely used in anaerobic wastewater treatment, though in recent years DGGE seems to be increasingly popular as it has been used for the evaluation of the granular sludge's microbial diversity from UASB reactors treating brewery (Chan *et al.*,2001), alcohol distillery (Akarsubasi *et al.*, 2006), and unbleached pulp plant wastewaters (Buzzini *et al.*,2006).

The technique is not used alone but rather as part of a combined approach with other methods, for example with in situ hybridization in the study of sulfate reducing bacteria (Santegoeds *et al.*, 1998) or phosphorous elimination (Onda *et al.*, 2002). Both these are good examples of the advantages of combining fingerprinting with in situ hybridization. The authors managed to trace the most probable protagonist in the process by evaluating DGGE band intensity and then designing a specific probe with the help of the predominant band sequence, in turn enabling quantification of the candidate and confirmation of the results obtained by DGGE (Sanz and Kochling, 2007).

The most important application of DGGE is monitoring dynamic changes in microbial communities, especially when many samples have to be processed. There are multiple applications of DGGE related to anaerobic digestion processes. These include: studies on differences between mesophilic and thermophilic reactors, demonstrating the lower biodiversity in thermophilic reactors used for the treatment of residual waters generated by the pharmaceutical industry (Lapara *et al.*,2000); analysis of the changes observed in the bacterial diversity of an anaerobic digester for treating urban solid waste (Silvay *et al.*,2000); studies on the changes in bacterial communities in a continuous stirred tank reactor (CSTR) in response to dilution rate (Ueno et ai., 2001). Nakagawa *et al.* (2002) monitored changes in an ethylbenzene-degrading acterial consortium in enrichment cultures under anaerobic, sulfatereducing conditions. By monitoring the predominant bacterial species over a period of 127 days, they identified a dominant bacterium that was present throughout the whole incubation period and most likely to be the microorganism responsible for ethylbenzene degradation. Both spatial and temporal changes in microbial community profiles were monitored by Pereira *et al.* (2002), in a study of expanded granular sludge bed (EGSB) reactors for the treatment of oleic acid. With this approach, the researchers were able to add another dimension to the analysis and compare the change in microbial communities in different layers of the sludge bed, as well as changes over the time (Sanz and Kochling, 2007).

Recently, Xing *et al.* (2005) used DGGE fingerprinting to monitor changes in the microbial community of a hydrogen producing bioreactor during the different phases of the process. The authors detected shifts in the population during start-up followed by stabilization once the process was running, and also found that cometabolism and mutual relationships played an important role in the microbial community involved in biological H_2 production(Sanz and Kochling, 2007). In another study, Roest *et al.* (2005) monitored microbial populations in a UASB reactor for treating paper mill wastewater over 3 years. With a combination of different molecular techniques and even conventional microbiological methodology, the authors were able to accurately describe the biological component of the process.

Several researchers have described changes in the microbial community taking place in different reactors (Connaughton *et al.*(2006); Liu *et al.* (2002); Park and Lee (2005).

C. FLUORESCENT IN SITU HYBRIDIZATION (FISH)

One of the ways to overcome some of the problems of studying microbial populations of a microcosm without resorting to traditional methodology is to use fluorescent probes. These are short sequences of DNA (16–20 nucleotides) labeled with a fluorescent dye. These sequences recognize 16S rRNA sequences in fixed cells and hybridize with them in situ (DNA–RNA matching). Microorganisms can be identified, localized and quantified in almost every ecosystem with hybridization (Amann *et al.*, 1990). The specificity of the probe enables detection/identification on any desired taxonomic level, from Domain down to a resolution suitable for differentiating between individual species. Previous knowledge of the expected microorganisms in the sample is often required to apply this method successfully. To target a particular species, a specific probe must be ready or its 16S rRNA sequence must be available (Sanz and Kochling, 2007). The use of oligonucleotide probes targeting 16S rRNA presents a revolution in microbial ecology, both for basic research and practical applications. Within the area of wastewater treatment, hybridization techniques are by far the most extensively used ones.

The applications of FISH in the wastewater treatment field have been directed towards study of the microorganisms taking part in the biological elimination of nitrogen and, to a lesser extent, phosphorous. Previous studies have dealt with the composition of nitrifying populations in bioreactors (Kim *et al.*, 2001;,Mosquera *et al.*,2005;,Okabe and Watanabe,2000), the predominant role of the ammonia- oxidizing Nitrosococcus and the nitrite-oxidizing Nitrospira in the nitrification process (Daims *et al.*,2001), or practical guidelines for developing highly efficient nitrifying biofilms (Tsuneda *et al.*,2000) FISH successfully identified anammox bacteria in different reactor types and wastewaters (Egli *et al* .,2001).

Studies that further illustrate the application of FISH in anaerobic digestion have dealt with the interaction and distribution of trophic groups, such as sulfate reducing bacteria and methanogenic archaea in methanogenic/sulfidogenic reactors (Santegoeds et al.,1999) or differentiation between hydrogenotrophic and acetoclastic methanobacteria, and within this group between Methanosaeta and Methanosarcina (Gonzalez *et al.*,2001;Rocheleau *et al.*,1999).

Researchers have combine complementary techniques in their studies which is evident in the work of Diaz *et al.* (2006) who have studied the microbial composition and structure of different types of granule in a UASB reactor that treated wastewater from a brewery. The authors used FISH, DGGE, cloning, and electron microscopy to gain insight into the structure, function and physical appearance of methanogenic granules. The use of multiple techniques was necessary to elucidate the structure-function relationship of the different granules (Sanz and Kochling, 2007). Roest *et al.* (2005) studied in depth the microbial community of granules from a reactor treating paper mill wastewater with a similar approach.

In situ hybridization has been also used as a molecular tool to describe microbial communities in other anaerobic wastewater treatment systems besides UASB reactors. A few studies include: analysis of the microbial composition of the biomass inside an anaerobic baffled reactor (Plumb *et a*l.,2001); various studies of membrane reactor systems [Luxmy., 2000;Rosenberger *et al.*, 2000]; the identification and characterization of anammox microorganisms in different systems by Jetten *et al.* [Jetten *et al.*, 2005] and the observation of anaerobic biofilm development (Araujo *et al.*, 2000).The advantages and disadvantages of the three (3) types of molecular biology techniques are presented in Table 5.

Table 5: Advantages and Disadvantages of the three (3) types of Molecular biology techniques

	Advantages	Disadvantages	References
Cloning of 16S rDNA	Complete 16S rRNA sequencing allows: *very precise taxonomic studies and phylogenetic trees of high resolution to be obtained; *design of primers (for PCR) and probes (for FISH). If time and effort is not a limiting factor, the approach covers most microorganisms, including minority groups, which would be hard to detect with genetic fingerprinting methods. Identification of microorganisms that have not been yet cultured or identified.	Very time consuming and laborious, making it unpractical for high sample throughput. Extraction of a DNA pool representative of the microbial community can be difficult when working with certain sample types (e.g. soil, sediments). Many clones have to be sequenced to ensure most of individual species in the sample are covered. It is not quantitative. The PCR step can favor certain species due to differences in DNA target site accessibility. This technology may be too complex, need specialized personnel and equipment.	Sanz and Kochling, (2007).
Denaturant gradient gel electrophoresis (DGGE)	Permits rapid and simple monitoring of the spatial-temporal variability of microbial populations if just band patterns are considered. It is relatively easy to obtain an overview of the dominant species of an ecosystem. It is adequate for analysis of a large number of samples (far more than cloning).	Depending on the nature of the sample, extraction and amplification of representative genomic DNA can be difficult (as in cloning). After the PCR amplification, the DNA copy number – which depends on abundance of a particular microorganism and the ease of amplification of the 16S rRNA – can be very different (as in cloning). The intensity the bands obtained on a DGGE gel may therefore vary (not quantitative). The number of detected bands is usually small, which implies: *the number of identified species is also small; *the bands correspond, although not necessarily, to the predominant species in the original sample. The sequences of the bands obtained from a gel correspond to short DNA fragments (200–600 bp), and so phylogenetic relations	Sanz and Kochling, (2007).

		are less reliably established than with cloning of the whole 16S rRNA gene. In addition, short sequences are less useful for designing new specific primers and probes.	
Fluorescent in situ hybridization (FISH)	Easy and fast if required probes are available. Allows direct visualization of non-cultured microorganisms. Generally quantitative. Quantification of specific microbial groups is also possible, in contrast to conventional techniques (most probable number, plate counts) or other molecular techniques. Differential/preferential detection of active microorganisms. Apt for routine use, highly trained and specialized personnel is not necessary, only a basic knowledge of microscopy and laboratory experience are required.	A prior knowledge of the ecosystem under study and the microorganisms most likely to be detected is necessary (combined use with other techniques may be necessary). If a particular microorganism has to be detected and quantified, its rRNA sequence must be known (if the corresponding probe has not yet been published). The design of a specific and unambiguously restrictive probe for a certain group of microorganisms is not always possible, especially if metabolic criteria are applied (e.g. nitrifying bacteria, halo-respiring bacteria). The design and optimization of hybridization conditions for a new probe is a difficult process that requires experience and dedication, and the results may not always be satisfactory. Quantification can be tedious and subjective (manual counting) or complex (image analysis). Structural analysis of aggregates (granular sludge, biofilms) requires a confocal microscope and an image analysis environment (expensive, trained personnel necessary).	Sanz and Kochling, (2007).

XI. MICROBIAL COMMUNITIES

Molecular biology tools are providing insight into the microbial community dynamics and structure during anaerobic

processes. This information can be used to improve treatment processes. The majority of tools used involve DNA extraction, 16S rRNA gene sequencing with polymerase chain reaction (PCR), quantitative PCR, clone libraries, fluorescence in-situ hybridization (FISH) and denaturing gradient gel electrophoresis (DGGE).

A. Process dynamics linked to microbial community structure

Two-stage anaerobic digesters consisting of one acidogenic reactor and one methanogenic reactor were set-up to treat food waste-recycling wastewater (Shin, Han, *et al.*, 2010).Process performance in the reactors was stable with COD removal efficiencies of 73.0-85.9% even with microbial community shifts in both reactors. Similar findings by Wang *et al.* (2010) were found for two full-scale wastewater systems where bacterial community structure changed significantly while functionality remained stable. The wastewater treatment systems were anaerobic/anoxic/aerobic and anoxic/aerobic with nitrified water recirculation. The stability was measured using effluent BOD, total nitrogen and ammonia concentrations.

Clostridium thermopalmarium and *Clostridium novyi* were found to be key players in the hydrolysis of suspended organic matter in food waste-recycling wastewater (Kim, Song, *et al.*, 2010). *C. thermopalmarium* was the butyric acid producer, and C. novyi was the propionic acid producer. Maximum efficiency was found at a pH of 5.7 and temperature of 44.5^{o}C. Gas production, organic acid consumption and methanogenic population were tracked in a maize silage reactor operating at 37°C (Blume *et al.*, 2010). Hydrogenotrophic *Methanobacterials* dominated at OLRs equal or greater than 3.7 g-DOM/(L·d), In contrast, aceticlastic *Methanosaetacaea* dominated at lower OLRs and disappeared at OLRs greater than 4.1 g- DOM/(L·d). A comparison of membrane-bioreactors and submerged-biofilter wastewater treatment plant (WWTP) showed significant differences in Archaea make-up (Gómez-Silván *et al.*, 2010). Treatment type and wastewater origin affected these results. Thirty-two different temperature-gradient gel electrophoresis (TGGE) bands were identified with five dominating the samples (Evans *et al.*, 2011).

B. Microbial characterization of isolates and communities

Methane production in anaerobic bioreactors can occur through syntrophic acetate-oxidizing bacteria. Westerholm *et al.* (2010) reported the isolation of one of these novel bacteria, *Syntrophaceticus schinkii*, from a mesophilic methanogenic digester. This bacterium is related to *Thermacetogenium phaeum* with 92% 16S rRNA sequence similarity. The isolate is capable of using ethanol, betaine and lactate as carbon and electron sources and grows in temperatures of 25-40oC and pH of 6-8. A different organism was isolated from a digester treating palm oil mill effluent (Zakaria *et al.*, 2010). The isolate is classified as a *Comamonas* sp. with the capacity to grow on acetic, propionic and n-butyric acids and is unique in its capacity to form polyhydroxyalkanoates.

Anaerobic digestion of cheese-processing wastewater showed dominance of aceticlastic *Methanosarcinaceae a*nd hydrogenotrophic *Methanomicrobiales* (Lee, Kim, *et al.*, 2010).

A thermophilic anaerobic digester for beet silage and beet juice was operated for seven years (Krakat *et al.*, 2010).

Morphologically rods dominated at 55°C, while rods and coccoids dominated at 60°C. Hydrogenotrophic *Methanobacteriales* dominated the microbial community,which contrasts findings from Anaerobid Digestion Model 1 (ADM1), which attributes dominance to acetotrophic *Euryarchaeota* in these conditions. The microbial community structure was determined for a full-scale anaerobic digester treating industrial food waste and seeded with sludge from treated swine waste (Ike *et al.*, 2010). The microbial community structure deviated significantly from the seed sludge community, with *Actinomyces, Thermomonospora, Ralstonia* and *Shewanella* hydrolyzing and *Methanosarcina, Methanobrevibacter* and *Methanobacterium* producing methane.

Activated sludge was used to treat carbazole-containing wastewater in a 70°C ultrasound anaerobic reactor (Tan and Ji, 2010). *Pseudomonas* sp., *Comamonas* sp. and *Diaphorobacter* sp. were found to use carbazole as a carbon source. Anaerobic landfill leachate was analyzed with a 16S rRNA clone library (Limam *et al.*, 2010). *Lentisphaerae* dominated the community with 98% of the clone library sequences.

Capacity of anaerobic wastewater treatment bioreactors to form biomass granules was tested at 15°C (O'Reilly *et al.*, 2010). *Methanocorpusculum* dominated, and only formed granules in the glucose fed bioreactor.

An anaerobic batch digester used for treating secondary sludge had an organic removal efficiency of 35% (Shin, Lee, *et al.*, 2010). *Fusibacter, Clostridium and Syntrophus* likely carried out acidogenesis.*Methanosarcinales and Methanomicrobiales* were present with the latter dominating.

Bergmann *et al.* (2010) also looked at methanogenic populations in a mesophilic biogas plant. Quantitative PCR determined that the methanogenic population was made of 84% *Methanomicrobiales*, 14% *Methanosarcinales* and 2% *Methanobacteriales.* In a study competed by Huang *et al.* (2010), hydrogen production was linked to the most dominant producer – *C. perfringens.*

XII. SWINE WASTEWATER

Li, *et al.* (2010) showed the close link between bacterial community makeup and treatment efficiency with a UASB reactor treating swine wastewater. Reactor acclimatization consisted of 3.5 g-COD/L influent, methane production of 9.5 L/d and a COD removal rate of 90%. At steady-state, the reactor had 3.0-6.0 g-COD/L influent, methane production of 9.5-13.2L/d and a COD removal rate of 90-95%. Microbial community diversity did not change significantly from start-up to steady-state operation. Contrasting findings were found in Kim *et al.* (2010) where two anaerobic batch digesters were seeded with anaerobic sludge from a WWTP to treat swine wastewater. Methane production differed in the two reactors from 4.5 L/L to 7.9 L/L. This difference was attributed to the abundance of *Methanomicrobiales* and propionate in the reactors. Abundance of *Methanobacteriales and Methanosarcinales* were found to be consistent in the two reactors.

Several researchers have elucidated methanogenic population composition in reactors treating swine wastewater.

Hydrogenotrophic methanogens such as *Methanobacteriales* dominated in a UASB reactor (Song *et al.*, 2010). Patil *et al.* (2010) found *Methanothermobacter* sp. and g-*Proteobacteria* dominated a thermophilic digester while *Firmicutes, Methanosarcina* and *Methanoculleu*s dominated a mesophilic reactor. Kim *et al.* (2010) characterized a mesophilic sludge used for thermal acidogenesis of swine wastewater at $51^{\circ}C$. The DGGE profiles indicated that *Pseudomonas mendocina*, *Bacillus halodurans*, *Clostridium hastiforme*, *Gracilibacter thermotolerans* and *Thermomonas haemolytica* are present.

XIII.   EFFECTIVENESS OF MOLECULAR BIOLOGY TECHNIQUES

Zhou *et al.* (2010) showed that the combined use of PCR-DGGE, gas chromatograph (GC)   analysis and triphenyltetrazolium chloride (TTC) dehydrogenase activity test are effective in evaluating changes in microbial activity, structure and quantity. These microbiological tools were tested on a bio-fluidized bed with an anaerobic-oxic-oxic process for treating coking wastewater. Ramos *et al.* (2010) used a 16S rRNA clone library with restriction fragment length polymorphism (RFLP) analysis to determine microbial diversity in a UASB reactor. The use of *HaeIII* simplified the 162 clones down to 28 distinct organisms, providing a simple and fast method for identifying microbial diversity. The use of PCR-DGGE was applied to estimate microbial population sizes in a UASB reactor treating streptomycin (Liu, Yang, *et al.*, 2010). *E. coli* was inoculated and used as an internal standard, which allowed for good correlation between band intensity and population size. Microbial populations lower than 10^3 CFU/g were undetectable.

XIV.   INHIBITION OF METHANOGENESIS

Methanogens are important in anaerobic sludge digestion. Chloroform and 2- bromoethanesulfonate are two known inhibitors of methanogenesis, but little is known of their impact on microbial communities (Evans *et al.*, 2011). Xu *et al.* (2010) completed a recent study that showed acetoclastic *Methanosaetaceae* were more sensitive to the inhibitors than hydrogenotrophic *Methanobacteriales* and *Methanomicrobiales*. This in turn affected methane production by the microbial community in the activated sludge.

In contrast, prolonged starvation of methanogens treating swine wastewater did not greatly affect cell numbers of *Methanosarcinales* or methanogenesis (Hwang *et al.*, 2010). The effect of nitrite and ammonium on two methanotrophic bacteria, *Methylomicrobium album* and *Methylocystis* sp., was tested (Nyerges *et al.*, 2010*). M. album* dominated in high nitrite levels, while   *Methylocystis* sp. dominated in high ammonium levels

XV.   INHIBITION OF THE ANAEROBIC PROCESS

Toxicants or inhibitors are mainly present from, but not necessarily limited to, differing compounds in the influent, excessive or limiting nutrients available for metabolism of the biomass, and waste products formed in the process (Evans *et al.*, 2011).

Martins *et al.* (2010) studied the use of Fenton's process for treating milk whey wastewater treatment effluent to produce a final effluent that could be discharged directly to the natural stream. They found that the hydrogen peroxide concentration and the ratio between $H_2O_2:Fe^{2+}$ was important to total organic carbon (TOC) and COD removal. When the optimum of both was achieved a harmless effluent resulted.

Sabalowsky and Semprini (2010b) exposed two reductively dechlorinating anaerobic cultures (Evanite and Point Mugu) to high concentrations of chlorinated aliphatic hydrocarbons (CAH). Both cultures accumulated cis-1,2-dichloroethene (cDCE) in a batch-fed reactor to   concentrations ranging from 9,000 – 12,000 uM before a loss in activity occurred. A concentration toxicity model was assembled incorporating CAH toxicity in terms of cell decay. A toxicity model that Sabalowsky and Semprini(2010a) assembled was extended to observations in continuous flow suspended and attached growth reactors.The model incorporating cDCE and trichloroethene (TCE) toxicity was predictive in determining that the cells in batch-fed growth are most sensitive to high concentrations of cDCE and TCE followed by the continuous flow   stirred tank reactor and finally the attached growth being the least sensitive. Àlvarez *et al.* (2010) reviewed the inhibition caused by the antibiotics oxytetracycline (OTC)   and Chlortetracycline (CTC) on pig manure anaerobic digestion (AD). The study found that varying concentrations of OTC and CTC combinations of 10, 50 and 100 mg/L fed to the reactor reduced methane production 56%, 60% and 62% respectively.

Dilute ethylene glycol aircraft deicing fluid was successfully treated using a four compartment anaerobic baffled reactor (ABR) (Marin *et al.*, 2010). The research team fed three dilute concentrations to the reactor and all achieved over 75% soluble COD removal. Acetoclastic activity changed throughout the study in each chamber suggesting that microbial differentiation was occurring in each chamber. Palatsi *et al.* (2010) fed manure and pulsed long- chain fatty acid (LCFA) into a   thermophilic anaerobic digester to determine microbial toxicity. They found significant microbial community changes occurred during the inhibitory pulses. They used the IWA ADM1 model and changed the kinetics to account for the inhibition of the LCFA resulting in an improved fit. Organic overloading may have an inhibitory effect on the high-solids AD of   municipal solid waste (MSW) (Schievano *et al.*,2010). The authors investigated a new approach by observing the putrescibility of organic mixtures. They found that measuring the organic loading calculated as OD_{20} (oxygen consumption in 20 h. biodegradation) was a very good indicator of inhibitory effects. Inhibition started at an $OD_{20} > 17 - 18g$-O_2/kg (Evans *et al.*, 2011).

Stone *et al.* (2010) studied the effects of Tylosin and Chlortetracycline (CTC) on swine manure digestion in the presence of sodium azide. CTC alone improved hydrolysis but inhibited methane and carbon dioxide production. Tylosin alone did not influence methane or carbon dioxide production but inhibited hydrogen and acetate-only microbial populations. Sodium azide alone enhanced biomass production and metabolic output.Sodium azide in the presence of Tylosin or CTC inhibited metabolism and methane and carbon dioxide production. Ismail *et al.* (2010) utilized four UASB reactors to evaluate EPS in a high saline environment. Reactor R1 was fed fully acidified

substrate while reactors R2 – R4 were fed partially acidified substrate. EPS was extracted by cation exchange. Bulk liquid Ca^2+ leaching was observed in granular sludge samples in the presence of 20-g Na^+/L.Extracted proteins were higher in reactors R2 – R4. An attempt to reduce recovery times by bioaugmentation after a transient toxic event in anaerobic digesters was studied (Schauer-Gimenez *et al.*, 2010). An H_2 utilizing culture was used as the bioaugmentation agent. It was found that recovery times do decrease after a transient toxic event and that propionate decreases and biogas production increases. Digesters that are adaptable will not benefit from this therapy but those with poorly adaptable microbes may benefit highly.

Addition of metal nutrient supplements to simulate acetoclastic methanogens was examined (Park,Bega, *et al.*, 2010). Two full-scale mesophilic digesters were examined using methane potential tests. Acetoclastic methanogens from a recently cleaned digester were not affected by low concentrations of trace metals including iron, cobalt and nickel. Another digester not having been cleaned for over 10 years was slightly affected with metal supplementation. Stressed acetoclastic methanogens are susceptible with trace metal supplements. Pirc *et al.* 2010) investigated cyanide influence on biogas production in AD of glucose. Cyanide was fed to the reactor at concentrations of 325 to 31,000 mg/L. Significant inhibition was found with cyanide concentrations greater than 2,600 mg/L.

XVI. CHALLENGES/RECOMMENDATION

The ponding system which is currently being practice by most mills to treat POME do not identify the individual microorganisms involve in degrading and utilizing the different components (oil and grease, total solids, total dissolve solids, total suspended solids, total volatile solids etc) in POME and hence discharge poor quality effluent into the environment. Knowledge of the biodiversity of the different composition of microbial consortium in the pond treating POME and bioreactors is crucial as this will establish the right compositions of individual microbial isolates or consortium to use at any particular given time in removing or reducing the components making up the overall COD and also to establish the substrates which the individual isolates utilize. In addition, the microorganisms are not established and hence the substrate they degrade and utilize is not ascertained. This lead to poor effluent discharge into the environment as the performance of the microorganisms with regards to the rate of reduction and removal of oily waste and cellulolytic material cannot be monitor since they are not known. This could pose challenges as the identities of the microbial isolates are not known and point to the limitation of this system.

It is worthy of note that the standard regulation governing the discharge of POME did not include COD and total solids(TS) in their schedule and excruciating as it may be, the standard has not being renew all these years. There is need for the government to look into the POME regulation standard with a view to fill in any missing gaps (inclusion of COD and TS) for better performance.

Since the identification of microorganisms by conventional methods requires the isolation of pure cultures followed by laborious characterization experiments, we therefore note here that the procedures are therefore inadequate for study of the biodiversity of a natural or engineered ecosystem like POME. A new set of molecular biology techniques developed during the 1990s has revolutionized microbial ecology research and hence we recommend the use of these techniques in monitoring the microbial population dynamic changes in microbial communities in POME.

These genetic fingerprinting techniques in molecular ecology will identify/detect, localize and quantify specific species of microorganisms utilizing and degrading the components' in POME both in the mesophlic and thermophlic stages in the treatment process. The predominant bacterial and fungal species will be identify and the most dominant species present in POME throughout the treatment process and responsible for the degradation and utilization will be establish and this is a step in the right direction as this will improve POME treatment since the organisms is establish and the substrate they utilize is ascertain.

We will like to state that the advantages of the molecular biology techniques in wastewater treatment are enormous as this will aid the identification of microorganisms that have not yet been culture or identify in POME treatment and when isolated, it could be the most suitable candidate organisms for bioremediation of polluted environment with POME.

To this end, the impact of POME on the environment calls for further studies in the areas of minimizing high COD and BOD load using other novel technologies or improve research technology for future advancement on the present status of POME treatment and continues utilization of POME as a suitable fermentation medium or substrates for the production of products such as organic acid, antibiotics, cellulase etc and for the production of fertilizer in order to reduce the burden caused by POME on the environment. Many palm oil mills are still unable to adhere to the wastewater discharge limits and thus resulting to a dramatic increase in the number of polluted rivers (Ahmad and Chan, 2009). The mills should routinely sample their pond in order to comply with government regulated standard for effluent discharge. The government on their own part should monitor the mills whether they comply with the said specifications and periodically make amendment and modifications in the regulation standard for POME discharge so as to better improve good quality effluent discharge into the environment.

XVII. FURTHER RESEARCH/STUDY

We will also like to reiterate and elucidate further that there is need to establish all the different composition of the microbial consortium in the anaerobic digester/bioreactor and pond use for POME treatment in mills as aforementioned in order to establish the most suitable microbial community or individual isolate utilizing and degrading the different components making up the overall COD in POME due to the inconsistency of POME. Secondly, for future improvement and advance research or improve technology in POME treatment, molecular biology techniques as earlier discussed should be use to provide more comprehensive study on the successional trend of microbial isolates utilizing and degrading POME in the anaerobic

bioreactor and the pond in mills as this can be use to improve treatment processes. Thirdly, the failure of the existing bioreactor/digester to achieve 100% removal of basic waste water parameters such as chemical oxygen demand (COD), therefore demand further research and development of novel bioreactor for effective treatment of POME(Jemeel *et al.*, 2011). This is a step in the right direction as this will improve POME treatment.

XVIII. CONCLUSION

Palm oil mill wastes have existed for years but their effects on environment are at present more noticeable. When discharged untreated, they may cause serious problem and deteriorates the environment. Due to the aforementioned, the palm oil industry faces the challenge of balancing the environmental protection, its economic viability and sustainable development. There is an urgent need to find an efficient and practical approach to preserve the environment while keeping the economy growing and maintaining the sustainability of the economy. Thus, while enjoying a most profitable commodity, the adverse environmental impact from the palm oil industry cannot be ignored. Hence, serious measures have to be taken in order to prevent the growing pollution and ecological degradation related to POME.

Considering the high organic concentration of POME, anaerobic process is the most suitable approach for its treatment. Hence, employing the biochemical abilities of microorganisms is the most popular strategy for the biological treatment of palm oil mill effluent. Microorganisms, than any other class of organisms, have a unique ability to interact both chemically and physically with a huge range of both man – made and naturally occurring compounds leading to a structural change to, or the complete degradation of, the target molecule. Anaerobic treatment of POME result in the production of methane as a value added product. Molecular biology tools is a veritable preferred and suggested technique which has the potential of providing insight into the microbial community dynamics and structure during anaerobic processes in wastewater treatment. In addition, the potential of using the molecular biology techniques to provide detailed profile of the microbial community structure and to establish the phylogenetics of microorganisms in bioreactors used for POME treatment will enhance wastewater treatment processes. This information can be used to improved POME treatment processes which will produce acceptable quality effluent before it can be discharged into the watercourse for land application with no harmful effect on the environment.

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RFID Based Automated Toll Plaza System

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Abstract- This research paper describes the automated toll collection system for toll gate based on RFID technology. Most of the toll collection systems commonly used in Myanmar is manual transaction. Nowadays, streams of traffic are increased and toll gate on highways are congested. It will cause the traffic jam and waste time. The objective of this journal paper is to transform manual transaction to automated toll collection with the help of RFID technology. There are three portions in toll collection system. They are RFID system, balance deduction system in host computer and toll gate control system. For the RFID system, 13.56 MHz passive RFID reader and tag pairs are used. The balance deduction system is implemented by Microsoft Visual Studio and Microsoft SQL Server as IDE. C# language is used to implement this system. The PIC microcontroller is also used to control the stepper motor and display the deposit on the LCD. The authorized person at the toll gate can check the ID numbers, vehicle numbers and the amount of balance with the database on PC. The new user can register and update the amount of balance via Graphical User Interface (GUI) easily. The amount of deposits will also update simultaneously at the two database of the toll gate because of LAN network. By using this system, it will save time, i.e. by avoiding long queue as no need to stop the vehicle and no need of manual transaction at the toll gate.

Index Terms- RFID, Microsoft Visual Studio, Stepper Motor, Database

I. Introduction

Nowadays, increasing traffic volume causes congestions commonly around the toll gate of highway. Therefore, the new technique is urgently required to reform the problem of congestions. Automated toll collection system is one of the methods to solve the above conditions. The automated system is composed of several subsystems. The RFID technology, computer database, power supply, microcontroller, motor and inferred device are included. Automated system can bring the several sectors for toll gates as saving time and reducing the human workers. Develop the prototype model, which reproduces the operation states of various toll gate systems: passing time and waiting time.

The RFID tag and RFID reader are contained in RFID technology. RFID means Radio Frequency Identification that consists of the tags which can be either active or passive tag. Passive tag do not have own power supply, much cheaper to manufacture and small coil antenna is used. On the other hand, active tag must have own power supply. It has longer range and larger memories. It can store additional information sent the RFID reader.RFID reader is an interrogator. It is placed at the

toll gate on every single row where vehicles are passed. The reader contains an RF module, which acts as both transmitter and receiver of radio frequency signals. The reader generates the signal to receive the data from tag. The received signals send to the computer system which contains Graphical User Interface (GUI) and the database of all users. The ID number from the tag checks with the recorded database and deduces the toll tax. The computer and microcontroller are connected with USB cable. So, the PIC 18F4550 microcontroller is very compatible for system. The microcontroller will display the amount of deposits on LCD and the gate will open. The IR sensor senses the vehicle motion for closing gate automatically.

II. Related Work

In [3], the author mentioned that the micro simulation model for the automated toll plaza system using RFID technology. The 8051 microcontroller is used for the control system. The signal is sent to the PC via RS-232 cable from PIC. In this system, the microcontroller is the main part of the system because of the signal is sent to PC and the output results showed on the LCD display. And then, the microcontroller sent the signal to the motor driver for opening the traffic gate. The author also described the GSM modem to update the information about the database of user account.

In [5], the author explained that the RFID based automatic toll gated system. The frequency 928 MHz is used for the communication between RFID system and the control system. The microcontroller was programmed using the C programming language and Visual Basic was used in the serial communication between the computer and the RFID as well as with the PIC. The database was developed using Microsoft Access because it can contain up to 32768 records of objects. The RS-232 cable is also used for the connection between PIC and PC.

III. Design and Implementation for the System

In order to design and implement the automated toll collection system, it should be divided into two main systems. They are hardware design for the system and software implementation for the system.

A. Hardware Design for the system

The automated system using RFID technology can be classified into two modules. They are vehicle module and base module. The vehicle module consists of passive RFID tag. The RFID reader, host computer system and gate control system are composed as the base module. The general RFID based toll tax image in figure1 and the block diagram of automated toll collection system is described in figure2.

Figure1.General RFID based toll tax image

Figure2.Block diagram of the Toll gate System (Base module)

Figure3. Circuit Diagram of Gate Control System

The major components of the gate control system are as follow:

- ❖ PIC 18F4550 microcontroller
- ❖ Motor driver
- ❖ Stepper motor
- ❖ LCD display
- ❖ 555 timer
- ❖ IR sensor
- ❖ Power supply unit

1. PIC 18F4550 microcontroller

The PIC 18F4550 a is 16 bit microcontroller which contains a program memory of 32-kbytes, data memory of 256 byte, version 2.0 USB compliant, DC operating frequency of 48MHz, 10bit A/D module (13 channels) and wide operating voltage range (2.2V to 5.2V). The main reasons of using PIC 18f4550 are compliant of USB connection, many I/O ports and having interrupt pin for IR sensor (RB0).

2. Motor Driver

The ULN2003A driver IC is used for this system. An ULN2003A is a high-voltage, high-current Darlington transistor array features continuous load current rating to 500mA for each of the seven driver. High output voltage is 50V. Its input is compatible with various types of logic.

3. Stepper Motor

The stepper motor is an electronic device that converts digital pulses into mechanical shaft rotation. The most significant advantage of stepper motor is its ability to be accurately controlled in an open loop system. The advantages of stepper motor are –

- ❖ Low cost and high reliability
- ❖ High torque at low speeds and a simple
- ❖ Rugged construction that operates in almost any environment

There are two types of stepper motor. They are unipolar stepper motor and bipolar stepper motor.The unipolar stepper motor is used for this system because its winding is made relatively simple with the communication circuit than bipolar stepper motor in open loop system. The supply voltage for motor is 12V. This motor is used to open the traffic gate at the toll gate station.

4. Liquid Crystal Display (LCD)

This module used for display the present status of the system. This is interface to 4 bit mode with LM016L

microcontroller LCD screen consists of two lines with sixteen characters each.

5. 555 Timer

The 555 timer IC is an integrated circuit (chip) used in a variety of timer, pulse generation, and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. The supply voltage is usually between 3 and 15V depending on the variation. The 555 timer has three operation modes :

(a) Monostable operation mode

In this mode, the 555 functions as a "one-shot" pulse generator.Applications include timers, missing pulse detectionfrequency divider, capacitance measurement, pulse-width modulation (PWM) and so on.

(b) Astable operation mode

The 555 can operate as an oscillator.Uses include LED and lamp flashers, pulse generation, logic clocks, security alarms, pulse position modulation and so on.The 555 can be used as a simple ADC, converting an analog value to a pulse length.

(c) Bistable operation mode

The 555 can operate as a flip-flop, if the DIS pin (pin7) is not connected and no capacitor is used. Uses include bounce-free latched switches.

6. Infrared Sensor (IR Sensor)

The IR sensor is a detection device for motion and other devices. There are two portions for object detection. They are –

(i)   Transmitter section

The transmitter section sends out a wave at a certain frequency such as 38kHz or other frequencies. The frequency choosing depends on the receiver IR sensor. In this system, the transmitter is designed for 38kHz frequency. The 555 timer is used as an astable state. The variable resistor can adjust upto a certain frequency. The transmitter circuit diagram is designed as shown in figure4.

The frequency oscillation of the astable operation for 555 timer is

$$f = \frac{1.44}{(R_1 + 2R_2)\,C_1}$$

f = frequency (Hz), R2 = variable resistor (8.123k ohms), C1 = capacitor (0.002 uF).

(ii)   Receiver section

The receiver section is designed to pick up the tramsmitted frequency. The 555 timer is also used in the receiver circuit as the monostable state. The output condition of the 555 timer IC is need to stable and send these signal to the PORTB (RB0) of the PIC 18F4550 microcontroller. TSOP 1738 IR sensor is used for the system because of the transmitted frequency is 38kHz. The TSOP 1738 is a standard IR remote control receiver.
The features of TSOP 1738 IR sensor are as follows.

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Low power consumption
- High immunity against ambient light
- Continuous data transmission possible (1200 bit/s)
- Suitable burst length is 10 cycles/burst

The receiver circuit diagram using TSOP 1738 IR sensor is shown in figure4.

Figure4.(1) Transmitter circuit for 38 kHz frequency using IR LED, (2) Receiver circuit using TSOP 1738 IR sensor

7. Power Supply Unit

The DC power supply unit is vital component in modern electronic devices as they need a wide range of DC voltages for their operations. The purpose of a power supply is to provide the required amount of power specified voltage from primary source.

B. Software Implementation for the system

To accomplish the system, the choosing of software is very important. The Microsoft SQL Server 2008 and Microsoft Visual Studio 2010 are used as Integrated Development Environment (IDE). The C# language and mikroC language are also used to implement the system. The C# language is familiar with many users and suitable for GUI design. The PIC microcontroller is programmed with the PIC kit2 programmer device.

❖ Microsoft SQL Server

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database, it is a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network (including the Internet).

❖ Microsoft Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows superfamily of operating systems, as well as web sites, web applications and web services. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms applications, Windows Presentation Foundation and Windows Store. This IDE can connect with database by using query language. The C# language is used to write the program.

❖ C# language

C sharp is a programming language that is designed for building a variety of applications that run on the .NET Framework. C# is simple, powerful, type-safe, and object-oriented. The many innovations in C# enable rapid application development while retaining the expressiveness and elegance of C-style languages.

❖ Flow Chart of the System

The system can be seen clearly by showing the flow chart of each program. The overall flow chart of the toll collection system is illustrated as follow. The RFID reader reads the ID number from the RFID tag and then will check with the recorded database in host computer system. If the users are not register, they need to create register and the authorized person at the toll gate get user information from them. The user can update the balance at the user updating form. Moreover, if the user quit from using this system, the recorded information can be deleted on the database. The flow chart of user deletion form and IR section are as follow.

Figure5. Overall flow chart for toll collection system and User registration flow chart

Figure6. flow chart for (1) User updating form, (2) User deleting form and (3) IR section for gate control

IV. SIMULATION AND EXPERIMENTAL RESULTS OF THE SYSTEM

Before constructing the automated toll collection system, the database construction and simulations are needed. Therefore the simulation results and experimental results of the system which is implemented are described. In the database, the userID, owner name, car number, driver licence, car model and deposits are constructed as the table. The database table is shown in figure7.

Figure7.Recorded database in SQL Server

The main window form of the toll collection, user registration, user updating and user deletion window forms are as follow.

Figure8. Main window form of the toll collection system and Balance deducing from the user amount

The user's RFID number read from the RFID tag, send these number to the textbox of the GUI for checking with the recorded database. Then, if the balance enough, the amount of deposit will show on the LCD and allow the vehicle. If not, the message will show on the LCD as "Wait". For the new user, the user need to create register on the GUI easily. If the balance is not enough, the balance can update in the user updating form. The unwanted user

for the system can delete from the database on the user deletion form.

The simulation of the USB connection between host computer system and PIC microcontroller using Proteus software is shown in figure9.

Figure9. User registring on the registration form, Updating amount on the user updating form and User deletion form

The output frequency of the IR transmitter circuit is measured with the oscilloscope. This experimental result of the IR transmitter output is shown in figure10(a). The output of the IR receiver circuit is input to the PIC 18F4550 microcontroller. The output results of the IR receiver is also mesaured with the

oscilloscope. The output of the TSOP 1738 IR sensor is also input to the 555 timer. The condition between IR transmitter and receiver circuit without motion is shown in firuge10(b) and the object detection condition is shown in figure6(c).

Figure6. (a) The output frequency (38kHz) mesaurement of the IR transmitter circuit and the outputcondition of the IR receiver circuit (b) no object detected (c) object detected

The prototype construction of the automated toll collection system is shown in figure13.

Figure6. Prototype design and circuit construction diagram

V. CONCLUSION

This system mainly reviewed the research and development work for toll collection at the toll gate on highway with the help of passive RFID technology. By developing this system, the knowledge of RFID system, PIC 18F4550 microcontroller, the database construction, GUI design and USB connection between PC and PIC using c# language are realized. Moreover, the designs of IR transmitter and receiver circuits are convenient for this system. So, these results can use for another IR sensing application. For this system, passive tags are better than the active tags because of low cost, low power consumption and also radio signals environmental factors. By using RFID based automated toll collection system, the vehicle can check for security with the passing time, save the time for toll collection and reduce traffic congestion at the toll plaza. Therefore, the

RFID based toll collection system is the best way for toll collection at the toll plaza.

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Rectangular Microstrip Patch Antenna Array for RFID Application Using 2.45 GHz Frequency Range

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Abstract- In this paper ,a microwave frequency band 2x2 microstrip phased antenna array is designed for an RFID reader system. The main focus will be on optimizing of dimensions of patch antenna for RFID application with resonance frequency of 2.45 GHz. In this paper we discuss the microstrip patch antenna, feeding techniques and phased array antenna with their advantage and disadvantages over conventional microwave antennas. The phased antenna array is used as the receiving antenna in a commercial reader system; experimental results indicate that the coverage of the RFID system with the phased array antenna is superior to with a conventional broader beamwidth microstrip patch antenna. Different parameters of antenna like VSWR, return loss and radiation pattern are calculated using MATLAB coding and hence their graphs are plotted in accordance with the simulated results using SONNET software. Moreover the antenna achieved and measured demonstrates a good agreement between simulation and typical results.

Index Terms- Microstrip Phased Array antenna, Microwave-band, RFID, Microstrip Patch Antenna, SONNET Simulate

I. INTRODUCTION

The Radio Frequency Identification (RFID) technique is supported by Wal-Mart and is becoming one of the most popular wireless communication techniques in the world. RFID has several benefits relative to traditional bar-code technique such as non-contact reading, longer reading range, anti-pollution property, longer lifetime and larger carrying information capacity. In general, RFID systems can be classified into three different types by operating methods which are passive, semi-active and active system. There are different operation frequency and standards in different countries. The common operation frequencies include 125 kHz in LF band, 13.56MHz in HF band, 915MHz in UHF band, 2.45GHz and 5.8GHz in microwave frequency. The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier, through the use of inductive coupling or electromagnetic waves. The data carrier is a microchip attached to an antenna (together called transponder or tag), the latter enabling the chip to transmit information to a reader (or transceiver) within a given range, which can forward the information to a host computer. In order to extend the coverage area of the RFID system, one may implement many readers and antennas with small reading ranges to cover the monitoring area, or use high gain phased array antenna system for extended reading range of an RFID reader for a smaller number of total reader deployments. In this paper, a phased antenna array system is proposed for extending coverage range of an RFID system.

The microstrip patch antenna is one of the most useful antennas for low cost and compact design for RFID applications and wireless systems. The major drawback of microstrip patch antenna is the narrow bandwidth. An individual microstrip patch antenna has a typical gain of about 6 dBi.

In single element antenna, the radiation pattern is usually very broad and the directivity is relatively low. This problem can be solved by enlarging the size of the element thus increasing the directivity. Another way to enlarge the antenna without changing the size of the individual elements is to assemble the radiating elements in a geometrical configuration known as an "array".

II. MICROSTRIP PATCH ANTENNA

A microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side as shown in Figure 1. The patch is generally made of conducting material such as copper or gold and can take any possible shape. The radiating patch and the feed lines are usually photoetched on the dielectric substrate. Arrays of antennas can be photoetched on the substrate, along with their feeding networks.

Figure 1 : A Typical Microstrip Patch Antenna

A.Feeding Method

There are many methods of feeding a microstrip antenna. The most popular methods are: Microstrip Line, Coaxial Probe (coplanar feed), Proximity Coupling, Aperture Coupling. Table-l shows different properties of different feeding mechanisms. Based on the properties in Table-l and also on the heritage, Line Fed in combination with Co-axial fed probe is used for design purpose since it provides better matching and wide bandwidth and low feed radiations.

Table I: Microstrip Feeding Mechanisms Properties

Characteristic	Line Feed	Probe Feed	Aperture Coupled Feed	Proximity Coupled Feed
Feed Radiation	Less	Less	Less	Minimum
Reliability	Better	Good	Good	Good
Ease of Fabrication	Easy	Soldering Required	Alignment Required	Alignment Required
Impendence Matching	Easy	Easy	Easy	Easy
Bandwidth	2-5%	2-5%	2-5%	13%

B.Phased Array Antenna

Phased array antenna is a multiple-antenna system.In order to achieve higher directivity and additional gain, antenna elements can be arranged to form linear or planar arrays.Consist of multiple antennas (elements) 'collaborating' to synthesize radiation characteristics not available with a single antenna.They are able to match the radiation pattern to the desired coverage area and to change the radiation pattern electronically through the control of the phase and amplitude. In addition, they are used to scan the beam of an antenna system, increase the directivity, and perform various other functions which would be difficult with any one single element. The elements can be fed by a single line or by multiple lines in a feed network arrangement. There are three types of array;liner array,planner array and conformal array.

III. DESIGN STEPS OF MICROSTRIP PATCH ANTENNA

A.Substrate Selection

Dielectric constant (εr) is in the range from 2.2 to14.εr of air, polystyrene ,dielectric honey comb is in the range from 0 to 2. εr of fiber glass reinforced teflon is in the range from 2 to 4. εr of ceramic,quartz,alumina is in the range from 4 to 10.Dielectric constant should be less than 4($\varepsilon r<4$) in order to get higher radiation efficiency and directivity.Heigh should be h<1.5mm for operating frequency less than 10 GHz. So the proposed system selects 1.5mm.

B.Calculate The Width Of The Patch

The selected parameters for the antenna design are as follows:
F_o = Operating frequency = 2.45GHz
ε_r = Dielectric Constant of the substrate
(here ε_r = 2.2 for duroid 5880 substrate)
h = substrate height = 1.5mm

$$W = \frac{c}{2F_0 \sqrt{\frac{\varepsilon_r + 1}{2}}}$$

Where, W =width of the patch
C =free-space velocity
ε_r =dielectric constant

C.Calculate The Length Of The Patch

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}[1 + 12\frac{h}{w}]^{-\frac{1}{2}}$$

$$L_{eff} = \frac{C}{2 f_r \sqrt{\varepsilon_{reff}}}$$

$$\Delta L = 0.412h \frac{(\varepsilon_r + 0.3)(\frac{w}{h} + 0.264)}{(\varepsilon_r - 0.258)(\frac{w}{h} + 0.8)}$$

$$L = L_{eff} - 2\Delta L$$

Where, ΔL = effective increase in length due to fringing effects

L = the actual length of the patch

L_{eff} = effective length of the patch

ε_{reff} = effective dielectric constant

By using the above equations, MATLAB GUI is created for patch dimensions calculation. Fig. 2 demonstrates the calculated parameters of rectangular microstrip patch using MATLAB GUI.

Figure 2: Matlab GUI for Patch Element Design Calculation

The parameters of Rectangular Microstrip Patch Antenna (RMSA) are calculated using MATLAB and the following table is obtained.

Table II:Parameters of Rectangular Microstrip Patch Antenna

Parameters	Values
Substrate Material	Duroid 5880
Relative Permittivity of the substrate	2.2
Thickness of the dielectric	1.5mm
Operating Frequency	2.45GHz
Length	39.7893mm
Width	48.4022mm
Efficiency	0.955702

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IV.   SIMULATED RESULTS AND DISCUSSION

</div>

The simulated results were obtained by considering an equivalent circuit of rectangular microstrip patch antenna using MATLAB for calculating various parameters. The designed parameters are utilized on SONNET software.

A. Return Loss

The S11 parameter for the proposed antenna was calculated and the simulated return loss results are shown in Figure 3. The value of return loss is -31.5224 dB in this proposed antenna. The achieved return loss value is small enough and frequency is very closed enough to the specified frequency band for 2.45 GHz RFID applications. The value of return loss i.e. -31.5224 dB shows that at the frequency point i.e. below the -10 dB region there is good matching. A negative value of return loss shows that this antenna had not many losses while transmitting the signals.

Figure 3:Return Loss

B. VSWR

The value of voltage standing wave ratio(VSWR) should be in the range between 1 and 2. The acceptable VSWR is 1.5. Fig. 4 shows that the value of VSWR is close to the ideal value of 1 and 2:1 VSWR Bandwidth = 0.89796 with the measurements that are provided.

Figure 4: VSWR in Band

C.3D Gain

Radiation pattern is a graphical depiction of the relative field strength transmitted from or received by the antenna. The antenna should not have the side lobes and back lobes ideally. We cannot remove them completely but we can minimize them. Microstrip antennas can provide directivity in the range of 6-9dBi. Figure 5 shows the simulated 3-D radiation pattern with directivity of 8.31 dBi

for proposed antenna configuration at the resonating frequency of 2.45 GHz. 3-D radiation pattern with directivity of 8.31 dBi for proposed antenna is agreement with the typical value of the directivity in the range of 6-9dBi.

Figure 5: 3D Directivity and Gain

D.Antenna Spacing Pattern Of The Antenna Array

The element spacing has a large influence on the array factor as well. If element spacing is greater than 0.5λ ,the side lobe is big and grating lobes occur. A grating lobe is another unwanted peak value in the radiation pattern of the array.   If element spacing is less than 0.5λ ,mutual coupling effects occur. To avoid grating lobes and mutual coupling effects, the patch spacing for this design was chosen as 0.5λ. In this paper ,a microwave frequency band 2x2 microstrip phased antenna array is designed for an RFID reader system.

E.Compare With 3D Directivity And Gain Of 0.5λ Spacing And 0.6 λ Spacing

Figure6:3D Directivity Gain Using 0.5λ Spacing

Figure7:3D Directivity Gain Using 0.6λ Spacing

In figure6,we find that if the patch spacing for this design was chosen as 0.5λ,we can avoid the occurance of grating lobes and the side lobes. In figure7,we find that if element spacing is greater than 0.5λ ,the side lobe is big and grating lobes occur.

F. Compare With Rectangular Plot Of 0.5λ Spacing And 0.6λ Spacing

If the side lobe level is less than -10dB or -15dB,the antenna performance is good. In figure8, we find that the side lobe level is -15dB. So the antenna performance is good. In figure 9, we find that the side lobe level is greater than -10dB.So the antenna performance is not good.

Figure8:Rectangular Plot of 0.5λ Spacing

Figure8:Rectangular Plot of 0.6λ Spacing

V. CONCLUSION

This paper has been presented the design and performance analysis of Microstrip Phased Array Antenna for RFID system. Physical patch dimensions were calculated in MATLAB and SONNET antenna simulator software was used to implement the performance of the patch. The selected patches were arranged in planner array form for RFID application. 4 patch elements were selected to achieve high gain and good efficiency. This proposed antenna model is cost effiective, high efficiency and impact design for the applications in 2.45GHz frequency range. The optimum design parameters (dielectric material=Duroid 5880, height of the substrate=1.5 mm, operating frequency=2.45GHz) were used to achieve the compact dimensions and high radiation efficiency. It provides a gain of 8.31 dBi, 95.5702 percent efficiency and VSWR < 2 is achieved over the complete frequency band with linear polarization of antenna in the desired part of the beam.

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Performance Analysis of Location Based Ad Hoc Routing Protocols under Random Waypoint Mobility Model

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Abstract- Mobile ad hoc Network is a self- configuring infrastructure-less network of nodes connected through wireless link. Each node in the network can act as router as well as host to find paths to exchange information. For finding paths, location based routing protocols have been developed for mobile ad hoc networks. This paper presents performance analysis of location based routing protocols, Greedy Perimeter Stateless Routing (GPSR) and Zone Routing Protocol (ZRP), based on metrics such as throughput, end-to-end delay, packet delivery fraction, and routing overhead.

Keywords- MANET, ZRP, GPSR, location based routing protocols.

I. INTRODUCTION

Mobile ad hoc Network (MANET) is an autonomous collection of mobile nodes. A typical MANET is also an infrastructure-less network as shown in figure1 and a node in the network receives its data from the source node. Mobile nodes in the network self-organize and self- configure as the network topology changes. Since MANET lacks infrastructure, each mobile node acts as a host as well as a router, to forward data from other nodes in the network. The desired target node may go outside the range of the source node transmitting the packets. For finding the path from the source to the target node, needs a routing process. MANET technology can be applied in two main areas. In the first area, wireless networks by adding new mobile nodes that use MANET technology at the edge of the network. For example, drivers in a city who can communicate with each other while obtaining traffic information, students on a university campus, company employees in a meeting room, and many other similar situations. In the second area, MANET technology can be applied in no infrastructure available, or the pre-existing infrastructure has been destroyed by a disaster or a war. For example, search and rescue operations, military deployment in a hostile environment, police departments, disaster recovery, and many others. Many routing protocols have been proposed in the literature and a variety of comparisons have been carried out on these protocols. Network performances are analyzed using the metrics like, throughput, packet delivery fraction, end-to-end delay, packet loss, routing overhead. Random Way Point (RWP) mobility model is employed to analyze the performance of ad hoc routing protocols.

This paper present a comparison of location based routing protocols (ZRP and GPSR) with the use of simulation. These protocols can help to find path to exchange information and also know the location of target node. The performances of location based routing protocol are analyzed using Random Way Point (RWP) mobility model with varying node density, node speed and traffic load.

Figure 1: Example of Ad Hoc Network

II. RELATED WORK

Sree Raga Raju, et al. [11] compared the performance of DSR, AODV, and ZRP. They found that the performance of ZRP was not up to the task and it performed poorly throughout all the simulation sequences.

P. Manickan and T. P. Manickan and T. G. Baskar et al. [12] compared performance of three routing protocols, DSDV, AODV, DSR. They analyzed these routings with Network Simulator version 2 (NS-2). They concluded that DSR performance is better in compression of AODV and DSDV due to a smaller amount of routing overhead when nodes have high mobility, counting the metrics throughput, Average End to End Delay and Packet Delivery Ratio.

Ajay Prakash Rai and Rasvihari Sharma et al. [13] compared the performance of routing protocols (AODV and DSDV). They concluded that for large wireless network performance of AODV is much better than DSDV in terms of PDF, packet loss and delay.

III. CLASSIFICATION OF ROUTING PROTOCOLS

Proactive routing protocols – Proactive protocol also called table-driven routing protocol and all the nodes maintain the list of information about the next node through it. The source node does not need route discovery to find a route to destination and needs required amount of data for maintenance when failure.

Reactive routing protocols - Reactive protocol also called as on-demand routing protocol is based upon query–reply dialog. Consuming more time to find routes and flooding of network obstruct can cause.

Hybrid routing protocols – Hybrid protocols take advantages of proactive and reactive routing and is based upon distance vector protocol but contain advantage of link state protocol. Hybrid protocol enhances interior gateway routing protocol.

Hierarchical routing protocols – Hierarchical routing starts with proactively prospected routes and serves demand for additional routes on reactive flooding.

Geographic routing protocols – Geographic routing is based on position of a location where source sends location message to destination rather than address of the network.

A. Zone Routing Protocol (ZRP)

Zone Routing Protocol (ZRP), a hybrid routing, is suitable for a wide variety of mobile ad-hoc networks. In ZRP, a zone for every node is defined with single configurable parameter n hops (zone radius) from it. The sequence number for message is used to discover loop free routes. ZRP uses three different route discovery protocols, Intrazone routing Protocol (IARP), Interzone Routing Protocol (IERP), and Bordercast Resolution Protocol (BRP).

Intrazone Routing Protocol (IARP) - The proactive Intrazone Routing Protocol (IARP) is used to maintain the local topology. The IARP is derived from globally proactive link state routing protocols that provide a complete view of network connectivity.

Interzone Routing Protocol (IERP) - Interzone Routing Protocol (IERP) is very similar to classical route discovery protocols. An IERP route discovery is initiated when no route is locally available to the destination of an outgoing data packet. The source generates a route query packet, which is uniquely identified by a combination of the source node's address and request number. The query is then relayed to a subset of neighbors as determined by the bordercast algorithm called Bordercast Resolution protocol. Bordercast, is used to reduce the number of redundant forwarding in route discovery of interzone routing protocol.

Figure 2: ZRP Path Discovery Process

In ZRP, peripheral nodes are nodes containing minimum distance from the node equal to the zone radius. IARP requires Neighbor Discovery Protocol. Link failures are identified by Hello

messages and ensure that neighbors are present. IERP is invoked if IARP is unable to locate the destination.

Figure 3: ZRP example

This example shows the node S which is the source sends packet to destination i.e. node X. This diagram has zone radius r=2. To check whether destination is within its zone checking by node uses the routing table offered by IARP because if not found then route request is issued by IERP. Request is broadcast to peripheral nodes represented gray in fig 3.

Route Maintenance

Each node proactively maintains routes within a local region. Knowledge of the routing zone topology is leveraged by the ZRP to improve the efficiency of a globally reactive route query/reply mechanism. The proactive maintenance of routing zones also helps in improving the quality of discovered routes, by making them more robust to changes in network topology.

B. Greedy Perimeter Stateless Routing (GPSR)

Greedy Perimeter Stateless Routing (GPSR) specifies only the geographic forwarding strategy, and GPSR's data forwarding algorithm embraces two components: greedy forwarding and perimeter routing.

Figure 4: Greedy forwarding example, y is x's closest neighbor to D

Greedy Forwarding

In Greedy Forwarding, the source node knows the geographic locations of the destination node. The information of position will be integrated into the route request packet. A local table with the listed positions of the entire neighbor nodes in its range is maintained by each node. The node which have to treat the route request packet checks its local table for a nearest node with the destination and forwards the data packet to the corresponding node.

An example of Greedy forwarding is shown in figure 3. X receives a packet destined for D. x's radio range is represented by the dotted circle. The packet is forwarded from x to y, as the distance between y and D is less than that between D and any of

x's other neighbors. This Greedy forwarding process repeats, until the packet reaches D. When the packet cannot find a neighbor node closest to the destination, a recovery strategy called the perimeter forwarding is used.

Perimeter Routing

When a node is unable to find a neighbor node nearer to the destination, greedy mode will be changed into perimeter mode.

(a)   (b)

Figure 5: (a) Node x's void with respect to destination D.
(b) The right-hand rule (interior of the triangle).

In figure 5 (a), x is closer to D than its neighbors w and y. The radius of D is equal to the distance between x and D. Although two paths (X→y→z→D) and (X→w→v→D), X will not choose to forward to w or y using greedy forwarding. X is local maximum in its proximity to D. The packet mode will be placed to perimeter mode and the second algorithm will be active.

In perimeter mode forwarding, the right hand rule is used for traversing the edges of a void (the shaded region without nodes). This algorithm finds out a possible path around a void to the destination node.

The right hand rule states that when arriving at node x from node y, the next edge traversed is the next one sequentially counterclockwise about x from edge (x, y). The right hand rule traverses the interior of a closed polygonal region in clockwise order. In figure 5 (b), edges are traversed in the order (y→X→ z→ y). The rule traverses an exterior region, in this case, the region outside the same triangle, in counterclockwise edge order.

IV. SIMULATION ENVIRONMENT

Figure 6: Simulation Network Area

NS-2.33 is used for the entire simulation. The TCL script is used to run NS-2 simulation for analyzing the performance of routing

protocols in MANETs. These files are then used for the simulation and a trace file is generated as output. Prior to the simulation, the simulation parameters must be selected. The trace files can then be scanned and analyzed for the various performance metrics. After the output trace file have analyzed with awk script, these data are plotted on Microsoft Office Excel. And the trace files can also be used to visualize the simulation run with Network Animator (NAM).

For MANET simulation, performance metrics are used to analyze the protocols.

Throughput – Throughput is the total number of packets that have been successfully delivered from source node to destination node.

End-to-End Delay – End-to-end delay is the average time delay for data packets from the source node to the destination node.

Packet Delivery Fraction – Packet delivery fraction is the ratio of total number of packets received by destination over total number of packets sent by source.

Routing Overhead – Routing overhead is all packets sent or forwarded at network layer.

There are many simulation parameters that need to be varied in order to perform exhaustive simulations.

Table1. Simulation Parameters

Parameters	Value
Routing Protocols	ZRP, GPSR
Mobility Models	Random Way Point
Propagation Model	Two Ray Ground
MAC Layer protocol	IEEE802.11
Antenna Model	Omni Antenna
Channel Type	Wireless Channel
Simulation Area	200m×200m
Simulation Time	100s
Number of nodes	10, 20,30,40, 50
Node Speed	1, 2, 3, 4, 5
UDP connections	20, 40,60, 80, 100
Packet size	512 bytes

V. SIMULATION RESULTS AND ANALYSIS

Figure 1, 2 and 3 represent as the performance of location based routing protocols. The protocols are analyzed for throughput, end-to-end delay, packet delivery fraction and overhead at varying node density, node speed and traffic load under Random WayPoint (RWP) mobility model.

Figure 1: (a) Throughput, (b) End-to-End Delay, (c) Packet Delivery Fraction and (d) Routing Overhead for varying node speed

Figure 1(a) shows the throughput of the protocols. GPSR performs better than ZRP in low node speed. ZRP scales well when the speed of node in the network increases. ZRP has a lower throughput than GPSR which increases fluctuately.

Figure 1(b) shows the end-to-end delay of the protocols. GPSR has the lower end-to-end delay at low and high node speed as compare to ZRP. ZRP has a higher end-to-end delay than GPSR in all case, which increases when the speed of node increases. This is not desirable property of a protocol, as that end-to-end delay reveals that ZRP inefficiency to operate properly in a network.

Figure 1(c) illustrates the packet delivery fraction of the two protocols. GPSR has better performance than ZRP in term of PDF in all case. The PDF of GPSR are same with 100%. ZRP has a lower PDF in case of 1 and 2m/s, which increase significantly up to 100% at 3 and 4m/s. After 4 cases, ZRP performance drop significantly with 5m/s.

Figure 1(d) shows the routing overhead of location based routing protocols. GPSR has lower routing overhead whereas ZRP has a higher routing overhead in simulation results. ZRP presents small fluctuations in term of routing overhead. That high routing overhead degrades the performance of the protocols as it consumes more bandwidth.

Figure 2: (a) Throughput, (b) End-to-End Delay, (c) Packet Delivery Fraction and (d) Routing Overhead for varying node density

Based on the results of simulation as indicated in figure 2(a) it is observed that both protocols have a similar performance at all nodes. GPSR has a smaller better than ZRP in term of throughput. The throughputs in the two protocols increase when the number of nodes increases.

GPSR has the lower end-to-end delay at low and high node density as compare to ZRP, as we see in figure 2(b). ZRP has a lower end-to-end delay than GPSR in case of 10 and 20 nodes, which increase exponentially with 50 nodes.

Figure 2(c) shows the PDF of the protocols. Both protocols have an identical performance except in case of 50 nodes, in which ZRP performance drop significantly with that node.

Figure 2(d) shows the routing overhead of ZRP and GPSR. GPSR has a lower routing overhead than ZRP, but the routing overhead of GPSR has slightly increase when the number of node increase. ZRP has the worst performance due to the high routing overhead with increasing nodes.

Figure 3: (a) Throughput, (b) End-to-End delay, (c) Packet Delivery Fracyion and (d) Routing Overhead for varying traffic load

Above the two protocols have a similar performance in term of throughput as seen in figure 3(a). Impoving the throughput is also well the performance of the protocols.

Figure 3(b) illustrates the end-to-end delay of both protocol. GPSR has a better performance than ZRP in all case. The performance of ZRP degrades with increasing network connections.

Figure 3(c) shows the PDF of ZRP and GPSR. Both protocols have an identical performance in term of PDF (100%) at 20 connections. At 40 connections, the PDF of GPSR continue stable whereas that of ZRP

drop significantly with 99.5%. After that the PDF of both protocols, GPSR and ZRP stable with 99.68% and 99.84% respectively.

Figure 3(d) shows the routing overhead of ZRP and GPSR. GPSR has a lower routing overhead than ZRP under varying traffic load. The routing overhead of both protocols decrease when the number of connection increase.

VI. CONCLUSION

In this paper, performance analysis are carried out on the simulation results of two location based routing protocols, ZRP and GPSR. All the simulations are performed over mobile ad hoc network. From the investigation, GPSR out performed ZRP in terms of end-to-end delay, packet delivery fraction and routing overhead.The two protocols have similar high throughput in varying node density and traffic load. High node speeds in GPSR can break the links in the network. So the throughput of GPSR decreases when the speed of node increases. ZRP has high end-to-end delay and routing overhead whereas GPSR has low end-to-end delay and routing overhead. This is the main reason of performance degradation of the routing protocols in high end-to-end delay and routing overhead. From previous simulation, it has been observed that GPSR performs better than ZRP.

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Implementation of Modern Traffic Light Control System

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Abstract- There are many problems of congestion with traffic light in many cities. This problem of congestion can be caused by long time delays of traffic light's Red light. When there are emergency case at traffic light intersection which are always busy with many vehicles, this problem can also be caused. The possibilities of traffic jams caused by traffic light can reduce by using the Programmable Integrated Circuit (PIC) 16F877A microcontroller. The intended system is to change the sequence back to the normal sequence after triggering for the emergency modes by using the controller. Many accidents which often happen at the traffic light intersections will be reduced because of using this system. The system that provides the traffic control of six way and four junction of modern traffic light has been implemented with arrowed signal for each direction. The arrowed signal of red, yellow and green light are displayed with LEDs. There are two modes of traffic light sequence in this system. One is the normal sequence and the other is the emergency sequence. The phases of red, yellow and green are determined by computer programming based on the patterns of traffic light congestion.

Keywords- Emergency vehicle, Congestion, PIC Microcontroller, Traffic flow control, Traffic light

I. INTRODUCTION

Nowadays, vehicular travel is increasing through the world and many countries are facing many problems at traffic light intersection which are caused many accidents between the emergency vehicle and other vehicle [1]. Traffic light control at the intersection point is a matter of concern in large cities. As the number of road users constantly increase and resources provided by current infrastructures are limited, modern control of traffic will become a very important issue in the future [2]. One way to develop traffic light flow and safety of the current transportation system is to apply a modern traffic light control system. Traffic light controlled by microcontroller is becoming a common place in many cities because these units can easily adjust for different timing sequence.

Traffic lights are signaling devices situated on the road at intersection points which are used to control the completing flows of traffic [3]. In generally, a traffic light consists of a set of three lights. They are red, yellow and green. When illuminated the red light, it indicates for vehicles facing the light to stop and the yellow light indicates caution to prepare for stop short of the intersection. The green light is to proceed in the direction denoted [4]. The traffic light sequence may differ from other, and they may be special rules or set of lights for traffic turning in the particular direction.

In this system, there are three order signs for turn-left, forward and turn-right. The timing of red, yellow and green arrowed light at each crossing of road design are based on the total traffic light on all adjacent roads. In a typically cycle, illumination of the green arrowed signal allows traffic to proceed in the direction denoted, the yellow arrowed signal is to prepare for stop short of the intersection and the red arrowed signal prohibits any traffic from proceeding.

II. SYSTEM AND COMPONENTS

Figure 1: Block diagram of Modern Traffic Light

The Figure 1 shows a block diagram of a modern traffic light control system which consists of four control switches, one PIC microcontroller, one BCD decoder, one 74LS138 decoder or multiplexer. Both of BCD decoder and 74LS138 decoder or multiplexer are used as a display driver to control the four sets of two digit of seven segment. LED drivers are used to control the four sets of traffic light. Four control switches are used to control for the emergency cases such as ambulance, fire brigade and VIP case.

BCD-to-Seven-Segment Latch or Decoder or Driver: CD4543B is a BCD-to-seven-segment latch or decoder or driver designed primarily for liquid-crystal display (LCD) applications. It is also capable of driving light emitting diode (LED), incandescent, gas-discharge, and fluorescent displays. It is a display blanking of all illegal input combinations and latch storage of code. For LED applications, a logic 0 is required at the PHASE input for common-cathode devices and a logic 1 is required for common-anode devices [5].

Decoder or De-multiplexer (74LS138): These Schottky-clamped circuits are designed to be used in high-performance memory decoding or data-routing applications, requiring very short propagation delay times. In high performance memory systems,

these decoders can be used to minimize the effects of system decoding. When used with high-speed memories, the delay times of these decoders are usually less than the typical access time of the memory. This means that the effective system delay introduced by the decoder is negligible. It is a 3-to-8 line decoders and power dissipation is 32mW.It have three binary select inputs, three enable inputs which is two active LOW (E1,E2) and one active HIGH (E3) and active LOW Outputs (Y0-Y7) [6].

III. PERFORMANCE AND EVALUATION

A. Sequence of Traffic Light

In a modern traffic light control system, there are four states of direction for users are shown in figure 2(a) to 2(d).

Figure 2(a): Turning lane for East-South and West-North direction

Figure 2(b): Straight lane for North-South and South-North direction

Figure 2(c): Turning lane for South-West and North-East direction

Figure 2(d): Straight lane for East-West and West-East direction

Table I: Table of sequence of modern traffic light

Direction	East-West Direction									North-South Direction									Lane Direction
TL No:	1			2			3			7			8			9			
Color	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	
State1	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	turning lane for (E-S & W-N) direction
State2	0	0	1	1	0	0	0	1	0	0	0	1	1	0	0	1	0	0	
State3	0	0	1	0	0	1	1	0	0	0	0	1	1	0	0	1	0	0	straight lane for E-W & W-E) direction
State4	0	0	1	0	1	0	1	0	0	0	0	1	1	0	0	1	0	0	
State5	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	0	1	turning lane for (S-W & N-E) direction
State6	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	1	0	
State7	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	Straight lane for(N-S & S-N) direction
State8	0	0	1	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	

The normal sequence of modern traffic light is shown in table I. The traffic light 1, 2 and 3 is active as the same performance of traffic light 4, 5 and 6 because of they are connected in parallel. And the traffic light 7, 8 and 9 is also active as the same performance of traffic light 10, 11 and 12 because of they are connected in parallel.

B. Software flowchart

The system is divided into two modes for traffic light. One is the normal mode sequence and the other is the emergency mode sequence.

(1) Emergency mode

This emergency mode is used when the importance vehicles such as ambulance, fire brigade, police cars or VIP are arrived. If there is no the emergency mode, the importance vehicles will be faced more delay time. Therefore, the emergency mode is very important for every traffic light.

In this traffic light junction, people waiting for the traffic light turns to green. During the traffic jam, the emergency vehicles such as ambulance, fire brigade, police car or VIP vehicles will be stuck in the traffic jam. This case can cause the emergency

case that becomes complicated. This case is very critical problem [7].

Figure 3(a): System flowchart for emergency mode

This flowchart is showed for the condition of emergency mode sequence. When each of control switches are pushed on triggered, the related emergency of each case is implemented. If each of control switches are not pushed or triggered, the normal mode sequence is implemented as the system flowchart.

(2) Normal mode

With the increasing number of vehicles on the road, the problem of a traffic congestion increased in large cities. This usually occurred in the morning and in the evening at the main junctions. Due to the effect of this, people wasted their time on the road. The delay for junctions that have high volume of traffic should be setting longer than the delay for the junction that have low of traffic. This operation is called Normal Mode [8].

Table II: Normal mode sequence of modern traffic light

Direction	East-West Direction									North-South Direction									Lane Direction
TL No:	1			2			3			7			8			9			
Color	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	
State1	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	turning lane for (E-S & W-N) direction
State2	0	0	1	1	0	0	0	1	0	0	0	1	1	0	0	1	0	0	
State3	0	0	1	0	0	1	1	0	0	0	0	1	1	0	0	1	0	0	straight lane for E-W & W-E) direction
State4	0	0	1	0	1	0	1	0	0	0	0	1	1	0	0	1	0	0	
State5	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	0	1	turning lane for (S-W & N-E) direction
State6	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	1	0	
State7	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	Straight lane for(N-S & S-N) direction
State8	0	0	1	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	

Figure 3(b): System flowchart for normal sequence

Figure 3(c): System flowchart for normal sequence

Figure 3(d): System flowchart for counting down of modern traffic light

IV. HARDWARE RESULTS

The system is implemented as shown in figure 4 when the power is on. The traffic light 1, 2 and 3 is active as the same performance of traffic light 4, 5 and 6 because of they are connected in parallel. And the traffic light 7, 8 and 9 is active as the same performance of traffic light 10, 11 and 12 because of they are connected in parallel. In this system, the traffic light 1, 6, 7 and 12 are used for free lane. Therefore, when the system is implemented as figure 4, the traffic light 1, 6, 7 and 12 will be displayed ever green light.

Figure 4: System flow diagram of modern traffic light

Figure 5: Hardware diagram of modern traffic light

The hardware results for normal mode sequence are as followed.

Table III: Table of green light of traffic light 3 and 4 for turning lane (East-South and West-North) direction for 35 seconds

Traffic Light	Red	Yellow	Green
1, 6	0	0	1
2, 5	1	0	0
3, 4	0	0	1
7, 12	0	0	1
8, 11	1	0	0
9, 10	1	0	0

The system is implemented as the above table III. The green light of the traffic light 3 and 4 is ON and the red light of the other traffic lights are ON except for the traffic light 1, 6, 7 and 12 because of they are using for free lane. The duration for green light is 35 seconds.

Figure 6: The green light of traffic light 3 and 4 for turning lane (East-South and West-North) direction is ON for 35 seconds

Figure 6 is a result of traffic light 3 and 4. In this state, the users can pass through the road from East-South and West-North

direction until the yellow light of traffic light 3 and 4 is ON. The duration for users in this state is 35 seconds.

When the green light of traffic light 3 and 4 is OFF, the yellow light of traffic light 3 and 4 is ON for 2 seconds.

Table IV: Table of yellow light of traffic light 3 and 4 for turning lane (East-South and West-North) direction

Traffic Light	Red	Yellow	Green
1, 6	0	0	1
2, 5	1	0	0
3, 4	0	1	0
7, 12	0	0	1
8, 11	1	0	0
9, 10	1	0	0

The system is executed as the above table IV. The yellow light of traffic light 3 and 4 is ON for 2 seconds. The result of yellow light is shown below.

Figure 7: The yellow light of traffic light 3 and 4 is ON for 2 seconds

This figure 7 is a result of yellow light 3 and 4. This result is showed the users to stop and recommaned the users who wanted to pass through the road from East-West and West-East direction.

Figure 8: The green light of traffic light 2 and 5 for straight lane (East-West and West-East) direction is ON for 35 seconds

The figure showed the above is a result of traffic light 2 and 5 for the straight lane (East-West and West-East) direction. When

the traffic light 2 and 5 is ON, the users on the road can pass through from the East-West and West-East direction until the yellow light is ON. The duration for the users can pass from East-West and West-East direction is 35 seconds.

When the yellow light of the traffic light 2 and 5 is ON, the users on this straight lane is needed to stop and the users who situated on the turning lane from South-West and North-East direction is needed to prepare to proceed. The duration for the yellow light of straight lane is 2 seconds.

Figure 9: The green light of traffic light 9 and 10 for turning lane (South-West and North-East) direction for 35 seconds

This figure 9 is a result of traffic light 9 and 10 for South-West and North-East direction. In this state, the users from South-West and North-East direction can proceed until the yellow light of this traffic light is ON. The duration for the green light of traffic light 9 and 10 is 35 seconds.

After finishing the green light, the yellow light is ON. In that situation, the users who pass through from South-West and North-East direction is needed to stop from proceeding and the users who situated on the road are needed to prepare to proceed from North-South and South-North direction. The duration of the yellow light is 2 seconds.

Figure 10: The green light of traffic light 8 and 11 is ON for 35 seconds

As the above figure 10, the users can pass through the road from North-South and South-North direction until the yellow light is ON. The green light of traffic light is taking 35 seconds. The yellow light of traffic light 8 and 11 is ON when the green light of traffic light 8 and 11 is OFF. The yellow light of traffic light 8 and 11 is taking for 2 seconds.

V. CONCLUSIONS

A modern traffic light of six road and four junction is implemented by using the programming in the PIC16F877A microcontroller. The sequences of this traffic light also have been developed by using the programming in the C language. The prototype of this system is using the frequency of 20MHz. The hardware implementation of traffic light is using the gate logic and the interfacing light is using LED [4]. The system works efficiently over the present traffic controlling system in respect of less waiting time, efficient operation during emergency mode and suggesting alternate route [9]. This prototype system can be developed in future by spending the real traffic position at intersection point.

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Design and Implementation of 10Gbps All-optical 2R Regenerator

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Abstract- An All-optical 2R regenerator (Reamplification and Reshaping) is a crucial element in optical communication systems in order to increase transmission performance. In this paper, an all-optical 2R regenerator is implemented by self-phase modulation (SPM) based spectral broadening and offset filtering. Design calculations of the required parameters for the proposed 2R regenerator are carried out. Simulation results in terms of power transfer and bit error rate (BER) measurements are shown to prove the effectiveness of the proposed system. After the optical signal has been degraded by 500 km- long transmission span, the 2R regenerator in this work can reshape the degraded signal by achieving only 0.3dB power penalty at BER of 10^{-9}.

Index Terms- all-optical 2R regeneration, self-phase modulation, reshaping, offset filtering.

I. INTRODUCTION

Optical fiber communication system has become popular nowadays with its advantages of high speed (>100Gbps) and long distance transmission. Indeed, the optical signal may undergo various degradations such as dispersion, polarization mode dispersion, nonlinear effects, and amplified spontaneous emission (ASE) noise during its propagation. To overcome these impairments, regenerators will be needed. All-optical regeneration technique had better be used for high speed operation capability and flexibility. Although all-optical 3R (Reamplification, Reshaping, and Retiming) regenerators are greatly interested, 2R (only Reamplification and Reshaping) regenerators can be used beneficially in medium distance transmission system.

Different all-optical regenerations based on nonlinear effects such as self-phase modulation (SPM)[1], cross-phase modulation (XPM)[2], and four-wave mixing (FWM)[3] have been demonstrated. Among them, SPM based 2R regenerator (proposed by Mamyshev) is progressively more attractive due to its experimental setup simplicity. In this work, self-phase modulation based 2R Regenerator for 10Gbps RZ with a duty cycle of 33 percent signal is implemented, combining with signal degradation stage to analyze its performance. A signal is passed through the transmission fiber that is 500km-long and then the degraded signal is regenerated via the proposed 2R regenerator. The performance of 2R regenerator is evaluated by the power transfer function curve and BER curve.

This paper is organized as follows: Section 2 describes principle of 2R regeneration by self-phase modulation and offset filtering. In section 3, design of the proposed 2R regenerator is mentioned. Section 4 explains simulation results and finally the paper is concluded in section 5.

II. PRINCIPLE OF 2R REGENERATION BY SELF-PHASE MODULATION AND OFFSET FILTERING

Fig.1. Block diagram of the proposed design work

The operation principle of the proposed design work is illustrated in Fig [1]. It includes signal transmission, signal degradation to prove the performance of regenerator, signal regeneration by means of self-phase modulation based 2R regenerator, and receiver. In signal degradation, dispersion compensation is done by dispersion compensating fiber after single mode fiber. A couple of amplifier and optical bandpass filter is used after each type of fiber length respectively to recover the fiber losses and to reject the spontaneous noise. Then the signal becomes distorted because of ASE noise caused by EDFA. Each transmission span consists of 100km-long single mode fiber and the signal is degraded by 5 transmission spans (i.e, 500km-long SMF). Signal degradation part in this work is considered to be almost the same as the actual optical signal transmission in the real world.

In regeneration, the degraded optical data streams are first fed into an Erbium doped fiber amplifier (EDFA) in order to reach the required power for '1' symbol. An additional optical bandpass filter is inserted after the amplifier to reject the out-of-band ASE noise. The amplified signal is passed through the highly nonlinear fiber (HNLF). The HNLF produces SPM induced spectral broadening when the signal reaches high enough peak power. At the output of the HNLF, an optical bandpass filter (OBPF) is used as a reshaping element.

The main function of 2R regenerator is the reshaping function. The optimum reshaping function depends on the SPM induced spectral broadening and position of offset filtering [4]. The broadening spectrum is directly proportional to the intensity of optical pulse [5]. When the low intensity pulses (or zero level noise) enter the HNLF, the spectrum broadening is small and it does not pass through the passband of OBPF. When the high intensity pulses (or one level noise) enter the HNLF, the spectrum broadening is large enough to extend over the passband of OBPF. Thus, the amplitude noise in the one and zero level can be suppressed by means of optical filtering.

Fig.2. Illustration of an ideal step-like power transfer function

Low level noise can be suppressed with large enough filter offset [4]. To reduce high level noise, the spectrum must be as flat as possible [6]. The fiber that has normal dispersive value (i.e $D<0$) can provide the flat spectral broadening in the presence of noise [7]. The optimum reshaping performance offers a step-like power transfer function. Fig.2. shows the ideal power transfer function of reshaping stage. If noise is taken into account, different power transfer function curves will be obtained. Flat top region of power transfer function curve can determine the performance of regenerator [8].

<center>III. DESIGN OF THE PROPOSED 2R REGENERATOR</center>

The proposed regenerator is implemented by using a 1.5km long highly nonlinear fibre with a dispersion D of -7.2ps/nm/km, a nonlinear coefficient γ of 12.6W^{-1} km^{-1}, and attenuation α of 0.47dB/km. It contains a high power EDFA with a noise figure NF of 4dB. The ASE rejection filter with a Gaussian shape has a spectral width of 75GHz and centre frequency is located at the signal wavelength (λ_0).

When 1.025W (25.292dBm) peak power (P_0) is launched into the highly nonlinear fiber, the spectrum is broadened due to self-phase modulation effect inside the fiber. The maximum spectrum broadening can be calculated as:

$$\Delta\omega_{max} = 0.86 \, \Delta\omega_0 \, \Phi_{max} \tag{1}$$

where, $\Phi_{max}= \gamma P_0 L_{eff}$, $\Delta\omega_0 = T_0^{-1}$, $T_0 = 1/e$ intensity at half width and $T_{FWHM}=1.665T_0$ for Gaussian pulse. Then Eq(1) can be written as:

$$\Delta\omega_{max} = \frac{1.4319\gamma P_0 L_{eff}}{T_{FWHM}} \tag{2}$$

$$\Delta f_{max} = \frac{1.4319\gamma P_0 L_{eff}}{2\pi T_{FWHM}} \tag{3}$$

where, $L_{eff=}$ effective length, $T_{FWHM}=$ pulse width at full width at maximum

$$= 124.9\text{GHz}$$

The broadened spectrum contains many peaks. The outermost peak is the most intent [5]. The filter offset has to select the outermost peak. The wavelength offset coincided with the outermost peak in the broadened spectrum is calculated as:

$$\Delta\lambda_{max}= \lambda^2/c \; \Delta f_{max} \tag{4}$$
$$= 1\text{nm, where the wavelength } \lambda \text{ of the optical signal is 1550nm.}$$

In this design, more power is needed (P_0=1.2182W, 26.042dBm) to get the accurate peak offset value. This is due to attenuation and dispersion effect in HNLF. For the regenerated pulse width to be the same as input pulse width, the bandwidth of offset filter can be design as:

$$\Delta\omega T_0 \text{ (1/e point) } =1 \tag{5}$$

$$\Delta\omega T_0 \text{ (FWHM) } = 2.77443$$

$$\Delta f_{(FWHM)} = \frac{0.4412}{T_{0(FWHM)}} \tag{6}$$

$$= 13\text{GHz}$$

<center>IV. SIMULATION RESULTS</center>

Fig.3. Simulation setup of the proposed system

Simulation setup of the proposed regenerator by using OptiSystem Software is depicted in Fig.3. The CW laser and 10Gbps RZ Pseudo Random Bit Sequence signal is modulated by Mach-Zehnder Modulator and then is sent to the transmission span. In the bit sequence, each '1'bit contains a Gaussian pulse with a full-width at half maximum (FWHM) of 33ps (typical pulse width for 10Gbps RZ signal) at a carrier wavelength of 1550nm. The transmission span is considered by a circulating loop. The loop is composed of 100km-long single mode fiber (SMF) with an anomalous dispersion of 16ps/nm/km, a dispersion slope of 0.08 ps/nm^2/km, a nonlinear coefficient of $1.3W^{-1}km^{-1}$, and attenuation of 0.2 dB/km. Total loss is recovered by EDFA with 20dB gain. Dispersion is compensated by using dispersion compensating fiber with a length of 20km, a normal dispersion of -80ps/nm/km, a dispersion slope of -0.5 ps/nm^2/km, a nonlinear coefficient of 5.2 $W^{-1}km^{-1}$, and an attenuation is 0.6dB/km. To recover the fiber loss, EDFA with 12dB gain is used. Both amplifiers have noise figure of 4dB.These two amplifiers are followed by OBPF with a spectral width of 500GHz to remove ASE noise added by amplifiers. The signal is passed through in circulating loop for 5 times in order to degrade its performance.

(a)

(b)

Fig.4. (a) The spectrum of the degraded signal, and (b) The broadened spectrum induced by SPM effect

Fig.4 shows the spectrum of the degraded signal before highly nonlinear and after highly nonlinear fiber. In Fig.4 (b), the spectrum is wider than that in Fig.4 (a) because of the self-phase modulation effect inside the highly nonlinear fiber. The OBPF selects the dominant spectral peak in the broadening spectrum. It changes from the original center wavelength.

(a)   (b)   (c)

Fig.5.Waveforms for (a) Transmitted signal, (b) Degraded signal, and (c) Regenerated signal

Fig.5 (a) is an input signal waveform of 10Gbps RZ signal and Fig.5 (b) is the degraded signal after 500km transmission fibre. Fig.5(c) shows the output signal after 2R regeneration. It can be seen that the regenerated output waveform is nearly the same as the input waveform.

(a)   (b)   (c)

Fig.6.Eye diagrams for (a) Back to back system, (b) without regenerator after passing through 500km transmission fiber, and (c) after regeneration at approximately 10^{-9} BER

Eye patterns of the original input signal, degraded signal and regenerated signal are compared in Fig.6. As seen in Fig.6 more eye opening (hence higher extinction ratio) is observed in the regenerated signal (c) than the degraded signal (b).

Fig.7 Power Transfer function of the 2R regenerator. Fig.8 BER measurements for 2R regenerator.

Fig.7 depicts the power transfer function of the designed 2R regenerator. Although it is not exactly the same as the ideal step-like power transfer function which is shown in Fig.2, it does have reshaping property. 'One' level noise can be suppressed in the flat-top region which is around the input average power of 26dBm. Bit error rate (BER) measurements for the back-to-back case, the degraded signal and regenerated signal are illustrated in Fig.8. As seen in Fig.8, the power penalty of the regenerated signal is only 0.3dB at standard BER of 10^{-9}.

V. CONCLUSION

In this work, SPM induced spectrum broadening and offset filtering based 2R regenerator is designed and implemented. The regeneration performance is expressed in power transfer function and BER measurement.. In this system, the flat-top region is achieved at input average power around 26dBm. Power penalty for 2R regeneration is 0.3 dB only.

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Design and Construction of Condition Reporting System Based on GSM Technology for Power Station

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   Abstract- This paper describes a condition reporting system of Power plant components using GSM technology. Most of the reporting systems commonly used in Myanmar are manual. The objective of this paper is to transform manual system to automated reporting system with the help of GSM technology. There are three portions in automated reporting system. They are GSM modem system, microcontroller system and sensing system. A dedicated microcontroller based hardware unit (DHU) has been developed to continuously measure the parameters of the viz. voltage, current and temperature of generation of the alternator to monitor the running condition of it also. Other than the generator there are subsystems which also need continuous monitoring. In this monitoring system equipment is connected with one such DHU which is also connected to a Global System for Mobile Communication (GSM) modem. The preliminary level of fault or abnormality in operation of component is diagnosed by the DHU and the fault or abnormalities details are reported to the pre-assigned operator through an SMS service. In extreme case, the provision of equipment shut down by a return SMS is also provided. The circuit model has been set up and is working satisfactorily.

   Keywords- Microcontroller, GSM modem, SMS service, reporting system, wireless communication

I. INTRODUCTION

       Wireless Communication is now-a-days playing a significant role in modernization of Power system. Wireless communication can be used to deploy different sensors in different Power system equipments where wired sensor deployment is difficult. Electrical equipments including alternator, transformer, circuit breakers etc. installed in different locations in a power system, are needed to be monitored and controlled for healthy operation and smooth running of the system. The convergence of wireless communication technology and the embedded controller technology with the different transducers makes these supervisory systems more reliable, flexible, and much efficient as well as cost effective than wire line deployment. Among different parameters of alternator, monitoring of output voltage, load current and temperature are most important for early detection of any incipient fault. In this context, real time condition monitoring and control has become an essential issue.

       Due to this motivation, real time GSM based condition reporting system for power station equipment is developed in this research.

II. RELATED WORK

   In [1], the author presented the methodology for monitoring patients remotely using GSM network & Very large scale integration (VLSI) technique. Patient monitoring systems consist of equipment, devices and supplies that measure, display and record human physiological characteristics, including blood pressure, body temperature, heart activity, various bodily substances (e.g. cholesterol, glucose, etc.), pulse rate, respiration rate and other health-related criteria. A patient monitoring system for providing continuous monitoring of a patient includes a data acquisition and processing module receiving physiological data from the patient This unit may be inserted in a bedside display unit to display the physiological condition of the patient. The major reason for the development of the said system is to reduce the product size, power consumption & cost of the system. The remote monitoring & control of the physiological parameters can be obtained by interfacing GSM mobile unit with the patient monitoring system. The system architecture is described. Patient monitoring systems measure physiological characteristics either continuously or at regular intervals over time. The embedded system is developed using libero IDE. An application of this method in Biomedical includes better accuracy, design security, productivity, speed and flexibility.

   In [2], the author explained the systems based on existing technologies and also proposes a GSM-Bluetooth based light controller and remote monitoring system. This system has simple features designed with the objective of minimum power consumption using infrared sensor for controlling lights, fans and other appliances which are controlled via SMS using a GSM module. A Bluetooth module is also interfaced with the main microcontroller chip. This Bluetooth module eliminates the usage charges by communicating with the appliances via Bluetooth when the application is in a limited range of few meters. The system informs user about any abnormal conditions like intrusion detection and temperature rise via SMS from the GSM module or by Bluetooth module to the user's mobile and actions are taken accordingly by the user.

   In [4], the author mentioned the performance of the sensors of a low cost Short Message System (SMS) based home security system equipped with motion sensor, smoke detector, temperature sensor, humidity sensor and light sensors has been studied. The sensors are controlled by a microprocessor PIC 18F4520 through the SMS having password. The operation of the home security has been tested on Vodafone- Fiji network for emergency and feedback responses for 25 samples. The GSM experiment showed that

it takes about 8-10s for the security system to respond the occupant and relevant civil authorities in case of emergency. It takes about 18-22s for the occupant to switch and monitor lights and appliances and then get feedback from home depending upon the network traffic.

III. PROPOSED SYSTEM

Figure 1. Block diagram of GSM based condition reporting system using microcontroller

This system is the GSM Based Condition reporting system using microcontroller in power station equipments. This system is mainly constructed with PIC 16F877A and GSM modem. PIC 16F877A is mainly used as control unit. Three sensors are mounted in power station and its surrounding. The three sensors sense the voltage, current and temperature and the sensing data are sent to PIC. PIC receives the sending data and checks overload or not according to the programmable. The three sensors are Voltage Level sensor, current level sensors and Temperature sensor. Initialization the microcontroller is operated and the sensors sense the data. If the over voltage or under voltage are occurred in the operating time, the microcontroller close the circuit and then one message is sent to the user mobile phone from the GSM modem. The user receives "voltage= V, current= A, temp= F" message. If the station temperature is over (250ºC), the engine can burn. So the temperature sensor is used to protect the station burn. The temperature sensor senses and the sensing data is report to the microcontroller. If the temperature is over, the microcontroller sent a message to the user. The user receives the message "The station is stop because of overheating!". If the power does not flow during the sensors, the modem sends the message "The station is stop because of lack of power!". The microcontroller and the GSM modem are connected with RS232 serial interface.

Block diagram of GSM based condition reporting system using microcontroller is shown in figure 1.

This design can be divided into several units or modules. They are sensor unit, processing unit and power unit. There are some devices and components used in the in the design to implement each unit. These devices used in this system are as follows;

- ➢ Power Supply Unit
- ➢ Current sensor
- ➢ Temperature sensor
- ➢ Voltage divider
- ➢ PIC16F877A microcontroller
- ➢ MAX232 level shifter
- ➢ GSM Modem
- ➢ Display Unit

A. Power Supply Unit

The DC power supply unit is vital component in modern electronic devices as they need a wide range of DC voltages for their operations. The purpose of a power supply is to provide the required amount of power specified voltage from primary source.

B. Current sensor

The Allegro ACS756 shown in figure 2, family of current sensor ICs provides economical and precise solutions for AC or DC current sensing in industrial, automotive, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include motor control, load detection and management, power supplies, and over current fault protection. The device consists of a precision, low-offset linear Hall circuit with a copper conduction path located near the die.

Features and Benefits of ACS756

- ▪ Industry-leading noise performance through proprietary amplifier and filter design techniques
- ▪ Total output error 0.8% at $T_A = 25°C$
- ▪ Small package size, with easy mounting capability
- ▪ Monolithic Hall IC for high reliability
- ▪ Ultra-low power loss: 130 μΩ internal conductor resistance

- 3 kV$_{RMS}$ minimum isolation voltage from pins 1-3 to pins 4-5
- 3.0 to 5.0 V, single supply operation
- 3 µs output rise time in response to step input current
- 20 or 40 mV/A output sensitivity
- Output voltage proportional to AC or DC currents
- Factory-trimmed for accuracy
- Extremely stable output offset voltage
- Nearly zero magnetic hysteresis

Figure 2. (a)ACS756 sensor (b) General block diagram of ACS 756 sensor

C. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in °Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4°C at room temperature and ±3/4°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 mA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C is rated for a -40° to +110°C range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-202 package.

Features of LM35

a) Calibrated directly in°Celsius (Centigrade)
b) Linear a 10.0 mV/°C scale factor
c) 0.5°C accuracy guaranteeable (at +25°C)
d) Rated for full -55° to +150°C range
e) Suitable for remote applications
f) Low cost due to wafer-level trimming
g) Operates from 4 to 30 volts
h) Less than 60 mA current drain
i) Low self-heating, 0.08§C in still air
j) Nonlinearity only ±1/4°C typical
k) Low impedance output, 0.1 Ω for 1 mA load

E. PIC16F877A Microcontroller

PIC 16F877 is 40/44 pin device and is one of the popular microcontroller used in complex applications. The device offers 8K X 14 word of Flash program memory, 368 bytes of RAM, 256 bytes of nonvolatile EEPROM memory, 33 input/output pins, 8 multiplexed A/D converters with 10 bits of resolution, PWM generator, three timers, an analog capture and comparator circuit, USART, and internal and external interrupt facilities.

F. MAX232 Level Shifter

Almost all digital device use either TTL or CMOS logic levels. Therefore, the first step to connecting a device to the RS232 port is to transform the RS232 levels back into 0 and 5 Volts. A MAX232 chip provides the TTL to RS232 (and vice versa) level conversions for the project.

The MAX232 provides two incoming ports and two outgoing ports. To create this interface, it mainly used the TTL outputs of the PIC in combination with a MAX232 serial driver chip. The MAX232 simply converts the TTL outputs to RS232 outputs.

This IC also includes two receiver and two transmitters in the same package. Two common RS232 level converters are the 1488 RS232 Driver and the 1489 RS 232 Receiver. Each package contains 4 inverters of the one type, either Drivers or Receivers. The driver requires two supply rails, +7.5 to +15v and -7.5 to -15V.

It may have a problem in many instances where only a single supply of +5V is used. However, the advantages of these IC's are cheap and also can be available in many places.

The MAX232 contains four sections:

       (1) Dual Charge-pump DC-DC Voltage Converters

       (2) RS232 driver

       (3) RS 232 receivers

       (4) Receiver and Transmitter enable control

G. GSM Modem(GM28)

The GSM modem communicates with the user cell phone to intimate the condition obtained for the microcontroller. Serial Port Adapter works in data and AT modes and needs to be properly configured. In AT mode, series of commands are sent for proper configuration. If match is found, it starts data communication between micro-controller system and GSM. AT commands are sent by sending text strings 'A', 'T', along with specified command strings through serial port to cell phone and are executed on receipt of carriage return. The result codes are sent by cell phone to system (TE) to indicate the status after execution of command.The GSM modem operates with SIM card as mobile phone.

Main features	Parameters
Power supply voltage	DC: 5~18V
Frequency band	Support four frequency: GSM850,GSM900,DCS1800,PCS1900 , Frequency automatic search , Frequency can be set by AT command
AT command	other extended AT command
Transmitting power	Class4 (2W): GSM850 and GSM900 , Class2 (1W): DCS1800 and PCS1900
Message	Text and PDU mode , Message storage equipment: SIM card
RS232 characteristic	Global function serial port, Used for AT command, Adaptive baud rate: 4800 bps-115200 bps, Character format: data bit 8, stop bit 1, no parity bit
Temperature range	Working temperature: -35 to 80 degree, Storage temperature: -40 to 80 degree
RS232 interface	A RS232 standard interface (device is female)
SIM card interface	a SIM card interface

V. SIMULATION RESULTS

Firstly, the system is simulated by using Proteus software. As shown in figure 5, the system can successfully read the data from sensors using microcontroller. Since the Modem is not available in Proteus, data transmitting and receiving functions are tested in Virtual terminals.

Principle of operation

The complete circuit diagram of the proposed system is shown in figure 3.

In this system, PIC 16F877A microcontroller is used as control unit. PIC 16F877A microcontroller consists of 40 pin. It has 33 pins of input/output port. The input/output ports are PORTA, PORTB, PORTC, PORTD and PORTE. The next 7 pins are two pins for ground reference (V_{SS}), two pins for positive supply (V_{DD}), two clock input pins and master clear (RESET) input. In this system, PORTB is used as input pin and PORTC is used for output. The three sensor's data enter the PORTB pins. The voltage level sensor is RB0 and the current sensor is RB1. The data of temperature low and high level enter RB3 and RB4 respectively.. The 5V power supply is connected to V_{DD} and V_{SS} is GROUND. The receive (R_X) and transmit (T_X) pins are connected to MAX232 IC. MAX232 has 16 pin and it converts 5V to 12V and 12V to 5V dc. The microcontroller receives the data from sensors and check overload or not according to programming. In programming design, transmit register and receive register is used to transmit and receive the data and then other registers are used in program. In this system, HI-TECH C program is used. To send the data from the microcontroller to modem, the serial data transmission system is used. The flow chart of the software implementation of the system is illustrated in figure 4.

Figure 3. Complete circuit diagram

Figure 4. Flow chart of the software implementation

Figure 5. Simulation result for data reading from sensors in Proteus

3. Test and Results

The microcontroller based dedicated hardware unit (DHU) is constructed in this research as shown in figure 6. In this hardware construction, the temperature sensor, current sensor and voltage divider network sense the temperature, current and voltage of the AC mains line instead of the power station equipment. Then the sensed data are transmitted to the GSM modem via RS232. And then GSM modem transmits the data to the user's GSM mobile. As seen in figure 7, the constructed circuit can successfully transmit and receive the condition (temperature, current and voltage).

Figure 6. Constructed and tested microcontroller based DHU

(a) Checking Modem is connect or not

(b) Requesting data and sending data to user GSM

(c) Normal Running Condition

(d) Receiving sms on user GSM

Figure 7. Test Results of Hardware Unit

V. CONCLUSION

GSM based condition reporting system using microcontroller in power station equipment is implemented in this research work. The system is physically constructed and its performance is tested. The system operates successfully. Therefore this proposed system can be practically applied for the condition testing of the actual power station equipment.

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Wireless Social Communication Network for Department

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Abstract- This research paper describes the about of social network for various fields. Social networking is the grouping of individuals into specific groups. Social networking is possible in person, especially in the workplace, universities, and high schools, it is most popular online. When it comes to online social networking, websites are commonly used. Social networking websites function like an online community of internet users. In this social network; it was implemented with many aspects and features of what makes up the majority of today's social networks or online communities. The goal is to implement the creation of a community in a scalable fashion. The objectives of our social network is to build a Social Network for staffs and students with common features such as direct messaging, download link, posting, etc.

Index Terms- Microsoft visual studio, Router, Internet Information Services (IIS) management, digital passcode devices, Database

I. INTRODUCTION

Social networking is all about developing connections between friends and associates. While people have always networked with one another, the Internet has allowed us to do this in a global manner. Some great examples of popular social networks are Myspace, Friendster, LinkedIn, Facebook, and Twitter. There are many related social media sides such as flickr, YouTube Pandora and etc. Most people have heard of these services and many use them on a daily basis. Many people are part of at least one social network, while more often people are members of many different communities. For this reason many people are trying to capitalize on this movement and are in a rush to put up their own social network. Many web applications are being developed and deployed on multi-tier environments involving browser-based clients, web application servers and backend databases.

II. WIRELESS COMMUNICATION

Wireless communication is the transfer of information between two or more points that are not connected by electrically. Wireless operations permit services, such as long-range communications, that are impossible or impractical to implement with the use of cables. The term is commonly used in the telecommunications industry to refer to telecommunications systems which use some form of energy to transfer information without the use of cables. Information is transferred in this manner over both short and long distances. Wireless networking is used to meet many needs. A wireless transmission technique is a logical choice to network a LAN segment that must frequently change locations. The following conditions justify the use of wireless technology:

- To span a distance beyond the capabilities of typical cabling,
- To provide a backup communications link in case of normal network failure,
- To link portable or temporary workstations,
- To overcome situations where normal cabling is difficult or financially impractical, or
- To remotely connect mobile users or networks.

Originators need to consider some factors including Wireless RF technology for better developing wireless networks:

- Sub-GHz versus 2.4 GHz frequency trends
- Operating range and battery life
- Sensitivity and data rate
- Network topology and node intelligence

III. SOCIAL NETWORK

Social networking is the grouping of individuals into specific groups, like small rural communities or a neighborhood subdivision. Although social networking is possible in person, especially in the workplace, universities, and high schools, it is most popular online.

This is because unlike most high schools, colleges, or workplaces, the internet is filled with millions of individuals who are looking to meet other people, to gather and share first-hand information and experiences. The topics and interests are as varied and rich as the story of our universe. When it comes to online social networking, websites are commonly used. These websites are known as social sites. Depending on the website in question, many of these online community members share common interests in hobbies, religion, politics and alternative lifestyles. Once you are granted access to a social networking website you can begin to socialize. This socialization may include reading the profile pages of other members and possibly even contacting them.

A. *Main features of Social Network*

Profiles and Friends lists are two vital features on social network. Another is a public commenting feature ('Testimonials', 'Comments', 'The Wall', 'The Post'). This feature permits individuals to comment on their Friends' profiles, photos and status. These comments are displayed obviously and visible for everybody who has admission to that profile.

These three features - profiles, Friends lists, and comments - include the primary configuration of social network sites, even though individual sites arrange for additional features for further arrangement. When social network sites allow visitors to roam

from Friend to Friend and communicate with anybody who has a visible profile, the primary use form is driven by pre-existing friend groups. People take part in social network sites with their friends and use the unlike messaging tools to hang out, share cultural articles and concepts, and communicate with one another.

B. *Potential Benefits of Social Network for Department*

Contact with students and staffs can be difficult for controlling. Social networking websites make an opportunity for management to have faster contact with their attendants. If there is a subject that requires immediate attention, a teacher can send a message through social networking websites to students and staffs without time-wasting. Moreover teachers or Head of Department can make announcements and give information to students at one sit-time through over social network.

Social networking websites reduce the amount of time it takes to be completed because they cut down the amount of time it takes for teachers, classmates and staffs to contact each other. Information is easily found through the network. Social networking websites can be one of the fastest ways to obtain information. "Organizations are actively leveraging the influence of social networks to find new teaching and communication opportunities, new groups of like-minded individuals and departments, and new sources of industry specific wisdom, advice and expertise" (Wilson, 2009). Social networking websites allow department to find and share information about different studying strategies and methods.

Among the benefits of social networking in the department presence can be maintained. Social networks can act as an advertising or announcement tool to help the department reach out to both students and customers. Wilson (2009) says "a logical extension of this is to students to spend their entire day maintaining the sanctioned department presence on several social network sites, acting as a department's 'voice'.

C. *Local information sharing*

Online social networks (OSNs) represent an unlimited technique to share information, but the very impermanent nature of the information in OSNs is such that if should somebody would like to share data on the long term, he has to place it on his account and periodically makes notifications aiming the new point. In addition, when data is meant to be shared among biologically close people, in reach of a local area network (LAN) for instance, there is no reason for that data to be uploaded to the Internet (at the often low WAN bandwidth), to be then downloaded once more locally. This would rely on the Internet infrastructure while the LAN infrastructure is perfectly adapted and sufficient here.

IV.   DEPARTMENT SOCIAL NETWORK

Department Social Network is an offline social networking service. It was built on C# language, ASP.NET and SQL server combined with IIS management. It can help the students and teachers get to know one another and also department administrations. It has affected the social life and activity of students and staff in various ways. With its availability on many mobile devices, laptops, tablets and other passcode devices that

allow users to continuously stay in touch with each other as long as there is access to the social network.

Figure 1.1 Main Page of Department Social Network

Figure 1.2 Registration Page of Department Social Network

A. *Registration*

Users must register before using the site, after which they may create a personal profile, add other users as friends, exchange messages, and receive automatic notifications.

B. *Create Profile*

Users can create profiles with photos, lists of personal interests, contact information, and other personal information.

C. *Messaging*

Users can directly communicate with each other using several different methods (including a special email address, text messaging, or through the website or mobile app).

D. *Privacy*

Users can choose their own privacy settings and choose who can see specific parts of their profile. Privacy is one of the first matter that arises up to mind when introducing any new idea in the region. The concept of offline social network, because of the fact that there is no connection with the Internet, offers possibly better guarantees than online social networks with esteem to privacy. However, Offline Social Networks need to account for such agreements while being designed.

E. *Trust and Security*

Outside privacy, a main for approval and achievement of an application is the trust that users can set on the service provider. When trust obviously relies on adjustable metrics, even feelings from one user to another, being able to deliver a provable means that privacy and security are respected and that the server follows the initial pronouncement is definitely an advantage for a wide adoption. Open source approaches clearly provide this advantage over closed and registered software that code can be checked out by anyone, and that privacy breaks can be detected

and fixed earlier, due to the potential amount of people attracted in a specified project.

V. SETUP PROCEDURE

For wireless connection, social network implemented a Router inside the sever engine by utilizing the facility in server's federated functionality.Router can transmit and receive data from server PC and other devices. And database tables were built into the Server PC to produce and store database input/output. It combined with the IIS Server to get nicknames and passwords for clients and other digital code devices. After making setups social network was tested with mobiles, laptops, tablets and so on for wireless communication.

For wired connection, social network connected PC which used as server with Rj45 cable to other PCs or clients by the help of switch.And set the Static IP on server (example 192.168.0.x). To gain wire connection, established one of static IP on the gateway box of sever that must not conflict server IP. After being these steps, network can be used as wireless or wired social communication network.

Figure 1.3 Form of Department Social Network on mobile

A. *Implementing the Database*

In this system the database is implementing by using the following tables.

Table 2.1: User Profiles Table

Table 2.2: Comment Table

Table 2.3: Post Table

Table 2.4: Message Table

VI. CREATING THE RELATIONSHIPS

Once all the tables are completed, create all the relationships. For this set of tables, have relationships between the following tables as shown in Figures.

.Figure 1.3 Relationship between server Profiles Table and Post Table

Figure1.4 Relationship between User Profiles Table and Comment Table

VII. CONCLUSION

Social networking has become a driving force on the Internet. Many people are part of at least one social network, while more often people are members of many different communities. For this reason many business people are trying to capitalize on this movement and are in a rush to put up their own social network.

As the growth of social networks, have started to see more and more niche communities popping up all over in favor of the larger, all-encompassing networks in an attempt to capture a sliver of the market. In this Department Social Network, it included the many aspects and features of the majority of today's social networks. It can also provide opportunities for new relationships as well as strengthening existing relationships. It can be used by teachers to communicate with students or for out-of-classroom discussions. By making connections with other people who have the same interest, students can learn and exchange knowledge with others they may not have had the opportunity to interact with. By collaborating with other students and teachers through social networking, students and teachers are able to build stronger Department communities.

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A Comparison Paper on Skew Detection of Scanned Document Images Based on Horizontal and Vertical Projection Profile Analysis

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Abstract- Skew detection has been an important part of the document recognition system. A lot of techniques already exists and has currently been developing for detection of skew of scanned document images. This paper describes the skew detection and correction of scanned document images written in Assamese language using the horizontal and vertical projection profile analysis and brings out the differences after implementation of both the techniques.

Index Terms- Skew Detection,Skew Correction,Projection-profile analysis.

I. INTRODUCTION

One of the most important steps of offline character recognition system is skew detection and correction which has to be used in scanned documents as a pre-processing stage in almost all document analysis and recognition systems. The skew of the scanned document image specifies the deviation of its text lines from the horizontal axis. The skew of the document image can be a global (all document's blocks have the same orientation), multiple (document's blocks have a different orientation) or nonuniform (multiple orientation in a text line) [1]. A variety of skew detection and correction techniques are available. Skew estimation approaches are classified into four main categories according to the basic approach they adopt [2]. It includes Hough transform [3], projection profile [4-7], nearest neighbor clustering [9] and interline cross correlation [10].

The traditional projection profile approach was initially proposed by Postl [4] and is based on horizontal projection profile. According to this approach, a series of horizontal projection profiles are calculated at a range of angles. The profile with maximum variation refers the best alignment to the text lines. At this stage, projection angle is the actual skew angle of the skewed document. In order to reduce high computational costs, several variations of this basic method have been proposed. Baird [5] proposes a technique for selecting the points to be projected: for each connected component the midpoint of the bottom side of the bounding box is projected. The objective function is to compute the sum of the squares of the profiles. Ciardiello [6] projected selected sub-region (one with high density of black pixels per row) of the document image; the function is to maximize the mean square deviation of the profile. Ishitani [7] uses a profile which is defined in a different style. A cluster of parallel lines on the image is selected and the bins of

the profile store the number of black/white transitions along the lines.These methods are limited to estimate skew angle within ±10° to 15°[8].

1.1.Introduction to Assamese script

The **Assamese script** is a writing system of the Assamese language. It used to be the script of choice in the Brahmaputra valley for Sanskrit as well as other languages such as Bodo (now Devanagari), Khasi (now Roman), Mising (now Roman) etc. The current form of the script has seen continuous development from the 5th-century Umachal/Nagajari-kanikargaon rock inscriptions written in an eastern variety of the Gupta script, adopting significant traits from the Siddham Script along the way. The present standard is identical to the Bengali script *except for three letters*. The alphabet of the modern Assamese script consists of 11 vowels and 40 consonants. These characters are called as basic characters. Writing style in Assamese is from left to right and the concept of upper/lower case is absent in this script. It can be seen that most of the characters of Assamese have a horizontal line (Matra) at the upper part. From a statistical analysis we notice that the probability that a Assamese word will have horizontal line is 0.994. In Assamese script a vowel following a consonant takes a modified shape. Depending on the vowel, its modified shape is placed at the left, right, both left and right, or bottom of the consonant. These modified shapes are called modified characters. A consonant or a vowel following a consonant sometimes takes a compound orthographic shape, which is called as compound character. Compound characters can be combinations of two consonants as well as a consonant and a vowel. Compounding of three or four characters also exists in Assamese. There are about 280 compound characters in Assamese.

II. METHODOLOGY

The projection profile can be used as a suitable feature for skew detection. We need to create a feature to describe which one is more peaked for comparing peaks of projection profiles. So employing a criterion function provides a numerical description of the peaks. The projection profile analysis process is as follows:
1. Rotate the binary input image to different angles and at any angle do "a" and "b".
a. Obtain the projection profile.
b. Calculate criterion function.

2. Skew estimation: obtain the angle corresponding to the maximum value of criterion function.

The horizontal projection profile is based on the histogram of black pixels along horizontal scan-lines. For a script with horizontal text lines, the horizontal projection profile will have peaks at text line positions and troughs at positions in between successive text lines [9]. This concludes to the fact that any noise and warp will ruin those peaks and troughs of the horizontal projection histogram and the efficiency of this technique. On the contrary a vertical projection method is robust to noise and warp of the image. The sum of squares of the projection profile elements as the value of the criterion function. This method also works well for the languages where most of their letters include at least one vertical line, such as languages with Latin alphabets. The pseudo codes of both the algorithms are as follows:

2.1.Vertical Projection profile Analysis Algorithm:

1. Read the image data into a matrix and convert it to grayscale.
2. This grayscale image is changed to black background and white writing on comparison each pixels with 0.34
3. Searches for the first column with a white pixel, i.e., with a written pixel.
4. The entire image column-wise is stored in a variable (Skew_input).
5. Each element of the input image matrix is added column-wise to get the number of white pixels per column and is stored in a variable Sum_col.
6. Sum of the squares of each Sum_col gives the value of energy function for the skew angle.
7. Input Image is rotated by angle "rot_angle" and steps 5 and 6 are repeated for this angle to obtain the value of energy function.
8. Input Image is rotated by angle "(-)rot_angle" and steps 5 and 6 are repeated for this angle to obtain the value of energy function.
9. rot_angle = rot_angle – 1.
10. Repeat steps 7, 8 & 9 till rot_angle != 0.
11. Find the angle for which the value of Energy function is maximum.
12. This angle gives the skew angle.
13. To display as output the values of energy function for each angle is displayed along with the bar graph for the column values for the skew angle and the corrected image segment.

2.2.Horizontal Projection profile Analysis Algorithm:

1. Read the image data into a matrix and convert it to grayscale.
2. This grayscale image is changed to black background and white writing on comparison each pixels with 0.34
3. Searches for the first column with a white pixel, i.e., with a written pixel.
4. One-Fourth of the image row-wise is stored in a variable (Skew_input).

5. Each element of the input image matrix is added row-wise to get the number of white pixels per column and is stored in a variable Sum_row.
6. Sum of the squares of each Sum_row gives the value of energy function for the skew angle.
7. Input Image is rotated by angle "rot_angle" and steps 5 and 6 are repeated for this angle to obtain the value of energy function.
8. Input Image is rotated by angle "(-)rot_angle" and steps 5 and 6 are repeated for this angle to obtain the value of energy function.
9. rot_angle = rot_angle – 1
10. Repeat steps 7, 8 & 9 till rot_angle != 0
11. Find the angle for which the value of Energy function is maximum.
12. This angle gives the skew angle.
13. To display as output the values of energy function for each angle is displayed along with the bar graph for the row values for the skew angle and the corrected image segment.

III.   RESULTS AND DIFFERENCES

The implementation of both the algorithms brings out the following differences:

Fig1: Input Image

1. In the case of vertical projection profile analysis technique, the written line is scanned vertically and then aligned to find the maximum value of the objective function. But in the case of horizontal projection profile analysis technique the written line is scanned horizontally and then aligned to find the maximum value of the objective function.

2**.** The result obtained for Vertical Projection Profile Analysis Algorithm is not uniformly increasing showing that a little noise can create skew detection errors in this case.

Fig2: Corrected Image Segment

Fig3: Bar graph for column values of the skew angle

The angle of skew from this algorithm for the input image is -8 degrees.

Whereas the results obtained for horizontal projection profile analysis algorithm is uniformly increasing showing that it can give accurate results for a little noisy image.

Fig4: Corrected Image Segment

Fig5: Bar graph for column values of the skew angle

The angle of skew from this algorithm for the input image is -6 degrees.

3. Due to the non-uniform variation of the objective function in the vertical projection profile analysis technique, for accuracy in result we have to process the complete image to get better results. Whereas the uniform variation in the horizontal projection profile analysis technique helps to get better results with processing of even small portion of the written image.

4. The time complexity of the algorithm designed for vertical projection profile analysis technique is higher than the algorithm for horizontal projection profile analysis technique.

The differences are presented in tabular form as follows:

Vertical Projection Profile Analysis	Horizontal Projection Profile Analysis
Working Principle:	
1. The image is scanned vertically column-wise for number of white pixels for each column.	1. The image is scanned horizontally row-wise for number of white pixels for each row.
Effect of Noise:	
2. The resultant distribution of values of the objective function for various angles, contains multiple peaks	2. The resultant distribution of values of the objective function for various angles, contains a single peak value.

allowing a small noise at the peaks to produce errors.	Thus effect of noise is reduced greatly.
Input Image data required:	
3. To reduce effect of noise and thus improve accuracy the complete image is required to be processed.	3. As the effect of noise on the result is negligible so processing a section of the image can also yield results with high accuracy.
Time Complexity:	
4. The time complexity of the algorithm designed is high.	4. The time complexity of the algorithm designed is less than vertical projection profile analysis.
Angle obtained:	
5.The angle obtained through experimental results from this algorithm is -8 degrees	5.The angle obtained through experimental results from this algorithm is -6 degrees.

Fig6:Differences in tabular form

IV. SIMILARITIES

Apart from thr differences observed there even exists some similiarities between both the techniques of Projection profile analysis.Some of them are stated below:

1. Projection profile based approaches are computationally expensive as different projections are calculated at different angles in a particular range.
2. Projection profile methods are limited to estimate skew angle within $\pm10°$ to $15°$.
3. The accuracy depends upon the angular resolution of the projection profile.
4. Projection profile based approaches cannot deal with noisy documents and broken characters.

V. CONCLUSIONS

In this work, we presented two algorithms for skew detection & correction. Both the algorithms are based on projection profile analysis, one based on vertical & other on horizontal projection profile. The subjective & objective evaluation of both these algorithms was executed and the results of both the techniques were compared. The algorithm was implemented on input images of Assamese language. The skew for the test images were estimated and corrected and the performance was observed to be improved in the horizontal projection profile from that in the vertical projection profile. It was also observed that the horizontal profile technique could be used for skew correction with images with some noise. However the algorithm could only estimate skew if the angle is less than $\pm15°$.

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Chaotic Particle Swarm Optimization for Congestion Management in an Electricity Market

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Abstract- Congestion management is one of the major tasks performed by system operators (SOs) to ensure the operation of transmission system within operating limits. To permit smooth and quality flow of power the problem of congestion has to be solved. The congestion in the transmission line will be removed by generation rescheduling with the cost involved in the rescheduling process should be minimized. T he literature, classical optimization techniques were applied to solve this problem. The main drawbacks of the classical optimization techniques are higher computation time requirement, non-differentiable characteristics of objective function and inferior quality of solutions. To overcome the above mentioned problems, heuristic optimization techniques are widely used. In our project presents Chaotic Particle Swarm Optimization (CPSO) based Congestion Management by optimal rescheduling of active powers of generators. In the proposed method, generators are selected based on their sensitivity to the congested line for efficient utilization. The task of optimally rescheduling the active powers of the participating generators to reduce congestion in the transmission line is attempted by CPSO and conventional PSO. The CPSO and PSO algorithms are tested on the IEEE 30-bus system. Compared with CPSO and PSO, CPSO can better perform the optimal rescheduling of generators to relieve congestion in the transmission line.

Index Terms- Chaotic Particle Swarm Optimization (CPSO), generator sensitivity, particle swarm optimization and Transmission congestion management.

I. INTRODUCTION

A system is said to be congested when producers and consumers of electric energy desire to produce and consume in amounts that would cause the transmission system to operate at or beyond one or more transfer limits. The main challenge faced by the Independent System Operator (ISO) in a deregulated environment is to maintain the security and reliability of the power system by maximizing market efficiency when the system is congested. The ISO, therefore, has to create a set of transparent and robust rules that should not encourage aggressive entities to exploit congestion to create market power and maximize profits at the cost of the market. Congestion in a transmission system cannot be allowed beyond a short duration because this could lead to cascading outages with uncontrolled loss of load. Vinod

kumar et al. [1] explained in detail the congestion management and felt that controlling the transmission system so that transfer limits are observed is perhaps the fundamental transmission management problem. In a deregulated environment, all the GENCOs and DISCOs plan their transactions ahead of time. But by the time of implementation of transactions there may be congestion in some of the transmission lines. Hence, ISO has to relieve the congestion so that the system remains in secure state.

Meena and Selvi [2] considered an open transmission dispatch environment in which pool and bilateral/multi lateral dispatches coexist and proceeded to develop a congestion management strategy for this scenario. Dutta et al. [3] presented congestion management techniques applied to various kinds of electricity markets. Kennady and Eberhart [4] reviewed extensively the literature for reporting several techniques of congestion management and informed that the congestion management is one of the major tasks performed by Independent System Operators (ISOs) to ensure the operation of transmission system within operating limits. In the emerging electric power markets, the congestion management becomes extremely important and it can impose a barrier to the electricity trading. Fang and David [5] proposed an efficient zonal congestion management approach using real and reactive power rescheduling based on AC Transmission Congestion Distribution factors considering optimal allocation of reactive power resources. The impact of optimal rescheduling of generators and capacitors has been demonstrated in congestion management.

Ashwani kumar et al. [6] described a coordinating mechanism between generating companies and system operator for congestion management using Benders cuts. Lamont et al. [7] proposed two approaches for a unified management of congestions due to voltage instability and thermal overload in a deregulated environment. Hazra and Sinha [8] discussed a combined frame work for service identification and congestion management while a new approach were applied to identify the services of reactive support and real power loss for managing congestion using the upper bound cost minimization.

Chen and Zhang [9] described the Particle Swarm Optimization (PSO) concept in terms of its precursors, briefly reviewing the stages of its development from social simulation to optimizer and discussed application of the algorithm to the training of artificial neural network weights. Shi et al. [10] research and development of PSO in five categories viz. algorithms, topology, parameters, hybrid PSO algorithms and applications.

In general, the search process of a PSO algorithm should be a process consisted of both contraction and expansion so that it could have the ability to escape from local minima, and eventually find good enough solutions. Yamina and Shahidehpour [11] detailed review of the PSO technique, the basic concepts and different structures and variants, as well as its applications to power system optimization problems. Snider et al. [12] Introduced PSO for solving Optimal Power Flow (OPF) with which congestion management in pool market is practically implemented on IEEE 30 Bus system. Kumar and Srivastava [13] proposed cost efficient generation rescheduling and/or load shedding approach for congestion management in transmission grids using Chaotic Particle Swarm Optimization (CPSO) method.

Fattahi and Ehsan[14] proposed a technique for reducing the number of participating generators and optimum rescheduling of their outputs while managing congestion in a pool at minimum rescheduling cost and explored the ability of PSO technique in solving congestion management problem. An optimal solution for static congestion management using PSO based OPF method. Here, the congestion has been created in the transmission line by loading the lines and it is relieved by placing a Static Synchronous Series Compensator (SSSC) in an optimal location in the transmission line. Masoud Esmaili et al. [15] proposed modified blenders decomposition technique for solving the congestion management in hybrid power markets.

Dutta and Singh [16] demonstrated the successful adaptation of the PSO algorithm to solve various types of economic dispatch (ED) problems in power systems viz. Multi-area ED with tie line limits, ED with multiple fuel options, combined environmental ED and ED of generators with prohibited operating zones. The better computation efficiency and convergence.

Property of the PSO technique shows that it can be applied to a wide range of optimization problems. Christie and Wollenberg [17] PSO method for solving the ED problem with the generator constraints and demonstrated that the PSO method can avoid the shortcoming of premature convergence of Genetic Algorithm (GA) method while obtaining higher quality solution with better computation efficiency and convergence property.

Shahidehpour and Alomoush [18] explained in detail that formulated chaotic particle swarm (CPSO) Optimization Algorithm for optimization process represented by the activity of particle optimization. The algorithm presented has been utilized in this paper for optimal generation of active power of the participating generators. Sakthivel et al. [19] introduced chaotic particle swarm optimization (CPSO) method to overcome the above mentioned drawbacks.

II. PROBLEM FORMULATION

1) OPF Problem Formulation

The objective function is corresponding to the production cost can be approximated to be a quadratic function of the active power outputs from the generating units. Symbolically, it is represented as

$$\text{Minimize } F_t^{cost} = \sum_{i=1}^{N_G} f_i(P_i) \tag{1}$$

Where $f_i(P_i) = a_i p_i^2 + b_i p_i + c_i, \quad i = 1,2,.......,N_G$

Is the expression for cost function corresponding to ith generating unit and a_i, b_i and c_i are its cost coefficients. Pi is the real power output (MW) of ith generator. N_G is the number of online generating units.

2) Power Balance Constraints

This constraint is based on the principle of equilibrium between total system generation and total system loads. That is given by set of non-linear power flow equations as

$$P_{G_i} - P_{D_i} - \sum_{j=0}^{n}|V_i\|V_j\|Y_{ij}|\cos(\theta_{ij} - \delta_i - \delta_j) = 0 \tag{2}$$

$$Q_{G_i} - Q_{D_i} - \sum_{j=0}^{n}|V_i\|V_j\|Y_{ij}|\sin(\theta_{ij} - \delta_i - \delta_j) = 0 \tag{3}$$

The real power loss in the system can be modeled a

$$P_{loss} = \sum_{k=1}^{N_l} g_k |V_i|^2 + |V_j|^2 - 2|V_i\|V_j|\cos(\delta_i - \delta_j) \tag{4}$$

3) The Generator Constraints

The output power of each generating unit has a lower and upper bound so that it lies in between these bounds. This constraint is represented by a pair of inequality constraints as follows.

$$P_{Gi}^{\min} \le P_{Gi} \le P_{Gi}^{\max} \tag{5}$$

$$Q_{Gi}^{\min} \le Q_{Gi} \le Q_{Gi}^{\max} \tag{6}$$

4) Voltage Limits

The voltage magnitudes of the each and every load buses after conducting the load flow simulation should be verified between its bounds. This voltage magnitude is having its own lower and upper bound and mathematically represented by

$$V_i^{\min} \le V_i \le V_i^{\max} \tag{7}$$

5) Transmission Line Loadings

The line flows of all the transmission lines should be within its line capacity given by MVA ratings. This can be given as

$$S_L \le S_L^{\max} \tag{8}$$

6) OPF Constraints Handling

The equality and inequality constraints of the power dispatch problem are considered in the fitness function (J_{error}) itself by incorporating a penalty function.

$$PF_i = \begin{cases} K_i(U_i - U_i^{\lim})^2 & \text{If violated} \\ 0 \end{cases} \tag{9}$$

Therefore the objective of the problem is the minimization of generation cost and penalty function due to any constraint violation as defined by the following equation.

$$J_{error} = F_t^{cost} + \sum_{l=0}^{nc} PF_i \qquad (10)$$

7) Determination Of Generator Sensitivity Factor

The generators in the system under consideration have different sensitivities to the power flow on the congested line. A change in real power flow in a transmission line k connected between bus I and bus j due to change in power generation by generator g can be termed as generator sensitivity to congested line (GS). Mathematically, GS for line k can be written as

$$GS_g = \frac{\Delta P_{ij}}{\Delta P_g} \qquad (11)$$

8) Congestion Management Problem

It is advisable to select the generators having non uniform and large magnitudes of sensitivity values as the ones most sensitive to the power flow on the congested line and to participate in congestion management by rescheduling their power outputs. Based on the bids received from the participant generators, the amount of rescheduling required is computed by solving the following optimization problem.

$$C_c = \min \sum_g^{N_g} C_g(\Delta P_g)\Delta P_g \qquad (12)$$

Subject to

$$\sum_g^{N_g} ((GS_g \Delta P_g) + PF_k^0 \le PF_k^{max}$$

$$(2.13)$$

$$\Delta P_g^{min} \le \Delta P_g \le \Delta P_g^{max}$$

$$(2.14)$$

$$\Delta P_g^{min} = P_g - P_g^{min}$$

$$(2.15)$$

$$\Delta P_g^{max} = P_g^{max} - P_g$$

$$(2.16)$$

$$\sum_{g=1}^{N_g} \Delta P_g = 0$$

$$(17)$$

Where ΔPg is the real power adjustment at bus-g and Cg (ΔPg) are the incremental and decremented price bids submitted by generators and these generators are willing to adjust their real power outputs. PF_k^0 is the power flow caused by all contracts requesting the transmission service. PF_k^{max} is the line flow limit of the line connecting bus-i and bus-j. Ng is the number of participating generators, P_g^{min} and P_g^{max} denotes respectively the minimum and maximum limits of generator outputs.

III. CHAOTIC PARTICLE SWARM OPTIMIZATION

A. PSO

Kennady and Eberhart first introduced the PSO in the year 1995[4]. PSO is motivated from the simulation of behavior of Social systems such as fish schooling and birds flocking. The PSO algorithm requires less computation time and less memory because of the simplicity inherent in the above systems.

The basic assumption behind the PSO algorithm is, birds find food by flocking and not individually. This leads to the assumption the information is owned jointly in flocking. Basically PSO was developed for two-dimension solution space by Kennedy and Eberhart [4].The position of each individual is represented by XY axis position and its velocity is expressed by V_x in x direction and V_y in y direction. Modification of the individual position is realized by the velocity and position information.

PSO algorithm for N-dimensional problem formulation based on the above concept can be described as follows. Let P be the in a search 'particle' coordinates (position) and V its speed (velocity) in a search space.

Consider i as a particle in the total population (swarm).Now the ith particle position can be represented as $P_i = (P_{i1}, P_{i2, Pi3...} P_{iN})$ in the N-dimensional space. The best previous position of the ith particle is stored and represented as $Pbest_i = (Pbest_{i1}, Pbest_{i2} ... Pbest_{ij})$. All the Pbest are evaluated by using a fitness function, which differs for the different problems. The best particle among all Pbest is represented as gbest.

The velocity of the ith particle is represented as $V_i = (V_{i1}, V_{i2}....V_{ij})$. The modified velocity of the each particle can be calculated using the information ,(i) the current velocity(ii)the distance between the current position and Pbest and (iii)the distance between the current position and gbest. This can be formulated as an equation

$$V_{ij}^{(iter+1)} = W*V_{ij}^{(iter)} + c_1*rand_1*(Pbest_{ij} - P_{ij}^{(iter)}) + c_2*rand_2*(gbest_i - P_{ij}^{(iter)})$$

$$(18)$$

$$P_{ij}^{(iter+1)} = P_{ij}^{(iter)} + V_{ij}^{(iter+1)} \quad I = 1, 2... N \text{ and } j = 1, 2... \qquad (19)$$

The use of linearly decreasing inertia weight factor w has provided improved performance in all the applications .Its value is decreased linearly from about 0.9 to0.4 during a run. Suitable selection of the inertia weight provides a balance between global and local exploration and exploitation, results in fewer iterations on average to find a sufficiently optimal solution; its value is set according to the following equation:

$$W = \frac{W_{max} - (W_{max} - W_{min}) \times iter}{iter_{max}} \qquad (20)$$

In Equation (20) the first term indicates the current velocity of the particle, second term represents the cognitive part of PSO where the particle change its velocity based on its own thinking and memory. The third term represents the social part of the PSO where the particle changes its velocity based on the social psychological adaption of knowledge.

B. CHAOTIC PARTICLE SWARM OPTIMIZATION

One of the simplest dynamic systems evidencing chaotic behavior is the iterator called the logistic map, whose equation is described as follows:

$$f_k = \mu . f_{k-1} . (1 - f_{k-1}) \qquad (21)$$

Where μ is a control parameter and has the real value between [0, 4]. Despite the apparent simplicity of the equation, the solution exhibits a rich variety of behaviors.

The behavior of the system represented by equation is greatly changed with the variation of μ. The value of μ determines whether 'f' stabilizes at a constant size, oscillates between limited sequences of sizes, or behaves chaotically in an unpredictable pattern.

Also the behavior of the system is sensitive to initial value of 'f'. Equation (5) is deterministic, displaying chaotic dynamics when μ = 4.0 and f0 0, 0.25, 0.50, 0.75, 1.0. In this thesis, the new weight is defined as multiplying equation (4) by equation (5) in order to improve the global searching capability as follows:

$$W_{new} = W \times f \qquad (22)$$

Whereas, the conventional weight decreases monotonously from Wmax to Wmin, the proposed new weight decreases and oscillates simultaneously for total iteration as shown in figure 3.1.

Figure 3.1.comparison of weights by each approach

The CPSO algorithm can be summarized as follows:

Step 1: Initialize parameters Wmax, Wmin, C1, C2 and Itermax.

Step 2: Generate intial population of N particles with random positions and velocities.

Step 3: Calculate fitness: Evaluate the fitness value of current particle.

Step 4: Update personal best: Compare the fitness value of each particle with its pbests. If the current value is better than pbest, then set pbest value to the current value.

Step 5: Update global best: Compare the fitness value of each particle with gbest. If the current value is better than gbest, set gbest to the current particle's value.

Step 6: Update chaotic weight: Calculate weight $W_{new}^{(k+1)}$ using equation.

Step 7: Update velocities: Calculate velocities $V_{ij}^{(iter+1)}$ using equation.

Step 8: Update positions: Calculate positions $P_{ij}^{(iter+1)}$ using equation.

Step 9: Return to step (4) until the current iteration reaches the maximum iteration number.

Step 10: Output the optimal solution in the last iteration.

C. FLOW CHART FOR CHAOTIC PARTICLE SWARM OPTIMIZATION

Buses	30
Branches	41
Generators	6

A) *PARAMETER SELECTION OF CPSO ALGORITHM*

Some parameters must be assigned before CPSO is used to solve the parameter estimation problem as follows: Particle size = 20; initial inertia weight W_{max} =0.9; final inertia weight, W_{min} = 0.1; acceleration factor $C_1 = C_2 = 1.5$; maximum iteration, $iter_{max}$ = 50; control parameter of chaotic sequences $\mu = 4.0$ and the initial value of 'f' is a random value between [0, 1] except for (0, 0.25, 0.5, 0.75, and 1).

IV. RESULTS AND DISCUSSIONS

The suitability of the CPSO method has been tested for IEEE-30 bus system and compared with PSO algorithm. The IEEE 30 bus system description has been given in Tables 1 and 2. The algorithms are implemented in Matlab-7.12 programming language and the developed software code is executed on 1.67 GHz, 2 GB RAM INTEL(R) ATOM (TM) CPU (N455), DELL computer.

1. optimal power flow

The preferred generation schedule corresponding to the particular load condition is obtained by running a optimal power flow to minimize the generation cost alone and is given in Table 3. The generator outputs except the slack bus generator are considered as the variable for running optimal power flow. The PSO and CPSO algorithms are used to optimize the generation cost. It is giving the minimum generation cost values as 801.843 $/h by CPSO method. The corresponding power generation is taken as the preferred schedule to meet the normal load demand. The bidding cost coefficients are given in Table 4.

2. Congestion removal

The congestion is created in the system by loading at load Bus-14 and is occurred in Line-26 connecting Bus-10 and Bus-17. The real power flow of the Line-26 before and after the congestion management is given in Table 5 and shown in Figure 1. The real power flow obtained in the congested line (line-26) is 7.01 MW. But the real power flow limit of the line is 6.99 MW. The CPSO algorithm is used for finding the necessary change in power generation to remove this congestion on Line 26. The results of rescheduling the generation by PSO and CPSO algorithms are reported in Table 6. The 20 trail is made with both the algorithms and result of best cost, worst cost and mean value of cost is presented in the same table.

Table 1 Description of the Test system

Variables	30 bus system

Table 2 Generator cost co-efficient

Bus No.	Real power output limit of generator (MW)		Cost co-efficient		
	Min	Max	a	b	c
1	50	200	0.00375	2.00	0
2	20	80	0.01750	1.75	0
5	15	50	0.06250	1.00	0
8	10	35	0.00834	3.25	0
11	10	30	0.02500	3.00	0
13	12	40	0.02500	3.00	0

Table 3 Active power generation before congestion management

Generator Bus No.	Active power generation before congestion management (MW)	
	PSO	CPSO
1	176.93	176.73
2	48.72	48.83
5	21.44	21.47
8	21.60	21.65
11	12.10	12.10
13	12.0	12.0
Cost($/h)	801.844	801.843

Table 4 Bidding cost

GEN. NO.	1	2	3	4	5	6
BIDS	11	17	19	20	15	10

Table 5 Comparison of line flow before and after congestion management

Branch power flow		Before congestion management active power flow (MW)	After congestion management active power flow (MW)	
From bus	To bus		PSO	CPSO
10	17	7.01	6.93	6.86

Table 6 Active power generation after congestion management

Generator Bus No.	Active power generation after congestion management (MW)	
	PSO	CPSO
1	176.15	176.05
2	47.55	49.54
5	21.45	21.68

8	24.50	23.59
11	14.5	13.55
13	12.0	12.0
Best cost	226.53	220.75
Worst cost	290.11	247.68
Mean cost	260.73	240.63

Figure 1 Active power flow in Line 26

Figure 2 Generator sensitivity factors of Line 26

Figure 3 Comparison of cost of generation obtained by PSO and CPSO algorithms

V. CONCLUSION

The congestion management problem has been solved through optimal rescheduling of active powers of generators utilizing PSO and CPSO. The generators have been chosen based on the generator sensitivity to the congested line. The rescheduling has been carried out by taking minimization of cost and satisfaction of line flow limits into consideration. Results obtained by CPSO has been compared with conventional PSO and tested on the IEEE 30-bus. Based on the results, CPSO is the most cost-efficient solution to the congestion management problem compared with conventional PSO.

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Task Parallelism using Distributed Computing for Encryption and Decryption

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   Abstract- In today's world internet is being used by almost everyone. Numerous file exchanges take place online including many official documents. These files require some sort of security mechanisms while being transmitted over the internet. Technology has done a great deal for changing the way we live and do business today. We can see the use of computers from the vegetable shop to large scale businesses. In this fast moving world we need something essential for fast computation. Along with the popular use of computer, information security has also become one of the problems which need to be solved. Many security issues like the malware authors, information leakage, endangerment and unauthorized exploitation need to be taken into account. To control this, crypto-security is necessary. More Applications started to use Advanced Encryption Standard (AES). However, Since AES on large blocks is computationally intensive and largely byte-parallel. This paper presents the parallel implementation of AES algorithm in a distributed environment for data conversion which provides flexibility & performance improvement in terms of speed-up. System will parallel perform the encryption and decryption process in a distributed environment and the performance analysis shows improvement in terms of execution time.

   Index Terms- *Distributed computing, parallel processing, data conversion, distributed programming, Advanced Encryption Standard Algorithm.*

I. INTRODUCTION

Early day's people used paper to record the data. With the evolution of computer this has been changed, we started using computers to store data. Instead of letters we started using email, securing information has also increased with this .Where cryptography has become mandatory. For the protection of data transmission over insecure channels two types of cryptographic systems are used: Symmetric and Asymmetric cryptosystems,[1]. Symmetric cryptosystems such as Data Encryption Standard (DES) and Advanced Encryption Standard (AES) uses an identical key for both to encrypt the plain text and decrypt the cipher text. Asymmetric cryptosystems such as Rivest-Shamir-Adleman (RSA) & Elliptic Curve Cryptosystem (ECC) uses different keys for encryption and decryption. Symmetric cryptosystem is more suitable to encrypt large amount of data with high speed.

To replace the old Data Encryption Standard, in Sept 12 of 1997, the National Institute of Standard Technology (NIST) required proposals to what was called Advanced Encryption Standard (AES) [2]. Many algorithms were presented originally with researches from 12 different nations. On October 2nd 2000, NIST has announced the Rijndael algorithm is the best in security, performance, efficiency, implement ability, & flexibility. The Rijndael algorithm was developed by Joan Daemen of Proton World International and Vincent Rijmen of Katholieke University at Leuven. It became effective as a Federal government standard on May 26, 2002 after approval by the Secretary of Commerce. It is available in many different encryption packages. AES is the first publicly accessible and open cipher approved by the National Security Agency (NSA) for top secret information. So, it has broad applications, such as smart cards and cell phones, WWW servers and automated teller machines, and digital video recorders. Numerous architectures have been proposed for the hardware implementations of the AES algorithm.

To estimate the speedup of a tightly coupled system on a single application, we use a model of parallel computation introduced by Ware[3]. We define a as the fraction of work in the application that can be processed in parallel. Then we make a simplifying assumption of a two-state machine; that is, at any instant either all processors are operating or only one processor is operating. Consider the condition user having 10000 document to process and each having large data in this case project need to employee the system which will transfer processing over the network system and save output on the server or main system. So the proposed system will aimed at parallel processing of provided task.

In Distributed Computing approach, it is followed to assign a job to a processor if it is idle. The focus is now on how to optimize resources to decrease the energy consumption by volumes of computing equipments to deal with green and sustainability issues[4]. Various hardware and software architectures are used for distributed computing. At a lower level, it is necessary to interconnect

multiple CPUs with some sort of network, regardless of whether that network is printed onto a circuit board or made up of loosely-coupled devices and cables. At a higher level, it is necessary to interconnect processes running on those CPUs with some sort of communication system.

II.   LITERATURE SURVEY

Various algorithm and models have been proposed, mostly heuristic in nature, as the optimal solution often requires future knowledge and is computationally intensive. Multiple tasks can be executed simultaneously in a given message-passing system. To achieve good performance, the system has to recognize efficiently free subsystems of various sizes for incoming tasks. Parallel processing is a form of computation in which many calculations are carried out simultaneously,[5] operating on the principle that large problems can often be divided into smaller ones, which are then solved concurrently ("in parallel"). There are several different forms of parallel computing: bit-level, instruction level, data, and task parallelism. As power consumption (and consequently heat generation) by computers has become a concern in recent years,[6] parallel computing has become the dominant paradigm in computer architecture, mainly in the form of multicore processors.[7] Parallel computers can be roughly classified according to the level at which the hardware supports parallelism, with multi-core and multi processor computers having multiple processing elements within a single machine, while clusters, MPPs, and grids use multiple computers to work on the same task. Specialized parallel computer architectures are sometimes used alongside traditional processors, for accelerating specific tasks.

Parallel computer programs are more difficult to write than

sequential ones,[8] because concurrency introduces several new classes of potential software bugs, of which race conditions are the most ommon. Communication and synchronization between the different subtasks are typically some of the greatest obstacles to getting good parallel program performance.

A. Parallel Programming Model

Parallel Programming Models typically falls into one of several categories: Shared memory model, Thread model, Distributed memory model, Data parallel model, Hybrid model, SPMD and MPMP model.

Shared Memory Model

In this programming model, task shares a common address space, which they read and write to asynchronously. Various mechanisms such as locks or semaphores may be used to control access to the shared memory.

Thread Model

This programming model is a type of shared memory programming. In the threads model of parallel programming, a single "heavy weight" process can have multiple "light weight", concurrent execution paths.

Distributed Memory Model

A set of tasks that use their own local memory during computation. Multiple tasks can reside on the same physical machine and/or across an arbitrary number of machines. Tasks exchange data through communications by sending and receiving messages.

Fig.1 Distributed Memory Model

Data Parallel Model

Data Parallel Model is also referred to as Partitioned Global Address Space (PGAS) model. In this model address space is treated globally. The data set is typically organized into a common structure, such as an array or cube.

Hybrid Model

A hybrid model combines more than one of the above programming models. A common example of a hybrid model is the combination of the message passing model (MPI) with the threads model (OpenMP).

Fig.2 Hybrid Model

Single Program Multiple Data (SPMD)

SPMD is high level programming model that can be built upon any of the above programming model. This program can be thread, message passing, data parallel or hybrid. The SPMD model, using message passing or hybrid programming, is probably the most commonly used parallel programming model for multi-node clusters.

Multiple Program Multiple Data (MPMD)

Similar to SPMD, MPMD is a high level Programming model. MPMD applications are not as common as SPMD application.
Another basic aspect of distributed computing architecture is the method of communicating and coordinating work among concurrent processes. Through various message passing protocols, processes may communicate directly with one another, typically in a master/slave relationship. Alternatively, a "database-centric" architecture can enable distributed computing to be done without any form of direct inter-process communication, by utilizing a shared database.

PROPOSED ARCHITECTURES

In the proposed architectures the main factors are the designing the distributed system and parallel processing through a specific problem domain. Here the problem domain is known and well defined, the environment in which the system run is also well defined. Figure 2 shows the basic block diagram of the system architecture. Actual task processing needs a series of steps to be performed. These series of processes are simultaneously executed on different client machines. Basically here we are distributing the no. of files on to the network through the shared database.

Fig. 3 System Architecture

AES Algorithm

Advanced Encryption Standard (AES) is a variant of Rijndael cipher algorithm, a symmetric block cipher which translates the plaintext into cipher text in blocks. This algorithm has the fixed input block size of 128 bits and the key size of 128, 192, 256 bits. The algorithm's operations are performed on a two-dimensional array of bytes called the State**.** The State consists of four rows of bytes, each containing nb bytes calculated by taking ratio of the total number of data (input) bits and 32. (128/32=4). The Cipher (encrypt) or Inverse Cipher (decrypt) operations are then conducted on this State array, after which the final value is copied to the output array. The AES algorithm, unlike DES does not form a fiestal network, where encryption and decryption processes are similar. AES processes data blocks of 128 bits, using cipher keys with lengths of 128, 192, and 256 bits.

The Encryption and decryption process consists of a number of different transformations applied consecutively over the data block bits, in a fixed number of iterations, called rounds (Nr), which depends on the length of the key used. The Middle round will undergo Nr-1 iterations.

The Encryption process consists of 4 phases. They are:
1. Key Expansion
2. Initial Round
    a. AddRoundKey
3. Middle Rounds
    a. Substitute Bytes
    b. Shift Rows
    c. Mix Columns
    d. Add Round Key
4. Final Round
    a. Substitute Bytes
    b. Shift Rows
    c. Add Round Key

The phases of Decryption are (for the particular cipher text):
1. Key expansion
2. Initial round
    a. Add Round Key
3. Middle Round
    a. Inverse Shift Rows
    b. Inverse Substitute Bytes
    c. Add Round Key
    d. Inverse Mix Columns
4. Final Round
    a. Inverse Shift Rows
    b. Inverse Substitute Bytes
    c. Add Round Key

The algorithm for encryption/decryption process is shown in figure 4

Fig. 4 AES Algorithm

Key Expansion:

Key expansion takes the input key of 128, 192 or 256 bits and produces an expanded key for use in the subsequent stages. The expanded key's size is related to the number of rounds to be performed. For 128-bit keys, the expanded key size is 352 bits. For 192 and 256 bit keys, the expanded key size is 624 and 960 bits. It is the expanded key that is used in subsequent phases of the algorithm. During each round, a different portion of the expanded key is used in the AddRoundKey step.

AddRoundKey:

During this stage of the algorithm, the message is combined with the state using the appropriate portion of the expanded key.

Sub Bytes:

During this stage, the block is modified by using an 8-bit substitution, or SBox. This is a non-linear transformation used to help avoid attacks based on algebraic manipulation.

Shift Rows:

This stage of the algorithm shifts cyclically shifts the bytes of the block by certain offsets. Blocks of 128 and 192 bits leave the first 32-bits alone, but shift the subsequent 32-bit rows of data by 1, 2 and 3 bytes respectively.

Mix Columns:

This stage takes the four bytes of each column and applies a linear transformation to the data. The column is multiplied by the coefficient polynomial $c(x) = 3x3+x2+x+2$ (modulo $x4+1$). This step, in conjunction with the Shift Rows step, provides diffusion in the original message, spreading out any non-uniform patterns. At the end of the algorithm, the original message is encrypted. To decrypt the cipher text, the algorithm is essentially run in reverse, however, if the key used for Key Expansion is not known, a brute-force attack on the cipher could take thousands of years.

The decryption implementation results are similar to the encryption implementation. The key expansion module is modified in the reverse order. In which last round key is treated as the first round and decreasing order follows.

Model Implemented

Implementing the system is to fairly offer flexibility on memory access in distributed environment using parallel processing. Adapting an algorithm, that has a computational complexity that consists in simple byte operations (AND, OR, XOR, Shifting, 32 bit adding etc.) is the starting point of our scientific research. The source has two main entries: Encrypt () and Decrypt (). These functions take in a plain text / cipher text 128-bit source block, and output an encrypted/decrypted 128-bit block.

At a higher level, Encrypt () and Decrypt () functions take in a 128-bit key and a variable length message. They split the message into 128-bit blocks, appropriately pad the block when the message size is a multiple of 128 bits, and pass the blocks to the Encrypt () and Decrypt () functions. This naturally leads to a highly parallel implementation. The thread perform the Encrypt () and Decrypt () functions in parallel. Each thread works on a subset of the data, so there are no dependencies between threads. This assumes that the cipher is used in parallel-friendly modes. Since the purpose of any cipher is to quickly encrypt incoming data, the performance metric we picked is the run-time of the algorithm.

RESULT

The results were achieved by running a random data set through the encryption and decryption modules 5 times

S. No	Input file size(KB)	Normal Encryption time(ms)	Normal Decryption time (ms)	Parallel Encryption time(ms)	Parallel Decryption time (ms)
1	23	30.6846	34362628 8	1.1432	1.276
2	58	30.786	34.551	3.777	4.231
3	115	32.1342	36.0249	7.8651	8.673
4	457	39.4578	44.113	9.2004	11
5	914	78.4082	88.131	15.221	17.8576

CONCLUSION

In this paper, an efficient way to enhance the encryption/ decryption using parallel processing in distributed environment is proposed. This report presents the most efficient, currently known approaches in encryption and decryption of text with AES on parallel processing to achieve great speed. If the amount of data is large, the encryption/decryption time required is greatly reduced, if it runs on a parallel processing in a distributed environment.

Future work will include efficient implementations of other common symmetric and asymmetric algorithms. Parallel implementations of hashing and public key algorithms may also be implemented, in order to create a complete cryptographic framework in a distributed environment.

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Data Extraction and Alignment Techniques for effective mining of Query Result Pages

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Abstract- Deep web comprises the online database, which generates web pages dynamically in response to a user query. The extracted data is used for many applications like meta querying and comparison shopping. For these applications the data is embedded in HTML pages. The automatic data extraction is necessary for utilizing these data. Only when the data are extracted and organized in a structured manner, such as tables, they can be compared and aggregated. An effective data extraction and alignment approach is used which utilizes both tag and value similarity in a web page. This method automatically extracts data from query result pages by identifying and segmenting the query result records (QRRs) in a query result page. The segmented QRRs are arranged in a table accordingly with data values from the same attribute. They are put into the same column using pairwise and global arrangement. This new technique also handles non continuous data regions that may exist in a web page due to some advertisements, additional information. Experimental results show that our system can achieve high accuracy in extracting and aligning structured objects inside complex web pages.

Index Terms- Data extraction, automatic wrapper generation, Data record arrangement, information integration.

I. Introduction

Web content mining is extraction and integration of useful information and knowledge from Web page contents. Web content mining process involves in automatic content extraction from web pages, integration of the information, knowledge synthesis, noise detection and segmentation. Due to the heterogeneity and lack of structure of Web data, mining is a challenging task. This paper focuses on the problem of automatically extracting data records that are encoded in the query result pages generated by online databases. The goal of data extraction from web database is to remove irrelevant information from the generated query result page and extract the query result records from the web page, and align the extracted QRRs into a table such that the data values belonging to the same attribute are placed into the same table column.

Fig. 1. An example query result page for the query—Book: Tennis Drills.

For example, Figure 1 gives some example data records on the Web. Figure 1 shows a Web page segment containing of query result records for list of two products (books). The description of each book is a data record.

Our objective in data extraction and alignment process is to
 (1) Identify such data records in a page automatically.
 (2) Align and extract data items from the data records automatically.

We employ the following two-step method, called Combining Tag and Value Similarity, to extract the QRRs from a query result page p.
   1. Data extraction identifies the QRRs in p and involves two sub steps: data region recognition and the actual segmentation step.
   2. Record alignment aligns the data values of the QRRs in p into a table so that data values for the same attribute are aligned into the same table column.

Fig. 2. Data Extraction and Alignment Framework

Compared with existing data extraction methods, our extraction method improves data extraction accuracy in three ways.

1. The method in [2] can find all data regions containing at least two QRRs in a query result page using mining techniques, likewise all other data extraction methods, such as [1] and [6], assume that the QRRs are presented adjacently in only one data region in a page. We examined some websites to determine the extent to which the QRRs in the query result pages are not continuous. We found that the QRRs in most of the websites are non contiguous, indicating that noncontiguous data regions are common in majority of websites. By analyzing this problem, we employ two techniques according to the layout of the QRRs and the auxiliary information in the result page's HTML tag trees (i.e., DOM trees).

2. An efficient method is employed to align the data values in the identified Query Result Records, first pairwise then globally, so that they can be put into a table with the data values belonging to the same attributes are arranged into the same table column.

3. A new nested-structure processing algorithm is used to handle any nested structure in the QRRs after the holistic arrangement. Unlike existing nested-structure processing algorithms that rely on only tag information, this algorithm uses both tag and data value similarity information to improve nested structure processing accuracy.

II.   RELATED WORKS

Web database extraction has received much attention from the Database and Information Extraction research areas in recent years due to the volume and quality of deep web data. Wrapper induction involves generalizing from a set of examples of a resource's pages, each annotated with the text fragments to be extracted. The most interesting challenges are that existing wrapper induction systems ignores the fact that the formatting conventions on which wrappers rely can change unexpectedly. The implicit strategy is to learn a new wrapper from scratch, rather than repair the broken wrapper.

World Wide Web Wrapper Factory (W4F) [5], a toolkit for the generation of wrappers for Web sources, that offers an expressive language to specify the extraction of complex structures from HTML pages and a declarative mapping to various data formats like XML and utilize some visual tools to make the engineering of wrappers faster and easier. All these Semi Automated approaches require manual efforts like labeling some sample pages. It is labor-intensive and time consuming.

In order to improve the efficiency most recent researches focus on automatic approaches. Some representative automatic approaches are ViNT [4], DeLa [1], MDR [2], ViPER [3]. These methods rely entirely on the tag structure in the query result pages. ViNTs [6] which focuses on the issue of how to extract search result records (SRRs) from dynamically generated result pages returned by search engines in response to submitted queries. DeLA which models the structured data contained in template generated web pages as string instances encoded in HTML tags. MDR currently finds all data records formed by table and form related tags. A large majority of web data records are formed by them. The problem with this approach is that the

computation is prohibitive because a data record can start from anywhere and end anywhere. In ViPER, assumption made is that a Web page contains at least two multiple spatially consecutive data records building a data region which exhibits some kind of structural and visible similarity.

By using similarity of tag and value which has better performance than ViNTs and DeLa in both non nested and nested pages. For non nested pages, each of the three methods has performance greater than 95 percent for the record-level precision and 94 percent for the record level recall. For the nested pages, CTVS and While the performance of ViNTs drops, DeLa still attain good record-level precision and recall. It is observed that the nested pages are usually more complex than the non nested pages. This more complex structure causes the performance of ViNTs to degenerate.

Each method's performance is greater than 95 percent on the record-level precision and 93 percent on the record-level recall for pages with continuous data. For noncontiguous pages, CTVS maintains a fairly high page-level precision when compared with ViNTs and DeLa. CTVS high page-level precision for noncontiguous pages is due to its data region identification and merging algorithms, which are designed to deal with noncontiguous QRRs. Inversely, if the actual data region is split into two or more parts, DeLa only report the QRRs from the largest subpart and ignore others.

However, unlike ViNTs, similarity of tag and value cannot handle no-result pages, since it assumes there are at least two QRRs in the page to be extracted. All the preceding works make use of only the information in the query result pages to perform the data extraction.

III.   DATA EXTRACTION

Given a query result page, the Tag Tree Construction module first constructs a tag tree for the page rooted in the <HTML> tag. Data Region Detection module identifies all possible data regions of dynamically generated data starting from the root node, traversing through the web page. The Data Record Segmentation module segments the identified data regions into data records based on the data region's tag patterns. With the segmented data records, the data regions containing similar records are merged in the Data Region Merge module. Finally, one of the merged data regions is selected as the one that contains the QRRs the Query Result Section Recognition module.

A. Tag Tree Construction

Tag tree construction finds all data records formed by table and form related tags, i.e. <html>, <form>, <table> and so on. Major Web data records are formed by them. Tag tree construction is based on two observations:

1. A group of data records that contains descriptions of a set of objects are presented in a varied region of a page and are formatted by HTML tags.

2. The nested structure of HTML tags in a Web page naturally forms a tag tree and data may not present in child node under same parent tag. A new algorithm to employed to process such nested structures.

Fig. 3. Tag tree of the page in Fig. 1

B. Data Region Detection

We propose a new method to handle noncontiguous data regions so that it can be applied to more web databases. Under the assumption that there are at least two QRRs in a query result page, the data region detection algorithm discovers data regions in a top down manner. Starting from the root tag of the query result page tag tree, the data region detection algorithm is applied to a node n and recursively to its children n_i, i ¼, 1 …….m as follows:

1. Compute the similarity sim_{ij} of each pair of nodes ni and n_j where i,j = 1...m and i ≠ j, using the node similarity calculation method presented later in this section. The data region recognition algorithm is recursively applied to the children of n_i only if it does not have any similar siblings. The similar nodes recognized with the same parent forms a data region. Likewise other similar data regions may be identified in this step.

2. Segment the data region into data records using the record segmentation algorithm is described later. Suppose that the tag tree has n internal nodes and a node has a maximum of m children and a maximum tag string length of l.

To calculate the node similarity, the method used in ViPER [3] and DEPTA [6] is adopted. Two nodes n1 and n2 are similar if their similarity, sim12, is larger than or equal to a threshold T_{nsim}. For n1 and n2, their corresponding tag strings s1 and s2 are used to evaluate their similarity. To overcome the problem caused by optional attributes and repetitive subparts, Simon and Lausen [3] suggest that the similarity threshold T_{nsim} be set to 0.6.

The time complexity of the data region detection algorithm is $O(nm^2l^2)$.

C. Record Separation

In the record separation module we will see for Tandem repeats. It refers to the repeated tag substrings which are directly adjacent to each other. If only a single tandem repeat is identified in a data region, then each repeated instance inside the tandem repeat corresponds to a record. If multiple tandem repeats are found in a data region, we need to select one to denote the record. The following two scenarios are considered to select a tandem repeat.

1. If there is auxiliary information is present between record instances then the tandem repeat will stop at auxiliary information.

2. When compared with any visual gap within a record the visual gap between two records in a data region is usually larger. Hence, the tandem repeat that satisfies this constraint is selected.

3. We select the tandem repeat that starts the data region If the above two heuristics cannot be used.

Nevertheless, our data region detection algorithm can still identify the data region that contains the noncontiguous QRRs.

D. Data Region Merge

The data region detection step identifies several data regions in a query result page. But the actual data records may span across several data regions. Before identifying all the Query Result Records, it is to be determined that whether any of the data regions should be merged. Given any two data regions, we treat them as similar if the segmented records they contain are similar. The similarity between two data regions is calculated as the average record similarity.

Two data regions can be merged into a merged data region if the records in the two data regions have an average similarity ranging near 0.6, which is a threshold used to judge whether two records are similar in [3].

E. Query Result Section Detection

After performing the data region merge step, still multiple data regions may exists in a query result page. Three heuristics are used to detect this data region, called the query result section.

1. The query result section usually occupies a large space in the query result page [7]. For every data region (d), area weight is calculated as d's area divided by the largest area of all identified data regions, is assigned for d.

2. The query result section is usually located at the center of the query result page [7]. For each data region d, a distance between its center and the center of the page is center distance, and the smallest center distance among all identified regions is center distance weight which is divided by d's center distance, is assigned for d.

3. Each QRR usually contains more raw data strings than the raw data strings in other sections. For each data region d, a value weight is calculated as the average number of raw data strings in the records of d divided by the largest average number of data values in all identified regions, is assigned for data region d.

The above three weights are summed and the query result section is selected from the data region that having the largest summed weight. Records in this data region are assumed to be Query Result Records.

A limitation of this approach is that if a query result page as more than one data region that contains query result records and the records in the different data regions are not similar, then only one of the data regions is selected and others will be discarded. This case is observed in least sites among the surveyed websites.

IV.   QRR ARRANGEMENT

Query Result Record arrangement is performed by a three-step data arrangement method that combines tag and value similarity.

1. In Pairwise QRR arrangement the data values are aligned in a pair of QRRs to provide the evidence for how the data values should be aligned among all QRRs.

2. Global Data Record arrangement that arranges the data values in all the QRRs.

3. In Nested structure processing, the nested structures that exist in the QRRs are identified.

A. Pairwise QRR Arrangement

The pairwise QRR arrangement algorithm is based on the observation that the data values belonging to the same attribute usually have the same data type and may contain similar strings, since the QRRs are for the same query. Given two QRRs $r1=\{f_{11}, \ldots, f_{1m}\}$ where f_{1i} refers to the ith data value of r1, and $r2=\{f_{21}, \ldots, f_{2n}\}$, we first calculate the data value similarity, s_{ij}, between every pair of data values in r1 and r2.

During the pairwise arrangement, we require that the data value arrangements must satisfy the following three constraints:

1. Same record path constraint. The record path of a data value f comprises the tag from the root of the record to the node that contains f in the tag tree of the query result page. Every pair of matched values should have same tag path. Hence, if f_{1i} has a different tag path with f_{2j}, then s_{ij} is assigned a small negative value to prevent the pair of values from being aligned.

2. Unique constraint. Each data value can be aligned to at most one data value from the other QRR.

3. No cross arrangement constraint. If f_{1i} is matched to f_{2j}, then there should be no data value arrangement between f_{1k} and f_{2l} such that $k < i$ and $l > j$ or $k > i$ and $l < j$.

B. Global Data Record Arrangement

The QRRs are arranged globally among them to construct a table in which all data values of the same attribute are aligned in the same table column. If we view each data value In the QRRs as a vertex and each pairwise arrangement between two data values as an edge, the pairwise arrangement set can be viewed as an undirected graph. Thus, finding connected components in an undirected graph is our global data arrangement problem. Each connected component of the graph represents a table column inside which the connected data values from different records are aligned vertically. There are two application constraints that are specific to our global data arrangement problem.

1. Vertices from the same record are not allowed to be included in the same connected component as they are considered to come from two different attributes of the record. A path must exist between the two vertices, if two are from the same record breach this constraint, which we call a breach path.

2. Connected components are not allowed to intersect each other. If C1 and C2 are two connected components, then vertices in C1 should be either all on the left side of C2 or all on the right side of C2,and vice versa (i.e., no edge in C1 cuts across C2, and no edge in C2 cuts across C1).

Function GlobalAlign(G,T)
Input : pairwise aligment graph G
Output: globally aligned table T
1. $C_{left} = C_{right} = \emptyset$
2. if C not empty then
3. find component C[i] in C having maximum edges
4. insert globally aligned column in T by
   aligning all vertices in C[i] in the column
5. for each component C[k] in C, K•i

6. if C[k] intersect with C[i]
   then
7. $C[k]_{left}$ = vertices of C[k] left to C[i]
8. $C[k]_{right}$= vertices of C[k] right to C[i]
9. remove edges connecting $C[k]_{left}$ and $C[k]_{right}$
10. $C_{left} = C_{left} + C[k]_{left}$
11. $C_{right} = C_{right} + C[k]_{right}$
12. else if C[k] is to left of C[i] then
13. $C_{left} = C_{left} + C[k]$
14. else
15. $C_{right} = C_{right} + C[k]$
16. GlobalAlign(C_{left},T)
17. GlobalAlign(C_{right},T)
Fig. 4. Global Data Record Alignment Algorithm

C. Nested Structure processing

Global data value arrangement constrains a data value in a Query Result Record to be aligned to at most one data value from another Query Result Record. A QRR containing a nested structure having multi valued attribute, then some of the values may not be aligned to any other values. For this the nested structure processing identifies the data values of a QRR that are generated by nested structures. The nested structure processing method in similarity of Tag and value has the following advantages.

1. CTVS processes the nested structures after the data records are aligned rather than before as is the case in DeLa[1] and NET[8]. Processing the nested structure before the records are aligned makes them vulnerable to optional attributes since the optional attributes make the tag structure irregular. CTVS avoids this problem.

2. The data value similarity information effectively prevents a flat structure from being identified as a nested structure in CTVS. As it shares similar tag structures, a structure with several columns having the same tag structure, may be identified as a nested structure mistakenly in DeLa. Such wrongly identified flat structure can have serious effects. DeLa groups all the values into one parent and then aligns them to other records, making the arrangement much more difficult.

Procedure nest_processing(QRRs,T,global_align)
1. C□ Ø
2. for each QRR with record root t
3. nest_column _identify(t,T,global_align,C)
4. for each column pattern c_p in C do
5. create a new row for each repeated subpart
Procedure nest_column_identify(t,T,global_align,C)
1. if(t contains more than one data value) then
2. for each child t_i of t do
3. nest_column_identify(t_i,T,global_align,C)
4. for each repetition p of any consecutive maximum repetitive tag found in t's children
5. c_p = data columns for p in global_align
6. if $c_p \notin C$ data and nested (c_p,Snest) then
7. add_nested_column(c_p,C)
Function boolean_nested(c_p,Snest)
1. $sim_{intra} \leftarrow$ intra- column similarity within c_p
2. $sim_{inter} \leftarrow$ inter- column similarity within c_p
3. if($sim_{intra}/ sim_{inter} > /Snest$) then

4. return true
5. else return false
Fig 5: Nested structure processing algorithm

V.   EXPERIMENTS

We now present the experimental results for CTVS over five data sets and compare CTVS with ViNTs [4], DeLa [1], and ViPER [3]. We choose ViNTs and DeLa to compare with CTVS. In the Data Extraction performed with CTVS, the extracted records precision and accuracy is higher when compared with DeLa and ViPER methods. While using mentioned two data sets, CTVS consistently has the best performance on both data sets. ViNTs is for QRRs with simple structures used document databases, while it degenerates quickly for QRRs with complex structures but CTVS outperforms with complex structures. CTVS is implemented using C#.

A. Data Sets

Data set 1 (PROFUSION) is obtained from ViNT's test bed which has 100 websites of government, education and healthcare domains. Data set 2 is the TestBed for information extraction from Deep web.

VI.   CONCLUSION

We presented a new data extraction method to automatically extract QRRs from a query result page. In our method, we first identified and segmented the query result records. Our extraction method is efficient in handling non contiguous QRRs from the existing methods. First, it requires at least two query result record in a result page. Second, if any optional attribute appears as the start node in a data region, then that data region will be treated as auxiliary information.

Although our algorithm has been shown to be an accurate data extraction method, it has some limitations. If a query result page has more than one data region that contains result records and the records in the different data regions are not similar to each other, then it will select only one of those data regions and discard the others. Our algorithm mainly depends on tag structures to discover data values. Therefore, it does not handle the case where multiple data values from more than one attribute are clustered inside one leaf node of the tag tree, also the case where one data value of a single attribute spans multiple leaf nodes. This can be considered as future enhancement.

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Effect of the Sportization on Physical Education Process Influenced by the Temperament and Anxiety in the Young Secondary School Students.

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Abstract- This study aimed to assess the process of sportization of physical education program (PEP) in young in school with the phenomenon of anxiety and temperament of students. The students studying three educational sessions and it possible to show the sport characteristics of the physical education, however the concept of anxiety is associated with the temperament as studied with the questionnaires of *identifying the state anxiety score* (STAI) and to identify the scores of positive or negative relation in sport (PANAS). The strong results of our study give an important correlation between anxiety and negative effects. Perhaps, we founded no correlation between the anxiety and positive effects. But, the comparison of the nature gender was no significant difference. The Sportization of (PEP) is great parameters of anxiety and negative temperament of the young students.

Index Terms- education, students, moods, anxiety, emotions.

I. INTRODUCTION

Physical Education is one practice phenomenal with an integral processes the school system. It is important to take the idea that the physical practice (PP) in the young school is reduced. But, the sport does not surely PP. For this reason we ask why the confusion between sport and physical education? But just we discuss the opposites situations that supported official texts of 1994 in Tunisia low stating that the EP not confused with the sports uses, however the teacher is desired learning objectives. This work based on the results of several study that and mainly the work of some authors which states that there are three types in which fits the choice of physical practices in schools, an *institutional logic* (sport); *the logic of legitimating* and / or *a pragmatic logic* into account environmental of teaching.

The anxiety panic interfere with daily of several activities, are difficult to control, are out of proportion to the actual danger and can last a long time of life . The Symptoms start during childhood or the teen years and continue into adulthood. The people with anxiety disorders have intense, excessive and persistent worry and fear about everyday situations in the life with great frequently situations. However, the anxiety disorders involve repeated episodes of feelings of intense anxiety and fear or terror that reach a peak within panic attacks.

The physical benefits of improving physical condition and disease have long been established, and PE encourage staying physically active in mood live. The E is also considered vital for maintaining mental and it can reduce the strong stress. Many studies show that it is very effective at reducing the felling of fatigue, improving alertness and motive concentration, to enhancing the cognitive function. This can be helpful when the stress has depleted the energy or the ability to concentrate in over practical life.

For this reason we outlined leads to wonder about the possible effects of the choice of teaching content in EP, centered about the sports activity on the temperament of the young student, include the anxiety with the relationships established between these psychological processes of several fieldwork. The modest contribution was to explore the EP taking into effective and environment of school. The experiment steps we conducted during in the end of 2010 year, the student were also allowed an idea to assess the reality of the EP. We experiment with a process of observations for to choose the school of the EP.

We start to consult the scientific literature studies about this subject and we have fixed the aim of our work. However, to study the influences of processes of sportization in the PE and the temperament and degree of anxiety. We have adopted for the experiment of the third year of secondary school; *firstly*, the group of third-year students are not faced with an emotion situation same that of anxiety degree. *Secondly*, we are complete the questionnaire given in French language with fewer faults, so with fewer methodology for the job.

We postulated the hypothesis that the anxiety and affect states measured during a session of EP change proportional. Particularly, the changes in anxiety and the state affect both the two sex of girls and boys compared with the theoretical model. In our study, we test the idea that the sport characteristics' of the EP session on anxiety of students and also to help to look the mood affecting theirs psycho-multicity engagement. We also found to know the manifest of the psycho-motors for the both girls and boys comparably to specific academic level.

Our hypothesis based on the idea that the sporty characteristics of the EP with the service of anxiety of young students and to contribute to temperament their affected with the motor ability. We also try to show the manifest psycho-multicity for the both girls and boys comparably with the specific academic literature. The analysis study was focuses on a sample of more two hundred young students in the third level of one

secondary school and to test the degree of anxiety and positive or negative temperament states after a PE session.

II. METHODS

1-Participants

The choice of a participant of relevant the research subject seems essential to develop the relationships between all variables that we can analyze. The choice can move the population to confront with the level of anxiety generated by the sports situation in the EP session. Thus, after revising the scientific reasons for the choice presented the all characteristics of activity. We were interviewed a total population a more of two hundred young students (101 boys and 102 girls) operating within the three schools and practicing EP an average of two hours per week.

2-Testing protocols

We opted for the questionnaire of *investigative technique*. The questionnaire was used to collect information from a population study.

STAI (Speilberger, 1964)) : The STAI measured the level of intensity states of cognitive and somatic anxiety of sport, as well as its degree of confidence. The questionnaire consists of twenty seven items when the sports meet from a likert- scale with 4 points. It consists of 3 subscales of 9 items, that measuring; the *cognitive anxiety*, *somatic anxiety* and *self-confidence*. For our study, we use the questionnaire previously used in French language as suggested by Jones and Swain (1992).

* Positive and negative effect in Sport (PANAS), (Watson, Clark, & Tellegen, 1988).

The PANAS measure the emotional experience in the sport but, the French version consists of twenty four adjectives, describe positively emotion level and negative emotion. The emotional state, sports evaluated the high intensity of his feelings on a scale of 5 points.

3- Evaluation and procedures

This study was designed at the end of the EP session, the young students asked to complete the PANAS recalling during their best service performed during a major competition of the season. Then, participants were again asked to complete the PANAS form, one reference to their performance achieved during a PE session. However, the period between the two sessions was avoiding the influence of the teachers on the latter. In each time the PANAS was presented voluntarily before CSAI-2, to latter affects the answers to first. Indeed, the PANAS, with a either positive or negative emotional level, seem unlikely to affect responses then made to the CSAI-2.

4-Selected variables in study:

The Gender, the social relations between both sexes who transforming and evolving at different times and contexts, are marked in all world and a hierarchy. Indeed the men were dominant in idea of power and decision level. The gender as a social construction is codified, but also the all variables in the space of time, and the cultural environment. The social constructs, the relations can deconstruct towards greater equality. *The level of anxiety*-was the *behavioral* response from perception is defined as "Speilberber" a *behavioral* disposition an individual to receive the variety of circumstances, as threatening, and respond with anxiety reactions compared to the magnitude of the dangerous objective.

The temperament states-The state of *temperament* are more diffuse and last longer than emotion trailed. To both what we feel in the moment and what is expected of the experience interactions (Batson, Shaw, & Oleson, 1992). Finally, the level of temperament can considered to include the emotions in the life, the feelings and the emotional level.

5-Statistical Analyses:

Means and SDs were calculated using standard statistical methods. Indeed the simple linear correlation coefficient, of Pearson was normalization bay the covariance with the product of standard deviations of the variables. Among the most interesting include the geometric interpretation that equates (*r*) the cosine of the angle between the two vectors *(n)*. We chose the general correlation for our population subjects without differentiation based on gender in order to study the general in relations between our used variables. The ANOVA is used when we want to compare the means of different groups according to categorical variables. We use ANOVA for one-way ANOVA when comparing the average of at least three groups based on a single variable.

III. RESULTS

Our study showed a significant positive correlation between level of anxiety of the participants and their scores of negative emotions, ($r = 0.90$, $p <0.01$). The situation was recognized as anxiety, more negative emotions for the high intensity; indicate a low controllability of the studied situation. The anxiety is a generalized negative temperament when the condition can occur without an identifiable stimulus in the EP. Additionally, the specific behaviors of escape and avoidance, anxiety were related to situations unavoidable. Conversely to the correlation made between the scores of positive affect states and level of anxiety scores of the subjects showed a lack of significance ($r = 0.03$, $p <0.001$). This relationship proportional to the dominance of negative affect and level anxiety by a sports situation, which clash with the affects positive comfortable situation.

The comparison of state anxiety scores recorded among girls and boys, given a no-significant difference, ($f = 0.21$, $p <0.05$). This significance was opposed to theoretical giving great importance to the kind of participant, considered with the strong factor affecting the degree of anxiety. The comparison of ANOVA revealed a no-significant difference between positive scores affected girls and boys, ($f = 0.21$, $p <0.05$). This significance indicates the negative temperament affect girls and boys equally. Thus, the gender cannot consider as differential element, comparable to all literature investigation.

IV. DISCUSSION

The first part of our work it appears important to consider gender as a high central element, among the young students and to full construction of the sense of the self worth. But, in the sports situations of EP it's important the development of level of the anxiety and temperament states. Perhaps, it's the level relative to others, and to collect the assessments by significant

people as the teacher or parents. The social and cognitive development of the young colligate student have a significant impact on the construction of temperament level, but also on the different degree of anxiety process, including cognitive assessments, and protocol was implemented allowed to evolution of the model of the first evaluation of social situations. Firstly the protocol allowed the anxiety process appropriate for children student and it came to check up temperament of states in this model, even though the situations of students were involved in the construction. The type was proved to be important into account in this model. Thereby, the second hypothesis was to identify the role all variable in the level of anxiety and the affect of this process. Quantitative analyzes provide the more answers, but there are only suitable for very special situations. It is impossible to generalize these all results. The, comparison of our results we analysis explanatory hypotheses of results of statistical tests used in the study. The various hypotheses will be explored for the first hypothesis, with the test anxiety proposed by Speilberger (1964) state processes and affects states (Clark, & Tellegen, 1988) with a population of third graders secondary.

Firstly, was expected that the relation between the state of anxiety and different issues as a direct result of this process of transaction between the young student and the practical sports. The young student's schools who receive important issues were supposed to be particularly demanding and less forgiving in their all performance suspected, as a sports or school. In the perceived success was assumed to have a very important impact on perceived issues, with the questioning at the end of the EPS session. Indeed, the perceived success could be a source of damage stress for young students, especially if the students are able to understand the issues related. The degree of anxiety processes emerged as being the process to better understand the interactions between the young student and the demands situational. (Woodman, 2001). Therefore, we expected that the correlations between the level of anxiety, especially its cognitive aspect, and the various components of temperament. However, the student with great anxiety would consider the situation action like as threatening, and the perception with more important issues. Similarly, the young child with a very lower anxiety have evoked less important issues, and it has been justified under the assumption , and this have a negative impact on the temperament that the scores of negative emotions are high.

The all correlations observed between the components of the level of anxiety and temperament, but the results are not all in direction of our hypothesis in this study. The significant positive correlation was found between degree of anxiety and negative effect, thereby, no correlation was made the relationship between anxiety and positive affect. In addition, the contrary no significant differences were found between the means of the state of anxiety, affect (positive or negative) and the young student school for any of the three phases of the protocol used in our study.

V. CONCLUSION

Our study presented the better visualizes the level of anxiety and temperament psychological process. However, the analysis showed that the different elements of the cognitive process do not meaning for all young students. It was also highlighted that

the significance was of the situation for each young student, as well as strategies to-face that he was involved before. The place that is the student in the model has been high defined. Therefore, to promoting the social situations we would change the meaning that these last take for the young students. In addition, they are important to take practice skills to effectively cope with a stressful situation of social evaluation and testing. Thereby, it appropriate to expand the population in an age then later in childhood and adolescence.

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The Impact of Quality Controlin Nigerian Secondary Schools Educational System

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Abstract- The Nigerian educational system need to have an impact of quality education due to the facts that the whole system need to improvement, development and standard to its objectives. To this study, the aim is to look at the impact of quality control for improving quality secondary school education and the effectiveness of teaching and learning. The main purpose of this study is to highlight how teachers improved intern of teaching quality and the effectiveness of supervisions in secondary schools. Thus, to encourage development and improved the relationship between supervisors and teachers for proper teaching and learning. However, all the challenges of quality control should be readdressed so that we can adjust for the proper action and adjustment. Moreover, quality control will enhance thorough supervisions in schools and will stimulate professional growth and development of teachers. In conclusion, to improve quality education in Nigerian secondary schools we need to retrained supervisors, adequate facilities for teachers, good remuneration, to revisit teachers' attitude to teaching and adequate statistical compilation in the school system among others. It recommends that School administrators and teachers are to monitor the inputs and outputs to ensure proper process so that relevant and adequate knowledge would be acquired. The paper then suggested prompt addressing of these issues to guarantee good quality educational system in line with the nation's and students' aspirations for better leaders.

Index Terms- Educational supervision, quality control, improving and development

I. Introduction

Prior to the formulation of the National Policy for Education Quality in Nigeria in 2008, the process of monitoring the quality of education service delivery in schools was by external inspection or supervisors commonly referred to as quality control by the Inspectorate Services Department of the Ministry of Education. The quality control mechanism basically involved the policing of schools by the Inspectors/supervisors of Education to enforce compliance with government's policies, with regard to such aspects of school's operations as staffing, curriculum delivery, infrastructure, management, corporate life, laboratory practical and library services being implemented. All these are required to ensure a complete well-rounded education and production of quality students from the secondary school system as contained in the National Policy on Education (FRN, 2004) which aptly states that the broad aims of secondary education in Nigeria are:

1.The preparation of students for useful living within the society; and
2. The preparation of students for higher education

The aims and objectives make it clear that the ultimate goal of secondary education is to develop the individual's mental capacity and character for behaviour for higher education and useful living within the society since the future of any nation depends quite considerably on the quality of education it provides for its citizens. The realization of these objectives hinges on quality of teachers, infrastructure and learning environment, resource inputs, teaching process, classroom management, academic assessment, principals' supervision roles and students' commitment to learning. In spite of the societal demand for quality assurance education and the need for thorough supervision in schools, there is a growing concern about the realization of secondary education objectives due to doubt that the inspectorate department and many principals give little attention to supervision of instructional activities in secondary school. However, some changes have been identified regarding organization, teaching and funding. Viteritti (2009) opined that the administrative personnel in Italian schools have begun to play an increasingly important role in decision-making process, that administrative roles have become more common among teachers and that administrative skills have developed in administrative offices. In respect to funding, parents are paying schools fees as well as other income in addition to government provided by the Ministry of Education. Biondi et al. (2009) asserted that new teaching initiatives are welcome such as the use of information and communication technology for teaching practice and the introduction of assessment projects and the use of new interdisciplinary forms

II. The Concept of Quality Education

According to Asim and Okon, (2005) The concept of quality education is relative subjective and variable while Okebukola (2005) Maintained that quality education as fitness of purpose and Fadipe (2005) views quality as appropriateness of resources available to education. However, Akpan and Esirah (2005) maintain that the concept of quality varies from that of providing special services to conforming to standards or fitness for purpose. Quality is the base line standard in education which can be measured on a scale of reference. It is an expression of standard or the means by which a certain set standard in education can be achieved .The concept of quality in education is multidimensional and embraces all functions and activities in the

academic sphere (Maduewesi, 2005).It involves quality of students, instructors/facilitators, instruction, facilities and equipment, academic programmes, curricula and assessment of students' performance. The quality according to Cavanaugh (2002) may include quantitative elements such as completion rates, student performance, and student evaluations of the learning experience or outcome product.

III. QUALITY CONTROL AND EDUCATION

Quality is concerned with how good or bad a product is. It is about the standard of something when compared with other things. It therefore presupposes that there is a standard set against which the outcome is compared. Jaiyeoba and Atanda (2005) posited that quality is synonymous with standard, efficiency, excellence, relevance and worthiness. When applied to education, it is the success with which an institution provides educational environment which enables students to effectively achieve worthwhile learning goals including appropriate academic standard. Still linking quality to education, Aigboje (2007) refers quality to excellence or more of societal values embodied in the school curricula. This involves stages and activities that take place until certificates are issued. According to Babalola,(2004) Thus, an education of high quality should have high quality students, teachers, facilities, school curriculum and government policies as inputs. The manner in which the inputs are processed from the beginning to the final years of an educational programme and the quality of assessment of the entire teaching-learning activities, also constitute important aspects of education. Quality education deals with proactive means of ensuring quality of inputs, teaching-learning process, academic achievement of pupils and school environment before things get out of hands. Quality outputs could be viewed in terms of achievement that is what the students learn in terms of skills, knowledge, attitude and behavior, attainment that is number of students who have completed prescribed academic programmes and quality of degrees or certificates awarded; standard that is the official learning and what the society expects.

IV. ROLE OF STUDENTS TO QUALITY EDUCATION

In Educational System, Students play a vital role into the education system. Without them, all other activities/ objectives cannot be achieved. At the entry point of the educational system, the students are expected to be of high quality in terms of moral. That is, they should meet the expected standard of the level or class in which they are to be enrolled for an academic purpose. Incidentally, students of poor ability have been admitted or promoted into higher classes in our educational institutions. Ezezobor (1983), wondered if products of such free primary and secondary education were going to be enrolled for General Certificate of Education. They were not seriously groomed for that type of examination, he concluded Quality education demands that students should be of required standard before they are admitted into schools and also demands that they should not be promoted if they are of low standard. According to Ebenebe (1998), opined that admission of children with very poor academic standards into secondary schools, as a way of laying

the foundation for indiscipline and violated the ethics of education.

V. THE ROLES OF TEACHERS TO QUALITY EDUCATION

According to Federal Republic of Nigeria, (2004) stated that 'no education system may rise above the quality of its teachers' incidentally, many teachers are lacking in good quality which can enhance meaningful teaching. As teachers to be quality they most purposes the Quality of teaching to be given by this category of teachers is likely to be low, and this will have adverse effects on the learners. Conversely, teachers of high quality could impart right and good skills, knowledge and attitude. Teachers are therefore, constitute a major factor of quality education in teaching and learning aspect.

According to Adegoke,(2003). In curriculum planning and implementation, attention is expected to be paid to the four pillars of learning which were advocated that learning to know, learning to do, learning to be, and learning to live together. When these aspect are adequately considered in the curriculum, the educational system will be functional and its recipient will be self-reliant. Even students 'with poor skill and knowledge acquisition the four areas, there is virtually no subject on the secondary school curriculum where there are no topics which teachers find difficulty to teach Okebukola, (2005). Though, this problem may be due to poor teacher preparation or poor teaching-learning environment, the problem may be inherent in the curriculum itself but also teachers are to be considered while planning a school curriculum contents for the students

Va. THE ROLE OF SCHOOL FACILITIES FOR QUALITY EDUCATION

Facilities can be generally defined as buildings, properties and major infrastructure which include physical and material assets (IES, 2006) Facilities in schools are materials resources that enhance teaching and learning thereby making the process and progress meaningful and purposeful. Facilities in schools can be defined as the entire school plant which school administrators, teachers and students harness, allocate and utilize for the smooth learning and efficient management of any educational institution, for the main objective of bringing about effective and purposeful teaching and learning experiences (Asiyai. 2012).According to Emetarom (2004) facilities in schools are the physical and spatial enablers of teaching and learning which will increase the production of results. School facilities serve as pillars of support for effective teaching and learning. furniture and recreational facilities, among others. They constitute vital inputs which are capable of achieving good results when combined with other resources in adequate quality and quantity. Teaching facilities include all of the infrastructure and material resources that are used to support the delivery of quality education. Infrastructure refers to basic physical and organizational structures needed for the successful running of the institution (Bakare, 2009). Studies have also shown that the condition of facilities in schools have a strong effect on quality academic performance of students. Chan Asiyai, (2012) found that students who were taught in modernized buildings scored consistently higher across a range of standardized tests. Adeboyeje (2000) reported that schools

with well-coordinated plant planning and quality control, maintenance practices recorded better students' result performance. Quality and Conducive school with physically decorated environment will enhance students 'school attendance, involvement in academic activities and academic performance will yield positively.

However, poor supply, poor maintenance and management will yield poor quality of teaching and learning in all schools. facilities are regular features in secondary schools. This will encourage a conducive environment for knowledge and skill acquisition.

Vb. CHALLENGES OF QUALITY CONTROL IN EDUCATION

According to Babalola (2007) on his own listed the following as some of the challenges especially as it relates to inspection which is a tool for sustaining quality education.
1. using of unqualified and untrained personnel in the inspectorate services which result in poor quality control and management.
2. Shortage of manpower in the inspectorate division.
3. Lack of adequate statistical compilation in the school system.
4. Inadequate funds and resources for inspection operation.
5. Lack of training for would-be a problem to school inspectors.
6. Inadequate facilities in the inspectorate.
7..Non-implementation/inadequate implementation of `recommendation in inspection reports which results in discouragement in producing high quality inspection reports.
8. Lack of cooperative attitude by some principals.
9. Political instability and frequent policy change.
10. Overload of administrative duties in addition to inspection tours, travels, etc.
11. Occupational hazards associated with road or river travels on inspection tours.

VI. CONCLUSION

The ultimate aims and objectives make it clear that the goal of secondary education is to develop the individual's mental capacity and character for behaviour for higher education and useful living within the society since the future of any nation depends quite considerably on the quality of education it provides for its citizens. The realization of these objectives hinges on quality of teachers, infrastructure and learning environment, resource inputs, teaching process, classroom management, academic assessment, principals' supervision roles and students' commitment to learning now is necessary for government and the stakeholder to embark on quality education for nation building**.**

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An Overview of Forging Processes with Their Defects

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Abstract- The objective of this paper is to identify and understand the various forging processes and to investigate the various forging defects. Initially, some important forging terms that are widely used in this field are discussed. A brief description about classification of forging process on the basis of temperature of work piece (hot, cold, and warm forging) and on the basis of arrangement of dies (open, impression and closed-die forging) is given. Die design parameters, die material requirements and selection of proper die materials are briefly discussed. Also, briefly described the forging equipments (hammer and press). Factors for selection of forging machine, characteristics and common applications of forging are given. Forging defects those are repeatedly occurring are discussed along with their causes and remedies. Then the fish-bone diagram is used to explore the possible causes of defects like unfilling, mismatch and scale pits through a brainstorming session and to determine the causes, which may has the greatest effect. Finally, it is concluded that the forging process gives better quality product than the part produced by any other processes with implementation of preventive actions to reduce the rejection rate.

Index Terms- Forging, Billet, Flash, Forging defects, Unfilling, Fish-bone diagram

I. INTRODUCTION

Forging is defined as a metal working process in which the useful shape of work piece is obtained in solid state by compressive forces applied through the use of dies and tools. Forging process is accomplished by hammering or pressing the metal. It is one of the oldest known metalworking processes with its origin about some thousands of years back. Traditionally, forging was performed by a smith using hammer and anvil. Using hammer and anvil is a crude form of forging. The smithy or forge has evolved over centuries to become a facility with engineered processes, production equipment, tooling, raw materials and products to meet the demands of modern industry.

In modern times, industrial forging is done either with presses or with hammers powered by compressed air, electricity, hydraulics or steam. Some examples of shapes obtained now-a-days by forging process are- Crane hook, connecting rod of an IC engine, spanner, gear blanks, crown wheel, pinion etc.

Forging process produces parts of superior mechanical properties with minimum waste of material. In this process, the starting material has a relatively simple geometry; this material is plastically deformed in one or more operations into a product of relatively complex configuration. Forging usually requires relatively expensive tooling. Thus, the process is economically attractive when a large number of parts must be produced and/or when the mechanical properties required in the finished product can be obtained only by a forging process.

Though forging process gives superior quality product compared to other manufacturing processes, there are some defects that are lightly to come if a proper care is not taken in forging process design. Defects can be defined as the imperfections that exceed certain limits. There are many imperfections that can be considered as being defects, ranging from those traceable to the starting materials to those caused by one of the forging processes or by post forging operations.

II. DISCUSSION

A. Some Important Forging Terms

1) Forging die: It may be defined as a complete tool consists of a pair of mating members for producing work by hammer or press. Die pair consists of upper and lower die halves having cavities.
2) Billet: A slug cut from rod to be heated and forged.
3) Blocker: Preform die or impression, used when part cannot be made in a single operation.
4) Cavity: The impression in upper and lower die.
5) Draft Angle: The taper on a vertical surface to facilitate the easy removal of the forging from the die or punch. Internal draft angles are larger (7^0-10^0), whereas external draft angles are smaller (3^0-5^0).
6) Fillet: It is a small radius provided at corners of die cavity to ensure proper and smooth flow of material into die cavity. It helps to improve die life by reducing rapid die wear.
7) Flash: The excess metal that flows out between the upper and lower dies which is required to accomplish a desired forging shape.
8) Gutter: A slight depression surrounding the cavity in the die to relieve pressure and control flash flow.
9) Parting Line: The location on the forging where excess material in the form of flash is allowed to exit from the forging during the forging operation.
10) Shrinkage: The contraction that occurs when a forging cools.
11) Sink: To cut an impression in a die.
12) Web: The thin section of metal remaining at bottom of a cavity or depression in a forging. The web may be removed by piercing or machining.
13) Die Closure: Refers to the function of closing together the upper and lower members of a forge die during the process of actually producing a forging.

B. Classification of Forging Processes

In forging, an initially simple part- a billet, is plastically deformed between two dies to obtain the desired final configuration. For understanding and optimization of forging operations, it is useful to classify this process in a systematic way. There are a large number of forging processes that can be classified as follows:

1) Classification based on Temperature of the work piece
a) Hot forging (most widely used): Forging is carried out at a temperature above the recrystallization temperature of the metal. The recrystallization temperature is defined as the temperature at which the new grains are formed in the metal. This kind of extreme heat is necessary in avoiding strain hardening of the metal during deformation.
Advantages: High strain rates and hence easy flow of the metal, Recrystallization and recovery are possible, Forces required are less.
Disadvantages: Lubrication is difficult at high temperatures, Oxidation and scaling occur on the work piece, Poor surface finish, Less precise tolerances, Possible warping of the material during the cooling process.

Table- 1: Hot forging temperature range for different metals and alloys [1].

Metal or alloy	Temperature Range (^{0}C)
Aluminum alloys	400 – 550
Magnesium alloys	250 – 350
Copper alloys	600 – 900
Carbon and Low-alloy steels	850 – 1150
Martensitic stainless steels	1100 – 1250
Austenitic stainless steels	1100 – 1250
Titanium alloys	700 – 950
Iron-base superalloys	1050 – 1180
Cobalt-base superalloys	1180 – 1250
Tantalum alloys	1050 – 1350
Molybdenum alloys	1150 – 1350
Nickel-base superalloys	1050 – 1200
Tungsten alloys	1200 – 1300

b) Cold forging: Forging is carried out at or near room temperature (below the recrystallization temp.) of the metal. Carbon and standard alloy steels are most commonly cold-forged. Cold forging is generally preferred when the metal is already a soft, like aluminum. This process is usually less expensive than hot forging and the end product requires little or no finishing work. Cold forging is also less susceptible to contamination problems, and the final component features a better overall surface finish.
Advantages: Production rates are very high with exceptional die life, Improves mechanical properties, Less friction between die surface and work piece, Lubrication is easy, No oxidation or scaling on the work.
Disadvantages: Residual stress may occur, Heavier and more powerful equipment is needed, Stronger tooling is required, Tool design and manufacturing are critical.

c) Warm forging: The temperature range for the warm forging of steel runs from above room temperature to below the recrystallization temperature. Compared with cold forging, warm forging has the potential advantages of: Reduced tooling loads, reduced press loads, increased steel ductility, elimination of need to anneal prior to forging, and favorable as-forged properties that can eliminate heat treatment. In warm forging, the billet is heated below the recrystallization temperature, up to 700 to 800 ^{0}C for steels, in order to lower the flow stress and the forging pressures.
Advantages: High production rates, Excellent dimensional tolerances and surface finish for forged parts, Significant savings in material and machining, Favorable grain flow to improve strength, Greater toughness of the forged part.

2) Classification based on Arrangements of Dies
a) Open-die forging: Forging in which the flat dies of simple shape are used to allow the material to freely deform in lateral directions of applied load. Figure 1 shows open-die forging operation.

Figure 1: Open-die forging

Features: Less dimensional accuracy, Suitable only for simple shapes of work, Requires more skill of the operator, Usually used for a work before subjecting it to closed-die forging (to give approximate shape), Dies are simple and less expensive, It is simplest of all the forging operations.

b) Impression-die forging: Forging in which the material is shaped to fill out a die cavity created by the upper and lower die halves. The dies are not fully closed and allow some material to escape as Flash. Flash formation builds pressure inside the bulk of the work piece, aiding material flow into unfilled impressions. Requires more complex (and more expensive) dies. Figure 2 shows impression-die forging operation.

Significance of Flash: Excess metal is taken initially to ensure that die is completely filled with metal to avoid any voids. Excess metal is squeezed out of the die cavity as a thin strip of metal, called Flash. A flash gutter is provided to reduce the area of flash. Thin flash increases the flow resistance of the system and builds up the pressure to high values which ensures that all intricate shapes of cavity are filled. Flash design is very critical and important step. Extremely thin flash results in very high pressure build up which may lead to breaking of the dies.

Figure 2: Impression-die forging

c) Closed-die forging: Forging in which the material is fully constrained in the cavity created by the upper and lower die halves. It allows more accurately shaped parts to be formed, No flash is formed in this process therefore no waste of material, Higher interface pressures required, Requires very accurate control of material volume and proper die design. Closed-die forging is a form of impression-die forging, which does not depend on flash formation to achieve complete filling of the die. Material is deformed in a cavity that allows little or no escape of excess material, thus placing greater demands on die design.

Features: Work is rough forged close to final shape by blocking die, Work is forged to final shape and dimensions by Finishing die, Both blocking die and finishing die are machined into the same die block, More number of dies are required depending on the complexity of the job, Two die halves close-in and work is deformed under high pressure, High dimensional accuracy/close control on tolerances, Suitable for complex shapes, Dies are complex and more expensive, Large production rates are necessary to justify high costs.

C. Die design parameters Die design depends on the knowledge of strength and ductility of work piece material, sensitivity of material to the rate of deformation and temperature, frictional characteristics, shape and complexity of work piece, die distortion under high forging loads.
Die material requirements: Strength and toughness at elevated temperature, Hardenability and ability to harden uniformly, Resistance to mechanical and thermal shocks, Wear resistance-to resist abrasion wear due to scales present on work piece.
Selection of proper die material depends on: Die size, Composition and properties of work piece, Complexity of shape-No. of performing steps, Forging temperature, Type of forging operation, Cost of die material, No. of forgings required, Heat transfer from work piece to dies, etc.
Die materials used: Tool and die steels with Cr, Ni, Mo, Va.

D. Forging equipments
Forged components are shaped either by a hammer or press. Forging on the hammer is carried out in a succession of die impressions using repeated blows. The quality of the forging, and the economy and productivity of the hammer process depend upon the tooling and the skill of the operator. In press forging, the stock is usually hit only once in each die impression and the design of each impression becomes more important while operator skill is less critical. The continuous development of forging technology requires a sound and fundamental understanding of equipment capabilities and characteristics. The equipment i.e. presses and hammers used in forging, influences the forging process, since it affects the deformation rate and temperature conditions, and it determines the rate of production. The requirements of a given forging process must be compatible with the load, energy, time, and accuracy characteristics of a given forging machine [1].

1) Forging Hammer: The most common type of forging equipment is the hammer and anvil. The hammer is the least expensive and most versatile type of equipment for generating load and energy to carry out a forging process. This technology is characterized by multiple impact blows between contoured dies. Hammers are primarily used for hot forging. There are basically two types of anvil hammers: Gravity-drop hammers and Power-drop hammers. In a simple gravity-drop hammer, the upper ram is connected to a board (board-drop hammer), a belt (belt-drop hammer), a chain (chain-drop hammer), or a piston (oil-, air-, or steam-lift drop hammer). The ram is lifted to a certain height and then dropped on the stock placed on the anvil. During the down stroke, the ram is accelerated by gravity and builds up the blow energy. The upstroke takes place immediately after the blow. The operation principle of a power-drop hammer is similar to that of an air-drop hammer. In the down stroke, in addition to gravity, the ram is accelerated by steam, cold air, or hot air pressure. In the power-drop hammer, the acceleration of the ram is enhanced with air pressure applied on the top side of the ram cylinder [1]. Figure 3 shows mechanical board hammer- It is a stroke restricted machine. Repeatedly the board (weight) is raised by friction rolls and is dropped on the die. Its rating is in the terms of weight of the ram and energy delivered. Figure 4 shows steam hammer- It uses steam in a piston and cylinder arrangement. It has greater forging capacity. It can produce forgings ranging from a few kgs to several tones. It is preferred in closed-die forging.

Figure 3: Mechanical board hammer

Figure 4: Steam hammer

2) Forging Press: In press forging, the metal is shaped not by means of a series of blows as in hammer forging, but by means

of a single continuous squeezing action. There are two main types: mechanical and hydraulic presses. Mechanical presses function by using cams, cranks and/or toggles to produce a preset (a predetermined force at a certain location in the stroke) and reproducible stroke. Due to the nature of this type of system, different forces are available at different stroke positions. Mechanical presses are faster than their hydraulic counterparts (up to 50 strokes per minute). Their capacities range from 3 to 160 MN (300 to 18,000 short tons-force). Hydraulic presses use fluid pressure and a piston to generate force. Figure 5 shows hydraulic press. It is a load restricted machine. It has more of squeezing action than hammering action. Hence dies can be smaller and have longer life than with a hammer.

Features of Hydraulic Press: Full press load is available during the full stroke of the ram, Ram velocity can be controlled and varied during the stroke, It is a slow speed machine and hence has longer contact time and hence higher die temperatures, The slow squeezing action gives close tolerance on forgings, Initial cost is higher compared to hammers. The advantages of a hydraulic press over a mechanical press are its flexibility and greater capacity. The disadvantages include a slower, larger, and costlier machine to operate [1].

Figure 5: Hydraulic press

E. Selection of Forging machine

Selection of forging machine depends upon force and energy requirements, Material to be forged (soft material- use press, hard material- use hammers), Size-shape and complexity of forging, Strength of the work piece material, Sensitivity of material to rate of deformation, Production rate, Dimensional accuracy, Maintenance, Operating skill level required, Noise level, Cost.

Characteristics of Forging- Usually involves discrete parts, May be done on hot or cold materials, Often requires additional finishing processes such as heat treating, machining, or cleaning, May be done at fast or slow deformation rates, May be used for very small or very large parts, Improves the physical properties of a part by controlling and refining the flow or grain of the material.

Common Applications of Forging- Automotive passenger cars, trucks, buses, trailers, motorcycles and bicycles. Bearings, ball and roller. Electric power generation/transmission. Industrial and commercial machinery and equipments. Hand tools. Industrial tools. Mechanical power transmission equipments. Internal combustion engines. Oil field machinery and equipments. Off-highway, equipment (construction, mining and materials handling). Pipeline fittings. Plumbing fixtures, valves and fittings. Pumps and compressors. Railroad equipments and spikes. Metalworking and special industry machinery. Steam engines and turbines. Steel works, rolling and finishing mills. Ship and boat building and repairs. Aerospace aircraft engines. Guided missiles and space vehicles, etc.

III. Forging Defects

When a forge shop begins to experience defects in their process, they should try to find the root cause of the problem, initiate corrective action and implement procedures to prevent its recurrence. A brief description of defects and their remedial methods is given below:

1) Incomplete forging penetration:
Dendritic ingot structure at the interior of forging is not broken. Actual forging takes place only at the surface.
Cause- Use of light rapid hammer blows
Remedy- To use forging press for full penetration.
2) Surface cracking:
Cause- Excessive working on the surface and too low temperature.
Remedy- To increase the work temperature
3) Cracking at the flash:
This crack penetrates into the interior after flash is trimmed off.
Cause- Very thin flash
Remedy- Increasing flash thickness, relocating the flash to a less critical region of the forging, hot trimming and stress relieving.
4) Cold shut (Fold):
Two surfaces of metal fold against each other without welding completely.
Cause- Sharp corner (less fillet), excessive chilling, high friction
Remedy- Increase fillet radius on the die.
5) Unfilled Section (Unfilling/Underfilling):
Some section of die cavity not completely filled by the flowing metal.
Cause- Improper design of the forging die or using forging techniques, less raw material, poor heating.
Remedy- Proper die design, Proper raw material and Proper heating. Figure 6- Shows the fish-bone diagram for root-cause analysis of underfilling defect.
6) Die shift (Mismatch): Misalignment of forging at flash line.
Cause- Misalignment of the die halves.
Remedy- Proper alignment of die halves. Make mistake proofing for proper alignment for eg. provide half notch on upper and lower die so that at the time of alignment notch will match each other. Figure 7- Shows the fish-bone diagram for root-cause analysis of mismatch defect.
7) Scale Pits (Pit marks):
Irregular depurations on the surface of forging.
Cause- Improper cleaning of the stock used for forging. The oxide and scale gets embedded into the finish forging surface.
Remedy- Proper cleaning of the stock prior to forging.
Figure 8- Shows the fish-bone diagram for root-cause analysis of Scale Pits defect.
8) Flakes:
These are basically internal ruptures.

Cause- Improper cooling of forging. Rapid cooling causes the exterior to cool quickly causing internal fractures.
Remedy- Follow proper cooling practices.
9) Improper grain flow:
Cause- Improper die design, which makes the metal not flowing in final interred direction.
Remedy- Proper die design.
10) Residual stresses in forging:
Cause- Inhomogeneous deformation and improper cooling (quenching) of forging.
Remedy- Slow cooling of the forging in a furnace or under ash cover over a period of time.

IV. CONCLUSION

Forging is an experience oriented process. Throughout the years, a great deal of know-how and experience has been accumulated in this field, largely by trial-and-error methods. Forging process produces final products in very short time with little or no scrap. Thus there is saving in energy and material. Forgings sometimes cost more than parts produced by other processes like- casting or machining, but it gives more reliable parts with better mechanical and metallurgical properties.

Since defects causes high rejection rates, it is important to move any process in the direction of eliminating all imperfections as part of an effective continuous improvement program. A good quality program begins with an attitude of making it right the first time. Forging processes are no exception to this. Economically, as well as from a quality perspective, it is better to understand and control the process so as to avoid defects rather than scrapping the defective parts during final inspection.

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Figure 6: Fish-bone diagram for root-cause analysis of underfilling defect.

Figure 7: Fish-bone diagram for root-cause analysis of mismatch defect.

Figure 8: Fish-bone diagram for root-cause analysis of scale pits defect.

An Optimization of Forging Process Parameters by using Taguchi Method: An Industrial Case Study

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Abstract- The objective of this paper is to obtain the optimal setting of forging process parameters in order to reduce the rejection rate due to unfilling defect. Initially, the various forging defects that occur in the components during closed-die hot forging process are investigated. The investigation is done with the help of Quality Assurance department in a forging industry. During investigation, the various defects that causes high rejection rates are identified and unfilling defect which has major contribution in high rejection rate is selected for study purpose. The process parameters considered for study purpose are- billet weight, heating temperature, heating time each at three levels and required output is final job weight. To obtain the optimal process parameter combination, optimization is carried out by the Signal-to-Noise (S/N) ratio analysis of Taguchi method using L9 Orthogonal Array. An analysis of variance (ANOVA) is used to present the influence of process parameters on filling the job weight. Results obtained by Taguchi method and by ANOVA method, are compared and found that they match closely with each other. Further multiple regression equation is formulated for estimating the predicted values of job weight. The values are then evaluated by conducting confirmation experiments to verify the validity of this study. In this way, the optimum levels of process parameters can be predicted. Finally it is concluded that, in order to reduce the rejection rate due to unfilling forging defect, the best process parameter combination which is derived through this study must be followed during the production process.

Index Terms- Unfilling, Process Parameters, Taguchi Method, S/N ratio, ANOVA, Regression analysis.

I. INTRODUCTION

As parts produced by forging process has superior mechanical and metallurgical properties, thus in modern times they are having wide applications in automotive industry, defense industry, marine industry and aerospace industry, agricultural machinery, off-highway and railroad equipment, valves, fittings, petrochemical applications, industrial hardware and hand tools [3]. Although forging process has special place among all the manufacturing processes, there are still high rejection rates due to forging defects. Defects ranges from those traceable to the starting materials to those caused by forging process itself or by post forging operations. In forging process, defects like unfilling, mismatch, scale pits, surface cracking, fold and lap, improper grain flow etc. are responsible for high rejection rates. In this

study, unfilling forging defect is focused. Unfilling defect can be defined as some section of die cavity not completely filled by the flowing metal, or metal does not fill the recesses of the die cavity completely during the forging process. It causes due to improper design of the forging die, die wear, improper use of forging techniques, less raw material, poor heating of raw material inside the furnace, etc. It can be avoided by proper die design, using proper raw material and proper heating of billets inside the furnace to get the desired forgeability of raw material. The effect of unfilling defect is that the job dimensions cannot be filled; ultimately the required final job weight cannot be filled completely as per the requirements of company standards. Due to presence of this defect, there will be insufficient material stock on forged component for subsequent machining operations, hence the job gets rejected. In order to increase the product quality and to reduce the rejection rate due to defects, design activities need to systematically consider various designs and process related parameters and finally come out with the best parameters combination for better process performance. The quality of the closed-die forging depends on several controlling parameters such as die design parameters and process parameters. Design parameters represent the geometrical aspect of the die such as flash thickness, flash land width, fillet radii, corner radii and draft [4]. Die design also consists of die wear analysis, since die wear is also responsible for unfilling defect. Process parameters are variable related to the forging process. During the brainstorming session, it is observed that the three process parameters (billet weight, heating temperature of furnace, and heating/soaking time of raw material/billet inside the furnace) have major influence on filling the die cavity. Therefore these three process parameters are selected for trial purpose. The purpose of conducting trials is to determine the best combination of these process parameters.

Traditionally, the empirical trial-and-error method has been used to get the best parameter combination, through a series of experiments; however, this approach is tedious, expensive, and time consuming. Design of experiments (DOE) techniques like the Taguchi method can optimize the process parameters with minimum number of experimental trials. Taguchi offers a simple and systematic approach to obtain optimal setting of the process parameters. Therefore, in present study, Taguchi optimization methodology is applied.

II. METHODOLOGY

Taguchi method was developed by Dr. Genechi Taguchi, as a researcher at the electronic control laboratory in Japan. He carried out significant research on DOE techniques in the late 1940's. He proposed that optimization of process parameters should be carried out in three-step approach- system design, parameter design, and tolerance design. System design deals with innovative research, looking for what factors and levels should be. Parameter design is used to obtain the optimum levels of process parameters to improve the performance of process/products by adjusting levels of factors. Finally, tolerance design aims to determine the control characteristics for each factor level identified in earlier studies [5]. The parameter design is the key step in Taguchi method to achieving high quality without increasing cost. The steps included in Taguchi parameter design are: selecting the proper orthogonal array (OA) according to the numbers of controllable factors (parameters); running experiments based on the OA; analyzing the data; identifying the optimum condition; and conducting confirmation trials with the optimal levels of all the parameters. To select an appropriate orthogonal array for experiments, the total degrees of freedom need to be computed. The degrees of freedom are defined as the number of comparisons between process parameters that need to be made to determine which level is better and specifically how much better it is. The degrees of freedom for the orthogonal array should be greater than or at least equal to those for the process parameters. For three parameters each at three levels, the degrees of freedom are six. Once the degrees of freedom required are known, the next step is to select an appropriate orthogonal array to fit the specific task [4]. A three level orthogonal array (L9 3^3) with nine experimental runs (total degrees of freedom = 9-1 = 8) is selected for the present study. Orthogonal array (OA) is nothing but the shortest possible matrix of combinations in which all the parameters are varied at the same time and their effect and performance interactions are studied simultaneously. With the selection of (L9 3^3) orthogonal array, using three parameters and three levels for each, the numbers of experiments required are nine, which in classical combination method using full factorial experimentation would require 27 numbers of experiments to get the influencing parameters [6]. Thus, by using Taguchi method, based on orthogonal arrays, the numbers of experiments can be reduced. Taguchi method employs the S/N ratio to identify the quality characteristics applied for engineering design problems. The S/N ratio characteristics can be divided into three types: lower-the-better, larger-the-better, and nominal-the-better.

III. INPUT DATA COLLECTION AND PROBLEM IDENTIFICATION

During the investigation that done with the help of QA department, in a forging industry, it is clear from the monthly rejection report (Table 1) for the month of December 2013, company has manufactured 14 types of gear blanks. In the total production of 12945 numbers, 787 numbers got rejected. It means the plant has a rejection rate of 6.08% in that month. This much rejection rate cannot be tolerated by the company, this lead to undergo detail study in the company about the defects that caused this much rejection rate and the remedial actions suitable

for that to reduce the rejection rate. From the information of Table 1, two charts are plotted. Chart 1 shows that Part No. 2876 has maximum rejection and Chart 2 shows that 'Unfilling' defect has major contribution in rejection of part No. 2876. Therefore, Part No. 2876 is selected here for study purpose and trying to attack on unfilling defect in that product.

As per the Process Standard of company, the ranges of three process parameters (which are selected for trial purpose), for the Part No. 2876 are- Billet Weight: 6.25 Kg +/- 0.05 Kg, Heating Temperature of furnace: 1200 ^{0}C +/- 50 ^{0}C, and Heating/Soaking Time for billets inside the furnace: 60 min. +/- 10 min.

Table 1 : Monthly Rejection Report (Dec. 2013)

Sr. No.	Part No.	Production Qty. (in Nos.)	Defect wise Rejected Qty. (in Nos.)						Total Rejected Qty. (in Nos.)	Rejection (in %)
			U/F	S/P	M/M	Lap	C/R	D/M		
1	2682	1080	27	9	5	7	6	3	57	5.28
2	2686	900	22	5	12	9	9	3	60	6.67
3	2690	1100	10	18	3	10	0	2	43	3.91
4	2691	850	1	6	19	3	7	3	39	4.59
5	2732	975	17	8	7	5	4	1	42	4.31
6	2793	1000	20	4	12	9	10	0	55	5.50
7	2873	995	27	11	9	6	3	2	58	5.83
8	2876	1000	59	13	7	11	8	10	108	10.80
9	2877	790	32	8	5	3	2	4	54	6.84
10	2930	600	8	15	14	3	0	5	45	7.50
11	2957	875	15	8	16	2	6	3	50	5.71
12	2958	1000	24	4	9	13	8	1	59	5.90
13	3038	930	11	23	4	7	7	5	57	6.13
14	3039	850	24	11	7	7	5	6	60	7.06
Total		12945	297	143	129	95	75	48	787	6.08

Chart 1 : Part number wise rejected Qty.

Chart 2 : Defect wise rejected Qty. for Part No. 2876

IV. EXPERIMENTAL DETAILS

A. Selection of Process Parameter levels and Response Factor:

There are three input controlling parameters selected with their three levels. Details of parameters and their levels used in this study are as shown in Table- 2. Unfilling defect is as shown in Photograph- 1 and 2. It is very difficult to predict the occurrence of this defect at a particular place on a job, but this defect directly affects the required final job weight. So, the selected response parameter/factor for this study is required final job weight. As per the Company standard, the required final job weight for Part No. 2876 is 5.50 Kg +/- 0.05 Kg.

Table 2 : Process Parameters with their Levels

A	Billet Wt. (in Kg)	6.20 (A1)	6.25 (A2)	6.30 (A3)
B	Heating Temp. (in ^{0}C)	1150 (B1)	1200 (B2)	1250 (B3)
C	Heating Time (in min.)	50 (C1)	60 (C2)	70 (C3)

Photograph 1: Unfilling defect at front side of job

Photograph 2: Unfilling defect at back side of job

B. Design of Experiments:

The design of experiment is carried out by Taguchi methodology using Minitab 14 Software. In this technique the main objective is to optimize the job weight that is influenced by various process parameters. Since three controllable factors and three levels of each factor are considered L9 (3^3) Orthogonal Array is selected

for this study. Table 3 shows the layout of experiments to be carried out according to Taguchi L9 Orthogonal Array.

C. Experimental Set-up:

A Series of experiments are conducted to evaluate the influence of process parameters on job weight. The trials are carried out on 2 Ton Pneumatic Hammer. Electronic weighing machine is used for weight measurement. The experiments are conducted by keeping all other parameters constant. The constant parameters are air-fuel ratio (6:1) to furnace burner, type of furnace oil (cbfs), air pressure (75 psi) to hammer, type of hammer, die wear within limit, skilled operator, etc. Photograph 3 shows hammering operation on 2-Ton hammer during experimentation and photograph 4 shows electronic weighing machine to be used for weight measurement purpose.

Table 3 : Layout of experiments

Trial No.	Parameters Combination		
	A	B	C
1	6.20	1150	50
2	6.20	1200	60
3	6.20	1250	70
4	6.25	1150	60
5	6.25	1200	70
6	6.25	1250	50
7	6.30	1150	70
8	6.30	1200	50
9	6.30	1250	60

Photograph 3: Hammering operation

Photograph 4: Electronic weighing machine

V.   RESULTS AND DISCUSSION

A. S/N Ratio Analysis:

After the conduction of trials, the results for job weight are collected and they are analyzed by means of calculating the S/N ratio. Taguchi uses the S/N ratio analysis to measure the quality characteristic deviating from the desired value. In S/N ratio, the term 'Signal' represents the desirable value (mean) for the output characteristic and the term 'Noise' represents the undesirable value for the output characteristic. In general, a better signal is obtained when the noise is smaller, so that a larger S/N ratio gives better final result. That means, the divergence of the final results becomes smaller. The S/N ratio for larger-the-better target of each experimental trial is calculated based on the following equation, and the values are listed in Table 4.

Larger-the-better characteristic

S/N = -10 log (MSD)

Where MSD= Mean Square Deviation for the Output Characteristic.

$$MSD = (1/Y_1^2 + 1/Y_2^2 + 1/Y_3^2 + ……….. + 1/Y_n^2) / n$$

Where Y_1, Y_2, Y_3 are the responses and 'n' is the number of tests in a trial.

The level of a factor with the highest S/N ratio is the optimum level for responses measured. The higher the signal to noise ratio, the more favorable is the effect of input variable on the output.

Table 4: Results of Experiments

Trial No.	Parameters Combination			Results	
	A	B	C	Job wt.	S/N ratio
1	6.20	1150	50	5.39	14.6318
2	6.20	1200	60	5.37	14.5995
3	6.20	1250	70	5.34	14.5508
4	6.25	1150	60	5.44	14.7120
5	6.25	1200	70	5.42	14.6800
6	6.25	1250	50	5.41	14.6639
7	6.30	1150	70	5.44	14.7120
8	6.30	1200	50	5.48	14.7756
9	6.30	1250	60	5.46	14.7439

From Table 4 - It is clear that, the S/N ratio is higher for Trial No. 8, hence the optimum value levels of control factors for higher job weight, are at- billet weight (6.30 Kg), heating temperature (1200 ^{0}C), and heating time (50 min.). Chart 3 shows the Trend for Results of Trials.

Chart 3: Trend chart for Results of Trials

Table 5: Estimated Model Coefficients for S/N ratios

Term	Coef	SE Coef	T	P
Constant	14.6744	0.008126	1805.758	0.000
B wt 6.20	-0.0804	0.011493	-6.992	0.020
B wt 6.25	0.0109	0.011493	0.950	0.442
Temp 1150	0.0109	0.011493	0.945	0.444
Temp 1200	0.0106	0.011493	0.926	0.452
Time 50	0.0161	0.011493	1.398	0.297
Time 60	0.0107	0.011493	0.933	0.449

Table 5 shows the linear model for S/N ratios.
Summary of Model-
S = 0.02438   R-Sq = 97.1%   R-Sq(adj) = 88.3%

From Table 6 and Figure 1, it is clear that, larger the 'delta' value, greater the significance of the control factor. It means for higher job weight, the most significant factor is billet weight (A), followed by heating time (C), and heating temperature (B).

Table 6 : Response for S/N ratios

Larger is better

Level	B wt	Temp	Time
1	14.59	14.69	14.69
2	14.69	14.69	14.69
3	14.74	14.66	14.65
Delta	0.15	0.03	0.04
Rank	1	3	2

Figure 1 : Effect of process parameters on S/N Ratio

B. Analysis of Variance (ANOVA):

Analysis of variance is a standard statistical technique to interpret the experimental results. It is extensively used to detect differences in average performance of groups of items under investigation. It breaks down the variation in the experimental result into accountable sources and thus find the parameters whose contribution to total variation is significant. Thus analysis of variance is used to study the relative influences of multiple variables, and their significance. The purpose of ANOVA is to investigate which process parameters significantly affect the quality characteristic. The analysis of the experimental data is carried out using the software MINITAB 14 specially used for design of experiment applications.

In order to find out statistical Significance of various factors like billet weight (A), heating temperature (B), and heating time (C), and their interactions on job weight, analysis of variance (ANOVA) is performed on experimental data. Table 7 shows the results of the ANOVA for S/N ratio. The last column of the table indicates p-value for the individual control factors. The 'p-value' plays an important role in this analysis. It is known that smaller the p-value, greater the significance of the factor. Table 7 indicates that, the billet weight (p=0.034), heating time (p= 0.267), and heating temperature (p=0.363) in this order, are the most significant control factors effecting the job weight. It means, the billet weight is the most significant factor and the heating temperature has less influence on the performance output.

Table 7 : ANOVA for S/N ratios

Source	DF	Seq SS	Adj MS	F	P
B wt	2	0.034190	0.017095	28.76	0.034
Temp	2	0.002082	0.001041	1.75	0.363
Time	2	0.003271	0.001636	2.75	0.267
Residual Error	2	0.001189	0.000594		
Total	8	0.040732			

C. Percent contribution:

Percent contribution to the total sum of square can be used to evaluate the importance of a change in the process parameter on these quality characteristics.
Percent contribution is calculated by the following equation:

Percent contribution (P) = (SS'A / SST) *100

Table 8 and Chart 4 shows individual % contribution of parameters under study.

Table 8: Optimum Condition and Percent Contribution

Sr. No.	Factors	Level Description	Rank	Contribution (%)
1	A: Billet wt.	6.30	1	83.94
2	B: Heating Temp.	1200	3	5.11
3	C: Heating Time	50	2	8.03

Chart 4: Percent contribution

D. Regression Analysis:

Regression analysis is used for explaining or modeling the relationship between a single variable Y, called the response, output or dependent variable, and one or more predictor, input, independent or explanatory variables. The mathematical model for process parameters such as billet weight, heating temperature and heating time is obtained from regression analysis using MINITAB 14 statistical software to predict the job weight. Table 9 shows the regression analysis model.

Table 9 : Regression analysis model

Predictor	Coef	SE Coef	T	P
Constant	-0.0967	0.7598	-0.13	0.904
B wt	0.9333	0.1193	7.83	0.001
Temp	-0.0002000	0.0001193	-1.68	0.154
Time	-0.0013333	0.0005963	-2.24	0.076

Summary of Model-
S = 0.0146059   R-Sq = 93.2%   R-Sq(adj) = 89.2%

The regression equation is
$Y = -0.0967 + 0.9333 A - 0.0002000 B - 0.0013333 C$ …… (1)

Where,
Y = Response i.e. Job weight (Kg)
A = Billet wt. (Kg), B = Heating Temperature (^{0}C), C = Heating Time (min)

   If we put optimum parameters (A3B2C1) which are drawn by S/N ratio and ANOVA analyses, in equation (1), it will give the optimum value of quality characteristic which will be the maximum job weight.

$Y_{opt} = -0.0967 + 0.9333*A3 – 0.0002000*B2 – 0.0013333*C1$
$Y_{opt} = -0.0967 + 0.9333*6.30 – 0.0002000*1200 – 0.0013333*50$

$Y_{opt} = 5.4764$ Kg   (Predicted by Regression Equation)

   In multiple linear regression analysis, R^2 is value of the correlation coefficient and should be between 0.8 to 1. In this study, the results obtained for final job weight are in good agreement with regression model ($R^2 > 0.80$). Figure 2 shows the Residual plots for job weight.

Figure 2: Residual Plots for Job weight

E. Confirmation Experiments:

   In Order to test the predicted result, confirmation experiment has been conducted by running another three trials at the optimal settings of the process parameters, determined from the Analysis i.e. A3B2C1.

Table 10: Results for confirmation experiments

Observation	Trial No.			Avg. Job wt.	S/N ratio
	1	2	3		
1	5.49	5.48	5.49	5.4867	14.7862

   The results for confirmation experiments are shown in Table 10, and it is observed that the average Job weight i.e. 5.4867 and S/N Ratio 14.7862, falls within predicted 80% Confidence Interval. Chart 5 shows the Trend for Results of confirmation experiments. Photograph 5 shows a defect free job produced during confirmation experiments and Photograph 6 shows the weight measurement for that job.

Chart 5: Trend chart for Results of confirmation experiments

Photograph 5: Defect free job

Photograph 6: Job weight = 5.49 kg

VI.   CONCLUSION

   The Unfilling defect in Part No. 2876, was selected for this study. The Process parameters considered were- billet weight, heating temperature, and heating time each at three levels. To obtain the optimal setting of these parameters, the S/N ratio analysis of Taguchi method (L9 OA) is used. ANOVA is carried out for determining the influence of given input parameters from a series of experimental results by Taguchi method. The optimum job weight is calculated by Regression equation. Hence, following conclusions are drawn from the present study:

- From the S/N ratio and ANOVA analyses, it is clear that the optimal combination of process parameters is A3B2C1.

- The optimum job weight value calculated by Regression equation closely matches with the actual job weight value obtained by Trial No. 8 of Taguchi method.
- The prediction made by Taguchi parameter design technique and by Regression analysis is in good agreement with the confirmation results.
- Thus, the use of Taguchi and ANOVA methods, were effective in studying the influence of selected process parameters on job weight.
- Among three process parameters, billet weight is the most significant parameter followed by heating time and heating temperature to get the higher job weight.
- The optimal level of process parameters that must be followed during the production process in order to reduce the rejection rate due to unfilling forging defect, are:

Billet weight	6.30 Kg
Heating Temperature	1200 ^{0}C
Heating Time	50 min.

- The results of present study are valid within specified range of process parameters. Hence, the present study stands valid.
- As unfilling defect also causes due to die design parameters, die wear etc., significant scope exists to conduct study in this direction also to reduce the unfilling defect.
- In present study, only unfilling defect was selected. Significant scope exists to design and conduct further research and experimentation to reduce overall rejection rate due to other forging defects also.

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Photodegradation of 4-Chlorophenol using Carbon Coated TiO2 under Solar Irradiation

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Abstract- The photocatalytic degradation of 4-Chlorophenol (4CP) using carbon C coated TiO_2 (C-TiO_2) and pristine TiO_2 under solar irradiation has been studied. The experiments were carried out in a suspension mode under custom made glass cell reactor with continuous aeration supply. Both photocatalysts worked efficiency at pH 6. It was found that 0.6 and 0.3 g were the optimum loading for C-TiO_2 and pristine TiO_2 respectively in the degradation of 20 mg L^{-1} 4CP under solar irradiation. The optimum C-TiO_2 was found six times faster than pristine TiO_2 based on pseudo first order rate constant of 4CP photodegradation. No adsorption was observed in the photocatalysts. The intermediates observed during this photocatalytic degradation process were maleic acid, hydroquinone (HQ), benzoquinone (BQ), 4-chlorochetol (4CC) and resorcinol.

Index Terms- Carbon coated TiO_2, photocatalysis, 4-Chlorophenol, intermediates.

I. INTRODUCTION

Recently, the increased world industrialization makes the huge productions of chemical wastes, such as dyes, sulphates and a toxic compound. These chemical wastes mostly are uncontrolled and the easiest way is discarded into the rivers and definitely it will contribute to the global environmental problems. 4CP which is known as endocrine disruptor is toxic and non-biodegradable, present 4CP in wastewater as by-products of pulp and paper, dyestuff, pharmaceutical and agrochemical industries [1]. Several ways have been proposed in order to remove these compounds, such as chlorination adsorption, and incineration [2-8]. The degradation of 4CP via chlorination process facing the problem since it generates carcinogenic by-products [3-4]. Another process of degradation is adsorption process using granular activated carbon as adsorption media. However, this process needs further treatment in order to reuse the activated carbon [5-6]. Incineration process of organic wastes was not always effective. Moreover, it can generate large quantities of toxic compound emissions into the atmosphere [7-8]. Indeed, such treatment process should be completely degrading all the pollutants without produced any hazardous residues [9].

Photocatalysis has been reported as an effective since it can degrade a wide range of pollutants both from water and air [9-15]. TiO_2 has emerged as the most viable semiconductor photocatalyst as it is stable in aqueous medium and is tolerant to both acidic and alkaline media [10]. Various modification of TiO_2 photocatalytic properties have been widely investigated since TiO_2 is only active under UV light region which was only consist 5% from the energy of the sun [11]. The modification of TiO_2 with nonmetal like C, N, S, F and P is considered as one of the most promising methods to efficiently develop TiO_2-based photocatalysts sensitive in visible light irradiation for decomposition of various environmental pollutants [11-15]. Among of these nonmetal modified TiO_2, C coated TiO_2 is one of the methods that being extensively studied [11,13,16-18].

Several investigations of the photocatalytic decomposition of 4CP using metal oxide semiconductors either in suspensions or in an immobilized form [19-5] have been studied. Wongwisate et al. [19] was reported the photodegradation 4CP and it mechanism using Au-Ag supported on sol-gel TiO_2 under UV light (200-280 nm). Another study by Qin et al. [20] was observed the degradation of 4CP using bifunctionalized dye-sensitized TiO_2 film under 300 W Xenon lamp (500 nm) used as the visible light source. Yang et al. [21] observed the effects of hydroxyl radicals and oxygen species on the 4CP degradation by photoelectrocatalytic reactions with TiO_2-film electrodes under 100W high-pressure mercury lamp. The degradation of 4CP under solar irradiation using nitrogen doped TiO_2 have been studied by Sun et al. [22], it was observed that 82% of 4CP being degraded at 6 h of irradiation and Guillard et al. [23] was studied the effect of different commercially available of TiO_2 toward degradation of 4CP and it intermediates under solar light.

For the best of our knowledge, many studies were conducted using TiO_2 for the degradation of 4CP involving various methods which are expensive, used toxic chemicals and UV light that has harmful effects. However, only few a works have studied for the degradation of 4CP under solar irradiation with no such publication in the presence of C coated TiO_2 as photocatalyst.

In our recent publication [24], a thin layer C coated TiO_2 with 0.25% C content had been successfully prepared. This C coated TiO_2 had improved the photocatalytic activity for the degradation of RR4, MB and phenol under 45 W fluorescent lamp and solar irradiation respectively. The improved of its photoactivity is due to the lowering of electron-hole recombination process as consequence of coated C on surface of TiO_2. Nevertheless, the literature data concerning application of

C coated TiO_2 for degradation of pollutants under solar irradiation is limited. There are still some important issues concerning C coated TiO_2 photocatalysts, which require further studies. The objective of this research is to study the photodegradation of 4CP under direct solar irradiation using C coated TiO_2 as photocatalyst. The study will be focused on effects of catalyst loading, aeration, pH, weather conditions and mineralization study with identification of intermediates, subsequently to propose the possible degradation pathways.

II. METHOD

Material

TiO$_2$ with 99% anatase (Sigma - Aldrich) was used as the starting material in the preparation of C coated TiO$_2$. Epoxidized natural rubber (ENR-50, Kumpulan Guthrie Sdn. Bhd.) dissolved in toluene to make an 11.4 % solution (w/v) was used as the C precursor. Acetone solvent (R&M chemicals) was used for dilution of sample mixtures for the homogenization process via ultra-sonication. 4CP with 99% pure was obtained from Aldrich, was employed as model pollutant. Hydroquinone (HQ, 99%) and benzoquinone (BQ, 99 %) from Acros, 4-Chlorocatehol (4CC, 98%) from Fluka and resorcinol (99%) from BDH were used to identify the intermediate products. Reagent grade hydrochloric acid and sodium hydrochloride were used to adjust the pH of the reacting mixture. Table 1 summarized chemical structure, molecular weight and λ max for 4CP, HQ, BQ, 4CC and resorcinol respectively. Ultra pure water (18.2 MΩ cm^{-1}) was used to prepare all solutions in this work.

Preparation of C coated TiO$_2$ samples

C coated TiO$_2$ was prepared using the method describes by Nawi et al. [24]. 1.0 g (± 0.03) of ENR solution mixed with 12 g (± 0.03) of TiO$_2$ into 60 mL of acetone. The mixture was than sonicated for 8 hours using 50Hz Crest Ultrasonicator to allow for homogeneous distribution of the carbon precursor on the TiO$_2$ sample. After drying off the solvent in an oven at 100 ˚C, the TiO$_2$ mixed ENR sample was calcined under 560°C temperature under N$_2$ flow for 5 hours. The product was cleaned by sonicating the sample in distilled water and centrifuged to isolate the contamination. After drying process, pure C coated TiO$_2$ sample was than produced with light brown in color.

Adsorption study

For adsorption study, experiment was conducted in the dark. 0.3 g (± 0.03) of photocatalyst sample was added into 60 ml of 20 mg L^{-1} 4CP to form suspensions. This suspensions were then poured into glass cell with dimension 60 x 10 x 250 mm (L x B x H) mm and aerated in the dark. The treated 4CP with TiO$_2$ in suspension mode was taken at every 15 minutes interval up to 1 hour, than filtered with 0.45µm syringe filter to separate the treated 4CP and TiO$_2$. The percentage of the degradation of 4CP was determined by Shimadzu HPLC, Model LC-10AT chromatograph equipped with a LC-18 Supelcosil reversed phase column (Supelco) with (60:40) methanol-water as mobile phase and UV wavelength detector set at 220 nm.

Photocatalytic study

0.3 g (± 0.03) of photocatalyst sample was added into 60 ml of 20 mg L^{-1} 4-CP solution to form suspensions. The suspensions were then poured into a glass cell and irradiated under solar. The entire solar experiments were conducted under time of irradiation between 11 am to 3 pm in the month of March to September.

Table 1: Summary of the organic pollutants

Chemical structure	Chem. formula	Molecular weight (g mol^{-1})
4-Chlorophenol	C_6H_5ClO	128.6
Hydroquinone	$C_6H_6O_2$	110.1
Benzoquinone	$C_6H_4O_2$	108
4-Chlorocatecol	$C_6H_5ClO_2$	144.6
Resorcinol	$C_6H_6O_2$	110.1
Maleic acid	$C_4H_4O_4$	116

The UV detector Radiometer (Solar light co. PMA 2100) connected with a UV-A, UV-B detector (260 - 400 nm) and PAR Quantum Light Sensor detector (401-700 nm) was used to determine the UV and visible light irradiance of solar respectively. An aquarium pump model NS 7200 was used as the aeration source. A direct reading air flowmeter (Gilmont) was used to determine the aeration rate supply to the reactor. Samples were taken at a specific time interval until almost complete degradation was attained. The percentage of the degradation of 4CP was determined by using HPLC. The concentration of the pollutant was plotted against the contact time of irradiation in order to determine the degradation rate of the pollutant. The dependencies of the rate of the degradation on its concentration as irradiation proceeds have been described well

by the Langmuir-Hinshelwood model [25] (equation 1). Where r is rate constant, C is the substrate concentration (mg L^{-1}) at a given time (t, second); K is Lamgmuir- Hishelwood adsorption equilibrium constant (ppm^{-1}) and k' is the surface reaction rate constant (mg L^{-1} min^{-1}). For highly diluted solution (M < 10^{-3}, C < 108 mg L^{-1}), the term KC is negligible with respect to time t, the above equation becomes simplified as an apparent or pseudo first-order equation as shown below:

$$r = \frac{dc}{dt} = \frac{k' \, KC}{1 + KC}$$

$$r = k' \, KC = kC$$

$$\ln \frac{c_0}{c} = kt$$

This experiment were also applied for the effect of catalyst loading, aeration rate, pH and whether condition.

COD analysis

The photocatalytic mineralization of the dye was monitored by using chemical oxygen demand (COD) using standard method ASTM D1252. Low COD values of the related solution indicated that mineralization process has taken place since it reflects the low content of the organic in the solution due to their conversion into CO_2 and H_2O by the photocatalytic process. 20 mg L^{-1} of 4CP was irradiated for 2 hours. Air was supplied from the bottom of the reactor. At every 20 min interval 6 mL aliquot was drawn out from the reactor and filtered with a 0.45 um polyethylene terephthalate (PET) syringe filter to remove the catalyst particle before being analyzed. 3.0 mL of COD reagent was pipetted into three clean COD vials. 0.1 g mercury sulphate was added into each vial to remove chloride interfierences. 2.0 mL of the sample was pipetted into each reagent. The vials were shaken to mix the sample with the reagent. The samples were refluxed using COD reactor ar 140°C for two hours. 2 mL of deionised water was pipetted in the reagent and refluxed under the same condition as the other samples serve as a blank. After 2 hours, the samples were colled down to room temperature before their absorbancies measured using the HACH DR2000 spectrophotometer at 620 nm.

Intermediates Study

The intermediates were determined using HPLC model. All substances were detected by UV detector at 220 nm. The peaks of 4CP and intermediates appeared from the chromatogram were identified by their respective retention times. The percentage of peak are relative to the total peak area was calculated and plotted as function of degradation time. The individual compounds were identified using 2 ways, either by comparing their retention times and retention times with those obtained for pure standard as shown in Table 2, or by spiking of pure standards into the degraded sample and photocatalytic degradation of some intermediates.

III. RESULTS AND DISCUSSION

Effect of the catalyst loading

Fig. 1a shows the pseudo first order rate constant for C-TiO_2 and pristine TiO_2 at different amount of catalysts loading. It was observed that the degradation of 4CP was always batter for C-TiO_2 as compare with pristine. The optimum amount of loading for pristine TiO_2 was found at 0.6 g with the rate constant was c.a. 0.098 min^{-1} while optimum loading for C-TiO_2 was observed at 0.3 g, it was observed that C-TiO_2 loading requires a half as compared with pristine TiO_2 to reach optimum efficiency. This could be due to the grey color of C-TiO_2 as early discuss in our previous study [24] may produced a dark condition of suspension media that scattering the light to penetrate deeply inside the mixture of 4CP and C-TiO_2. The same explanation was also observed by increased the C-TiO_2 loading beyond the optimum (0.3g) where it reduced the photodegradation of 4CP. The pseudo first order rate constant for optimum loading of C-TiO_2 was c.a. 0.422 min^{-1} which takes only 10 minutes to complete 4CP removal and it's more than 4 times faster than the optimum loading of pristine TiO_2 as can be seen in Fig. 1b

Figure 1: Photodegradation of 4CP; a) effect of catalyst loading vs degradation rate, b) graph % remaining on the optimum loading for pristine TiO_2 and $C-TiO_2$ at 0.6 and 0.3 g respectively

Effect of the aeration

The presence of dissolved oxygen plays a significant role in the photocatalytic degradation of 4CP. Oxygen molecule can act as an electron scavenger to trap and separate electron out from the positive holes that help to reduce the chance of electron–hole pair recombination. In order to determine the effect of dissolved oxygen on the 4CP degradation, one of studied without aeration while others were carried out at different aeration rate by bubbling air into the solution. As seen from Fig. 2 (a) and (b) the degradation rates of 4CP in the presence of dissolved oxygen was much higher than those of the systems run in the absence of dissolved oxygen for both catalysts. As the rate of aeration increased, the degradation rate increased until it reached an optimum value. However, increasing too much aeration would slow down the rate of degradation due to scattering of light by air bubbles.

Figure 2: Graphs of; a) effect of aeration rate in the 4CP photodegradation and b) a control study of 4CP photodegradation under normal and BQ additive for $C-TiO_2$.

All photocatalytic evaluations were carried out under continuous aeration. The presence of dissolved oxygen plays a significant role in the photocatalytic degradation of 4CP. Dissolved oxygen is usually employed as an electron acceptor [26]. The presence of an electron acceptor improved the photocatalytic process by increased the separation of the photogenerated electrons and holes. During the photocatalysis process in aerated condition, the oxygen molecule is adsorbed onto the catalyst surface. The adsorbed oxygen molecules will be reduced to $O_2^{\cdot-}$ by electron that is promoted into the conduction band, leading to the formation of perhydroxyl radicals. In addition, perhydroxyl radical will produce hydrogen peroxide which can produce super hydroxyl radicals. The role of oxygen as an electron acceptor is summarized by the following equations [27]:

$$e^- + O_2 \rightarrow O_2^{\cdot-} \tag{1}$$

$$H^+ + O_2^{\cdot-} \rightarrow HO_2^{\cdot} \tag{2}$$

$$2\,HO_2^{\cdot} \rightarrow H_2O_2 + O_2 \tag{3}$$

$$H_2O_2 \rightarrow 2OH^{\cdot} \tag{4}$$

$$H_2O_2 + O_2^{\cdot-} \rightarrow {}^{\cdot}OH + OH^- + O_2 \tag{5}$$

$$H_2O_2 + e^- \rightarrow {}^{\cdot}OH + OH^- \tag{6}$$

Figure 2a shows the effect of aeration flow rates towards photodegradation rate of 4CP under $C-TiO_2$ as a photocatalyst. The optimum aeration rate for $C-TiO_2$ was found at 600 mL min^{-1}, the rate was almost 11 times faster than the system running without aeration with the rate was *ca.* 0.037 min^{-1}. Therefore all photocatalytic and adsorption experiments in this work were carried out under this optimum aeration rate.

Photocatalytic degradation of 4CP dye using $C-TiO_2$ in the presence of 1,4-benzoquinone (BQ) under aerated condition was also carried out in order to provide evidence for the role of O_2 in the photocatalytic process since BQ is known as superoxide scavenger. It was found that the degradation of 4CP presence of BQ reduced significantly as compared to the experiment ran under aeration without BQ as can be seen in Fig. 2b. This was clearly indicates that BQ has significantly reduced the efficiency of the photocatalytic degradation of 4CP eventhough the solution was optimally aerated. Apparently superoxide produced via equation 1 was consumed by BQ thus making reactions 2-6 ceased to exist.

Effect of pH solution

The pH of the solution has strong effect on the photodegradation process for both TiO_2 and $C-TiO_2$ as shown in Fig. 3. Degradation rate of 4CP has not been found to be significant at low pH values but increased rapidly with increase of the pH, attaining a maximum degradation at pH 6. Further increase in pH has showed decreased in the photodegradation efficiency. The surface charge development of TiO_2 is affected by the pH. Upon hydration, surface hydroxyl group (TiOH) are formed in TiO_2. These surface hydroxyl groups can undergo

photon dissociation reaction, thereby bringing out surface charge which is pH dependent:

$$TiOH + H^+ \quad TiOH^+_2$$

$$TiOH \quad TiO^- + H^+$$

Where, $TiOH^+_2$, $TiOH$ and TiO^- are positive, neutral and negative surface hydroxyl groups respectively. A low pH is associated with a positively charge surface which cannot provide hydroxyl groups which are needed for hydroxyl radical formation. Consequently, the rate of 4CP degradation may decrease. On the other hand, higher pH value can provide higher concentration of hydroxyl ion (OH^-) to react with the hole to form hydroxyl radicals (OH^-), thereby enhancing the photodegradation of 4CP [28].

Figure 3: Effect of different pH suspension towards degradation of 4CP.

Effect of weather conditions

Fig. 4 shows the effect different weather conditions (cloudy and sunny day) on the photodegradation rate of 4CP for pristine and C-TiO_2 as photocatalyst. The average of UV and VIS light intensity for these conditions are listed in Table 2. The UV light intensities of cloudy and sunny day were 19 and 23 W m^{-2} while for VIS light intensity were 200 and 300 W m^{-2}. The photocatalytic activity for both pristine and C-TiO_2 on a sunny day were higher as compared to its photocatalysts under cloudy day. As can be observed in Fig. 4, the degradation rate for C-TiO_2 is faster by 5 times on sunny day compared with C-TiO_2 on cloudy day, this is due to the low intensity of UV and VIS light irradiations under cloudy day which influenced the process of photo-induced of electron-hole during photocatalysis process.

Figure: Photodegradation rate of 4CP at different weather condition.

It also happened for pristine TiO_2 where the degradation rate of 4CP was faster by 3 times when the photodegradation was applied under sunny day. The same observation was also reported by Dong et al [29] for the photodegradation of azo dyes under different condition.

Table 2: Light intensity at different weather condition.

Conditions	UV light Intensity (W m^2)	Visible light Intensity (W m^2)
Cloudy day	19	200
Sunny day	23	300

Chemical Oxygen Demand (COD)

The decreasing trend in the test of COD against irradiation time in the degradation of 4CP using pristine and C-TiO_2 are depicted in Fig. 5. The COD removal efficiency of unmodified anatase TiO_2 is lower than that of C-TiO_2 under identical experimental conditions. The optimum COD degradation of 4CP was achieved at 2.5 mg L^{-1} for 60 minutes of irradiation under C-TiO_2, while optimum COD under pristine TiO_2 was achieved at 3 mg L^{-1} for 100 minutes. No further degradation was observed beyond of that the irradiation time. The experimental results revealed that the dopant in TiO_2 plays significant role in the enhancement of photocatalytic activity, but it is not enough to achieve a complete mineralization of 4CP.

Figure 5: Mineralization study determined by COD values for photodegradation of 4CP.

Intermediates study

Fig. 6 shows the HPLC chromatogram for the 4CP intermediates during photocatalysis degradation process which maleic acid, hydroquinone (HQ), benzoquinone (BQ), resorcinol and 4-chlorocatechol (4CC) has been detected with the main of intermediates compound are maleic acid and 4CC which also reported other researcher [30]. The photodegradation of 4CP and its intermediates under solar irradiation of optimum condition C-TiO_2 is shown in Fig. 7. It was observed that 4CC and resorcinol were completely degraded after 15 and 20 minutes irradiation respectively. BQ was appeared at first 5 minutes of solar irradiation and completely degraded after extended for 15 minutes.

Figure 6: HPLC chromatogram for 4CP and intermediates at 5 minute solar irradiation treatment.

Figure 7: Graph detection of 4CP and intermediates during photocatalysis process.

However, maleic acid and HQ were not completely degraded with reached to the maximum degradation limits and remained stable after 10 minutes of irradiation. This is due to the fact that maleic acid in acidic medium can exist in equilibrium with 4CC. Thus, the released electron can neutralized the holes formed on TiO_2. While, BQ is known as electron acceptor which can reduced the photocatalytic efficiency. This uncompleted degradation intermediates are the reason for previous COD analysis reading was remained incomplete after prolongs the irradiation.

IV. CONCLUSION

The photocatalytic degradation of 4CP in aqueous TiO_2 suspension by solar energy has been examined using two different catalysts, unmodified anatase TiO_2 and carbon coated TiO_2. In particular, the influence of the catalyst loading has been studied and the optimum catalyst loading for both catalysts were found to be 10 and 3.0 g L^{-1} respectively. The photo catalytic activity in the degradation of 4CP was found to be more efficient for the carbon doped TiO_2 than the unmodified anatase TiO_2 at pH6. The reaction rate constant was found to be six times higher for the carbon doped TiO_2 than unmodified anatase TiO_2. The mineralization of 4CP was studied by monitoring of COD removal and chlorine ion formation during its photocatalytic degradation process. The presence of dissolved oxygen plays a significant role in the photocatalytic degradation of 4CP. The degradation rate on a sunny day was about five times more than on cloudy day for both catalysts. The main intermediated formed during the photocatalytic degradation of 4CP were found to be maleic acid, hydroquinone, hydroquinone, benzoquinone, resorcinol and 4CC. The pH and catalyst loading have an effect on the concentration and degradation of intermediates.

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Electromagnetic Foot Step Power Generation

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Abstract- We are generating electrical power as non-conventional method by simply walking or running on the foot step. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into the electrical energy.

The main aim of this project is to develop much cleaner cost effective way of power generation method, which in turns helps to bring down the global warming as well as reduce the power shortages. In this project the conversion of the force energy in to electrical energy by using electromagnetic induction. In this project the force energy is converted into electrical energy. The control mechanism carries the copper coil and bar magnetic which is used to generate voltage, a rechargeable battery is used to store this generated voltage.

Index Terms- Non-conventional renewable energy source, Electromagnetic principle, etc

I. INTRODUCTION

1.1 Introduction to the project

Energy is the ability to do work. While energy surrounds us in all aspects of life, the ability to harness it and use it for constructive ends as economically as possible is the challenge before mankind. Alternative energy refers to energy sources, which are not based on the burning of fossil fuels or the splitting of atoms. The renewed interest in this field of study comes from the undesirable effects of pollution (as witnessed today) both from burning fossil fuels and from nuclear waste by products. Fortunately there are many means of harnessing energy, which have less damaging impacts on our environment [1].
The alternatives are,

- Solar
- Wind Power
- Tides
- Hydroelectric

In addition to these we have developed a new methodology of generating power using human energy and the name of this alternative is a foot step power generation. The usage of traditional power generation .

II. LITERATURE SURVEY

Method such as burning of coal, wood, diesel (generators) etc is continuously depleting our natural resources such as fossil fuels, which is the demand for power has exceed the supply due to the rising population. In addition to this the traditional methods cause pollution,

Global warming is the increase in the average measured temperature of the Earth's near surface air and Oceans since the mid-20th century, and its projected continuation. Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the 100 years ending in 2005[2]. The Intergovernmental Panel on Climate Change (IPCC) concludes that most of the increase since the mid-twentieth century is "very likely" due to the increase in anthropogenic greenhouse gas concentrations. Natural phenomena such as solar variation combined with volcanoes probably had a small warming effect from pre-industrial times to 1950 and a small cooling effect from 1950[2] onward.

Climate model projections summarized by the IPCC indicate that average global surface temperature will likely rise a further 1.1 to 6.4 °C (2.0 to 11.5 °F) during the twenty-first century [2]. This range of values results from the use of differing scenarios of future greenhouse gas emissions as well as models with differing climate sensitivity. Although most studies focus on the period up to 2100, warming and sea level rise are expected to continue for more than a thousand years even if greenhouse gas levels are stabilized. The delay in reaching equilibrium is a result of the large heat capacity of the oceans.

Increasing global temperature is expected to cause sea levels to raise, an increase in the intensity of extreme weather events, and significant changes to the amount and pattern of precipitation, likely including an expanse of the subtropical desert regions. Other expected effects of global warming include changes in agricultural yields, modifications of trade routes, glacier retreat, mass species extinctions and increases in the ranges of disease vectors.

Remaining scientific uncertainties include the amount of warming expected in the future, and how warming and related changes will vary from region to region around the globe. Most national governments have signed and ratified the Kyoto Protocol aimed at reducing greenhouse gas emissions, but there is ongoing political and public debate worldwide regarding what, if any, action should be taken to reduce or reverse future warming or to adapt to its expected consequences.

Global dimming, the gradual reduction in the amount of global direct irradiance at the Earth's surface, may have partially mitigated global warming in the late 20th century. From 1960 to 1990 human-caused aerosols likely precipitated this effect. Scientists have stated with 66-90% [2] confidence that the effects of human-caused aerosols, along with volcanic activity, have offset some of the global warming, and that greenhouse gases would have resulted in more warming than observed if not for these dimming agents.

Ozone depletion, the steady decline in the total amount of ozone in Earth's stratosphere, is frequently cited in relation to global warming. Although there are areas of linkage, the relationship between the two is not strong.

2.1 Problem definition:

Some developing countries and newly-industrialized countries have several hours of daily power-cuts in almost all cities and villages because the increase in demand for electricity exceeds the increase in electric power generation. People in these countries may use a power-inverter (rechargeable batteries) or a diesel/petrol-run electric generator at their homes during the power-cut. The use of standby generators is common in industrial and IT hubs. This ultimately increases the shortage of power.

2.2 Objective of project:

The main aim of this project is to develop much cleaner cost effective way of power generation method, which in turns helps to bring down the global warming as well as reduce the power shortages. In this project the conversion of the force energy in to electrical energy by using electromagnetic induction. The control mechanism carries the copper coil, bar magnetic and dc rechargeable battery.

2.3 Existing system

Other people have developed Rack-pinion [3] (mechanical-to-electrical) and piezoelectric [4] method in the past. The Crowd Farm floor is composed of standard parts that are easily replicated but it is expensive to produce at this stage and produce less power. This technology would facilitate the future creation of new urban landscapes athletic fields with a spectator area, music halls, theatres, nightclubs and a large gathering space for rallies, railway stations, bus stands, subways, airports etc. like capable of Harnessing human location for electricity generation.

2.4 Proposed system

Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock. This whole human/bio energy being wasted if can be made possible for utilization it will be great invention and crowd energy farms will be very useful energy sources in crowded countries. Walking across a "Crowd Farm," floor, then, will be a fun for idle people who can improve their health by exercising in such farms with earning. The electrical energy generated at such farms will be useful for nearby applications.

The ultimate aim of this project is to develop much cleaner cost effective way of power generation method, which in turns helps to bring down the global warming as well as reduce the power shortages In this project we are generating electrical power as non-conventional method by simply walking or running on the foot step. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into the

electrical energy. This project uses electromagnetic induction principle.

In this project the pressure energy is converted into electrical energy. The control mechanism carries the copper coil and bar magnetic which is used to generate voltage, a rechargeable battery is used to store this generated voltage.

III. BLOCK DIAGRAM

Fig-1: block diagram

IV. LINE DIAGRAM

Fig-2: line diagram

4.1 Step by step procedure

Step1: when force is applied on the plate by virtue on stamping on the plate the spring gets compressed

Step2: The magnet fixed at the top plate hit the copper coil fixed at bottom plate and emf is induced in the copper coil.

Step3: The generated voltage is stored in the battery.

V.   WORKING PRINCIPLE

5.1 Electromagnetic Induction

We have seen previously that when a DC current pass through a long straight conductor a magnetizing force, H and a static magnetic field, B is developed around the wire. If the wire is then wound into a coil, the magnetic field is greatly intensified producing a static magnetic field around itself forming the shape of a bar magnet giving a distinct North and South pole.

Fig-3: Air-core Hollow Coil

The magnetic flux developed around the coil being proportional to the amount of current flowing in the coils windings as shown. If additional layers of wire are wound upon the same coil with the same current flowing through them, the static magnetic field strength would be increased.

Therefore, the magnetic field strength of a coil is determined by the *ampere turns* of the coil. With more turns of wire within the coil the greater will be the strength of the static magnetic field around it But what if we reversed this idea by disconnecting the electrical current from the coil and instead of a hollow core we placed a bar magnet inside the core of the coil of wire. By moving this bar magnet "in" and "out" of the coil a current would be inducted into the coil by the physical movement of the magnetic flux inside it.

Likewise, if we kept the bar magnet stationary and moved the coil back and forth within the magnetic field an electric current would be induced in the coil. Then by either moving the wire or changing the magnetic field we can induce a voltage and current within the coil and this process is known as Electromagnetic Induction and is the basic principal of operation of transformers, motors and generators.

Electromagnetic Induction was first discovered way back in the 1830′s by Michael Faraday. Faraday noticed that when he moved a permanent magnet in and out of a coil or a single loop of wire it induced an Electromotive Force or emf, in other words a Voltage, and therefore a current was produced [5].

So what Michael Faraday discovered was a way of producing an electrical current in a circuit by using only the force of a magnetic field and not batteries. This then lead to a very important law linking electricity with magnetism, Faraday's Law of Electromagnetic Induction. So how does this work?

When the magnet shown below is moved "towards" the coil, the pointer or needle of the Galvanometer, which is basically a very sensitive centre zero moving-coil ammeter, will deflect away from its centre position in one direction only. When the magnet stops moving and is held stationary with regards to the coil the needle of the galvanometer returns back to zero as there is no physical movement of the magnetic field.

Likewise, when the magnet is moved "away" from the coil in the other direction, the needle of the galvanometer deflects in the opposite direction with regards to the first indicating a change in polarity. Then by moving the magnet back and forth towards the coil the needle of the galvanometer will deflect left or right, positive or negative, relative to the directional motion of the magnet.

5.2 Electromagnetic Induction by a Moving Magnet

Fig-4: Electromagnetic Induction by a Moving Magnet

Likewise, if the magnet is now held stationary and ONLY the coil is moved towards or away from the magnet the needle of the galvanometer will also deflect in either direction. Then the action of moving a coil or loop of wire through a magnetic field induces a voltage in the coil with the magnitude of this induced voltage being proportional to the speed or velocity of the movement.

Then we can see that the faster the movement of the magnetic field the greater will be the induced emf or voltage in the coil, so for Faraday's law to hold true there must be "relative motion" or movement between the coil and the magnetic field and either the magnetic field, the coil or both can move.

5.3 Lenz's Law of Electromagnetic Induction

Lenz's law is one of the basic laws in electromagnetic induction for determining the direction of flow of induced currents and is related to the law of conservation of energy. According to the law of conservation of energy which states that the total amount of energy in the universe will always remain constant as energy cannot be created nor destroyed. Lenz's law is derived from Michael Faraday's law of induction. One final comment about Lenz's Law regarding electromagnetic induction. We now know that when a relative motion exists between a conductor and a magnetic field, an emf is induced within the conductor [6]. But the conductor may not actually be part of the coils electrical circuit, but may be the coils iron core or some other metallic part of the system, for example, a transformer. The induced emf within this metallic part of the system causes a circulating current to flow around it and this type of core current is known as an Eddy Current.

VI.   DESCRIPTION OF PARTS

6.1 Compression springs

Fig-5 compression spring

Spring free length = 80mm
Outer diameter = 40mm
Inner diameter = 35mm
Quantity = 4

6.2 Copper coil

Fig-6 copper coil

Gauge size = 18awg
Normal wire diameter = 0.0403
Ohms/mgt normal = 6.386

6.3 Magnet

Fig-7 Magnet

Magnet type NdFeB Rare Earth
Permanent Magnet Grade = 35
Length = 50mm
Width = 30mm

VII. MERITS AND DEMERITS

7.1 Merits

- Power generation is simply walking on the step
- Power also generated by running or exercising on the step.
- No need fuel input

- This is a Non-conventional system
- Battery is used to store the generated power
- Less moving parts.
- Easy maintenance.

7.2 Demerits

- Only applicable for the particular place.
- Initial cost of this arrangement is high.
- Coil winding may damaged when we apply high pressure

VIII. APPLICATIONS

- Street-1lightening.
- Colleges.
- Cinema theatres.
- Shopping complex.
- Railway stations.
- Airports.
- Bus stand.
- Speed breakers.
- Suspension system.
- Dancing floors.

IX. KIT PHOTO REPRESENTATIONS

Fig-6: kit photo representations

X. CONCLUSIONS

The project **"ELECTRO MAGNETIC FOOT STEP POWER GENERATION"** is successfully tested and implemented which is the best economical, affordable energy solution to common people. This can be used for many applications in rural areas where power availability is less or totally absence. As India is a developing country where energy

management is a big challenge for huge population. By using this project we can drive both AC as well as D.C loads according to the force.

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Familial Bond of Multi-Ethnic Society Based on Wisdom Culture through Social Network in Anticipation the Inter Ethnic Conflicts

Study in the Ambawang River District of Kubu Raya Regency, West Kalimantan

Fatmawati

Abstract- Since the opening of the Trans Borneo and toll bridge that connects the Ambawang River District, Kubu Raya district with the city of Pontianak, this area had been isolated into the open area which makes access to the city to be smooth. These conditions of productive land in the District of Ambawang River be one of the strategic areas that became the target of investors, giving rise to unhealthy competitive claims between citizens and immigrants, feared misunderstanding. As its known to people's social life is flural Ambawang River District consists of some dominant ethnic Malays and Dayaks such as indigenous people and ethnic immigrants such as Javanese, Buginese, Madurese and Chinese (China). These periods, they live together in a familial bond that still adhere to the values of cultural wisdom. This study used a qualitative approach comes with a descriptive method. This study uses the data networking techniques purposive the informants came from representatives of each ethnic, and then analyzed using qualitative analysis. Results illustrate several times of ethnic conflict in West Kalimantan with 17 times in this area is not affected conflicts in other places, the people live in peace. This is due to the formation of family ties based on cultural wisdom through social networks such occurrence *amalgamsi* (cross-breeding), language adaptation of "mother", the preservation of tradition of *Robo-Robo*, *Naik Dango* and *Sedeqah Bumi*. The existence of inter- ethnic communication fabric through traditional institutions. Network in the form of cultural economy "*Pangari*" such as mutual aid and financial institutions Credit Union as an economic driver in the region. Although the occurrence of conflict and the influence of employers, and a modern urban culture, society Ambawang River upholding social values and norms so as to anticipate the conflicts that may occur.

Index Terms- Kinship Association, wisdom and social networking

I. INTRODUCTION

Ambawang River District is one of the districts of Kubu Raya district located on the outskirts of Pontianak city of about 30 miles to the distance of about one hour. Since the opening of the road trans-Borneo 2006. District of Ambawang River into the buffer zone Pontianak West Kalimantan. The isolated area was transformed into an open area marked the rapid development of the construction. These conditions of productive land in the District of Ambawang River be one of

the strategic areas that became the target of investors to invest or have in the region.

Besides social conditions Ambawang River district is multi ethnic, such as among the dominant ethnic Malays, Dayaks, Javanese, Buginese and Madurese. Since the first can coexist without significant dispute. As is known the affected areas of West Kalimantan including social (social disaster). Background history of recurrent conflict in several areas in West Kalimantan as described by Alqadrie (2000), until now (2012) there has been a violent conflict that tends to over and over again, that is between the Dayak and Madurese ethnic occurred 15 times, with the Malay Group Madura happened 3 times, once also between the Malay with Chinese, between Dayak and Chinese and the Malays with the Dayaks. Of the dispute was not affected at Onion River District Kubu Raya district. Even one in the village of Kubu Raya District Tembang Nuts by the local government made re-localization Sambas conflict IDP 1998/1999.

Based on the survey results while (May, 2012) illustrates that the people in the District River Ambawang fully aware that social conflicts must be anticipated by the attitude of awareness of togetherness based on family ties. Society considers that the conflict would lead to poverty on many people, for it is anticipated through inter-ethnic family ties. Public awareness Ambawang River District has been established through social networks and economic culture that comes from wisdom until now retained. Values social networks formed through customs preservation and maintaining social norms, while the values of economic social networks formed through cooperation in accordance with the characteristics of developing economies in the region.

Since the opening of the District area of Ambawang River, describe social phenomena indications of a negative effect on the local community, where the influx of modern culture and the competitive struggle for productive economic resources in the social life of the community. Based on the observation that there are several crucial issues that arise, such as; First, the fight over land boundaries between people that are definitive. The boundaries of this region fought after the splitting of sub-district was split into several villages. Before the expansion area, the border is generally characterized by a small stream or ditch boundary, after the splitting of the region, the border region be transformed into boundary markers and claimed legally by the State in the form of certificates.

Second, the existence of competition between people as a third party intervention the entrepreneurs (investors) who want to take control of productive assets owned by residents,

especially in the strategic region. Unfavorable conditions cause streotipe and social jealousy among villagers when investors began to take control of land belonging to residents. Potential residents increasingly powerful social vulnerability when living area space more narrow controlled by the employer. This condition if there is a trigger, could lead to disastrous social (social disaster) form of open conflict.

Moving on before the occurrence of the phenomenon of social conflict among the citizens of one of the alternative concepts presented between people are rebuilding that began tenuous family ties through social networking systems and economic culture in which individuals tied into the network, each of which has its function and role and interdependence, as such areas are considered to have the potential social disaster (conflict) is glued back through the strengthening of social networking groups.

II.   METHODS

This study used a qualitative descriptive approach with consideration to describe the bond of brotherhood multi ethnic society based on the wisdom Ambawang River District Kubu Raya Regency. The target of the research community is a multi-ethnic society of some representatives of ethnic Malay, Dayak, Javanese, Madurese, Buginese and some other ethnics include community leaders and government in Ambawang River District. Research data collection techniques using non-participatory observation techniques to observe the shape of Kinship ties between different ethnic groups based on mutual respect, trust each other. At the time of data collection conducted in-depth interviews (depth interviews) to target consisted of each ethnic group represents. Processing and analysis of data using qualitative analysis. Context qualitative studies as described by Alwasilah (2003:79) describes the qualitative approach went on a factual event that comes from shared experience. The collected data is analyzed and processed into a specification of a more simplified formula so easily interpretable. Analysis of the data here provide clarity of meaning of any observed phenomenon based on the quality of the data obtained, Clarified by Muhajir (1998:67).

Qualitative Data interpreted basis of the depth data in the analysis. Moving on from the context of this study is the interpretation and analysis of multi-ethnic society when it binds to a sense of kinship based on wisdom in the form of cultural and social network social networking economy. The final stage to determine the validity of data through triangulation techniques to verify the resource persons, informants and relevant studies.

III.   RESULTS AND DISCUSSION

3.1 Description of Society existence in Ambawang River District

This discussion topics analyzed two categories, namely; The first category descriptions discuss the state of the population, migration history of the dominant ethnic group in the district Ambawang River. Migration exposure represented by some ethnic Malays, Dayaks, Java, Madura, Buginese, and Chinese so as to form social relationships in the region Ambawang River District. The second category is discussed patterns form a familial bond and form social networks and economic culture in multiethnic societies Ambawang River District in anticipation of ethnic violence in West Kalimantan.

Preview River District Ambawang based on data from Profile Ambawang River District in 2011, the current number of villages are still included in the Ambawang River District consists of 13 villages. Based on these changes, now is the River District area Ambawang geographically divided into 13 Village, which is Durian, Simpang Kanan, Puguk, Bengkarek, Piang Stake, Stake, Kuala Ambawang village, Central Java village, village Matches, Lingga village and Village of Five Roba, villages namely Mega East. Since the formation of Kubu Raya district, sub-district Ambawang River, consists of 13 villages, 63 sub-villages, 71 RW and 323 RT. Based on population growth in the River District in 2012 Ambawang is based on statistical data Ambawang River District amounted to 68,724 people, consisting of a population of 35,011 men while the female population were 34,163 inhabitants with 14,496 households. Population growth is quite rapid in Ambawang River districts, this is due to the migration of people with a wide range of purposes including government housing, marriage and work. In Administrative Ambawang River District is one district located in Kubu Raya regency government area. This district directly adjacent to the city of Pontianak and Sanggau. In addition, Ambawang River District is located across the lane Trans Kalimantan road that connects directly from Pontianak to other districts, so that it can be said as one of the strategic areas.

Profile Ambawang River District 's multi-ethnic, inter-ethnic relations are well established from the beginning when they settled in the region. Preview plural society in some Ambawang River District consists mostly of ethnic Malay community groups, Dayak, Buginese, Java, and Madura. The relation between the ethnic groups generally lasted quite well, because there is almost no dispute that means, it can be seen from the history of the migration of several ethnic groups with different backgrounds to encourage them to move to this area to make a living so they raised awareness among to establish a good relationship with other ethnic groups. The relations derived from the migration of ethnic groups, including:

1. History of Malay Ethnic Group Migration

One of the Malay ethnic group native of West Kalimantan, if traced from the oral tradition, in the old days about 90 percent of the ethnic origin of the Dayak ethnic Malays, when converted automatically turned into Malay ethnic identity, the existence of ethnic Malays synonymous with Islam. According to Al Qadrie (2000) The origin of the existence of ethnic Malays in West Kalimantan cannot be separated from the relics of several kingdoms that once existed in West Kalimantan, such as Pontianak Sultanate, the Sultanate of Sambas, Kingdom of Matan in Ketapang, as well as several small kingdoms (Panembahan) contained in some districts like Mempawah, Ngabang, Sintang and Putussibau. Based on the analysis the authors that the deployment of more Malays dominate in coastal areas in some districts such as District Kayong, Ketapang, Sambas, Mempawah, Kubu Raya, Pontianak and Kotib Singkawang, is no exception to spread Ambawang River District.

According to the stories of some of the elders spread of Malays Ambawang River District, came from some old people from Pontianak District of East Village shoals around the early 1900's. The origin of the Malays when parents open forest land for farming. According to them even though we have family in Pontianak, parents have the desire to farm. At first the parents and friends compatriot open forest. Previously parents often return to "Kampong in Shelf", but since that time the transport pathway through the river and use a sampan (small boat), then for a place to stay while their parents make a hut, then when back to Pontianak takes a long time about 4 or 5 hours drive. Eventually we rarely go to the village and settled until now.

When we opened the land and farming, we feel very good relations between people. We worked together to clear the forest. We do not question the origin of which tribe. We actually felt already know each other and become a family feel. If there is among people who are sick or ask for help, and work together with us to help. Similarly, if we sell agricultural products to sell to the city together using a canoe. In the past there has been no road, all paths through the river called the River Ambawang. After the government opened the road around the early 1990's the river path is rarely done, since the people here started to use a landline. A large part of their existence in the village of Ambawang Kuala, Desa Jawa Tengah, Mega Timur, Simpang Kanan and Korek village.

2. Historical Migration of the Dayak ethnic group

Dayak ethnic is one of West Kalimantan natives after ethnic Malays. According Maunati (2004) the existence of Dayak ethnic is divided into several sub-tribes more or less around 300 sub- tribes. However, generally speaking, there is divide four, seven or 12 major sub-tribes. For example Kenedi divide it into six major groups, namely the Kenyah-Kayan-Bahau, Ngaju, Dayak Darat, Klementan-Murut, Iban, and Punan. It is estimated that they have a common origin that is derived from a common ancestor.

The existence of ethnic Dayak in Ambawang River District is located in the village of Matches, Linga, Stake Piang, and Bengkarek. The origin of the search from their family tree Dayaks described by informants revealed that the Dayak community is located in this area, come in groups originating from former refugees "war" (ethnic violence) are in districts Establish. The conflict between the Dayaks and ethnic groups of China (Chinese) when fighting over gold mines in Monterado sources.

Based on the oral narrative of community leaders, the arrival of the first group of Dayaks, comprising about 19 heads of families Dayak sub Kanayatn chaired by Ne Oto and Ne Nyabankg around 1820s. They are given by the location of Pontianak Sultanate at that time to occupy Ambawang River region. Their coming purpose was in Kuala Kuala Ambawang or Pantak Ambawang, and by the time they opened land for cultivation. Intermittently, few months later to expand into the region moves toward the river edge, and boundary between the village and Kuala Ambawang Durian approximately 5 KM. Once settled they founded Radankg (Long House), and began to clear land for cultivation or "bahuma" (farming).

In few years later in the 1830s estimated that, some Dayak people expand to regions like Sempang penghuluan Ambawang

River today called Simpang Kanan, and Kalimantan currently Piang called Pasak Village and the Village of Lingga. As with the arrival of their first, second expansion is also clear land for cultivation and farming, then they Kuala Ambawang village. The arrival of the third wave of about 38 heads of families led by Ne ' Jaya and Ne' Paraya, their stopover destination is their relatives who had come first. The first is Kampung Teluk Dalam today called Hamlet Paraya Jaya, Desa Lingga, the transition, and Simpang Right). The arrival of the group also aims to clear land for cultivation, farming and rubber tree planting, and subsequently be performed livelihood for generations.

The oral narrative as the analysis of inter-ethnic social relations. According to some community leaders in the study site, the information obtained as follows, that at the beginning of the city of Pontianak, Sultan Syarif Abdurrahman Al Qadrie established a policy that the Dayaks were given the freedom of establishing settlements in north palace is located along the River Ambawang. They live and make plantations around the River Ambawang like Kuala Ambawang, the transition, Puguk, Retok, Lingga and so forth. According to information from several community leaders in this area, rubber is a commodity that is the main attraction of some ethnic groups and migrant communities such as Javanese, Buginese and Madurese Ambawang to come to the river to try to find a new livelihood by farming.

Madurese community population in this region quite a lot and growing rapidly. Their existence begins with the arrival of some of the Madurese who came to work as laborers on rubber plantations Dayaks. One of the specialties of workers Madura This is making trenches, which are essential in plantations in the low areas. According to Mr. Solomon, the arrival figures Madura Rifai (deceased) was the first immigrants from Madura came in Korek village around 1920. As for the other villages have no Madurese as a rubber plantation workers. This is a forerunner in the Village Community Madura Korek. Most of the village community in Madura Korek initially come directly from the island of Madura, before settling in the village of Matches to live in other places like the Gulf Pakedai.

The development of ethnic Madurese came as laborers of rubber plantations owned by Dayaks, next group came in Korek village as traders brought some cow from the island of Madura about 1970s. Increasing population of ethnic Madurese community since the close kinship system, which is reflected in the term Teretan (immediate family). Residents Mandura accommodate relatives of ethnic Madurese in overseas, giving land for cultivation, thus speeding Madura in the number of members in the region. Besides being very little Ethnic Madurese families who followed the family planning program (KB). Most of the population are ethnic Madurese in East Mega village and village Puguk, Bengkarek and Pasak Piang. The interesting thing is that while in other places at the same time have experienced communal violence several times, the same community in the village of Korek and Lingga villages never be influenced to commit acts of violence involved the two ethnic groups.

4. Migration History of Javanese ethnic group

Migration of Javanese ethnic group was looked at the obviously village in Central Java, it is evident from the compositions residents in this village is a community that is largely derived or descended from Javanese ethnic group. Based on the interview with the father Sudarso, community leaders in the village of Central Java, said that according to Javanese history first came to River Ambawang to explore the forest that lies between the Landak River and Ambawang River. Naming village in Central Java was not caused by the Central Java who came to the village because the village mepainkan located between two rivers, the village called Village of Central Java. Thus the Javanese who came to the village from Central Java and East Java.

The origin of the village of Central Java by stories of elders in the village comes from the arrival of the father Purbo Sudiro and his entourage as many as 12 people came from Kebumen Yogyakarta in 1910. They go directly to the River Region Ambawang. The goal is to open up new agricultural land. First of all, to explore the forest and open shortcuts. In 1912, a group of Java coming chaired by Mr. Hasan Gendon and they soon joined the first group. The delegation Purbo Sudiro father and Mr. Hasan Gendon received local community. Their arrival to help the local community to open a new land. After obtaining permission from the local community, the main activity is to open farmland with fields of rice cultivation, planting fruits. Among the growing crops, they also grow rubber. In the following years of their family of Java following the river to Ambawang and soon joined assist working farms and plantations. The arrival of the Javanese from Central Java, Yogyakarta and East Java village continually resulted in the wilderness had become a new township coming from Java. The existence of ethnic Javanese village located in Central Java, Sungai Ambawang village and Desa Simpang Kanan.

On arrival the first group, Mr Purbo first Sudiro do is make cottage residence. The cottage as a place to accommodate people arriving and transit. Among the residents there who suggested that the cottage was made marquee witness the arrival of Javanese history first. Subsequent developments were made larger cabin and changed into the pavilion building (sort of shaped hall building). The pavilion as a meeting and events center villagers until now. Javanese people overseas is bringing culture or customs of Java. According to the father Sudarso (Java elders who came to the River Ambawang 1960), that people still use custom Java. At that time the village like a Javanese village. All residents using the Java language and Java clothes, also the activities of marriage, birth, traditional ceremonies such as everything Javanese month of Suro. The customs preserved until now. For people longing Java at that time, they made a bevy of puppet art, dance, music and art studio called Campur Sari.

5. Migration History of Buginese Ethnic Group

In general, people only know as a Buginese ethnic as the native of Sulawesi, then each person who comes from Sulawesi is called Bugis. The arrival of Bugis ethnic inseparable their arrival in Pontianak regency Mempawah regency on the 18th. Bugis ethnic easily blend with the locals, and then interbred with the locals Malays and Dayaks. When hosting a cross-breeding with Dayak ethnic, religious and cultural influences through strong, Dayaks do conversion to Islam. Strong customs inherent in Bugis ethnic acculturation to occur between indigenous (Malay) with ethnic Bugis, then at this time the custom indigenous of Malays Mempawah identical to Bugis ethnic customs.

As its known that Buginese have a maritime culture of sailor. They wander the seas come to affect the islands of the archipelago are located on the coast. After staring them in an open area and agricultural plantations including palm, rubber, fruits and agricultural crops. No wonder in some coastal areas inhabited by the Bugis, there is no village names are derived from the Bugis, like Kampung Bugis, Kampung Wajok, and Manambon Daeng village. After a long time and then ethnic Bugis in Mempawah who are migrating to the district of Ambawang River around the early 19th century. They followed the coast beach with a small boat anchored in the river until the Landak River. Their arrival was received by the locals that the Malays. Their existence is accepted as bound by a common faith (Islam) and was at that time the Malays need workers to work on farms. As the new comer they must be diligent in order to be accepted by the locals. Malay ethnic melting pot with ethnic Bugis after a few generations ethnic Bugis becomes ethnic Malays. Their existence side by side with them Malays in Ambawang Kuala Village area, Village of Central Java, Mega Timur and Simpang Kanan.

Family Ties Based Social Network and Multi Ethnic Economic Community in the River Ambawang District

The geographical position of Ambawang River District is bounded by the river Ambawang contact one village to village. The area through which the river path called the front region, while areas that were not covered by the path of the river including the back or in the region. Front region used for the township-village residents, partly planting horticulture. People who were in the rear area (inside) is used in addition to housing residents also cater horticulture crops and plantation crops of rubber. After the opening of the Trans Borneo, the area was turned into an area of the back of the front section into a new township, and became the new administration office was located at the back of the village, this time moving to the front, as well as moving the elementary schools, health centers, shops owned by residents. Currently transport lines more smoothly and more quickly, if the water through the water using a motor travel time to the village one village to another, take between 2 to 6 hours drive. Given the Trans Kalimantan and Kapuas II bridge toll to get to nearby villages, using relatively fast travel time, between 1 to 3 hours drive. The villages are now already changed the rear that is located relatively far from the land, then to go to the village still use water vehicles. Currently villages located in the area (river channels), some of which made the roads connecting them, making it easier for citizens to move toward one village to another village, or go to the city.

Among the isolated villages and dense forests, this time after the highway became impassable strategic region. Looking ahead Ambawang River District is a buffer zone development and widening of Pontianak city. Moreover, since the opening of the road trans Borneo, then Ambawang River District will be transformed into a new city, complete with infrastructure like a city. As a result the villages through which the highway

becomes the target of entrepreneurs to open new businesses. According to some residents, resident lands on the fringes of the highway to the ownership has changed hands to the entrepreneurs. If at this time look like a Ambawang River District has become a suburb of the city of Pontianak buffer. As we know though is plural districts Ambawang River area free events including ethnic conflicts in West Kalimantan. Some communal events characterized by inter- ethnic conflict in West Kalimantan by Al Qadrie (2000) including 1967-1968, 1977, 1983, 1996-1997, 1999, 2000 and 2001, there are problems of inter-ethnic relations and the spread between the points violent events 1967-1968, 1977, 1983, 1996-1997, 1999, 2000 and 2001. There are exceptions in some spots, the places where the ethnic community groups not only passively involved in the form of collective violence but actively oppose such acts of violence and have established good relations between ethnic groups there.

Based on the description, as it provides confirmation that several villages in the district area Ambawang River is an exception that is not the point of social conflict and should receive reinforcement - reinforcement in the hope of those communities to continue to build a sustainable culture of peace that the next stage can be shared cultural roots of the various ethnic groups living in the region and become an example for other regions. Besides family ties Ambawang River community can also prevent the influence of third parties who want to divide its citizens. The existence of family relationships across ethnic groups backdrop of a sense of community that is built. The shape of the familial bond more details according to the conditions described in the field:

1. Familial Bond through Social Cultural Network

The focus of the following study is the of social and cultural life such as multi- ethnic Malays, Dayaks, Java, Madura, Minang, Batak, Chinese, Bugis and other ethnicities. They coexist and produce polarization of social relations. When hosting social contacts, they have their own experiences, so that each life together and formed a symbiotic mutual cooperation mutual awareness groups, giving rise to a sense of kinship.

This kinship is social capital in a multi- ethnic society. Familial bond can be formed through social networks, and characteristics of lack of trust between each other, by Fukuyama (2002) called "Trust". Meaning of trust is as expectations towards regularity, honesty and cooperative behavior emerging from within a community based on shared norms shared by members of the community. Patterns of social relationships hold social contacts based on the values and norms are adhered together to build awareness of kinship with, and as social capital resident in doing productive activities in order to maintain and build their village life. The following aspects of social bonding culture Ambawang River District residents are summarized below.

a. Social life through the Amalgamation (inter-marriages between ethnic).

Due to intense social relationships both ethnicity is not uncommon cross-breeding. The occurrence of cross-breeding caused every day young people meet and cooperate each other, giving rise to seed an interest in each other. According to some

opinions of some experts that one is to strengthen family ties through cross-breeding. Understandable pair of men and women who are married are not only both of which converge the merging of two families but most of the men and women, believed to be the bond of marriage can mean uniting the entire family of both parties. Based on observations and interviews with residents who interbred different ethnic, said the cross-breeding caused when people help each other when working on farms and plantations in the village. As its known to work in the garden to cultivate vast tracts of land requires a lot of labor and cooperation with each other. From there they get to know one another according to the proverb says that a "do not know means do not love", because to know each will lead to fall in love. Residents in this village are used to perform cross-breeding, such as the Javanese and Malay, between the Bugis ethnic Banjar, between the Chinese and Dayak ethnic. The occurrence of crossbreeding every family in some villages is bound to be one big family (kinship). Kinship when some ethnic groups there at the beginning of the migration of some families to Ambawang River District. Some of them are unmarried youth. After a long silence in the new area and mingle with the locals, among them were married. The marriage with the locals because at the time the track is difficult transportation not allow them to return to their homes in the end chose to marry locals. The events as told by one of the residents came from Central Java. His parents took him as a child, as a teenager he was interested in one of the Malays. This event occurs also with other ethnic like Buginese, Madurese, Banjar, Javanese, Sundanese and other ethnicities.

Results of interviews with the author natives of West Kalimantan Malay and Dayak ethnic state that was common outsider choosing a life partner with the locals because of the proximity distance between them, giving rise to interest in each other, in addition to the area where the immigrant population residing assume that time is considered as moreover hometown livelihoods have been so at home in a new place. Relations between ethnic interbred with the natives resulted primarily kinship networks are bound by ties of blood and marriage increasingly widespread. Their kinship extends from one village to another village, from one village to another.

b. Social Networking Through Language.

Every ethnicity has a native language as a tool of everyday communication. Almost all native language comes from areas where ethnic groups live. In addition to the mother tongue language people use unity as a means of communication that is understood throughout the community. By the time they are in their environment are more likely to use their mother tongue. The use of mother tongue feels belonging and being accepted as part of the group. Without the use of the mother language support then they are considered the "outside". Therefore the language as a communication tool that can bring a person in the group.

Language is one of the characteristics that have owned ethnic group vital function in communication. When citing the opinion of Berry (1999:569) suggests the character of each ethnic identity or attachment that distinguish certain of other ethnic groups. This is a typical characteristic of a culture that a group of ethnic referred to as "folk ways". Furthermore, if a

term borrowed by Barth (1988:62) describes each ethnic group has an "ethnic identity" that has boundaries and cultural characteristics owned by the group. The explanation can be ascertained from the language is one part of the identity of the ethnic group.

Language is a very effective communication tool to strengthen the sense of family of ethnic groups. The habit of using one's local language easily accepted in the new group. Through language makes getting close kinship to create a sense of sympathy with each other. The use of ethnic languages in District Ambawang river becomes a habit, like the native language of the ethnic Malays and Dayaks. According to one informant claimed exposure to the use of language here has become a habit, is not uncommon among people master a variety of languages such as Malay, Dayak or Javanese language. They mastered the language for interaction between residents. At the time when they are in the Malays neighborhood the language used is the language Malay, so when in a spontaneous environment Dayak Dayak language. Moreover, the immigrant population has always adapted to the local language, so that they have some language "Mother". This habit makes residents feel Ambawang River District one big family though different ethnic backgrounds.

c. Social Cultural Networking of Preservation customs form

Each community has a different behavior that is typical with other people. This behavior forming a patterned social system where there are norms in force and adhered to members of the community. At the time Koentjaraningrat (1990:124) describes these norms are lines or direction in life called "culture". This means that culture is loading a staple lines or rules of behavior that sets the rules on what should have been done by members of the community. Rules that apply to the public according to Johnson (1986:232) serves to maintain order in society, so that it becomes a value system. General value system and has a very broad scope and complex in nature, and value systems aim to organize social life that give life direction their peoples. Each activity in the social system has a function, it means there are parts that are interconnected, reciprocal, and mutually support each play a role. Customs here is a society's culture contains a social system has functions relating to beliefs sacred and highly respected by all members of society. Preserve the public has confidence customs because this has to do with the element of life. Speaking customs Ambawang River District community is still preserved like the tradition of "robo - robo" of the Malays, the tradition of "Naik Dango" of the Dayak ethnic and "Sedeqah Bumi" of ethnic Javanese. This tradition is celebrated annually on an event that is considered sacred by the people of the community as a sign of gratitude to God who has given the safety and well-being. At the time of the celebration of all members of the various ethnic communities participated, and regarded as a symbol of kinship local community. *Robo - Robo tradition, Naik Dango and Sedeqah Bumi* cannot be separated from the people's livelihood in agriculture. The tradition is carried out as a sign of gratitude to God for good fortune and safety given to them and expected future care always got from him. How customs that still preserved the following tradition presented Robo - Robo, *Naik Dango and Sedeqah Bumi*.

Robo-Robo Tradition by Malays Ethnic.

The origin of the tradition of *Robo-Robo* according to the narrative oral tradition derived from Pontianak regency society begins arrival Mempawah ethnic Bugis called Opu Daeng Luwuk Manambon of the Kingdom, South Sulawesi in 1148 H or 1737 Masehi (http://www.pontianak.web.id/pontianak / history - robo - robo.html). At the beginning of this tradition to commemorate his death every year in Kuala Mempawah, but over time other than the memory of the death Daeng Manambon, it became a sacral tradition that is intended to ward off evil spirits in the sea. Robo - Robo tradition held on the Wednesday of end of Syafar month (Hijriyah). The tradition spread across some of which are in coastal areas in the District Mempawah, Kubu Raya regency and the administrative City of Singkawang. Since the coastal region is synonymous with people's livelihood as a fisherman. As known fisherman closely related to the sea as a means of livelihood. According to the fishermen, the sea full of dangers, especially weather problems, so that when the fishermen go to sea must have strong mental wading through big waves. This condition gives rise to a belief that the people in the sea there is a large power element called the "guardian of the sea". According to the belief that they could keep sea fishermen can sail calmly. The essence of this tradition closely related to the fishing community of trust, that they should be able to maintain a relationship with the sea through the guard ceremony by performing prayers and give alms offerings in the form of waste into the sea. In addition to the marine community did also a tradition in the yard with a roll mat with food safety while praying prayed to God and hope to get abundant fortune.

Center activities especially in Kubu Raya regency centered in some districts namely in Kakap River, Pakedai Gulf and partly in the Ambawang River District. Ceremonial of this tradition not only among the Malays but of various other ethnicities together to celebrate. Based on information from one informant said we expect the Malay tradition Robo-Robo is still maintained public awareness of the art form of culture that has been passed. This activity is accompanied by other activities such as agenda popular market held one week. In addition to celebrating the tradition of being one of the main goals for the surrounding community to shop, because the highway market selling a variety of public purposes at a relatively cheap price. It is utilized by the merchant to obtain multiple benefits. The involvement of various ethnic traditions can serve as 'glue' multi-ethnic society of social relations. They create a sense of emotional involvement and sympathy, giving rise to a sense of solidarity. Based on the results of interviews with one of the residents said that the agenda of Robo-Robo is a social capital for the Kubu Raya community, especially in the districts of Ambawang River as well as to build togetherness of people from all different ethnic backgrounds.

Naik Dango Activity for Dayak Ethnic

Tradition of *Naik Dango* of Dayak West Kalimantan performed each year. *Naik Dango* ritual activities performed after the rice harvest activities as an expression of gratitude to *Nek Jubata* (the Creator) to all the crops that have been obtained by the Dayak people. Based on the narrative Corn

(2010.Http://mengenalsukudayakdikalimantanbarat.blogspot.co
me) meaning *Naik Dango* Ceremony for the Dayak community
among others ; First, as a sense of gratitude for the gift of the
human Jubata for giving rice as food for humans. Second, as a
prayer request approval to Jubata to use rice that has been
stored in *dango* rice, so the rice used is really a blessing for
man and not run out quickly. Third, as a sign of the closing
years of farming. Fourth, as a means to strengthen the
relationship fraternity or solidarity.

Implementation tradition of *Naik Dango Tepanya* Korek
Village, because it had a long standing home (Longhouse)
which is a traditional house of Dayak. Currently tradition *Naik
Dango* packed into a cultural tourism event cheered by various
forms of custom events, traditional arts, and exhibit various
forms of traditional crafts. This celebration provides economic
benefits to the community it is a main thoroughfare market by
selling various items of daily needs.

Sedeqah Bumi Tradition of Javanese Ethnic.

Central Javanese village's society still holds the majority of
Javanese culture and tradition. At this location there are big
houses two (2) units that serves as a place to hold cultural
activities. On certain dates as the 1st of the month of Safar
Shura or every year is always held cultural activities *Sedeqah
Bumi*. Village Community Central Java who settled in the
hamlet of Great Source, Central Java Village, River District
Ambawang continue to preserve the *Sedeqah Bumi* culture and
a tradition passed down from generation to generation by the
people there. "Earth charity event was held as a form of public
gratitude upon the crops that have been obtained in a single
year.

In the cultural events, in addition to cultural and religious
activities are also featured entertainment pleasures of Java -
like *Campur Sari*, *Wayang kulit, Singa Barong, Pencak Silat,
Hadrah* and other arts. Through the Society of Rural
Communities in Central Java and guidance from community
leaders in the village, some arts and traditions evolved and
maintained its existence. Some arts like puppet development
and lion barong. The development of Javanese tradition at this
location, can be used as the center of Javanese culture
development in Kubu Raya district. This activity is carried out
every year after each harvest, and this has become Central
Javanese tradition. Based on interviews with community
leaders explained that the Java implementation is done and
work together, each contributing citizens of their crops, to be
processed and then distributed to other communities and eaten
together at the mosque. Before the food is distributed,
performed cultural attractions such as *barongan*, *Kuda lumping*
and prayer together as a form of gratitude to God who has
given the abundant fortune. Activities carried out by the
cultural traditions of each ethnic Ambawang River District has
been on the agenda at the community level every year. At the
moment this tradition than as a traditional ceremony has also
been packaged into a cultural tourism events in addition to
preserving the cultural function also serves the surrounding
communities, especially the economy. When execution of all
ethnic cultural traditions involved so that the adhesive used to
create a sense of community social kinship.

d. Communications Forums Network of Citizens Cross- Ethnic.

Forum for communication between people across ethnic
supported by awareness of the importance of togetherness
through cross-ethnic forum as an adhesive bond of kinship
between people. Through the forum created a peaceful
atmosphere among residents. The benefits of this forum as a
mediation between people so that they know each other based
on tolerance, mutual understanding, mutual respect, mutual
respect between people. This forum is also functioning as a
buffer in the event of disputes between citizens, so they can
anticipate conflict. Residents have had local knowledge to build
unity among the citizens. So far, people have no awareness of
the conflict in order to keep their village safe both among
residents and outsiders. The village head, district and very
influential traditional institutions create harmony among the
citizens. Some social institutions established to maintain
harmony among citizens social institution or social organization
called the Church Board, the *Taklim Majelis*, *Taklim Dakwah*,
Harmonious Society Institute Java, Madura Harmonious
Society Institute, the Institute Harmony Bugis community,
Mosque Youth, Cooperative Joint Unit, Kredit Union of
Pancur Kasih (financial institutions), the Catholic Youth
Association (Komka) and Christian, Association of Dayak
Youth Lettoy.

The existence of this forum has been proven to have
contributed prevention of social conflicts that have occurred in
West Kalimantan. Based on interviews with several people told
me that our experiences when there is conflict in some
regencies in West Kalimantan. Through cross-ethnic forum
every citizen to form a security cordon and social safeguards to
prevent provocation outsiders who want to pit in his village.
Residents serve as "spy" any particular party pitting and
inciting citizens. So despite the presence of unfavorable
information, residents are not affected even those who pass
secured by the citizens. In addition to preventing outside
influences that are negative, this forum also serves as a
mediator if disputes between citizens. With awareness of the
conflicting parties requesting help resolve disputes warring
parties.

e. Indigenous Institutional Network

One of the society of non-formal institutions are traditional
institutions and religious institutions in the form of community
harmony. Traditional institutions and religious institutions in
tandem or intersect and complement each other. Sometimes
traditional and religious institutions cannot be separated blends.
Traditional institutions hold a central function of the social and
cultural life and socioeconomic citizens. The existence of
traditional institutions cannot be separated from traditional
leaders (chairman of the society). The rule traditional leaders
by consensus duty to preserve this tradition for generations, and
function as an advisor as well as being a mediator with various
parties, both internally and externally. The existence of
traditional institutions in accordance with the background of
ethnicity and religious affiliation of the background. The
traditional institutions such as Malay traditional institutions of
society, and Dayak Community, Harmonious Java Community,
Harmonious Madura Society, Harmonious Buginese Society.
Each of these traditional institutions to coordinate and
cooperate with each other with other traditional institutions.

The role of traditional institutions such as the real- life residents organize activities related to religious ceremonies , events and death ceremonies , wedding events , or other big days . The structure of traditional institutions has its own structure in accordance with the social system in the institution . Such as indigenous religious institutions in Muslim societies where traditional institutions are *taklim* council consisting of the panel *taklim* Mothers and the panel Fathers *taklim*. Taklim coaching under the auspices of the board of the mosque. Mosques Council is tasked to take care of all the activities of people associated with customs activities and religious activities. Similarly, the Dayak community has its own traditional institutions called Indigenous Management. According to Paul (2005) that the Institutional customs duty charge life of socio-religious and socio-cultural indigenous peoples relating to customs and customary law by the Chief of the district, in his duty aided by *Pasirah* and *Panaraga*. The Chief has the authority of a territory called *binua* (indigenous name for the region) includes several rural areas. His job deciding matters of customary law in a fair, and became chairman of the ceremonies.

One of the roles of indigenous Dayak, Malay traditional institutions served as the settlement of disputes between residents at the village level. This Court resolved informally and obeyed by its citizens without any compulsion. For example, when there is among residents who do dispute, the residents come from different ethnic. If a dispute occurs in the area of the Dayak community, then by agreement of both parties to the conflict to be reconciled by the board according to Dayak custom. Both warring citizens reported to the board of customs. Head of the board and chief Dayak tribal councils come from other ethnic compromise the ways in which the dispute settlement. Following the agreement of both parties held settlement through ceremonial and traditional sanctions. Types of traditional ceremonies performed according to the level of mistakes made by both. The purpose of this custom ceremonies to drive away evil spirits which dwell in the hearts of both parties, and also repel evil spirits that exist in the village so that the village safe and secure. Similarly, traditional sanctions done by paying the customary form of "custom display" according to the degree of guilt.

Family ties Ambawang River District residents have formed as consistent with the values espoused. The function of social networks on the one hand to preserve cultural traditions and values such as cultural wisdom traditions and customs, traditional institutions and inter-ethnic communication forum, but it also serves to maintain the stability of the security of the citizens. Family ties of each ethnic instrumental unify the vision and mission of the citizens base on mutual tolerance and control functions as well as residents if there is a dispute or negative influence of foreign culture that damage public morale and when the presence of the parties who want to pit the divisive family ties during was formed. The following describes the social network is also economic.

2. Social Networking of social – economic
One form of familial ties of Ambawang River District residents is the presence of joint activities in the field of socio-economy. Raises social network ties of solidarity groups as the

research Fatmawati (2013:290) concerning social solidarity bond trader from Indonesia in Serikin market, Sarawak Malaysia, the bond states formed because they must be able to survive in other countries that are vulnerable to legal and security issues that arise taste the same boat between them. Similar, people in the District Ambawang river current challenges facing entrepreneurs from   outside and stirring up others to divide pitting family ties that have been established. Economic social networks meant any element of society fastener when doing productive actions to boost the economy in the region without any outside intervention.

Cooperation in the work make them interact each other and know each other. Economic social networking creates a feeling among fellow citizens because brotherhood is a mutual symbiotic relationship. The interaction effect is continuity between fellow citizens, between the members of the group to build the economy in his village. Socioeconomic institutions contributed to the economic development of its people. It also acts as a mediator when negotiating with employers and co-operation from the outside. The following describes the forms of social networking in the economy Ambawang River District, namely:

a. Mutual Aid Network "Pangari"
Communities in the River Ambawang district are have a culture of mutual aid that is still preserved. One of the values of cultural wisdom that contain economic values are *Pangari* culture.   Corn   2010. Http://mengenalsukudayakdikalimantanbarat.   blogspot.com) explains the term comes from Dayak pangari Bekati'k "pangari" which means "turn". That is a job done in mutual aid to work on agricultural land in turn. *Pangari* as ingrained in society and still preserved for generations. At the time of cultivation of agricultural land Pangari done. System Pangari work done in turns according to the number of members. That if in one family sends two people then if it can turn to the sender of the person concerned was obliged to reciprocate by sending two people. So on mutual unrequited-reply. *Pangari* done every day except Sunday. *Pangari* is done in full day, start work at 8 am and return at 5 pm. During *Pangari* activities coincidence residents turn bear eating everything working the land. Each member carries only 1 canting rice per person for meal assistance. In the course of this unity and togetherness pangari stronger communities. Either at meals or finish the job. Although it works quite a long time but it feels a little while and feels light. At first culture *Pangari* done for the cultivation of agricultural work done alternately. The essence *Pangari* currently regarded as a symbol of community networks covering the whole of any type of work that complement each other.

b. Cooperation Pattern of Agricultural Land   Cultivation
The system of agriculture is still traditional employment, most residents work as farmers. They are communal cooperation at the level of small groups with a division of labor with no clear boundaries. Agricultural areas and plantations as a source of livelihood in the cultivation of large farms, thus providing consequences should require more labor. Labor not only recruited from family labor, but labor must be imported

from surrounding residents. Therefore, naturally the villagers together and work together regardless of who work the land and where they came from, but the emphasis is to work in order to produce goods and services for the common good. Working system is formed citizens as owners and working the land as well as doing the marketing of the product. Such as the Dayaks in the village of Match, Simpang Kanan and Lingga village rubber incise doing; such work is assisted by the Dayaks, or contrary to the pattern of wage labor or for the results depending on mutual agreement. Some residents also provide land use to the citizens (ethnic) other traditionally conducted without a formal labor contract by letter agreement. During this collaboration binder element is the presence of people trust each other. They have done this cooperation for generations of generations. As revealed by one of the residents of the Dayak ethnic group, and justified by other citizens of the ethnic Malay, Madurese, Buginese and Javanese. They are biased using other people's land by mutual agreement. Old people they have to build trust and foster a sense of togetherness among the people of different ethnic circles.

Agricultural production and plantation resident immature large scale production. Marketing of products obtained by the collectors to the villages bit by bit. The collectors also came from local residents and sold "ketoke-toke" big business. In addition to be sold to collectors, private farmers market to customers in the city. Marketing patterns like this illustrate the interdependence between fellow citizens. Likewise, local people do not question the origins of ethnicity, even among those already bound by kinship in a large family. This bond is formed existence of cross-breeding. This is justified by Mr. H. Hadi (the interview in August 2011) by saying that our citizens for a long time already know each other, eventually interested among them to decide to get married. This hybridization is common among fellow citizens of different ethnicities .Different conditions of social life in the city Ambawang River District Subdistrict directly with Pontianak so that the population is more diverse, this is due to the number of immigrants from various ethnic groups residing there. The pattern of the original population work as farmers work began to turn to the pattern of trade, services, agro-processing rice, vegetables and fruits, even though residents in the establishment of trade micro-enterprise level. Changes in livelihood due to the opening of the residents at Ambawang River District, can be seen at several locations on the roadside, they opened small shops, open the car wash services and petrol kiosks. This new business patterns provide income and new jobs for residents, had been working in the agricultural sector to switch to the trade and services sector.

c. Networks Financial Institutions Credit Union (CU)

As has been stated earlier that the bulk of the work patterns of the villagers in agriculture and plantations. One of the economic institutions that are in there named Credit Union (CU), which is the system's non-formal institutions are cooperative. Most people become a member of the CU. This institution as one of the local wisdom that is owned by social capital. According to information from local residents that the

turnover CU already worth tens of billions, and membership of various ethnicities.

CU forerunner to the establishment of this association according to the story comes from the Dayak people initiated to help raise capital. At the first time people cannot borrow money through a bank, they do not have collateral to borrow, so they make fund raising associations among them. CU membership Dayak people who had just come over time from other ethnic. According to a story from several informants said that the Dayak in West Kalimantan are already many established CU initiated by the Dayak people. Among existence *Pancur Kasih* CU turnover of up to hundreds of billions. The existence of the CU members and turnover are discussed based on the results of interviews with one of the administrators CU Pancur Kasih said that the number of CU in West Kalimantan is pretty much over fifty CU. Among CU that has reasonably large turnover among *Lantang Tipo CU, Pancur Kasih CU, Keling Kumang CU, dan Daya Lestari CU*. (The results of the interview in August 2011). Their presence has spread across several Kabaten West Kalimantan . CU programs in addition to providing capital loans to members also provide assistance and training to the members in agriculture and entrepreneurship. Based on the interview with Mr. Yes 'intelligences Dukang Dayak Customary Council chairman said that the management of CU not only from among the Dayaks, but none of the ethnic Malays and other ethnic. This suggests that a sense of community of the villagers for a variety of activities regardless of the background of each resident. The success of financial institutions to help its citizens CU can match the modern financial institution "banking". They form a force of social existence among citizens. Local residents were able to perform the economic development of the people without government assistance. Raising the data obtained from the members jointly develop their own financial institutions. Until now the existence of CU as one of the modern financial institution is considered community property owned by the community as local knowledge, they are able to move through the CU in the village economy.

Network economy is an economy that raise the economic actors or productive resources interconnected in a forum of citizens and supported by a network of business and trade traditionally. Economy strengthened network functions of economic stability citizens of third-party intervention (employers) who want to take advantage of the situation. Cultural wisdom through Pangari mutual aid in land management to increase the production of agricultural and plantation residents. The existence of financial institutions Credit Union serves as a buffer of capital resilience of the villagers, the village economy is driving the acceleration of the transformation of the economy and citizens, especially citizens of various ethnic majority, Malay, Dayak, Buginese, Javanese and Madurese. The existence of the Credit Union is currently able to compete with modern banking financial institutions managed professional management to institute CU into a financial institution that can provide an outlet for people who need venture capital. For the people in the Ambawang River District since the opening of access roads and toll bridges provide ease of access of citizens to the outside economic resources such as the ability to absorb information,

opportunities and market capitalization and appropriate technology, especially the cultivation of horticulture that can support rural development and new business.

Perform a transformation of society livelihoods of farmers into growing trade leads and business services by processing of plantation crops and agriculture. Developing economic stability with increasing existence of public financial institutions in developing economies in the village. Besides the existence of socioeconomic network empower citizens and economic enterprises productive able to establish business partnerships with third parties (employers), especially in the production and marketing of agricultural products as well distribution. Where

previously the function of the social network is still traditional, the current social network functions are packed through modern technology so beneficial to the improvement of living standards through economic development for communities of color. If citizens can prosper and strengthen family ties will not be affected by outside parties who want to divide. Residents of Ambawang River districts realized by strengthening family ties serve as "social security" to prevent inter- ethnic conflict. Based on a study of the concept and field studies following details via skematika described as follows:

Description: Schematic Association of Multi Ethnic community Kinship

IV. CONCLUSIONS

1. Ambawang River District development since the opening of the toll bridge connects the city of Pontianak with previously isolated Ambawang River District is now open and provides an easy area residents to access a positive culture from outside influences such as the ability to absorb information, obtain market opportunities to sell agricultural products and access to capital. Where previously people's livelihood in agriculture are now beginning to open up new trade and business services. Besides the geographical location is very strategic Ambawang River District as a buffer Pontianak city, at strategic locations became the target of investors to develop business in that place. With regard to the very rapid population growth, giving rise to interest in immigrant communities to live there.

2. Bond of kinship society River District Ambawang as social capital derived from the values of wisdom that are still

maintained and preserved. Social networks and cultural traditions and customs, traditional institutions and inter- ethnic communication forum, serves as a cultural heritage also serves to maintain the security and stability of society. In contrast to the economic network functions based on values such as cultural wisdom Pangari and financial institutions can strengthen the stability of the credit union and the community to develop and drive the economy.

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Water Quality Status of Loktak Lake, Manipur, Northeast India and Need for Conservation Measures: A Study on Five Selected Villages

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Abstract- The present study was carried out to assess the physico-chemical properties of Loktak lake at five selected villages– three lakeshore villages i.e. Phoubakchao, Laphupat Tera, Nongmaikhong and two island villages-Ithing and Karang. A total of eleven parameters were monitored for a period of one year to assess the standard of water quality of Loktak lake with reference to its status of pollution. It was observed that air temperature ranged between 11-33°C, water temperature between16-32°C, pH ranged between 6.05-9.10, Dissolved oxygen between 4.05-14.18 mg/l, Biochemical oxygen demand between 1.51-10.65 mg/l, Free CO_2 between 0-35 mg/l, Total dissolved solids between 50-150 ppm, Phenolphthalein Alkalinity between 0-20 mg/l, Total Alkalinity between 35-90 mg/l, Conductivity between 90-220 µS/cm and Transparency between 29-162 cm. Seasonal variations of the parameters across the five sites have been observed. Mean values of the physico-chemical parameters like DO and BOD studied were found higher than the World Health Organization (WHO) guideline. The result revealed that discharge of municipal sewage, domestic wastes, fertilizers and pesticides from agricultural practices have degraded the water quality. The water of Lokak lake is moderately polluted and unsuitable for human consumption and for the survival of life forms unless treated properly. There is need for implementing conservation measures and generating awareness among the people towards the lake which provides livelihood to the people and forms an integral part of the social, economic and cultural life.

Index Terms- Loktak lake, Physico-chemical properties, Seasonal variations and Water quality

I. INTRODUCTION

Water is most essential for all living organisms. Water from surface sources provides sustenance to plants and animals and constitutes the habitat for aquatic organisms and meets importance of agriculture and industrial needs (Prasad and Gaur, 1992). The rapid industrialization, growing urbanization and increasing use of chemicals in agriculture constitutes some of the important factors responsible for various forms of pollution of water bodies (Tripathi and Pandey, 1990). The beginning of systematic limnological studies in India was made by Ganapati (1940) and his associates (Ganapati and Chacko, 1951 and Ganapati *et al.*, 1953). Many workers have worked on the assessment of water quality by conducting physico-chemical and biological analysis (Pandey *et al.*, 1999; Bhanja and Kumar,

2000; Chen *et al.* 2000; Ojajire and Insokparia, 2001; Khwaja *et al.* 2001; Zafar and Sultana, 2003; Devi, 2005; Kalita *et al.*, 2006; Kosygin and Dhamendra, 2009).

Loktak Lake is located between 93° 46' and 93° 55' E and from 24° 25' to 24° 42'N in the southern part of the Imphal valley of Manipur. Loktak lake is the largest freshwater wetland of Manipur and declared a Ramsar Site in 1990 (LDA, 1996). The lake is oval in shape with maximum length and width of 26 Km and 13 Km respectively. The depth of the lake varies between 0.5 to 4.58 m with average depth recorded at 2.7 m. Loktak lake can be considered as a sub-basin of the Manipur River basin. It has a direct catchment area of 980 sq.km and indirect catchment area of 7157 sq.km. There are 55 rural and urban settlements around the lake with a total population of 100,000 (LDA and WISA, 1999). The lake provides livelihood to the settlements in the form of fishing, agriculture, collection of vegetables etc.

Municipal wastes, agricultural fertilizers and pesticides, bathing, washing of clothes and utensils makes the lake polluted. A large number of people living in these villages use the water of the lake for drinking and other domestic purposes. Hence, it is necessary to study the quality of water to know the extent of pollution and aware the concerned authorities to take up steps in controlling the pollution of the water so as to prevent the local people from being affected by the possible health hazards. With these objectives the present study was carried out to assess the physico-chemical variables of Loktak lake at the five lakeshore villages of Phoubakchao, Laphupat Tera, Nongmaikhong, Ithing and Karang of Loktak lake. The villages were selected considering their dependency on the lake resources.

II. MATERIALS AND METHODS

Water samples were collected for physico-chemical analysis from five different sampling sites i.e. Phoubakchao, Laphupat Tera, Nongmaikhong, Ithing and Karang. Monthly water samples were collected once in every month from March, 2012 to February, 2013 for a period of one year. The samples were collected in two litre polythene bottle during morning hours between 7:00 A.M. to 11:00 A.M. Air temperature (AT) and water temperature (WT) were measured using mercury thermometer, pH was measured using digital pH meter (pHScan 3 Double junction of Merck company), Dissolved oxygen (DO) was estimated following Winkler's method and Biochemical oxygen demand (BOD) by titration methods after 5 days of incubation at 20°C and titration of initial and final DO. Free carbondioxide (FCO_2) was determined by titration methods.

Total dissolved solids (TDS) were obtained using digital TDS meter (TDScan 1 0-1990 ppm of Merck company), Phenolphthalein alkalinity (PA) and Total alkalinity (TA) were obtained by titration methods. Conductivity (CON) was measured by digital conductivity meter (EC Scan low 0-1990 µS of Merck company Microprocessor series) and Transparency (TRAN) by secchi disc of 20 cm diameter. AT, WT, pH, FCO_2, TDS, CON, TRAN were determined in the field. DO, BOD, FCO_2, PA, TA, TRAN were analyzed by following standard methods (APHA, 2005; Trivedy and Goel, 1986).

III. RESULTS AND DISCUSSION

The mean variations of the parameters along with the standard deviation and range is presented in Table 1. Seasonal variation of the physico-chemical parameters is presented in Table 2 and correlation coefficient among the parameters from five selected villages (March, 2012 to February, 2013) is presented in Table 3.

Table 1: Characteristics of physico-chemical parameters of Loktak lake from five selected villages (March, 2012 to February, 2013)

	Minimum	Maximum	Mean	SD	SE	WHO limits
AT (°C)	11	33	25.03	5.33	0.68	*N/A
WT (°C)	16	32	24.69	4.11	0.53	30-35°C
pH	6.05	9.10	7.31	0.71	0.0919	6.5-8.5
DO (mg/l)	4.05	14.18	8.58	2.54	0.32	5-7 mg/l
BOD (mg/l)	1.51	10.65	5.07	1.88	0.24	5 mg/l
FCO_2 (mg/l)	0	35	11	8.41	1.08	22 mg/l
TDS (ppm)	50	150	71.33	23.25	3.00	500 mg/l
PA (mg/l)	0	20	2.08	5.23	0.675	*N/A
TA (mg/l)	35	90	56.58	14.03	1.81	120 mg/l
CON (µS/cm)	90	220	161.67	23.15	2.98	750 µS/cm
TRAN (cm)	29	162	95.43	33.03	4.26	*N/A

*N/A = Not available

Table 2: Seasonal variation in physico-chemical parameters of Loktak lake from five villages (March, 2012 to February, 2013)

Seasons	AT (°C)	WT (°C)	pH	DO (mg/l)	BOD (mg/l)	CO₂ (mg/l)	TDS (ppm)	PA (mg/l)	TA (mg/l)	CON (µS/cm)	TRAN (cm)
Pre-monsoon											
March	23.6	22.8	7.99	8.79	7.29	7.04	72	4	83	146	58.8
April	26.66	26.22	8.18	8.28	4.3	6.6	132	7	77	144	110.4
May	27.3	26.62	7.38	8.3	4.62	11	82	3	65	198	79.8
Mean±SD	25.85±1.97	25.21±2.09	7.85±0.41	8.45±0.28	5.40±1.64	8.21±2.42	95.33±32.14	4.66±2.08	75±9.16	162.66±30.61	83±25.94
Monsoon											
June	28.3	27.4	6.66	7.59	5.61	13.2	74	5	44	186	107.6
July	28.9	28	6.91	7.09	4.63	19.36	64	2	39	156	99.6
August	29	28	7.62	6.92	3.7	16.72	58	2	43	152	90.6
Mean±SD	28.73±0.37	27.8±0.34	7.06±0.49	7.2±0.34	4.64±0.95	16.42±3.09	65.33±8.08	3±1.73	42±2.64	164.66±18.58	99.26±8.50
Post monsoon											
September	31.6	30.6	7.91	8.38	5.82	16.72	52	2	46	142	93.2
October	27	27.2	7.95	8.14	5.71	11.44	52	0	56	156	78.4
November	21.8	21.8	7.23	7.73	3.09	9.68	58	0	58	154	123.2
Mean±SD	26.8±4.90	26.53±4.43	7.69±0.40	8.08±0.32	4.87±1.54	12.61±3.66	54±3.46	0.66±1.15	53.33±6.42	150.66±7.57	98.26±22.82
Winter											

December	17.2	17.8	6.61	11.18	5.47	5.28	62	0	55	156	113.6
January	16.6	18	6.19	11.38	4.67	7.04	70	0	52	178	112.4
February	22.4	21.8	7.15	9.2	6.02	7.92	80	0	61	172	77.6
Mean±SD	18.73±3.18	19.2±2.25	6.65±0.48	10.58±1.20	5.38±0.67	6.74±1.34	70.66±9.01	0±0	56±4.58	168.66±11.37	101.2±20.44

Table 3: Correlation coefficients among physico-chemical parameters of Loktak lake from five selected villages (March, 2012 to February, 2013)

	AT	WT	pH	DO	BOD	FCO$_2$	TDS	PA	TA	CON	TRAN
AT	1	.926(**)	.460(**)	-.237	.089	.312(*)	-.047	.184	-.192	-.136	-.115
WT		1	.504(**)	-.333(**)	.031	.355(**)	-.051	.211	-.249	-.116	-.119
pH			1	-.045	.157	-.195	.094	.461(**)	.442(**)	-.242	-.231
DO				1	.564(**)	-.626(**)	-.105	.220	.208	-.052	.326(*)
BOD					1	-.310(*)	-.193	.170	.206	-.093	-.038
FCO$_2$						1	-.141	-.529(**)	-.480(**)	-.080	-.143
TDS							1	.144	.448(**)	.122	.026
PA								1	.335(**)	.118	-.021
TA									1	-.100	-.092
CON										1	-.137
TRAN											1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Temperature is one of the most important factors in an aquatic environment. Changes in the air temperature naturally affect the water temperature (Kumar, 1997). The AT in this study ranges from 11°C to 33°C (Table I). AT was found to be higher in monsoon season and low in winter. Kaushik and Saksena (1999) also found that ambient temperature at Motijheel varied from 12°C to 43.8°C, at Surajkund 15.5°C and 43.0°C and at Ranital from 21.5°C to 42.5°C. In the present study AT has high significant positive correlation with the value of WT (r=.926) and pH (r=.460) and a significant positive correlation with FCO$_2$ (r=.312).

Surface water temperature is one of the most significant parameters which control inborn physical qualities of water. WT fluctuates from 16°C to 32°C (Table 1). WT was found to be higher in monsoon season and low in winter. More penetration of sunlight and longer duration of receiving sunlight in a day is the reason for higher temperature during monsoon season. The water temperature of Kalyani lake in West Bengal was found to vary from 25° C to 37° C. The summer temperature (May-Jul) was always above the winter temperature (Jan-Feb) due to lack of sunlight (Sinha and Biswas, 2011). The WT across the five sites under study is below the WHO (1995) standard of 30°C-35°C and showed high significant positive correlation with pH (r=0.504) and FCO$_2$ (r=0.355) and a high significant negative correlation with DO (r=-0.333).

pH is an important factor in determining the productivity of an ecosystem (Singh, *et al.* 2009). pH in the present study ranged from 6.05 to 9.10 (Table 1). It was found to be higher in pre-monsoon season and low in monsoon. This may be due to removal of large amount of CO$_2$ by photosynthetic process by aquatic plants during summer while during rainy season there was active decomposition of organic matter (Meetei and Singh, 2011). Zafar and Sultana (2003) also noted highest pH in

summers and lowest in rainy seasons in river Ganga. The pH of Narmada river water samples was found to be in the range 7.6-9.9 (Shraddha, *et.al,* 2011). The pH of the water under study is within the WHO standard of 6.50-8.50. pH limits laid by BIS (Bureau of Indian Standards) limits for drinking water are 6.5-8.5. pH has high significant positive correlation with PA (r =0.461) and TA (r =0.442).

Dissolved oxygen is one of the important parameters of water which directly effects the survival and distribution of flora and fauna in an ecosystem. It is one of the most reliable parameters in assessing the trophic status and the magnitude of eutrophication in an aquatic ecosystem (Edmondson, 1966). The values of DO ranges from 4.05 mg/l to 14.18 mg/l (Table 1). The highest value of DO i.e. 14.18 mg/l was found from the village of Ithing in the month of January. DO was found to be higher in winter season and low in monsoon. The high value of DO during winter may be due to growth of large quantity of aquatic plants and the low value of oxygen in monsoon may be due to the utilization of oxygen for metabolic activities by the increasing growth of bacteria (Pandey *et al.* 1999). Kosygin *et al*. (2007) also observed highest value of DO in winter season and lowest in monsoon. Manjare *et al.* (2010) found that DO of Tamdalge tank in Kolhapur, Maharashtra fluctuates from 6.40 mg/l to 15.5 mg/l. The mean DO of the five sites in the lake is above the WHO standard of 5.0-7.00 mg/l. The royal commission has reported a scale for deciding the quality of water based on DO. The content of DO of 7 mg/l in water is considered as very clear, 6 mg/l as moderate, 5 mg/l as doubtful and 4 mg/l or below as bad (Singh, *et al.* 2009). DO in the present study shows high significant positive correlation with BOD (r =0.564) and high significant negative correlation with FCO$_2$ (r =-0.626) and a significant positive correlation with TRAN (r=0.326).

BOD is an indicator of organic pollution. The BOD of water samples fluctuates from 1.51 mg/l to 10.65 mg/l (Table I). The highest value of BOD i.e. 10.65 mg/l was found from the village of Karang in the month of February. It was found to be higher in pre-monsoon and low in monsoon. The higher values of BOD in pre-monsoon may be due to high pollutant load drained from rivers of the urban areas of Imphal. Pathak, *et al.* (2012) recorded higher values of BOD in monsoon compared to post monsoon. Gupta, *et al.*, (2011) reported values of biological oxygen demand of river Chambal was varied from 1.20 to 12.20 mg/L. Observed values clearly indicate that the river water is moderately polluted by organic wastes. The values of BOD are above the standards limit of 5 mg/l laid by WHO. BOD have a significant negative correlation with FCO_2 (r=-0.310). The present study indicates moderate pollution of the lake.

Free CO_2 in water is derived from many sources such as atmosphere, respiration by the organisms, bacterial decomposition of organic matter etc. Rain also absorbs small amount of gas and delivers it to the water on which it falls (Kaushik and Saksena, 1999). The values of FCO_2 were found to be in the range of 0- 35 mg/l (Table 1). The highest value of Free CO_2 i.e. 35 mg/l was found from the village of Phoubakchao in the month of July. It was found to be higher in monsoon and low in winter. The high value of FCO_2 in monsoon may be due to high rate of composition of organic matters by bacteria resulting in rapid production of CO_2 (Pandey, *et al.,* 1999). Kosygin *et al*. (2007) also observed highest value of free CO_2 in monsoon and lowest in winter. According to Sarwar (1999), the FCO_2 of Anchar lake, Kashmir varied from 0.05-26.7 mg/l. The observed values are below the WHO standards of 22 mg/l. FCO_2 have highly significant negative correlation with PA (r = -0.529) and TA (r = -0.480).

The total dissolved solids in water comprise mainly of inorganic salts and small amount of organic matter such as carbonate, bicarbonate, chloride, sulphate, nitrate, sodium, potassium, calcium and magnesium. The total dissolved solids in water originate from natural sources and depend upon location, geological nature of the pond basin, drainage, rainfall, bottom deposit and inflowing water (Kaushik and Saksena, 1999). The values of TDS were found to be in the range of 50-150 ppm (Table 1). TDS was found to be higher in pre-monsoon and low in post-monsoon. The high values of TDS in pre-monsoon may be due to deposition of inorganic salts and organic matter from other rivers draining into the lake. The observed value is in contrast with the one reported by Zafar and Sultana (2003) where the TDS values of river Ganga at Kanpur ranges from 200-640 mg/l having maximum values in winter and minimum values in monsoon. The observed values was found below the WHO permissible limit of 500 mg/l. TDS showed highly significant positive correlation with TA (r= 0.448).

Alkalinity may also be caused due to evolution of CO_2 during decomposition of organic matters. The PA of the stations was found to vary from 0 to 20 mg/l (Table 1). PA was found to be higher in pre-monsoon and low in winter. The high values of PA in pre-monsoon may be due to the liberation of carbondioxide during the decomposition of organic matter. Lower values of PA was observed in winter by other workers (Singh, *et al.,* 2009). The values of PA of river Ganga during the year 2003 was found to be in the range of 4.5- 17.5 mg/l with a mean value of 9.5 mg/l

while that of 2004 was found to be 4.5- 13.7 mg/l with a mean value of 9.17 mg/l (Singh, *et al.,* 2009). PA have highly significant positive correlation with TA (r=0.335).

Alkalinity of water is its capacity to neutralize acid and is characterized by the presence of hydroxyl (OH^-) ions capable of combining with hydrogen (H^+) ions in solution (Kaushik and Saksena, 1999). The values of TA ranges from 35 to 90 mg/l (Table 1). TA was found to be higher in pre-monsoon and low in monsoon. The high value of TA in pre-monsoon may be due to the dissolution of calcium carbonate from the sediments and use of detergent and soap (Meetei and Singh, 2011). Minimum values of TA was observed during monsoon months by Singh, *et al.* (2009). The observed values is found to be lower when compared to one reported by Singh, *et al.* (2010) in Kharungpat Lake, Manipur (38.0 to 284.0 mg/l). Similar study was conducted by Pathak, *et al.* (2012) who observed that the bicarbonate and total alkalinity in both the water bodies vary from 98.0 mg/l to 185.4 mg/l and 117.0 mg/I to 167.6 mg/l. The observed values were found below the WHO permissible limit of 120 mg/l. TA does not have any significant correlation with other parameters.

Water becomes a good conductor of electric current when substances are dissolved in it and the conductivity is proportional to the amount of dissolved substance. These substances are ions which act as conductor. The values of conductivity across the five sites ranged from 90 µS/cm to 220 µS/cm (Table 1). COND was found to be higher in winter and low in post monsoon. The high value of COND in winter may be due to the addition of sewage from other rivers draining into the lake. Sharma, *et al*. (2013) also reported the values of COND ranged from 105.56 µS/cm to 201 µS/cm in Keibul Lamjao National Park, Manipur, India from six selected stations and found high value of COND during winter and low during post-monsoon season. The observed values was found below the WHO permissible limit of 750 µS/cm. COND does not have any significant correlation with other parameters.

Transparent waters allow more light penetration which has far reaching effects on all aquatic organisms, including their development, distribution and behaviour, etc. (Kaushik and Saksena, 1999). TRAN in the present study ranges from 29 cm to 162 cm (Table 1). TRAN was found to be higher in winter and low in pre-monsoon. The high value of TRAN in winter is due to the better penetration of light while it is low in pre-monsoon season because of the abundance of floating plankton on the surface of the water. Khan and Choudhary (1994) reported higher values of TRAN during winter. Kosygin and Dhamendra (2009) noted the transparency values of Loktak lake, Manipur ranges from 0.51 m - 2.98 m.

IV. CONCLUSION

Among the eleven parameters analyzed across five sites it was found that the physico-chemical properties of DO and BOD are above the WHO standard limit due to discharge of municipal sewage, domestic wastes, fertilizers and pesticides from agricultural practices disturbing the ecology of the Loktak lake and potable nature of the water. Hence, we can conclude that the water of the Loktak lake is getting polluted. It needs to be controlled to prevent further pollution, spreading of water borne diseases and utilization of water for domestic purposes. Loktak

lake is the lifeline of the people of Manipur and bears significant importance in the social, cultural and economic life. The people of the three offshore and two island villages are dependent on the natural resources of the lake for livelihood and also for drinking water. Pollution due to various anthropogenic activities need to be checked and awareness regarding the conservation of the lake has to be generated. Although Loktak Development Authority (LDA) is actively involved in managing the ecological status of the lake, community participation is needed to prevent further degradation of the lake which would have a direct impact on the availability and abundance of various bioresources.

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Molybdate-Catalyzed Oxidative Bromination of Aromatic Compounds Using Mineral Acids and H₂O₂

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Abstract- A facile, efficient, simple, environmentally safe, regioselective, controllable and economical method for the oxybromination of aromatic compounds using sodium molybdate in presence of mineral acids and H_2O_2. The use of sodium molybdate as catalyst accelerates the rate of reaction in presence of mineral acids and hydrogen peroxide.

Index Terms- Halogenation, Bromination, Anilines, Sodium Chlorate, Aqueous medium, Oxidative Bromination

I. INTRODUCTION

The insertion of bromine atom into the organic molecule with its simultaneous oxidation is called oxybromination. The bromonium ion (Br+) along with counter ion (mainly OH-) is the main active species in oxybromination reactions. The bromonium ion provided directly in the solution by brominating reagent or alternately it is generated in-situ from the oxidation of bromide (Br-) using suitable oxidant in particular reaction conditions. The later strategy is more favorable than former one and it is widely utilized. The oxybromination reactions are vital for the synthesis of various important bromoderivatives: bromohydrins, α-bromoketones and α,α-dibromoketones as well as for other useful organic synthesis.

Bromination of organic compound is one of the popular industrial process due to multiple uses like: In water purification, agriculture, healthcare, photography etc.

Organic compounds are brominated by either addition or substitution reactions. Bromine undergoes addition to the unsaturated hydrocarbons (alkenes and alkynes) via a cyclic bromonium intermediate. In non-aqueous solvents such as carbon disulfide, it gives di-bromo products. For example, reaction of bromine with ethylene will produce 1,2-dibromoethane as product. When bromine is used in presence of water, a small amount of the corresponding bromohydrin will form along with desired dibromo compounds. Bromine also gives electrophilic nuclear bromination of phenols and anilines. Due to this properties, bromine water was employed as a qualitative reagent to detect the presence of alkenes, phenols and anilines in a particular system. Like the other halogens, bromine also participates in free radical reactions. Classical bromination of aromatics, for example, utilizes only 50% of the halogen, with the other half forming hydrogen bromide.

$$ArH + Br \rightarrow ArBr + HBr \quad \text{---- (1)}$$

Though bromine has many application in chemistry as a reagent, it has some disadvantages also whenever disposed to environment. Some bromine-related compounds have been evaluated to have an ozone depletion potential or bio accumulate in living organisms. As a results, many industrial bromine compounds are no longer manufactured and are being banned.

Theoretically, it is possible to reoxidise the Hydrogen Bromide, e.g. with H_2O_2, and achieve high bromine utilization, between 90 and 95%.

$$2HBr + H_2O_2 \rightarrow Br_2 + 2H_2O \quad \text{----- (2)}$$

Thus, activated aromatic, like as phenols, anisols, and anilines, may be oxybrominated without catalyst, while inactive (benzene, toluene) but not deactivated ones, have been oxybrominated in the presence of quaternary ammonium salts. Practically, however HBr recycling is rarely performed in industrial processes, as the additional step and the corrosiveness of HBr necessitate reactor costs that exceed those of purchasing more Br_2.

Oxidation of bromides to bromine according to this invention typically takes place in a commercial setting in a packed column with addition of the reagents and steam in a continuous system using hydrogen peroxide as an oxidant for bromine production; however, variations are possible as will be familiar to those skilled in the art.

This invention provides that bromine can be derived from about 0.01 wt % to about 60 wt % HBr, about 3 wt % to about 70 wt % H_2O_2, about 0.03 wt % to about 0.5 wt % catalyst according to this invention and about 5 wt % to about 20 wt % HCl, all based on the sum of the weights of the HBr, the H_2O_2, the catalyst, and the HCl prior to each being used in the bromine derivation. Typically, the bromide source, the oxidant, and the catalyst, and when included, the hydrogen chloride or mineral acid, are in aqueous solution. This invention also provides that the molar ratio of bromide source to catalyst according to this invention can be from about 150:1 to about 1200:1, or about 200:1 to about 1000:1, or about 400:1 to about 900:1, or about 600:1 to about 850:1, or about 858:1 to about 831:1.

The major issue is transportation and storage of large quantities of molecular bromine and HBr is extremely hazardous. These risk can be reduced by bromide recycling. Several recent publications cite toxicity of as the incentive to investigate various comples oxybromination reagents. Neurocardiogenic syncope is a well-defined cardiovascular condition, its cause, however is still poorly understood. Although seveveral pathophysiologic interpretations regarding its cause have been proposed, various mechanism may contribute to the cause in

different subjects or even simultaneously in one subject. But in real life two situations have to be distinguished:

(a) When molecular bromine is available on site, it is the cheapest and most environmental friendly brominating

$$H_2O_2$$

reagent.used in conjugation with ____, the stoichiometry would

$$H_2O_2 \quad Br_2 \quad \rightarrow \quad H_2$$

then be ____ + 2Ar + ____ 2ArBr + 2 ____O.

(b) When a bromine containing reagent has to shipped to the site, only four reagents are cheap enough to matter for large-scale

$$Br_2$$

manufacturing: ____, HBr, KBr and NaBr.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

All the melting points are uncorrected and are presented in degree celcius. FT-IR spectra was recorded on a Bomem Hartmann and Barun MB-series FT-IR spectrometer. ACS grade chemicals were purchased from commercial firms (Sigma Aldrich) (> 99% pure) and used without further purification. Common reagent grade chemicals were procured from SD Fine Chemicals Ltd. (Mumbai, India) and also used without further furification. Gas Chromatograph were performed using an HP-5890, with the HP1 capillary column. Mass spectra were measured on an LC-MSD-Trap-XCT instrument. High-resolution mass spectra were measured on a MALDI-FTMS.

Sodium Molybdate specification:
(CAS No. 10102-40-6)

Assay	99.5%
P^H of a 5% solution at 25 degree celcius	7.0 – 10.5
	0.0005%
Insoluble Matter	0.0005%
	2 ppm
Chloride (Cl)	0.005%
	0.0001%
Plosphate (PO$_4$)	2 ppm
Sulphate (SO$_4$)	0.0001%
Ammonium (NH$_4$)	
Heavy Metal (as Pb)	
Iron (Fe)	

Table 4.3 : Composition of reagent

Test: By oxidative titration after reduction of Mo^{VI}. Weigh accurately about 0.3g, and dissolve in to 10 mL of water in a 150 mL beaker. Activate the zinc amalgam of a Jones redactor by passing 100 mL of 1N sulphuric acid, through the column. Discard this acid, and place 25 mL of ferric ammonium sulphate in the receiver under the column to the sample solution, add 100 mL of 1N sulphuric acid and pass this mixture through the redactor, followed by 100 mL of 1N sulphuric acid and then 100 mL of water. Add 5 mL of phosphoric acid of the solution in the receiver, and titrate with 0.1N KMnO$_4$ volumetric solution. Run a blank and make any necessary correction. One mL of 0.1 N KMnO$_4$ corresponds to 0.008066g of sodium molybdate.

$$\frac{\{[mL(Sample)-mL(Blank)*N\,KMnO4]\}*8.066(g)}{Sample\,wt\,(g)}$$

% Na$_2$MoO$_4$.2H$_2$O

Sodium Molybdate FTIR spectra:

FTIR spectrum of pure sodium molybdate is given in Figure xyz. The Mo-O stretching frequency appears at 826 cm-1.

Figure 4.3a FTIR spectrum of pure sodium molybdate (SM)

a) SM solution

Figure 4.3b FTIR spectrum of sodium molybdate solution

Sodium molybdate (SM) effectiveness over a vide P^H range:

It is environmentally safe and nontoxic. It is effective over a wide pH range. Due to increasing environmental constrains, molybdate represents a logical, environmentally acceptable alternative. In *appendix I figures* describe the detailed summary of of the pH dependence of reagent and shows the admittance of sodium molybdate at different pH ranges.

Elemental composition and mass composition by element (g/mol) of NaMoO4:

Symbol	Element	Atomic weight	Number of atoms	Mass percent
Na	Sodium	22.989769282	1	12.5662%
Mo	Molybdenum	95.962	1	52.4527%
O	Oxygen	15.99943	4	34.9811%

Bromination of various aromatics with sodium molybdate using mineral acids and hydrogen peroxide at room temp.[a]

Entry	Substrate	Product	Time/min	Yield (%)[b]	Mp/°C (lit.)
1.			10	98	167(165-169)
2.			25	92	200(200-202)
3.			15	93	105(105-107)
4.			20	95	104(105-107)
5.			20	95	235(235-237)

6.	benzaldehyde with OH (salicylaldehyde)	3,5-dibromo salicylaldehyde (Br, CHO, Br, OH)	15	96	80(80-84)
7.	HO—C6H4—CHO (4-hydroxybenzaldehyde)	HO—, Br, CHO, Br	20	90	183(181-185)
8.	8-hydroxyquinoline (OH, N)	5,7-dibromo-8-hydroxyquinoline (Br, Br, OH, N)	15	98	200(198-200)
9.	phenol (OH)	2,4,6-tribromophenol (Br, Br, OH, Br)	15	91	92(92-94)
10.	aniline (NH2)	2,6-dibromoaniline (Br, NH2, Br)	25	93	120(120-121)
11.	2-nitrophenol (OH, NO2)	Br, Br, OH, NO2	20	95	114(116-117)
12.	2-nitroaniline (NH2, NO2)	Br, NH2, NO2	15	94	108(110-113)
13.	2-nitroaniline (NH2, NO2)	Br, Br, NH2, NO2	20	97	127(127-130)
14.	3-nitroaniline (NH2, NO2)	Br, Br, NH2, NO2, Br	20	96	102(100-103)
15.	HO—, CHO, H3CO	Br, HO—, CHO, H3CO	15	92	166(164-166)
16.	O2N—C6H4—NH2	O2N—, NH2, Br	15	90	102(102-104)

17.			20	94	204-208 (206-208)

III. STUDIES AND FINDINGS

I- All commercially available chemicals and reagents were used without further purification unless otherwise indicated. All reactions were carried out in air without any special precautions. 1H and 13C NMR spectra were recorded on a Bruker F113V spectrometer operating at 500/200, and 125/50 MHz, respectively. Chemical shifts are reported in ppm relative to TMS as an internal standard, for 1H and 13C NMR spectra. FT-IR spectra were recorded on Perkin Elmer GX-2000 spectrometer. Gas chromatograms were recorded on ThermoTrace-GC-Ultra. Melting points were recorded on Veego- capillary instrument as well as on Mettler Toledo FP62 melting point apparatus with open capillary tubes and are uncorrected. Progress of the reactions was monitored by thin layer chromatography (TLC) using Aluchrosep Silica Gel 60/UV254 plates of Merck, Germany or on TLC's prepared from silica-gel fine powder coated on glass plates. Compounds were purified by column chromatography over silica gel 100-200 mesh size and neutral alumina wherever nessarary using hexane/ethyl acetate as eluent. (Note: The peak appeared in 1H-NMR spectra around 1.6 -1.7 and 3.3 ppm is corresponding to the residual H2O from the deuterated solvent CDCl3and DMSO respectively).

II- Potassium bromide is used in some photographic developers to inhibit the formation of fog (undesired reduction of silver). Bromine is also used to reduce mercury pollution from coal-fired power plants. This can be achieved either by treating activated carbon with bromine or by injecting bromine compounds onto the coal prior to combustion. Soft drinks containing brominated vegetable oils are sold in the US (2011). Various bromine containing compounds are used in various pharmaceutical applications such as brompheniramine, bromocriptine (parkinsons disease), citalopram hydrobromide (antidepressant), homatropine methyl bromide (anticholinergic), propantheline.

III- Spectral data (^{1}H NMR, IR and MS) of of brominated compounds is given below:

IV- *4-bromoacetanilide (2):* White crystals; ^{1}H NMR (400 MHz, DMSO): δ 2.1 (3H, s), 7.25 (2H, d, J= 8.4 Hz), 7.52 (2H, d, J = 8.8 Hz), 9.73 (1H, s); IR (KBr): 3293, 3260, 3186, 3115, 3052, 1668, 1644, 1601, 1586, 1532, 1487, 1394, 1309, 1290, 1255, 1007, 831, 819, 740, 687, 504 cm^{-1} ; MS m/z calcd. for C_8H_8BrNO: 216.07, FOUND 216.

V- *4-Bromobenzanilide (3)* : Light grayish powder; ^{1}H NMR (400 MHz, CDCl$_3$) : δ 7.29-7.74 (9H, m); IR (KBr) : 3339, 3054, 1661, 1589, 1411, 1196, 946, 893, 750, 714, 509 cm^{-1} ;MS m/z calcd. for $C_{13}H_{10}BrNO$: 276.132, FOUND 276.

VI- *2,4,6-Tribromoaniline (4)*: White-shining fine needles; ^{1} H NMR (400 MHz, CDCl$_3$: δ 7.49 (s, 2H, ArH), 5.21 (bs, 2H, NH$_2$); IR (KBr): 3414, 3293, 1452, 1383, 1285, 1225, 1063, 858, 729, 706, 673, 546, 486 cm^{-1} ;MS m/z calcd. for $C_6H_4Br_3n$: 329.816, found 327.

VII- *2,4-Dibromo-1-naphthol (6)* :Grayish-brown powder; ^{13}C NMR (100 MHz, CDCl$_3$): 148.02, 131.73, 130.93, 127.97, 126.97, 126.74, 124.92, 122.66, 113.27, 103.09; IR (KBr): 3412, 3075, 1961, 1934, 1720, 1616, 1583, 1548, 1502, 1449, 1374, 1330, 1266, 1230, 1209, 1146, 1057, 1030, 966, 870, 851, 766, 716, 671, 646, 602, 580 cm^{-1} ; MS m/s calcd. for $C_{10}H_6Br_2O$: 302, found 300.

VIII- *1,6-Dibromo-2-napthol (7)* : Light brown solid; ^{1}H NMR (400 MHz, CDCl$_3$): δ 6.20 (1 H, brs), 7.40-7.78 (2H, dd, J=66 and 9Hz), 8.15-8.36 (2H, dd, J =33 and 9 Hz), 8.76 (1H, s); IR (KBr): 3485, 3444, 1617, 1586, 1381, 1210, 1183, 928, 871, 805, 645, 536, 512 cm^{-1}.

IX- *5,7-Dibromo-8-hydroxyquinoline (9)*: Light beige powder; ^{1}H NMR (400 MHz, DMSO): δ 8.90 (dd, 1H, arom), 8.46 (dd, 1H,arom), 7.89 (s, 1H, arom) 7.65 (t, 1H, arom); IR (KBr): 3071, 1738, 1583, 1491, 1459, 1389, 1333, 1273, 1202, 1138, 1045, 934, 868, 808, 787, 725, 686, 652, 617, 594, 563, 500 cm^{-1} ; MS m/z calcd. for $C_9H_5Br_2NO$: 302.95, found 302.2.

X- *3,5-Dibromosalicylaldehyde (10) :* Pale-yellow crystalline powder; ^{1}H NMR (400 MHz, CDCl$_3$): δ 7.68 (d, 1H, J=2.12 Hz, ArH), 7.90(d, 1 H, J= 2.60 Hz, ArH), 9.81 (S, 1h, COOH), 11.51 (s, 1H, OH); IR(KBr): 3184, 1682, 1662, 1653, 1449, 1410, 1375, 1362, 1327, 1281, 1255, 1200, 1153, 1134, 877, 866, 735, 712, 692, 679, 505 cm^{-1} ; MS m/z calcd. for $C_7H_4Br_2O_2$:279.9, found 280.

XI-   ***2,6-Dibromo-4-nitroaniline (18)*** : Yellow powder; ^{1}H NMR (400 MHz, DMSO): δ 8.21 (2h,s), 6.79 (1H,s); IR(KBr): 3480, 3372, 3084, 2922, 2666, 2363, 1605, 1501, 1474, 1383, 1300, 1270, 1126, 943, 897, 821, 737, 695, 575, 532, 457 cm^{-1} ; MS m/z calcd. for $C_6H_4Br_2N_2O_2$: 295.9, found 295.2.

IV.   RESULTS AND DISCUSSION

Our initial exploratory studies probed the best reaction conditions and for that we choose salicylic acid (10 mmol) as a typical compound which was first reacted with molecular bromine (20 mmol) in CH_3CN (10 ML) at room temperature for 50 minutes. Workup of the reaction resulted under-brominated

$$2KBr + 2HCl + H_2O_2 + \quad —C{=}C— \quad \longrightarrow \quad \left[—\overset{|}{C}\underset{Br}{\diagdown\diagup}\overset{|}{C}— \right]^{+} \quad Cl^{-} \quad \longrightarrow \quad —\underset{Br}{\overset{|}{C}}\text{—}\underset{Cl}{\overset{|}{C}}—$$

Na_2MoO_4- Catalysed Generation of Br_2 using Potassium Bromide and Mineral Acids. It was claimed that sodium molybdate (Na_2MoO_4) catalyses the oxidative bromination of various activated aromatics, without the need for stiochiometric amounts of acid. We found, however, that the Na_2MoO_4, which dictates the acidic environment (pH 2-3) is required for the reaction to proceed.

The present review gives short glance on various reagents reported in the literature for oxidative bromination of various substrates using various oxidative reagents with new catalysts and new non catalyst methods.

However, Na_2MoO_4 may be used to catalyse oxidative bromination in the presence of dilute mineral acids, which may solve problems arising from the corrosiveness of 49% HBr, or other combinations of bromide with concentrated acids. This is important, because, although the productivity of the processes employing concentrated acids is higher, it is partly due to corrosiveness that recycling of bromide is shunned by the chemical industries.

Halogenation reactions are gained considerable importance from their discovery. The halides are important in organic synthesis due to their use for synthesis of various commercially important compounds. Among the halides chlorides and bromides are of commercially important over fluoride and iodide. Organic bromides are widely used as synthetic precursors for various coupling reactions in organic and pharmaceutical synthesis. They can be used as potent antitumor, antibacterial, antifungal, antineoplastic, antiviral, and anti-oxidizing agents and also as industrial intermediates in the manufacture of pharmaceuticals, agrochemicals, and other specialty products, for instance, flame-retardants. The traditional bromination using elemental bromine shows a maximum of 50% atom efficiency in terms of bromine consumption. The bromination reaction has been still attracting attention to develop the more practical method without the use of hazardous and highly toxic elemental bromine. Oxidative bromination is a process which generates electrophilic bromine using various oxidants with or without

off-white 3,5-dibromosalicylic acid (3,5-DBSA) which melts over a range 190-221 ˚C (Table 1, entry 1). Other solvents such as CH_3COOH, CH_3OH, CAN, H_2O and CH_2Cl_2 were also tested but the results were unsatisfactory, yielding 3,5-dibromosalicylic acid in lower yields with low melting points where the crude product is contaminated by significant quantities of impurities particularly the monobrominated salicylic acid or decarboxylated brominated phenol.

As this study mainly deals with application of dilute acids, the term acid refers to a dilute acid of ˜ 1M in water. Where concentrated acid is used, the concentration is specified. Similarly, the amount of Na_2MoO_4 used in all reactions, are 1-2 mol % relative to substrate unless noted otherwise. Reagent productivity will be in terms of amount of substance produced per unit reactor volume per unit time.

using catalyst. (An exception is fluorination, since it is too difficult to oxidize fluoride.) In the laboratory as well Industrial scale, however, bromination is generally carried out with hazardous, toxic, and corrosive molecular bromine mostly in combination with chlorinated solvents. A growing ecological awareness among chemists has coincided with an increased understanding of oxidative bromination in biological systems, which has boosted research in the field of oxidative bromination. From Green chemistry point of view Hydrogen peroxide and oxygen are considered as best agent for oxidative halogenation as the waste generated is water only[6,7]. In the literature various oxidative halogenation methods are reported, where various oxidants like metals, persulphate, mineral acids and hyper valent iodine are used for generation of electrophilic bromine.

Using HCl for bromination is interesting, as it seems possible that companies engaged in chlorination processes may also be interested in bromination, and might have waste HCl streams available on production sites. As chlorine is less soluble than bromine in water, it seems reasonable to suppose that the absence of chlorinated products indicates either that no chlorine gas is formed when HCl is used as the source of protons. With the use of this system, ex situ bromination of 1-octene gave >99%. Selectvity to 1,2-dibromooctane, indicating that the sodium

$$H_2O_2 \rightarrow X_2 \qquad H_2$$

molybdate- catalysed reaction $2HX + \qquad + 2 \qquad O$. Moreover, an ex situ process is advantageous in this case, because in a one-pot reaction using HCl + KBr, attack of chloride on the cyclic bromonium cation would result in formation of a vic-bromo-chloro-product in above reaction in presence of 1 mol% sodium molybdate.

V.   CONCLUSION

Molybdate-catalysed oxidative bromination is a cost effective and safe system, the risk factor for the known reagents like molecular bromine is very high. Furthermore, this method

has the advantages of low transportation and storage risk is less. The drawback of the system is high prices and low productivity (compared to using Br₂), and the fact that concurrent unwanted decomposition of H_2O_2 in the reagent system. A comparison of the brominating ability of the present system with those of published methods shows that the present protocol is inexpensive, simpler, faster and more efficient than other catalytic bromination systems used for this purpose.

APPENDIX

Figure 1. LC-MS of 3,5-dibromosalicylic acid (1)

Figure 2. ¹H and ¹³C-NMR spectra of 3,5-dibromosalicylic acid (1)

Figure 3. ¹H and ¹³C-NMR spectra of 3,5-dibromosalicylic acid (1)

Figure 4. IR spectra of 3,5-dibromosalicylic acid (1)

Figure 5. ^{1}H-NMR spectra of 2,4,6-tribromoaniline (4)

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The Efficacy of Multiple Micronutrient Supplementation on Improvement Hemoglobin and Serum Feritin Level in Adolescent Girls with Anemia

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Abstract- The prevalence of anemic adolescent is still public health problem in Indonesia. The objective of this study was to compare the effect of multiple micronutrient and iron folic acid supplementation on hemoglobin and ferritin serum levels in adolescent school girls who suffer from anemia. The study was a randomized controlled trial conducted in five schools in Maros Regency, South Sulawesi Indonesia from January to October 2013. The subjects were 148 adolescent girl with anemia were randomly allocated into two groups. The first group (n=75) received a multiple micronutrient (MMN) and second group (n=73) received an iron folic acid (IFA) supplement. Supplement was consumed twice a week for 26 weeks. The average of hemoglobin levels increased significantly in both treatment groups after supplementation with multiple micronutrient (0.73±1.1 g/dl; p=0.000) and iron-folic acid (0.61±0.98 g/dl; p=0.000), While serum ferritin levels were not significantly increased in both of group, namely multiple micronutrient (2.03±23.2 ng/ml; p=0.420) and iron-folic acid (8.31±31.8 ng/ml; p=0.078). The increased levels of hemoglobin and ferritin serum in two groups did not differ significantly. The prevalence of anemia was significantly reduced in IFA group (25.9%) and MMN group (17.6%). It can be concluded, twice-weekly supplementation with MMNs for 26 wk is not more efficacious than iron and folic acid in improving the hematologic status of anemic adolescent girls. Future studies are needed to increase of the frequency of micronutrient supplementation (3 times a week) with sufficient macro nutrient intake and prevent the incidence of infectious diseases.

Index Terms- multiple micronutrient supplementation, hemoglobin, serum feritin, adolescent girls

I. INTRODUCTION

The female adolescent is a crucial period for the woman's life. Health and nutritional status during this phase is important for physical maturity, which in turn will affect the health of the offspring [1]. The nutritional status of female adolescents contributes to the nutritional status of the community[2]. However, the female adolescents are included as one of the vulnerable nutrition groups due to : 1) the more requirement of nutrient because of accelerating the growth and development of the body; 2) changes in lifestyle and eating habits that require adjustment of nutrient intake, 3) pregnancy, active in sports, suffer disease, which increases nutrient requirements[3,4].

Anemia of iron deficiency is the major micronutrient deficiencies that affect the youth particularly in developing countries[5], hence the need of iron to support growth and menstruation often exceeds intake[6]. However, the nutritional anemia is not only caused by iron deficiency, but also by other micronutrients such as vitamin A and folic acid[7,8,9], vitamin B12[10,9], B2[11,12], vitamin C[13,12], selenium[14]. All of which are the precursors to the eritropoiesis in the bone marrow, hemoglobin formation, metabolism, absorption and mobilization of iron in the body[15,16].

The global prevalence of anemia among school-age children was estimated at 25.4%[17]. In Indonesia, based on the data of Riskesdas 2007, there were 19.7% of women (≥15 years old) who suffered from anemia (8% of urban respondents), 59.9% of them suffered from anemia microcytic-hypochromic[18], which was considered as a public health problem based on WHO criteria (20-39.9%)[19].

However, efforts to improve nutrition have been more focused on pregnant women, whereas impact female adolescent are expectant mothers who have to be healthy and give birth the healthy babies. The main barrier in the implementation of prevention and control programs particularly the nutritional problem of anemia in girls, was probably due to lack of knowledge of policy makers on the risks of anemia in girls and low priority in the agenda of nutrition[20]. One way to decide the issue of nutrition and health intergenerational is to improve the nutrition of female adolescent, in other words, female adolescent which is an opportunity to break the intergenerational cycle of malnutrition[21,22]. Therefore, paying attention the nutrition and health of adolescent girls is required.

Micronutrient deficiency problem in female adolescents can be improved through the provision of micronutrient supplements. Based on UNICEF/WHO/UNU recommendation, regarding the use of multiple micronutrient supplement in formula UNIMMAP on females adolescent, it is necessary to investigate multiple micronutrient supplementation in anemic girls to improve hematologic profiles as a regulator eritropoiesis. School-based supplementation programs can be an effective channel of

supplementation, when implemented and supervised by the teacher. The efficacy of multiple micronutrient supplemenetation (UNIMMAP formula) on the female adolescent suffer from anemia nutrient deficiency on the improvement of hematologic profile of female adolescent in Indonesia is still relatively limited, there for this study is urgently required. So, the purpose of this study is to compare the effect of multiple micronutrient (MMN) and iron folic acid (IFA) supplementation on hemoglobin and ferritin serum levels adolescent school girls who suffer from anemia.

II. MATERIAL AND METHOD

1.1. Study Participant

The population in this study is all female students who are in class X and XI in 5 Government senior high school in Maros Regency, with the total number of females students are 1158 female students. Government senior high school were selected purposively based on the considering that schools are in a rural area, easy to reach and there is the willingness of the school to participate in the study, evidenced with the acquisition of permission from the school principal, and the school has a relatively large number of females students

Initial screening for anemic (Hemoglobin <12 g/dl) was carried out with a B-Hemoglobin Analyze (HemoCue, Angelholm, Sweden) on a finger-capillary blood sample. Those who were identified as anemic were then invited to provide a venous blood sample, to measured again hemoglobin concentration based on cyanmethemoglobin method as baseline sample. Female adolescent were eligible for the study if they have regular menstruation in every month, non married and pregnant. Subjects were exclude they had severe anemic (Hb <8 g/dl based on hemoCue method), suffering from acute or chronic infections (eg, tuberculosis, typhoid, malaria, dengue fever, etc.), or a metabolic disorder that can affect hemoglobin levels at the time of blood sampling, and had taken the other nutritional supplements (vitamins and minerals). The drop out criteria was the subjects who are resigned from the study or does not participate fully in the research activities in accordance with the research protocol, subjects change schools, lysis of blood taken or damaged so it is not able to be analyzed.

The sample size calculation based on 80% of study power to be able to detect a 5.2 g/dl[23] difference in hemoglobin level between multiple micronutrient and iron-folic acid (control)) group, assuming a two tailed test, with $\alpha=0.05$ and hemoblogin standar deviation (SD) of 10.1 g/dl (based on values observed across all treatment groups)[24]. The number of subjects required in each set was 59 students, and assuming loss to follow up 20% of students, so it required 74 samples per group. The study was conducted from January to October 2013, after obtaining permission from the Health Research Ethics Committee of the Faculty of Medicine, Hasanuddin University, Makassar South Sulawesi Indonesia.

1.2. Study design intervention

This study was a randomized, double-blind controlled trial as an experimental trial. The subjects entered into the study were randomly assigned to 1 of 2 supplemented groups: to receive either a double dose of multiple micronutrient (MMN as UNIMMAP formulation containing 15 micronutrient), or iron-folic acid (IFA) as Indonesian Government program for 26. Randomization by using 2 coded groups (A vs B) carried out by an independent research, and female adolescent were allocated to 1 of the 2 codes by computer. All the personnel and investigator were blinded to the 2 groups assignment. Encapsulated of the two supplements is carried out by a pharmacist in the research centre of nutrition and health Hasanuddin University, Makassar South Sulawesi Indonesia. The composition of the two kinds of supplements are presented in the Table 1. Both supplements were identical in appearance and were color coded, were kept by the independent researcher at medicine faculty Hasanuddin University and opened only after data analysis was completed. All participants received the capsule twice weekly for 26 weeks for the benefit of nutritional anemia therapy and re-store the body's iron reserves[25].

Table 1. The composition of the mltiple micronutrients (MMN) and iron-folic acid supplement, nutrient supply from each supplements for female adolescents

Nutrient	Dose	RDA 2013 16-18 years old	Nutrient supply per a day from each supplement
Multiple Micronutrient Supplement (Double doses)			
Vitamin A (Retinol)	800 μg	600 RE (μg)	457.1
Vitamin D (Cholecalciferol)	200 IU (5 μg)	15 μg	2.86 μg
Vitamin E (Tocopherol)	10 mg	15 mg	5.71 mg
Vitamin B-1 (Thiamin HCL)	1.4 mg	1.1 mg	0.8 mg
Vitamin B-2 (Riboflavin)	1.4 mg	1.3 mg	0.8 mg
Niacin (Nicotinamide)	18 mg	12 mg	10.29 mg
Asam Folat	400 μg	400 μg	228.57 μg
Vitamin B-6 (Pyridoxine)	1.9 mg	1.2 mg	1.09 mg
Vitamin B-12 (Cyanocobalamin)	2.6 μg	2.4 μg	1.49 μg
Vitamin C (As. Ascorbat)	70 mg	75 mg	40 mg
Zink (zinc sulphate)	15 mg	14 mg	8.57 mg
Iron (Ferrous fumarate)	30 mg	26 mg	17.14 mg

Copper (Copper sulfate)	2 mg	890 mcg	1.14 mg
Selenium (Sodium selenite)	65 µg	30 µg	37.14 µg
Iodine (potassium iodide)	150 µg	150 µg	85.71 µg
Iron-Folic Acid Supplement			
Iron (ferrous sulfat)	60 mg	26 mg	17.14 mg
Folic acid	250 µg	400 µg	71.42 µg

1.3. Compliance

Supplements were distributed by the teacher to the students, accompanied by field officers, as well as direct observation of the supplements to be swallowed properly by the subject, and then it is recorded by field assistant in the sheet monitoring. If a female adolescent was absent on the day supplement distribution (Wednesday and Saturday), she received supplement on the day she returned to school. Compliance was calculated as the number of capsule eaten divided the number of capsule to receive). For the holidays, the subjects are given supplements based on the numbers of the day that the supplement is consumed, then they are controlled by phone, and at the time the subjects are at school, they are asked about the number of the supplements they have been consumed.

1.4. Data and sample collection

Data of the females student's characteristics: socioeconomic (education, occupation, income) parents, medical history, menstruation which is asked through interviews using questionnaires (questionnaire). Biochemical, medical history and menstruation data were collected twice: before intervention (baseline = t_o) and at the end (t_6) of the intervention in non-fasted female adolescent. For biochemical data, 3 cc of venous mediana cubiti blood of sample using vacutainer anticoagulant with the remainder centrifuged for collection of serum by Prodia officers, and 4 cc venous mediana cubiti blood of using vacutainer without anticoagulant by Prodia officers. All specimen were transported to the laboratory in dry ice and stored below -20^0C. The Hb concentration, red blood cell index and white blood cell as a cell immune was analyzed in the Prodia Laboratory Makassar Indonesia as a private laboratory by the immuno-chemiluminescence method,. Serum feritin consentration that measure the number of Fe stores were analyzed by the ELISA method with a commercial kit (Abcam) and the inter-assay is 4.8%.

1.5. Statistical Analysis

All data were analyzed using SPSS for windows. The difference between baseline and endpoint biochemical indicator were tested by Wilcoxon test, whereas the difference biochemical indicator in both treatment groups were analyzed with the U-Mann Whitney. The difference of prevalence anemic and iron depletion was analysed by Mc Nemar Test. ANCOVA test be used to control confounding factor that influenced the group difference. Anemia was defined as Hb level <12.0 g/dl[26] and iron depletion was defined as serum ferritin concentration Nutrient <15 ug/L[27].

III.   RESULTS AND DISCUSSION

Figure 1 describes the development of the study sample in each school until the study ended. The number of samples at the beginning of the study was 148 students consisting of 73 students from group A and 75 from group B. As the study ended, the number of samples that drop out (DO) was 37 students (25%), which came from the IFA group was 19 students (26%) and 18 students from MMN group (24%). The number of DO subject between the two groups did not differ significantly (p = 0.78). Based on the number of samples until the end of the study (111 students), then the power test of the calculation of the amount of the sample changed from 80% to 77%.

The characteristics of the subjects and their families do not have significant differences between the two treatment groups, so that it can be stated that the study sample was homogenized before being given micronutrient interventions (**Table 2**).

Total of the supplements that should be taken by each subject is 52 capsules. The average number of the supplements taken by the subjects was ±46 capsule with a range between 34-51 capsules. Compliance in the intake of the supplements (> 80%) in the IFA group was lower (85.2%) than the MMN group (87.1%) (chi-square p = 0.811). Adverse events were reported by subjects who acquire IFA supplements namely: head ache, nausea, stomachache, and chest pain.

FIGURE 1. Selection process for the study participants and reasons for loss to follow-up in a randomized controlled trial-double blinded with multiple micronutrient (MMN) and iron and folic acid (IFA) supplementation.

Micronutrient intervention gave a significant effect on the changes in hematological parameters. The mean change in Hb values were higher in group MMN subjects compared to group IFA (Table 4). Increased hemoglobin levels were higher in MMN group may be caused by the mean value of serum ferritin and hemoglobin levels before the intervention was lower than IFA group, so that the response rate of MMN group was higher than the IFA group to reach the normal threshold. It is characterized by a rise in the average of hemoglobin level velocity (6.3 g/dl) was higher during the 26-week intervention MMN supplement. Guyton and Hall (2008)[28] states that if there is deficiency of hemoglobin (Hb), then the allotment of more iron for hemoglobin formation, and vice versa when the hemoglobin level is normal, then the allotment of iron components intended for the formation of myoglobin, cytochromes, peroxidase and catalase or stored in the form of ferritin. Supplementation of iron for hemoglobin synthesis is partially absorbed as indicated by elevated levels of hemoglobin, and some go into the tissue to be stored.

Although iron reserves in the body, but without the multiple-micronutrient supplementation, hemoglobin synthesis process is inefficient, and most much iron is absorbed from the intestine to the liver directed. This proves the essential role of multiple micronutrients such as vitamins A, B2, B6, B12, C, Cu, etc., all of which play a role in the synthesis of hemoglobin, either directly or indirectly through a process of absorption and or iron mobilzation. The results of this study demonstrate that functional improvement after supplementation was preferred than sufficient supplies of iron that is characterized by a significant increase in levels of hemoglobin subjects in both treatment groups (p = 0.000).

The increase in mean Hb levels between the two treatment groups were not different significantly (mann whitney p = 0.788) (**Tabel 4**). ANCOVA test results showed that baseline levels of ferritin serum (effect size = 0.176, p = 0.000) was significantly an influential factor to the difference in hemoglobin levels of the subjects (P <0.05), while both types of supplements provide the same effect on the differences in the mean increase in hemoglobin levels (p = 0.820). If iron storage decreased, it's needs 2-3 months to accelarete of absorption to return of normal hemoglobin level[29]. Ferritin serum was a predictor significantly on the hemoglobin concentration in Cambodian children (ß = 2,55; effect size = 0.044; p = 0.011)[30].

If the reduced iron reserves, it takes 2-3 months for accelerating the absorption to restore normal hemoglobin levels (Lynch, 2007)[31]. Serum ferritin is a significant predictor of hemoglobin concentration in children of Cambodia (ß = 2.55 ; effect size = 0.044 , p = 0.01)[32] (Anderson et al., 2008).

These findings confirm the results of previous studies conducted in Bangladesh in girls, namely multiple micronutrient supplementation for 6 months resulted in an increase in hemoglobin concentration as much as 10.5 ± 9.4 g/L (paired T-test p = 0.000) compared to the placebo group increased by only 2.9 ± 6.7 g /L (paired T - test p = 0.000)[33]. Ahmed et.al (2005)[34] reported that the MMN and IFA supplementation 2 times a week for 12 weeks in girls aged 14-18 years found a increase in mean hemoglobin levels for the MMN group (0.63 ± 0:08 g/dl) and the IFA group (0.62 0:08 ± g /dl) were not statistically different (p = 0.91). Hyder study[35] results that provide beverages containing multiple micronutrients on the girls for 12 months giving effect to the increase in Hb 10.8 ± 3.6 g/L was significantly (p = 0.0001) in the first 6 months of intervention. Furthermore, Ahmed et.al (2010)[24] also reported that the IFA and MMN supplementation 2 times a week increase the hemoglobin levels of 8.0 ± 8.2 g /L in the IFA group, and 8.8 ± 9.6 g /L in the MMN group was significantly at week 26 intervention. Study in Bogor found that multiple micronutrient supplementation 3 times a week for 4 months at girls aged 13 -15 years that anemia may increase hemoglobin levels of 15.8 ± 10.7 g/L[23]. In Shaanxi China study that provides multiple micronutrient supplementation (5 mg iron) for 5 months in children aged 10-12 years can increase hemoglobin levels of 3.2 g/L subjects (p = 0.002) and reduced the number of anemia was 12.3 % (p = 0.01)[36]

Table 2. Baseline characteristics subjects and family

Variable	IFA mean±SD	MMN mean±SD	Total mean±SD	P value
Age (years)	16.02±0.8	16.17±0.8	16.09±0.8	0.20[1]
Age of menstruation (years)	12.98±0.9	13.25±0.9	13.12±0.9	0.08[2]
Pocket money (IDR/day)	12648±8077	10710±5654	11653±6975	0.31[2]
Money Buy Snack (IDR/day)	6462±4546	5271±2208	5851±3577	0.58[2]
Family size (person)	5.9±2.0	5.7±2.2	5.8±2.1	0.61[2]
Parent's Income (IDR/mo)	1667124.1±1435854.8	1784210.5±1495429.0	1727249.5±1461785.8	0.62[2]
Education mothers (years)	8.9±4.0	8.3±3.5	8.6±3.8	0.48[2]
Hb (g/dl)	11.72±1.4	11.67±1.3	11.69±1.3	0.92[2]
MCV (fl)	77.92±8.4	78.58±8.2	78.26±8.3	0.68[1]
MCH (pg)	24.59±3.3	25.7±7.2	25.16±5.6	0.46[2]
MCHC (pg)	31.48±1.5	31.51±1.8	31.49±1.6	0.75[2]
Hematocrit	37.2±3.4	36.9±2.6	37.10±3.0	0.51[2]
Serum ferritin (ng/ml)	23.22±23.5	17.27±15.9	20.16±20.1	0.19[2]
Weight (kg)	45.09±7.5	45.02±7.6	45.05±7.5	0.99[2]
Height (cm)	151.31±4.7	151.71±4.9	151.5±4.8	0.67[1]
Height-for-age (z-score)	-1.69±0.7	-1.59±0.7	-1.61±0.7	0.76[1]
BMI-for-age (z-score)	-0.52±0.9	-0.58±0.8	-0.55±0.9	0.77[1]

[1]Uji T Independent   [2]Mann-Whitney

On the contrary, based on hemoglobin status, it was still found 28.8% of the subjects suffering from anemia, which was 27.8% in the subjects of IFA group and 29.8% in the subjects of MMN group. It is probably due to several factors other than iron deficiency such as infections that can contribute to blood loss and the loss of nutrients, etc. The results of the study in Bangladesh supporting these findings, is the prevalence of anemia in girls who have obtained multi micronutrient supplementation 2 times/week was found approximately 29.3% and 40.9% in those who acquire iron + folic acid supplements[24]. Besides that, the percentage of subjects who suffer from microcytic-hypochromic anemia decreased significantly to 46.3% (Δ = 25.9%; McNemar test p = 0001) on the subject of the IFA group, whereas the MMN group of subjects was reduced significantly to 36.8% (Δ = 36.9%; McNemar test p = 0.000).

Based on the anemic degree, the percentage of the subjects in IFA group suffering from mild anemia decreased by 22.2% while the subjects in MMN group decreased by 10.5%. Moderate anemia was reduced more in the MMN group subjects (5.3%) compared to the IFA group (1.9%). Severe anemia was not found

in the subjects of MMN group while the subjects of IFA group was found to be 1.9% (**Tabel 3**).

Rate of decline in the prevalence of anemia in all subjects after obtaining micronutrient interventions for 26 weeks was 21.7% (McNemar test, p = 0.000). The decrease in the prevalence of anemia in the IFA group was 25.9% (Mc Nemar test, p = 0.003) greater than the MMN group subjects only decreased by 17.6% (McNemar test, p = 0.041) (**Table 3**). The cure rates of anemia differ between subject groups IFA and MMN, which is the cure rate of anemia was higher in the IFA group (48.3%) compared to subjects MMN group (37.0%).

The effectiveness of micronutrient supplementation on anemia status was also seen after the intervention that is the subject of anemia become normal after the intervention in group A (31.5%) and group B (26.5%), while that remained anemic after the intervention in group A (40.7%) and group B (43.9%). The effectiveness of both types of supplements are for improving the status of anemic subjects was statistically significant, namely group A (p = 0.003) and group B (p = 0.041).

Table 3. Iron status before and after supplementation between groups

Indicator	IFA [n, (%)]		MMN [n, (%)]		Total [n, (%)]	
	Before	After	Before	After	Before	After
Hemoglobin Status*	**11.73±1.4**	**12.3±1.4**	**11.67±1.3**	**12.40±1.1**	**11.70±1.4**	**12.37±1.2**
• Normal (≥ 12 g/dl)	25 (46.3)	39 (72.2)	30 (52.6)	40 (70.2)	55 (49.5)	79 (71.2)
• Mild Anemia (11.0 – 11.9 g/dl)	24 (44.4)	12 (22.2)	21 (36.8)	15 (26.3)	45 (40.5)	27 (24.3)
• Moderate Anemia (8.0 – 10.9 g/dl)	3 (5.6)	2 (3.7)	5 (8.8)	2 (3.5)	8 (7.2)	4 (3.6)

• Severe Anemia (< 8 g/dl)	2 (3.7)	1 (1.9)	1 (1.8)	0 (0.0)	3 (2.7)	1 (0.9)
Serum Feritin Status **	**23.2±23.5**	**31.53±28.9**	**17.26±15.9**	**19.29±17.5**	**20.16±20.1**	**25.24±24.4**
• Normal (15 – 150 µg/)	29 (53.7)	35 (64.8)	21 (36.8)	25 (43.9)	50 (45.5)	60 (54.1)
• *Iron depletion* (<15 µg/)	25 (46.3)	19 (35.2)	36 (63.2)	32 (56.1)	61 (55.0)	51 (45.9)

*WHO, 2011a;   ** WHO, 2011b

Besides the impact of micronutrient interventions on the increase of Hb level of the subjects, it is also seen in the increase in the level of ferritin serum of the subjects who indicated the increase in nutrient reserve after receiving micronutrient supplementation. The level of ferritin serum after micronutrient interventions appears higher in the subject of IFA group than MMN group which is significantly different (p<0.05) (**Tabel 4**). Correlation test results showed that the level of ferritin serum endline of the subjects in group B is significantly correlated with baseline levels of eosinophils (r= -0264, p=0.047), baseline levels of basophils (r = -0316, p=0.017). Ferritin serum increased by the possibility of the presence of inflammation and infection, so the correlation of ferritin serum with total body iron becomes less reliable[37]. When the presence of significant inflammation, the levels of ferritin serum do not accurately reflect iron reserves [38]. Ferritin serum in addition to biomarkers Fe reserves in body also serves as a marker of inflammation (acute phase protein) that increased during the acute phase response due to infection[39]. Several types of white blood cells measured in this study, can be used as a marker of inflammation, which is also recommended for the assessment of immune function in public health intervention trial[40]. Although inflammatory markers is significantly correlated to the levels of feritin serum of the endline of group B subjects , but ferritin serum is still subject to normal values within the limits set by the WHO (2011b)[27] is ≤ 150 mg/L. In addition, an increased number of white blood cells as the immune response is only around 1.7 % - 11.1 % (data not shown), which suggests that the prevalence of infection is low[41]. Another explanation is the inflammatory and immune response is most pronounced in body tissues, not in blood, and blood and tissue production may not be relevantly correlated[42]. Therefore, the results of this study indicates that the increase in serum ferritin is an indication of Fe reserves in body.

The difference in mean of serum ferritin levels in the IFA group was 4 times higher than the MMN group, however, statistically it is not significantly different (p> 0.05). Similarly, the increase in serum ferritin levels are also higher in IFA group (1.96 ± 5.1 g/dl) compared to MMN group (0.94 ± 2.4 g/dl), and statistically (Mann Whitney test) the difference between those two groups is not significant (p = 0.46). Higher increase on iron reserves in the IFA group subjects occurred because the mean of hemoglobin level of the subjects after intervention was sufficient to meet the functional needs of the subject's body, so that the rest can be saved as a backup, while on the subject of MMN group, effectiveness of micronutrient supplementation for 26 weeks is only able to improve the profile hemoglobin and red blood cell indices to meet the functional needs of hemoglobin and red blood cell indices, whereas the mean levels of iron is slightly stored. However, the differences in mean level of ferritin serum between the two treatments are not statistically different. The resut of ANCOVA test indicate that the increased levels of ferritin serum of the subjects is simultaneously influenced by hemoglobin levels (p = 0.000) and HAZ-score baseline (p = 0.016) of the subjects before the intervention was significant, while both types of supplements provide the same effect on the difference increase in mean of ferritin serum levels (p = 0411). HAZ-score value was higher in group B subjects (-1.59±0.7) than in group A (-1.63±0.7) which gives an indication that there was a tendency of the nutritional status of the subjects in group B is better than in group A.

The impact of the intervention on the ferritin status of the subjects is shown in **Table 3** in which the percentage of subjects that had a decline in the deficit of iron stores (iron depletion) was 11.1% in group A but not significant according to the McNemar test (p = 0.263), whereas in group B it was decreased by 7.1 % much lower than the IFA group subjects, and a non-significant decline as well based on the results of the McNemar test (p = 0.523).

The result of this study is supported by the results of the study of Ahmed et.al (2005)[34] who reported that multi-micronutrient (MMN) supplementation and iron - folic acid (IFA) 2 times a week for 12 weeks in girls aged 14-18 years found increased levels of serum ferritin were not statistically different (p = 0.89) in both treatment groups, namely the IFA group increased serum ferritin of 5.2 ± 1.3 ng / ml and 5.4 ± 1.3 MMN group ng /ml. The study result of Hyder *et.al* (2007)[35] that gives a drink containing multiple micronutrients to girls who had consumed it for 6 days / week for 12 months showed a significant impact on the increase in serum ferritin levels of 12.5 mg/L (p = 0.001) at the first 6 months of the intervention . The study of Ahmed et. al. (2010)[24] also showed that serum ferritin concentrations in the MMN group and IFA 2 times a week significantly increased at week 26 of intervention, but the increased levels of serum ferritin subject MMN group (19.7 ± 14.7 mg/L) is significantly (p = 0.045) smaller than the acid + iron group folate (24.2 ± 18.8 mg /L) was significantly.

Overall, the result of this study indicates that after consuming micronutrient supplementation in both treatment groups, some iron is used for the synthesis of hemoglobin, which is indicated by increased hemoglobin levels, and partly is stored as reserves indicated by elevated levels of serum ferritin. Increased levels of hemoglobin-related subjects with serum ferritin concentrations before intervention, and vice versa elevated levels of serum ferritin subjects related to serum ferritin levels before intervention.

Table 4. Hemoglobin and serum ferritin concentration before and the end supplementation

Variable	IFA group (n = 54)	MMN Group (n =57)	P Value
Hemoglobin (g/dl)			
baseline	11.73±1.4	11.67±1.3	0.920[2]
endline	12.34±1.4	12.40±1.1	0.930[2]
mean difference	0.61±0.98	0.73±1.1	0.788[2]
P value	**0.000**[1]	**0.000**[1]	
Serum Ferritin (ng/ml)			
baseline	23.2±23.5	17.3±15.9	0.198[2]
endline	31.5±28.9	19.3±17.5	**0.024**[2]
mean difference	8.31±31.8	2.03±23.2	0.344[2]
P value	0.078[1]	0.420[1]	

In conclusion, twice-weekly supplementation with MMNs for 26 wk is not more efficacious than is supplementation with iron and folic acid alone in improving the hematologic status of anemic adolescent girls. So, the findings of the present study have considerable implications for reducing anemia among anemic adolescent girls and support to choose one of them supplement giving twice weekly containing 60 mg iron/dose. Future studies are needed to increase of the frequency of micronutrient supplementation (3 times a week) with sufficient macro nutrient intake and prevent the incidence of infectious diseases.

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Bio Synthesis of Cerium Oxide Nanoparticles using Aloe Barbadensis Miller Gel

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Abstract- The synthesis of metal oxide nanoparticles with certain morphologies and sizes has become the matter of great interest in present experimental protocols. Bio synthesis production of metal oxide nanoparticles using plants is more desirable than physical and chemical methods due to its eco-friendliness. The objectives of this study were to report the potential of green chemistry to synthesize metal oxide nanoparticles. Furthermore, characterizations such as X-ray diffractometry, Fourier Transform Infrared Spectroscopy, Transmission electron microscopy and Particle Size Analysis of the nanoparticles were discussed.

Index Terms- biosynthesis; cerium oxide nanoparticles; aloe barbadensis miller

I. INTRODUCTION

In recent years, there has been increasing attention towards eco-friendly synthesis of metal oxide nanoparticles using plants, this is because though nanoparticles exhibit exceptional electronic, thermal, anti-bacterial properties compared to bulk particles, the nanoparticles synthesis causes lot of toxic byproducts. The green synthesized nanoparticles do not produce any toxic byproducts and also have reported to be more stable compared to chemically synthesized ones. Moreover, the rate of synthesis is also much faster.

Cerium(IV)oxide(CeO_2) Nanoparticles have numerous applications, mainly in the biomedical industry due to their strong antioxidant properties. These are amongst the highly used rare earth compounds possessing applications in industrial and commercial products. It is also an excellent absorber of ultraviolet radiation and can be used as an alternative for zinc oxide or titanium oxide nanoparticles in cosmetics.

Aloe barbadensis miller is also known as aloevera, which is a very short stemmed succulent plant. It produces two substance "gel" and "latex" which are used for medicinal applications. The chemical constituents of Aloevera are amino acids, anthraquinones, enzymes, minerals, vitamins, lignins, monosaccharide, polysaccharides, salicylic acids, saponins and sterols. Poly saccharides are very good thickening agents which encapsulates the cerium ions.

II. MATERIALS AND METHOD

2.1 Materials

Cerium(III) nitrate hexahydrate($Ce(NO_3)_3 \cdot 6H_2O$) was purchased from SD-Fine. Double distilled water was used throughout the process.

2.2 Preparation of alovera extract

Few big leaves from Aloe barbadensis miller plant were collected and washed thoroughly with water to remove any dirt or debris on the surface. Rind from the leaves was carefully peeled off using a sharp knife and discarded. The leaf was slit longitudinally into half, sharp edged spoon was used to scrap off the gel from the leaf into a sterile beaker.

2.3 Synthesis method

0.1M of *Ce*rium (III) nitrate hexahydrate was taken into a beaker and 40ml of distilled water was added to it. This solution was stirred using a magnetic stirrer until a homogeneous solution was formed. To this aqueous solution aloevera leaf extract of 10ml was added. The reaction mixture was stirred for 30 mins continuously. The solution was then heated on a hot plate at $80^{o}C$ till the supernant got evaporated. The obtained product was pounded into fine powder and calcinated at $600^{o}C$ for 2 hrs.

III. RESULTS AND DISCUSSION

The obtained cerium (IV) oxide nanoparticles were characterized using X-ray diffractometer, Fourier Transform Infrared Spectroscopy, Transmission electron microscope and Particle size analyzer.

3.1 X-ray diffractometer

The X-ray diffraction was done for cerium (IV) oxide nanoparticles using x-rays with wavelength of 1.54 A^o. The XRD analysis was done before and after calcination. No peaks were observed in the graph plotted for cerium (IV) oxide before calcination.

Figure 1. XRD graph of CeO$_2$ before calcinations.

The XRD was repeated after calcinating cerium(IV)oxide nanoparticles at 600°C for 2hours. The peaks were observed at 28.57, 33.13, 47.5, 56.38, 59.07, 69.5, 76.7 and 79.09 which correspond to planes 111, 200, 220, 311, 222, 400, 331 and 420 respectively. The obtained particles were confirmed to be cerium (IV) oxide using XRD graph. The structure was observed to be FCC cubic structure.

Figure 2. XRD graph of CeO$_2$ after calcinations.

3.2 Fourier Transform Infrared Spectroscopy

The FTIR spectroscopy was done within a range of 400-4000 cm^{-1}. The peaks were observed at 1417.73, 1653.03, 1384.94, 1151.54, 879.57 and 624.96 correspond to alkane, carbonyl, alkane, alkyl halide, alkene and alkylhalide with functional groups –C-H-, C=O, -C-H-, C-F, =C-H and C-Cl respectively. The observed functional groups in the obtained product are a result of the organic compounds like are amino acids, anthraquinones, enzymes, vitamins, lignins, monosaccharide, polysaccharides, salicylic acids, saponins and sterols present in the leaf extract of aloevera.

Figure 3. FTIR spectroscopy of CeO$_2$ nanoparticles.

3.3 Particle size analyzer

The particle size analysis was done using the dynamic light scattering technique. A small amount of cerium (IV) oxide nanoparticles were dispersed in distilled water and subjected to ultrasonication for 30mins. The dispersed solution was then analyzed under dynamic light scattering. The viscosity of the dispersion medium was found to be 0.8 mPa.s. The scattering angle was about 173°. The mean diameter of the particles summed up to 63.6 nm.

Figure 4. Dynamic light scattering plot for CeO$_2$ nanoparticles

3.4 Transmission electron microscopy

The morphology of the green synthesized CeO$_2$ nanoparticles was studied using TEM as shown in Figure 5, Figure 6 and Figure 7. Figure 8 is the SAED image of CeO$_2$ nanoparticles. It was observed that the growth of CeO$_2$ nanoparticles was spherical in shape.

Figure5., **Figure 6.** and **Figure 7.** are TEM micrographs and **Figure 8.** is the SAED image of green synthesized CeO$_2$ nanoparticles.

IV. CONCLUSION

Successfully, cerium (IV) oxide nanoparticles were synthesized by a very simple and eco-friendly way using leaf extract of aloevera plant. The obtained product was confirmed to be cerium (IV) oxide, the crystal structure was studied and the d-spacing of CeO$_2$ nanoparticles was studied using XRD. The functional groups in the CeO$_2$ nanoparticles were studied using FTIR spectroscopy. The morphology of CeO$_2$ nanoparticles was studied using TEM micrographs. The average size of synthesized nanoparticles was calculated using dynamic light scattering technique.

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Kinetic Approach to Hydrolysis of Mono-6-Chloro-2, 4-Dinitroaniline Phosphate in Acidic Medium

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Abstract- Phosphate ester hydrolysis plays a very important role in many biological processes. The present investigation belongs to study of kinetic behavior of acid catalyzed hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate in 0.1-7.0 mol dm^{-3} HCl at 50°C in aqueous medium. The log rate profile shows that the rate of reaction increases up to 4.0 mol dm^{-3} HCl. The results show that mono-6-chloro-2, 4-dinitroaniline phosphate is reactive mainly via conjugated acid species. Positive salt effect has been exhibited through ionic strength data. Behavior of molecularity and order of reaction have been estimated by the use of different concepts and hypothesis, such as Hammett acidity function, Zucker-Hammett hypothesis, Bunnett, Bunett-Olsen and Arrhenius parameters. Isokinetic relationship has been applied to propose probable reaction mechanism for the hydrolysis. Experimental rate coefficients have been found to agree well with theoretical rates in the entire acid range.

Index Terms- Hydrolysis, mono-6-chloro-2,4-dinitroaniline phosphate, molecularity, bond-fission.

I. INTRODUCTION

Phosphate esters are the derivatives of phosphoric acid which may be esterified in one, two, or three positions, forming monoester, diester or triester respectively[1]. The role of phosphate esters having different linkages as C-O-P, C-N-P, C-S-P are well known in various branches of chemistry. Phosphate esters control a significant part of living system from genetic material, coenzyme to energy storing compounds and signaling agents[2, 3]. Tri-esters do not occur naturally, but together with related compounds have found widespread use as herbicides and insecticides[4]. Phosphate esters are normally considered as important pharmacological compounds and have received an increasing amount of attention due to their significant biological interests[5]. They are used as fungicides, antiviral, antitumor agents[6-7]. In addition to their biological significance, they are proved to be of great technical importance for industries. They are used as additives in petroleum, flame retardants, corrosion inhibitors, and smoke generation [8-10]. The facile hydrolysis of these organophosphate esters is found everywhere and has attracted a great consideration due to their great values in various chemical and biochemical reactions [11-13]. Thus it has become the subject of intense research to the chemists and biologists.

II. EXPERIMENTAL

Mono-6-chloro -2, 4- dinitroaniline phosphate ester has been synthesized by Cavalier method[14], which involves the reaction of 6-chloro-2,4-dinitroaniline with phosphorylating agent phosphorus pentaoxide (P_2O_5) in 1:1 mol ratio by weight in benzene. Hydrolytic reactions of mono-6-chloro-2, 4-dinitroaniline phosphate ester has been carried out at 50 ± 0.5°C and concentration of ester was kept constant at 5.0 x 10^{-4} mol dm^{-3}. The progress of kinetics of hydrolysis has been studied by Allen's modified method[15]. The constant ionic strengths have been maintained by using the mixture of HCl and NaCl. First-order rate coefficients have been determined from the first-order rate equation. All the chemicals used were of A. R. quality. HCl was standardized by N/10 sodium tetra borate (Borax) solution. Triple distilled water has been used in all experiments.

III. RESULT AND DISCUSSION

Hydrolysis via conjugate acid species

In order to understand the behavior of mono-6-chloro-2, 4-dinitroaniline phosphate during the hydrolysis i.e. involvement of its reactive forms as well as their modes of hydrolysis, kinetic runs were performed in 0.1 to 7.0 mol dm^{-3} HCl at 50°C. The first order rate coefficients obtained are shown in Table II and illustrated in figure 1. From the result it is observed that in acid region rate of hydrolytic reaction increases with increase in acid molarity up to 4.0 mol dm^{-3} HCl and after that decreases. The initial rise in rate in acid media may either be due to complete conversion of substrate in to its conjugate acid species (acid catalyzed reaction). Decrease in rate was attributed to lowering of the concentration of attacking nucleophile in the reaction i.e. due to variation in water activity.

Figure 1: The plot of 3+log k_e versus HCl mol dm^{-3} for acid catalyzed hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate

Kinetic Salt Effect

In order to understand the salt effect kinetic runs were performed at different constant ionic strength using appropriate molarities of hydrochloric acid (HCl) and sodium chloride (NaCl). Plot of rate coefficients of acid hydrolysis and acid molarities is illustrated in Figure 2.

Figure 2: Acid catalyzed hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate at constant ionic strength

Hydrolysis at each ionic strengths (μ) is denoted by six straight lines that make a positive slope with acid axis, hydrolysis is subjected to acid-catalysis. The slope of straight lines increases with increase in ionic strength. Thus acid catalyzed hydrolysis is attributed to positive salt effect. Straight lines meet at different points on rate axis indicate that there is involvement of other species in addition to conjugate acid species. The possibility of neutral species can not be ignored due to the fact that mononegative species can not be reactive at higher concentration more than 1.0 mol dm^{-3}. Linear curves are intercepting the rate axis at different points which show that the contribution of neutral species at different acidities is varying. Specific acid catalyzed rate with their logarithmic values at that ionic strength are summarized in Table I and illustrated in Figure 3.

Table I: Specific Acid Catalyzed rates for the hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate via its conjugate acid and neutral species

Ionic Strength μ	$k_H^+ \times 10^3$ (min^{-1})	3+log k_H^+	$k_N^+ \times 10^3$ (min^{-1})	3+ log k_N^+
0.5	19.90	1.30	05.25	0.72
1.0	20.71	1.32	06.99	0.84
1.5	22.38	1.35	09.65	0.98
2.0	23.84	1.38	11.47	1.06
2.5	25.05	1.40	14.05	1.15
3.0	26.52	1.42	17.87	1.25

Figure 3: Plot of 3+log k_e versus ionic strength (μ) for acid catalyzed hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate

The slope of lines represents a constant, b'$_H^+$ which is equal to b'$_H^+$ /2.303 and intercepts on rate axis represent the specific acid catalyzed rate (k_H^+). From the study of ionic strength effect, the total rates contributed by conjugate acid and neutral species can be calculated by the following 2nd empirical term of Debye-Huckle equation[16].

$$k_e = k_H^+ . C_H^+ + k_N \qquad (1)$$

where k_e, $k_H^+ . C_H^+$, k_N are observed rate coefficient, specific acid catalyzed rate and specific neutral rate at that ionic strength respectively.

Specific acid catalyzed rate and neutral rate can be presented by following equation:

$$k_H^+ . C_H^+ = k_{Ho}^+ . C_H^+ . \exp. b'_{H^+}. \ \mu \qquad (2)$$

$$k_N = k_{No} \exp. b'_N. \mu \qquad (3)$$

Equation 1 was used to determine the caculated rates. Table II summarizes both the estimated and experimental rate of the hydrolysis in acid region from 0.1 to 7.0 mol dm^{-3} HCl. The lowering in rate after 4.0 mol dm^{-3} may be due to the lowering in the concentration of water molecules. The rate beyond 4.0 mol dm^{-3} HCl was calculated employing the Bronsted Bjerrum Equation[17].

$$k_e = k_H^+ \ C_H^+ (a_{H_2O})^n + k_N(a_{H_2O})^n \qquad (4)$$

Table II : Estimated and experimental rate data for acid catalyzed hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate ester

HCl (mol dm^{-3})	$k_{H^+}.C_H$+x 10^3 (min^{-1})	k_N x 10^3 (min^{-1})	-log $(a_{H2O})^n$	k_e x 10^3 (min^{-1}) Estd.	k_e x 10^3 (min^{-1}) Expt.	3+logk_e Estd.	3+logk_e Expt.
0.1	1.86	4.47	-	06.33	06.94	0.80	0.84
0.2	3.80	4.68	-	08.48	09.88	0.93	0.99
0.5	10.00	5.50	-	15.50	17.33	1.19	1.24
1.0	20.89	6.92	-	27.81	29.60	1.44	1.47
1.5	33.88	8.91	-	42.79	43.31	1.63	1.64
2.0	46.77	11.22	-	57.99	60.81	1.76	1.78
					67.11[a]		
					74.19[b]		
					83.18[c]		
					90.07[d]		
2.5	63.10	14.45	-	77.55	78.90	1.89	1.90
3.0	79.43	18.20	-	97.63	98.92	1.99	1.99
3.5	97.72	23.44	-	121.16	122.54	2.08	2.09
4.0	117.49	29.51	-	147.00	148.89	2.17	2.17
4.5	104.71	28.18	(0.13)[1]	132.89	133.51	2.12	2.13
5.0	79.43	22.91	(0.16)[2]	102.34	99.83	2.01	2.00
6.0	52.48	18.20	(0.21)[3]	70.68	69.23	1.85	1.84
7.0	22.39	9.55	(0.28)[4]	31.94	32.97	1.50	1.52

Note: a=10% Dioxane, b=20% Dioxane, c=30% Dioxane, d=40% Dioxane

Where n is an integer and a_{H2O} is water activity. The estimated rates agree well with the experimentally observed rates. It is clear from the results that hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate in acid occurs via both conjugated acid species and neutral species, and their rates are subjected to positive ionic strength or water activity.

Molecularity of the Hydrolytic Reaction-
Zucker-Hammett Hypothesis[18] is made up of two parts, in the first part Hammett Postulated[19], that the reactions which give linear plot of log rate constants against acidity function (-H$_o$) did not involve water molecule in rate determining step (i.e.

unimolecular hydrolysis). The slope value 0.59 (±0.02) of the plot (figure not shown) is far from unity, indicating the absence of unimolecular hydrolytic reaction of phosphate ester.

Second part of hypothesis deals with a plot between the log rate constant and log acid molarities. A unit or approximately unit slope of plot was used as a criterion to predict the probable mechanism to be bimolecular, i.e. reaction involves the participation of water molecule in the transition state (Scheme 1). The slope value 1.17 (±0.05) clearly shows the bimolecular nature of the reaction, data is presented in Table III (figure not shown).

Table III : Hammett and Zucker Hammett plot rate data for the hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate

HCl (mol dm^{-3})	k_e x 10^3 (min^{-1})	3+logk_e	-H$_o$	log C_H^+
1.0	29.60	1.47	0.20	0.00
1.5	43.31	1.64	0.47	0.18
2.0	60.81	1.78	0.69	0.30
2.5	78.90	1.90	0.87	0.40
3.0	98.92	1.99	1.05	0.48
3.5	122.54	2.09	1.23	0.54
4.0	148.89	2.17	1.40	0.60
4.5	133.51	2.13	1.58	0.65
5.0	99.83	2.00	1.76	0.70
6.0	69.23	1.84	2.12	0.78
7.0	32.97	1.52	2.53	0.85

Table IV : Bunnett and Bunnett-Olsen plot rate data for the hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate

HCl (mol dm^{-3})	k_ex10^3 (min^{-1})	3+logk_e	3+logk_e +H$_o$	3+logk_e - logC$_H^+$	-log a$_{H2O}$	- logC$_H^+$ +H$_o$
1.0	29.60	1.47	1.27	1.47	0.02	0.20
1.5	43.31	1.64	1.17	1.46	0.03	0.29
2.0	60.81	1.78	1.09	1.48	0.04	0.39
2.5	78.90	1.90	1.03	1.50	0.05	0.47
3.0	98.92	1.99	0.94	1.51	0.07	0.57
3.5	122.54	2.09	0.86	1.55	0.09	0.69
4.0	148.89	2.17	0.77	1.57	0.11	0.80
4.5	133.51	2.13	0.55	1.48	0.13	0.93
5.0	99.83	2.00	0.24	1.30	0.16	1.06
6.0	69.23	1.84	-0.28	1.06	0.21	1.34
7.0	32.97	1.52	-1.01	0.67	0.28	1.68

Some other correlation plots like Bunnett plot[20] in which log k_e+H$_o$ is plotted against log a$_{H2O}$ and another plot is plotted between logk_e.log C$_{H+}$ and log a$_{H2O}$. The slope values are ω = 7.20 (± 0.39), ω* = 3.22 (± 0.31) respectively. Bunnett and Olsen[21] plot is plotted between k_e+H$_o$ vs - (logC$_{H+}$ + H$_o$) and obtained slope value is ϕ = 1.18 (±0.05). These slope values suggested a bimolecular nature of hydrolysis in which water is involved as a proton transfer agent in the rate determining step. Data are shown in Table IV (figures not shown).

Chemical reactions can be affected by the solvent through several kinds of interactions. Table II shows significant rise in rates with increase in percent of dioxane in water. Dioxane is regarded as a polar aprotic solvent and being a better proton donor than water. It increases the concentration of conjugated species resulting in the increase in rate. Effect of solvent on rate of the hydrolysis indicates the transition state in which charge is dispersed out. This is in accordance with chanley's observation[22]. Further evidences regarding molecularity and rigidity of transition state with probable mechanism of hydrolysis can be obtained by Arrhenius parameters[23]. Arrhenius parameters were determined for the hydrolysis of mono-6-chloro-2,4-dinitroaniline phosphate at 2 and 6 mol dm^{-3} HCl and presented in Table V. The results favor the bimolecular nature of hydrolytic reaction.

Table V: Arrhenius plot data for the hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate

HCl (mol dm^{-3})	Parameters			
	Slope	E$_a$ (Kcal/mol)	A (sec^{-1})	-ΔS$^{\neq}$(e.u.)
2	-0.025	11.44	1.99x10^8	30.89
6	-0.024	10.98	1.12x10^8	32.01

A comparative kinetic rate data for hydrolysis of some phosphate monoesters also support the bimolecular nature of hydrolysis of mono-6-chloro-2, 4-dinitroaniline phosphate involving with the cleavage of P-N bond by attack of water molecule on phosphorus of the monoester are mentioned in Table VI.

Table VI : Comparative kinetic rate data for the the hydrolysis of some phosphate monoester via their conjugate acid species

Phosphate monoesters	HCl (mol dm^{-3})	E$_a$ (Kcal/mol)	-ΔS$^{\neq}$ (e.u.)	Molecularity	Bond fission
Mono-p-toluidine	4	11.89	28.48	2	P-N
2-nitro-4-methoxyaniline	4	6.61	54.80	2	P-N
p-nitro aniline	3	15.25	9.50	2	P-N
2,4-dinitrophenyl hydrazo	3	6.44	55.47	2	P-N
2,4-dinitrophenyl hydrazo	5	5.94	56.86	2	P-N
2-methyl-5-nitroaniline	3	14.64	20.79	2	P-N
2-methyl-5-nitroaniline	4	13.73	22.87	2	P-N
6-chloro-2,4-dinitroaniline*	2*	11.44*	30.88*	2*	Present
	6*	10.98*	32.03*	2*	work*

Mechanism of Hydrolysis

(a) Formation of conjugate acid species by a fast pre equilibrium proton transfer:

(b) Bimolecular nucleophilic attack of water on phosphorus via conjugate acid species S_N^2

Inorganic Phosphate

IV. CONCLUSIONS

Acid catalyzed hydrolysis of mono-6-chloro--2, 4-dinitroaniline phosphate in 0.1 -7.0 mol dm^{-3} was found to proceed via neutral and conjugate acid species. The acid catalyzed hydrolysis is subjected to the positive salt effect of ionic strength. Bimolecular nature of hydrolysis was supported by different concepts and hypothesis such as Hammett, Zucker Hammatt, and Bunnett, Bunnett Olsen. Arrhenius parameters also supported the bimolecular nature of reaction. Bimolecular attack of water on phosphorus of the mono-6-chloro-2, 4-dinitroaniline phosphate is taken to proceed via P-N bond fission. Isokinetic relationship plots among the same type of esters whose mechanism is already known supported the P-N fission of bond. S_N^2 (P) mechanism was suggested for the hydrolysis via conjugate acid species.

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Simulation of closed loop control of DC to DC convertor

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Abstract- A Closed loop Boost dc-dc converter with novel capabilities of fuzzy logic controller is proposed, which mainly meant for constant power loads. The fuzzy logic controller controls the system to achieve constant output as per the requirement of the load. Due to the variation of input voltage and load current, a two stage ZVT boost converter with series resonant convertor is used to give supply to the load. The selected converter has the advantage of No duty cycle loss, wide zero voltage switching (ZVS) range, No ringing problem of the rectifier. The closed loop system is developed in such a way that, it provides necessary corrections for any slight variation in system output. The advantage of fuzzy logic improved the system efficiency in terms of accuracy compared to other conventional controllers. The system suits for electrolyzer.

Index Terms- Boost converter, Closed loop control, series resonant convertor, fuzzy logic controller

I. INTRODUCTION

Constant power drivers are very essential for industrial application. Advanced techniques in power electronics are available in industries for constant power applications [1]. The proposed system comes under such category which does power conditioning to improve efficiency[4]. The dc-dc converter mainly designed as a power conditioning unit, where a ZVT boost converter is used at initial stage and a series resonant converter unit at the latter stage.[7] The dc-dc converter connected to the system makes an open loop, which solely does not satisfy the load demand.[1] Considering variations in output parameter, a closed loop system is proposed to the power conditioning unit with a fuzzy logic controller. The output variables must be monitored continuously to avoid system malfunction.[5] Hence closed loop is preferred, since it eliminates erroneous conditions to a very good extend. The converter unit provides power as per the load demands.[1]

II. POWER CONDITIONING UNIT

A two stage approach is used to develop the converter unit. At first stage, ZVT boost converter provides supply to the series resonant converter unit for specified input voltage. The input voltage is boosted up to make input voltage to the series resonant converter. It provides ZVS for all primary switches.[6] The series resonant converter is operated for almost fixed input voltage. The series resonant converter works with lagging power factor and no duty cycle losses, ringing problem of rectifier is not present .A wide range of ZVS is possible. This scheme has good load efficiency [1]. To increase their efficiency and to further increase the switching frequency wile reducing the size cost and EMI

frequency resonant topology that achieves ZVS while operating at constant frequency operation simplifies EMC and magnetic component design

The resonant frequency fr of the converter is mainly determined by the inductance Lr and the capacitance Cr of the series capacitor. Turn-on switching losses of the power switches are reduced under zero-voltage switching condition as the [3] The gating signals are generated with respect to the change in output occurred. The signal is 30° phase shifted to achieve three level output. The duty cycle will be taken as per the change in output voltage.[8] The reference voltage is directly proportional to the duty cycle, which itself is proportional to the output voltage.

III. CIRCUIT DESCRIPTION AND OPERATIONs

Fig. 1 shows a closed loop system for a dc-dc converter. The circuit consists of a boost converter and a high frequency (HF) resonant converter. High frequency switching is implemented using MOSFET switches[2]. This is the high frequency link. A HF transformer provides voltage transformation and isolation between the DC source and the load. At the output side, a full bridge rectifier is connected to load. For analytical study, a resistive load is selected. The closed loop is controlled for constant output

Fig.1 Closed loop control of Dc-Dc converter with fuzzy logic controller

The circuit operation is as follows, the input voltage is boosted up through ZVT boost converter and the boost converter output is given to the series resonant circuit (SRC) .The switching frequency of MOSFET switch is 10Khz.The SRC will do the power conditioning process through its filter components. This power will be fed to the load through rectifier circuit. The fuzzy

logic controller is designed in such a way, which maintains the output constantly according to the set voltage

Fuzzy logic controller developed is as shown in Fig,2.The references block are set for -350V to 350V range with seventeen membership functions, in which one membership function is within the range of 50V.The error block contains three membership function for comparison

Fig.2 Fuzzy Logic Controller

IV.   A. SIMULATION RESULTS

The simulation of closed loop system is done using MATLAB and the results are presented .The driving pulses for MOSFETs is given in the Fig.3 .The gating pulses are given to the interleaved multicell configuration of SRC MOSFETs. The output of Dc-Dc convertor is shown in Fig. 4

For the input voltage of 40V, the output voltage is 150V provided the closed loop is set for 150V.The reference voltage can be set within a range of 100 to 350V.The controller is programmed to maintain the output within the above mentioned limit.

The output waveform of series resonant converter is given in Fig.5.Its typical operation waveforms for fixed frequency operation using phase shifted gating signals are in Fig.3

current and output voltages is shown in Fig.4.The time response is improved compared to open loop. Hence the system can be chosen for industrial application

Time in Sec

Fig.4 Output voltage of power conditioning module

The fuzzy logic controller provides an improvement by reducing peak overshoot and the settling time. The controller is programmed to maintain the output within the above mentioned limit. The output voltage is checked with the set voltage and the error signal is sent to the fuzzy logic controller unit. The controller does necessary action looking at the commands provided.

Time in Sec

Fig.5 Output voltage of series resonant converter

The output waveform of series resonant converter is given in Fig.5. The Output of SRC is a three level output, that can be studied from the plot given above. The three level output is due to 30° phase shift of the gating signals during operation. An Isolation transformer is used in order to provide isolation between the converter and the load side. The transformer turns ratio is 1:1.The plot for isolation transformer is given in Fig 6

Time in Sec
Fig.6 Output voltage of Isolation transformer

Time in Sec

Fig.3 Gating signal for MOSFETS

Plot for output

The soft switching technique is usually implemented using MOSFET or IGBT. Here we implemented zero voltage switching

(ZVT) .Force the voltage across the switching device to drop to zero before turning it ON is Zero-Voltage Switching (ZVS)

Fig.7 Zero Voltage Switching Waveform

The waveform associated with soft switching is given in Fig.7. Switching transition of MOSFETs occur at zero voltage level of gating signal [3].

V. CONCLUSION

A Closed loop Boost dc-dc converter is simulated using Simulink MATLAB and the plots are presented in this paper. From the graphical plots , we can conclude that the system is able to maintain output constantly. Due to the presence of fuzzy logic controller, rise time and settling time of the output voltage is very less and error is only ± 2 %.Hence the accuracy rate is good .

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Effect of drip fertigation on growth and yield of oriental pickling melon (*Cucumis melo* var. *conomon* (L.) Makino) under high density planting

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Abstract- A field experiment was conducted at the Kerala Agricultural University during December 2012 to March 2013 to standardize drip fertigation under high density planting in summer grown oriental pickling melon. The experiment was laid out in Randomised Block Design (RBD) with three replications. The treatments consisted of combinations of four irrigation levels (50, 75 and 100 % Ep through drip irrigation and farmers practice of pot irrigation) and three fertilizer levels (100, 150 and 200 % Recommended dose of fertilizer). Irrigation levels significantly influenced the growth characters *viz.*, length of vine, number of leaves per vine, number of branches per vine, LAI and shoot dry matter production. The highest values of vegetative characters were observed under drip fertigation with 100 per cent Ep combined with 200 per cent of RDF. The number of fruits and fruit characters like weight of fruit and volume of fruit were significantly influenced by the levels of irrigation. Maximum number of fruits as well as the weight and volume of fruits were observed at 100 per cent Ep given through drip irrigation and was significantly superior to all other irrigation levels. Fertilizer levels also significantly influenced both vegetative parameters and yield attributes. The highest growth parameters and yield attributes were observed with 200 per cent RDF. Highest fruit yield of 72.4 tonnes per hectare was obtained by drip fertigation with the 100 percent Ep combined with 200 per cent of recommended dose of fertilizer.

Index Terms- Fertigation, oriental pickling melon, high density planting, yield.

I. INTRODUCTION

Among the cucurbits cultivated in Kerala, Oriental pickling melon occupies an important place. It is mainly cultivated in the summer rice fallows as an irrigated crop. The average yield of oriental pickling melon in the state is about 25-30 tonnes per hectare under the recommended spacing of 2m x 1.5m (Anoop, 2009). Preliminary studies have indicated the possibility raising the per hectare yield of op melon to 70-75 tonnes per hectare by high density planting with short duration, less vigorous varieties (Jamuna devi, 2001 and Rajees, 2013). Oriental pickling melon variety "Saubhagya" is a short duration, less vigorous high yielding variety, maturing in 65-70 days and is suitable for high density planting. Other good qualities of Saubhagya, like concentrated fruiting and small attractive fruits, led to its wide acceptance among the vegetable growers of Kerala state.

High density planting needs more nutrients than the crop planted at the normal recommended spacing. Conventional application of nutrients has very low use efficiency. Improved methods of nutrient application through drip fertigation almost double the nutrient use efficiency. Drip fertigation, which is the application of fertilizer through drip irrigation, is one of the most efficient and convenient means of supplying both nutrients and water, according to the specific requirements of the crop, also results in higher productivity and better quality of produce (Greef, 1970). The main constraint for production of oriental pickling melon in the summer rice fallows is the scarcity of water for irrigation. Therefore a study was undertaken in summer grown op melon under high density planting to estimate the water and nutrient requirement through drip fertigation.

II. MATERIALS AND METHODS

The field experiment was conducted from December 2012 to March 2013 at the Agricultural Research Station, Kerala Agricultural University, Mannuthy, Thrissur. The experimental site is situated at 12º 32' N latitude and 74º 20' E longitude at an altitude of 22.5 m above mean sea level. The area enjoys a typical warm humid tropical climate. The experimental site is a double crop paddy wet land in which a semi dry sown crop (April - September) and a transplanted wet crop (September - December) of rice are regularly cultivated. The land is usually left fallow during summer season. Soil type of the experimental field is sandy clay loam. Saubhagya variety of op melon maturing in about 65 days was planted at a spacing of 1.00 m x 0.30 m in channels accommodating 33,333 plants per hectare. The treatments consisted of combinations of four irrigation levels (50 (I_1), 75(I_2) and 100 % Ep (I_3) through drip irrigation and farmers practice of pot irrigation @ 10 litres per plant on alternate days from flowering to maturity and half of this quantity from 10 DAS to flowering) and three fertilizer levels (100 (F_1), 150 (F_2) and 200 % (F_3) as recommended by the KAU, PoP). Entire dose of phosphorus through S.S.P was applied basal and incorporated into soil. Nitrogen and potassium were applied through drip irrigation in six split doses at weekly interval from 10 DAS to 40 DAS through urea and muriate of potash. The quantities of water used were in the order of 185, 257, and 329 mm in I_1, I_2 and I_3 levels of drip irrigation and 706 mm in farmer's practice of irrigation.

III. RESULTS AND DISCUSSION

Growth parameters

Growth parameters like length of vine, number of leaves per vine, number of branches per vine, leaf area index and shoot dry matter production at harvest increased significantly with increase in drip irrigation level from 50 to 100 per cent Ep. A high irrigation level with pot watering totaling 706 mm was inferior to both 75 and 100 per cent Ep through drip irrigation (Table 1). As the growth parameters showed linear relationship with increasing levels of drip irrigation, the study reveals the necessity for trying higher levels of drip irrigation over 100 per cent Ep under high density planting.

Length of vine, number of leaves per vine, number of branches per vine, LAI and shoot dry matter production increased significantly with increase in fertilizer levels from 100 to 200 per cent RDF. As these growth factors showed linear increase with increase in fertilizer levels from 100 to 200 per cent RDF, higher levels of fertilizer above 200 per cent RDF are to be tried under high density planting. Similar results have also been reported by Jaksungnaro *et al*. (2001) in cucumber and Alemeyhu (2001) in oriental pickling melon.

Interaction effect of irrigation and fertilizer was significant on vegetative characters like length of vine, number of leaves per vine, number of branches per vine, LAI and shoot dry matter production. The highest values of these parameters were recorded by the treatment combination of 100 per cent Ep given through drip irrigation with 200 per cent RDF.

The increase in length of vine, number of leaves per vine, number of branches per vine, LAI and shoot dry matter production in I_3 over I_1 is in the order of 18, 21, 57, 41 and 55 per cent respectively. Similarly the increase of the above parameters under F_3 level of fertilizer over F_1 level of fertilizer (RDF) is in the order of 12, 18, 39, 27 and 38 per cent respectively. The increase of the above parameters under I_3F_3 over I_1F_1 is in the order of 29, 47, 114, 88 and 107 per cent respectively. Over I_4F_1, the above parameters increased in I_3F_3 in the order of 28, 24, 125, 48 and 116 per cent respectively.

While the interaction between irrigation levels of 75 and 100 per cent Ep through drip irrigation and fertilizer levels responded positively on growth parameters (Table 2), such a strong interaction could not be seen at the lowest level of drip irrigation with 50 per cent Ep or at the highest level of irrigation (706 mm) with pot. The results obtained in this study are in conformity with the results of Bach and Hruska (1981) in cucumber and Sharda *et al.* (2006) in onion.

Both days to flowering and harvesting did not show significant change under irrigation or fertilizer levels. The interaction between them also was not significant. In general, days taken to flowering were 23 in the case of drip irrigation and 24 in pot irrigation. Days to harvest as lesser in drip irrigated plots than pot irrigated plots. Similar results were also recorded by Anoop (2009) in oriental pickling melon.

Table 1. Influence of irrigation and fertilizer levels on vegetative growth parameters Figures with same alphabets in superscript do not differ significantly at 5 % level in DMRT

Treatment	Length of vine (cm)	Number of leaves per vine	Number of branches per vine	Leaf Area Index	Shoot dry matter (kg/ha)	Days to first flowering
Irrigation						
I_1	114.9^d	15.1^c	2.3^c	1.48^c	1059.0^d	23.0^b
I_2	133.1^b	17.5^{ab}	2.8^b	1.78^b	1353.0^b	23.0^b
I_3	135.6^a	18.3^a	3.6^a	2.08^a	1642.0^a	23.0^b
I_4	122.3^c	17.3^b	2.2^c	1.81^b	1144.0^c	24.0^a
Fertilizer						
F_1	119.0^c	15.6^c	2.3^b	1.58^c	1100.0^c	23.25^a
F_2	126.9^b	17.2^b	2.6^b	1.78^b	1284.0^b	23.25^a
F_3	133.6^a	18.4^a	3.2^a	2.00^a	1515.0^a	23.25^a
SEm $\pm$	1.13	0.18	0.06	0.02	17.68	0
I x F	Sig	Sig	Sig	Sig	Sig	NS

Table 2. Interaction effect of irrigation and fertilizer levels on vegetative growth parameters

Treatments	Length of vine (cm)	Number of leaves per vine	Number of branches per vine	Leaf Area Index	Shoot dry matter (kg/ha)
I_1F_1	110.0^f	13.5^g	2.1^{fg}	1.28^e	988.3^i
I_1F_2	114.3^e	15.3^f	2.4^e	1.55^d	1043.0^h
I_1F_3	120.3^d	16.7^d	2.6^{de}	1.60^d	1146.0^{fg}
I_2F_1	125.8^c	15.7^{ef}	2.4^e	1.61^d	1176.0^f
I_2F_2	136.8^b	17.9^c	2.7^{cd}	1.75^c	1400.0^d
I_2F_3	136.8^b	18.8^b	3.3^b	1.99^b	1484.0^c
I_3F_1	128.5^c	16.9^d	2.9^c	1.80^c	1288.0^e
I_3F_2	136.0^b	18.1^c	3.3^b	2.05^b	1596.0^b
I_3F_3	142.3^a	19.9^a	4.5^a	2.40^a	2043.0^a
I_4F_1	111.5^{ef}	16.0^e	2.0^g	1.62^d	947.7^i
I_4F_2	120.4^d	17.6^c	2.2^f	1.80^c	1096.0^{gh}
I_4F_3	135.0^b	18.2^c	2.6^{de}	2.02^b	1388.0^d

Figures with same alphabets in superscript do not differ significantly at 5 % level in DMRT

Yield attributes

Yield attributes like number of fruits per plant, average weight of fruit, mean volume of fruit, fruit dry matter and fruit yield increased significantly with increase in drip irrigation level from 50 per cent Ep to 100 per cent Ep. A high level of irrigation through pot watering (706 mm) was inferior to both 75 and 100 per cent Ep through drip irrigation. (Table 3). The results indicated the superiority of drip irrigation at 100 per cent Ep (329 mm) to enhance yield and yield attributes under high density planting of op melon and the inefficiency of high level of irrigation water applied through pot watering (706 mm). As there was linear increase in yield and yield attributes due to increasing level of drip irrigation, higher levels of Ep above 100 per cent needs to be tried under higher density planting. Lower levels of drip irrigation with 50 per cent Ep as well as higher level of pot irrigation (706 mm) are not beneficial to promote yield attributes and yield of op melon. The study clearly indicated water requirement of above 100 per cent Ep through drip irrigation for op melon under high density planting. But a high level through

pot watering was ineffective. The beneficial effect of drip irrigation are due to a high water use efficiency because of application of water at the root zone of the crop, reduced seepage, percolation and evaporation losses and maintenance of an ideal moisture/oxygen relationship in the root zone which is highly essential for vegetative and reproductive growth. Results of several studies have indicated the water saving in drip irrigation is 30 to 70 per cent (Shinde and Malunjkar, 2010).

Mean fruit yield per hectare increased significantly with increase in irrigation level up to 100 per cent Ep through drip irrigation and then decreased under pot watering. The increases in per hectare fruit yield in I_3 over I_1 and I_2 was in the order of 18.7 and 36.0 per cent respectively. The increase in fruit yield of op melon in I_2 and I_3 over pot irrigation (I_4) was in the order 10 and 26 per cent respectively. Better growth expressions under I_2 and I_3 were responsible for more fruit yield under these treatments. I_4, which is the farmer's practice of irrigation, recorded significantly lower fruit yield than I_2 and I_3 because of lower production of vegetative parameters, number of fruits per plant and average fruit weight.

Number of fruits per plant, average fruit weight and mean fruit yield increased significantly with increase in fertilizer level from 100 to 200 per cent. Increase of fruit yield per hectare in F_2 and F_3 over F_1 was in the order of 7 and 19 per cent respectively. As the response of fruit yield to fertilizer level was linear in nature, it indicates that under high density planting, which has 33,333 plants per hectare, a fertilizer dose more than 200 per cent of the recommended dose for the normal population of 10,000 plants per hectare is needed.

Among the yield attributes and yield interaction between irrigation and fertilizer level was significant only on mean fruit yield. I_3F_3 recorded the highest fruit yield of 72.4 tonnes per hectare (Fig. 1). The increase in fruit yield in I_3F_3 over I_1F_1 and I_4F_1 was in the order of 61 and 48 per cent respectively. Higher level of irrigation through farmers practice and lower level of drip irrigation with 50 per cent Ep did not interact favourably with fertilizer levels under high density planting. The result clearly indicates that a favourable interaction between water and nutrients occurs only at a suitable level of moisture in the root zone of the crop. The positive interaction between irrigation and fertilizer level on enhancing the fruit yield in various vegetables has been reported by Alemeyhu (2001) and Jamuna devi (2003).

Highest fruit yield in I_3F_3 was due to the best expression of growth parameters like length of vine, number of leaves per vine, number of branches per vine and leaf area index. As all the growth parameters increased linearly with increase in drip irrigation up to 100 per cent Ep and fertilizer level up to F_3, best growth was expressed in I_3F_3. The expression of yield attributes and yield followed the same trend shown by the vegetative parameters. The study clearly indicated the superiority of drip fertigation over conventional irrigation and manurial practices by the farmers. As the plant population in the trial was 33,333 per hectare compared to the normal recommended population of 10,000 plants per hectare, the water and nutrient requirement through drip fertigation under high density planting was found to be more than the tried maximum level of 100 per cent Ep and 200 per cent RDF tested in the trial. Therefore, further studies are required to standardize the drip fertigation requirement of op melon at high density planting.

Table 3. Influence of irrigation and fertilizer levels on fruit characters, yield and days to harvest

Treatment	No. of fruits per plant	Average weight of one fruit (g)	Volume of one fruit (cm^3)	Mean fruit yield (t/ha)	Days to harvest	Fruit dry matter (kg/ha)
Irrigation						
I_1	2.3[d]	624.9[b]	637.3[b]	49.1[d]	65.0[b]	4414.0[d]
I_2	2.7[b]	638.9[b]	652.8[b]	58.3[b]	65.0[b]	5248.0[b]
I_3	2.8[a]	710.2[a]	724.4[a]	66.8[a]	65.0[b]	6010.0[a]
I_4	2.5[c]	626.8[b]	639.3[b]	52.9[c]	67.0[a]	4757.0[c]
Fertilizer						
F_1	2.4[c]	638.7[b]	652.2[b]	52.3[c]	65.50[a]	4707.0[c]
F_2	2.6[b]	645.4[b]	658.2[b]	56.0[b]	65.50[a]	5031.0[b]
F_3	2.7[a]	666.7[a]	680.0[a]	62.0[a]	65.50[a]	5584.0[a]
SEm $\pm$	0.039	9.31	9.71	0.479	0	61.90
I x F	NS	NS	NS	Sig	NS	NS

Figures with same alphabets in superscript do not differ significantly at 5 % level in DMRT

Fig 1. Interaction effect of irrigation and fertilizer levels on fruit yield

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Recent Innovations in Yarn Technology: A Review

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Abstract- A significant amount of studies have already been devoted to the advancement of spun yarn production technology. This article has critically evaluated some recent innovations in spun yarn production such as twisting mechanism based on superconducting technology in ring-spinning system, concept of manufacturing cluster spun composite yarn and development of bobbin tracing system based on RFID technology. All the above mentioned technologies consist of huge potentiality and have not been commercialized yet in the industrial sector. This paper depicts the above aspects and their feasible interactions.

Index Terms- Bobbin tracing system, Cluster-Spun Yarn, RFID technology, Superconducting magnetic bearing (SMB).

I. INTRODUCTION

Most of the latest innovations in spun yarn production are modifications of current techniques as well as advances in processes and product qualities. A foremost drawback of existing twisting mechanism of ring spinning is the friction between the ring and traveller. The implementation of 'superconducting technology based twisting mechanism' remarkably reduces the friction between ring and traveller during production [2].Another new concept of producing composite yarn called cluster-spun yarn. Here, polyester multifilament are spread by applying a slotted roller and then blended with cotton fibre. This yarn reduces the slippage tendency of staple fibres relative to the filaments in core spun composite yarns [1] . Besides, the purpose of 'Radio Frequency Identification (RFID)' bobbin tracing technique is to identify the bobbin to spindle in the spinning frame during the process of production. The target bobbins are traced and recorded in the spinning frame via non-touching dual-directional data communication. The bobbin information can be implemented to observe the quality of spun yarn from each spindle [6].

II. INNOVATIVE TWISTING SYSTEM BASED ON SUPERCONDUCTING TECHNOLOGY

A. Background

In the short staple spinning process, the ring-spinning technology is most extensively used nowadays. A combined action of ring and traveler is applied for inserting twist and winding the yarn on cops. However, the principal drawback of this twisting system is the friction between the ring and traveler. At higher speed this friction generates heat and thus decreases the productivity. A magnetic bearing system based on superconducting technology can be implemented to overcome this limitation by replacing the existing ring/traveler system. This

superconducting magnet bearing includes a circular superconductor and a durable magnet ring [2].

B. Principle of superconducting magnetic bearing

The SMB is the collaborating force between an agent system (such as a permanent magnet (PM)) and High Temperature Superconductors (HTSC) components. These bearing acts as self-stabilizing, that is, they stay as completely passive devices without any essentiality for position sensing and control [2].

Figure-1: Levitated magnet over superconductor (HTSC)[2].

A PM is positioned over a superconductor at few millimetres distance. The flux lines of the PM go through the superconductor are pinned by nano-crystalline defects. This is executed by cooling the superconductor at -196°C with liquid nitrogen, which is termed as the 'flux pinning effect' [8].

C. Designs of superconductor magnet bearing ring

Hossain(2010) [3] suggested two renowned designs of SMBthat can be implemented as twisting and winding devices in the conventional ring-spinning machine.

- SMB1, where a magnetic ring rotates coaxially overa superconductor ring;
- SMB2, where a magnetic ring rotates coplanarinside the superconductor ring(Hussain, 2010) [3].

In Figure 2(a), the PM (rotor) and the superconducting ring (stator) are organized coaxially with the spindle axis instead of the typical ring/traveler system. The PM is levitated and free to rotate, while the superconductor ring stays fixed[2].

Figure-2: Superconducting magnetic bearing, SMB1: (a) topology; (b) cross-sectional view of SMB1 [2].

Figure-3: New concept of ring-spinning using SMB1 [2].

D. Ring spinning with SMB

The superconducting ring has been placed on a non-magnetic brass pot, which is utilized as a container for liquid nitrogen in order to cool down the superconductor shown in Figure 4(a). In Figure 4(b), the entire SMB system is represented after its placement in the ring-spinning tester [2].

Figure-4: Superconducting magnetic bearing: (a) construction; (b) implementation in the ring-spinning tester [2].

The YBCO ($YBa_2Cu_3O_{7-X}$) superconductor is cooled at -196° C and kept at this temperature throughout the entire spinning process before yarn production in SMB [2].

Figure-5: Schematic diagram of superconducting magnetic bearing SMB1 before cooling [2].

Figure-6: Spinning with the superconducting magnetic bearing ring-spinning machine [2].

In order to affix the levitation distance a non-magnetic spacer has been utilized between the PM ring and superconductor. The flux lines of the PM ring penetrate the superconductor ring, as represented schematically in Figure 5[2].

E. Advantages of SMB over the conventional ring/traveler system

The core advantages of SMB over the conventionalring/traveler system mentioned by Hossain, Abdkader, Cherif, et al., (2013) [2]summarized as follows.

- The SMB is a type of passive magnetic bearing system.
- No need of extra system and sensor to run SMB.
- This bearing technique can be executed as a radial, axial, linear bearing system for high-speed applications like in linear transport systems, turbo machines, etc.
- In comparison with active magnetic bearing system the construction of this kind of bearing is simple.
- The SMB is a durable bearing system, which is essential to prevent tension variation of yarn during the spinning process.
- The friction-free SMB can increase the productivity of the ring-spinning machine because of its stable rotation at high speed.

F. Future Prospects

SMB system proposes an enormous possibility to replace the current ring traveler system. However, the weight and the size of the PM and the superconductor ring is required to be more optimized. A theoretical method has to be established in order to predict the yarn tension, balloon formation, the weight of PM, etc.by considering the superconductor magnetic bearing system. As there is no friction in the SMB during running, it is possible to spin yarn to double the speed of the ring spinning machine. Hence, the SMB can bring revolution at the twisting mechanism of yarn by eliminating the friction of the ring/traveler system in the typical ring-spinning machine [2].

III. CLUSTER-SPUN YARN – A NEW COMPOSITE YARN MANUFACTURING TECHNIQUE

A. Background

In recent years, researchers are giving emphasis on further developments of Composite yarn spinning methods. A general drawback with core-spun composite yarns manufactured on the ring spinning frame is the slippage of the staple fibres comparative to the filament [7] .To build up the required cohesion between the sheath and the core component a high level of twist can be applied. But this will rise production costs and reduce production speed as well [5] . To resolve these deficiencies a new concept of composite yarn production called "cluster-spun yarn", where polyester multifilament is drawn by a slotted roller and cotton fibres are act as the staple part. The multifilament is divided into two or three (even four) substrands by a slotted roller with fine grooves and thus a clustered spun yarn is produced [1] .

B. Production of Cluster Spun Yarn

A modified conventional ring spinning frame with a slotted roller to facilitate feeding of polyester multifilament to the front rollers of the drafting system is applied in order to manufacture cluster-spun composite yarn [1] .

In this operation, the spinning frame is modified with a spread slotted roller (Figure 7.) having fine grooves (1 mm). Before clustering and joining the staple fibres at the front roller nip, the filaments are passed over a flexible tensioning device. At the top of the drafting unit a thread guide is placed to ensure accurate positioning of the filaments at the centre of the drafted fibre strand [1] .

Figure-6: Schematic diagram of the device for the spinning of cluster-spun yarn [1] .

Figure-7: Schematic of the slotted roller for spreading [1] .

C. Properties of Cluster spun yarn

The properties of cluster spun yarn are characterized by Gharahaghaji, Zargar, Ghane et al., (2010) [1] shown in the followings.

The tenacity and elongation of cluster-spun yarns is much higher than that of core-spun yarns. This indicates that clustering significantly influence the yarn properties as well as structure because of the reasons pointed below:

Polyester filament and cotton fibre blend provides a greater frictional force and fibre cohesion.

Reduces the slippage tendency of the staple fibres comparative to the filament. Enhanced fibre migration in the yarn.

Figure-8: Longitudinal view of the cluster-spun spun yarn [1]
.

Figure-9: Longitudinal view of the core-spun yarn [1] .

From Figure 8 and 9, it is noticeable that cluster-spun yarns have a clearer appearance than core-spun yarns. In addition, the cluster spun yarn structure is more packed and tighter than core spun yarns.

D. Future Prospects

The distinguished internal structures and structural mechanics of a cluster spun yarn have outcomes in superior properties of the yarn. This upgraded yarn properties and structure reduce the slippage tendency of staple fibres relative to the filament. Furthermore, higher frictional force and cohesion result in evenly and firmly blended polyester filaments and the cotton fibres in cluster-spun yarn. In addition, lower twist is necessary to produce a quality yarn. Overall, cluster-spun yarn has a huge potential to perform a significant role at the commercial application of composite yarn spinning in near future [1] .

IV. RFID TECHNOLOGY BASED BOBBIN TRACING SYSTEM

A. Background

The predominant barrier of quality control for every spindle in spinning frame is the loss of information related with bobbins and spindles after the point-of-spinning. Based on RFID technique, the information of bobbins associated with serial number of spindles is identified and recorded automatically in this process. The RFID (Radio Frequency Identification) is termed as a non-contact automatic identification technique [6].

B. Development of electronic spool

Electronic spool and bobbin are the two substantial elements in the management of bobbins applying RFID technology [6]. As shown in Figure 8, the electronic spool is a spinning spool attached with a RFID tag [4].

Figure-10: Structure of electronic spool[6].

The tracing management is an object database management system with ability of traceability. The information of bobbin can be obtained through the system [6].

Liu and Gao (2010) [6]stated that the tracing system of bobbin has the following two important aspects.

- It is essential to attain traceability of each bobbin. In order to trace a single bobbin, each bobbin needs to attain a unique identity (UID).
- It is appropriate to apply the information of tracing a bobbin for queries; the bobbin information is recorded and saved as database in case of tracing.

C. System structure

Figure-11: Diagram of system structure [6].

Figure-12: Hardware of bobbin management information system (B-MIS)[6].

According to Liu and Gao(2010)[6], the reading system is principally consists of three components.

- An RFID tag (Texas Instruments Incorporated (ISO15693) established on the bobbin to be recognized.
- Tag reader (ID ISC.MR100/101) as a read or write/read device.
- An antenna (Texas Instruments Incorporated: RI-ANT-T01A, 13.56 MHz) discharging radio signals to operate the tag and read/write data to it.

D. System function

Liu and Gao(2010)[6] suggested that this system can be acquired with the following main functic To Reader

- Spool login: Newly purchased electronic tags are attached on each spool of spun yarn.
- Bobbin login: Based on the spindle order of spinning frame each spindle is ranked and the spool is established to the ranking spindle of spinning frame.
- Bobbin use: The winder information about the bobbin used and the time of use are stored in the database.
- Bobbin management: Inventory inspection and analysis of bobbin location in the warehouse are contained in the management of bobbin stored in the warehouse.
- Bobbin information tracing: The ambiguous bobbin will be analysed from the database and the entire information about it will be displayed.

Liu and Gao(2010)[6] exhibited the development of primary functional module in the following three aspects:

- Real-timing: A multi-thread programming technology is implemented in research to enhance the actual timing of software.

- Reliability: Application program is accountable for processing, storage, and presentation of the reader's identification information.
- Universality: This software method is assembled for a particular intension to assist the application of other incidents without much alteration onto the system.

Figure-13: Main module of electronic tag system [6].

Figure-14: Module of electronic tag database system [6].

Figure-15: Reading process of electronic tag [6].

A specific spool code is stored in the database due to the registration of spool in the bobbin management system; this step is termed as spool registration [6].

E. Advantages of utilizing RFID in Bobbin Tracing System

The benefits of applying RFID in bobbin tracing system asserted by Liu and Gao(2010)[6] outlined below.

- To comprehend shared information among bobbins, spindles, winding, and other connected techniques.
- RFID for quality control automation of bobbin can be applied to differentiate precisely individual bobbin from distinctive spindles.
- Application of bobbin real-time and closed loop tracking information can enhance yarn quality and achieve possible economic benefit.

- Improve the efficiency of data collection by multi-tag identification.

F. Future prospects

There are various areas for future prospects on the RFID based bobbin tracing system. Firstly, RFID management system of bobbins needs to be organised for the transaction of data among enterprises to attain tracking, tracing, and other exchange in a broader extent. Currently, the internal exchange of data in an enterprise information management system can be executed in this process, which could act as the foundation for exchange of information among enterprises. Secondly, management areas are required to be expanded in the textile industry to form new application solutions. The application of RFID is the only technique restricted in the aspect of bobbin management till now [6].

V. CONCULSIONS

The inventions discussed in this paper exhibit huge potential in spun yarn production. They can play a vital role as all of them are time saving, cost effective and ensure to manufacture a better quality yarn. This definitely will create a momentous influence in the spun yarn production if these technologies can be commercialized appropriately at the industrial sector. However, further research is still required to bring successful commercialisation of these concepts.

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Security in WLAN using Kerberos

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Abstract- The Kerberos Authentication Service, developed at MIT, has been widely adopted by other organizations to identify clients of network services across an insecure network and to protect the privacy and integrity of communication with those services. This paper gives an overview of kerberos in WLAN. It describes the framework used and operation's performed by kerberos in WLAN.

Index Terms- EAP Over LANs (EAPOL), Kerberos realm, proxy server, Personal Digital Assistant.

I. INTRODUCTION

Owning to the growing popularity and use of computers and network-based devices, providing privacy and data integrity have become crucial, in order to protect data, resources and systems from attacks and unauthorised access. For purposes of attack prevention, authentication and access control play a vital role. In recent years, to meet the increasing demands in secure computer communications, various security protocols have been developed. Most of these protocols agreed upon a cryptographic key or achieved authentication specifications. In order to meet increasing demands, various security protocols have been developed. Kerberos is one of these commonly used mechanisms[1] [2] . The Kerberos Authentication Service was developed by the Massachusetts Institute of Technology (MIT) to protect the emerging network services provided by Project Athena. Versions 1 through 3 were used internally [5].

II. LITRATURE REVIEW

The Kerberos Authentication Service, developed at MIT, has been widely adopted by other organizations to identify clients of network services across an insecure network and to protect the privacy and integrity of communication with those services. In this chapter existing security and cryptography techniques of Kerberos are critically analysed [1][2]. In addition, wireless communication networks and their security aspects are also critically analysed. Detailed explanations of kerberos framework and basic operations of kerberos in wireless network are explained.

III. THE FRAMEWORK FOR KERBEROS IN WLAN

The wireless LAN is secured via permitting authorized access to information and services, while preventing unauthorised access to and corrupting the network as shown in Figure 1. Since Kerberos is a trusted 3rd party authentication protocol and application independent, its paradigms and entities are finalized [1][2]. As it can be seen from Figure 3.1, the cryptographic protocol, programs and data containing the credentials of the legitimate entities of a particular wireless LAN environment are installed on each of the entities as well as TGS and KDC. The credentials are the identities of the devices (such as MAC addresses) and they are stored with cryptographic protection.

The cryptographic protocol adopts the challenge-response paradigm. The interactions between the entities are represented using numbers 1-19. These numbers represent the interactions between the legitimate entities of a wireless LAN environment. Numbers 1, 2, 3, 16, 17 represent the interactions between the client and the access point while numbers 4, 15, 18, 19 represent the interactions between the access point and the authentication server. The numbers 5, 6, 7, 8 and 9, 10, 11, 12 represent the interactions between authentication server and KDC, and authentication server and TGS respectively. Also, numbers 13, 14 represent the interactions between KDC and TGS.

The involved steps are explained below:
1. The supplicant (wireless client) sends an Extensible Authentication Protocol over LAN (EAPOL) start message to the authenticator (access point) requesting authentication.
2. The access point (AP) responds with a challenge to the supplicant to supply the supplicant's device identity. The AP also bundles the MAC address of the AP itself along with the challenge on actual network traffic under strong encryption to the supplicant.
3. The supplicant responds to the AP after processing the challenge. The supplicant processes the challenge by decrypting the challenge text and ensuring that the AP's MAC address is found in the supplicant's database of possible APs that the supplicant can use to connect to the server or other nodes in the wireless LAN. The supplicant's response is also under strong encryption.

Authentication Server/Certification Authority

Figure 1: The proposed Framework

4. The AP challenges the authentication server (AS). The challenge text is bundled with the AP's and the supplicant's MAC address still under strong encryption.

5. The AS sends an EAP Over LANs (EAPOL) start message to the KDC requesting authentication.

6. The KDC responds with a challenge to the AS to supply the AS's device identity. The KDC point also bundles the MAC address of the AS itself along with the challenge on actual network traffic under strong encryption to the AS.

7. The AS challenges the KDC. The challenge text is bundled with the AS's, AP's and the supplicant's MAC addresses still under strong encryption.

8. The KDC responds to the application server's challenge after processing the content of the challenge text. The process involves the decryption of challenge text and a confirmation or proof of knowledge of the existence of both AS and the address of the server. The KDC sends this response under encryption to the AS.

9. The AS sends an EAPOL start message to the TGS requesting authentication.

10. The TGS responds with a challenge to the AS to supply the AS's device identity. The TGS points also bundles the MAC address of the AS itself along with the challenge on actual network traffic under strong encryption to the AS.

11. The AS challenges the TGS. The challenge text is bundled with the AS's, AP's and the supplicant's MAC addresses still under strong encryption.

12. The TGS responds to the AS's challenge after processing the content of the challenge text. The process involves the decryption of challenge text and a confirmation or proof of knowledge of the existence of both AS and the address of the server. The TGS sends this response under encryption to the AS.

13. The KDC server challenges the TGS. The challenge text is bundled with the KDC's, AP's and the supplicant's MAC addresses still under strong encryption.

14. The TGS responds to the KDC's challenge after processing the content of the challenge text. The process involves the decryption of challenge text and a confirmation or proof of knowledge of the existence of both KDC and the address of the KDC. The TGS sends this response.

15. The AS responds to the AP's challenge after processing the content of the challenge text. The processing involves the

decryption of the challenge text and a confirmation or proof of knowledge of the existence of both the AP and the supplicant within the secured database of the server. The response includes the MAC address of the server. The AS sends this response under encryption to the AP.

16. The AP challenges the supplicant to run the program to authenticate the end user.

17. If the user responds correctly to the authentication request, the supplicant responds accordingly to the AP.

18. The AP sends the users sign-on response from the supplicant to the AS for the necessary processing.

19. The AS responds to the AP with either the ACCEPT packet or the REJECT packet, depending on the outcome of the processing, to the AP. This makes the AP to transition to the authorized state to allow traffic to and from the supplicant with the ACCEPT message or unauthorised state with the REJECT message.

The proposed model presented above is addition of a new variant on highly confidential, popular authentication protocol, Kerberos for wireless LANs.

IV. BASIC OPRATION OF KERBEROS IN WIRELESS COMMUNICATION NETWORK

In wireless networks, although Kerberos relies on the provisions of IEEE 802.1 x standards, owing to the fact that, its operation is system and application independent, security features for authentication are independent as well. Kerberos protocol assumes that initial transactions take place on an open network where clients and servers may not be physically secure and packets travelling on the network can be monitored and even possibly be modified.

Due to the critical function of the KDC, multiple KDCs are normally utilized, where each KDC stores a database of users, servers, and secret keys. However, since the KDC stores secret keys for every user and server on the network; they must be kept completely secure. If an attacker were to obtain administrative access to the KDC, the attacker would have access to the complete resources of Kerberos realm[4].

Kerberos tickets are cached on the client systems. If an attacker gains administrative access to a Kerberos client system, he can impersonate the authenticated users of that system. In other words, the authentication service authenticates the client

and replies to the client with a ticket to the TGS. The TGS receives the ticket from the client and checks its validity and replies to the client with a new ticket for the server the client wishes to use. In order to prevent ticket hijacking, Kerberos KDC must be able to verify that the user who is presenting the ticket is the same user to whom the ticket was issued. This is shown in Figure 2.

1. Authorisation

1. Client associates with AP   **2. AP blocks access to network**

Kerberos Authentication Server
+
Key Distribution center

3. Client login with user name and password

2. Authentication

4. Client mutually authenticate with Kerberos. AP only bridge authentication traffic, all communication encrypted per kerberos

5. Client receives Kerberos ticket and establish to communicate security with AP

Kerberos Authentication Server
+
Key Distribution center

6. Client provides Kerberos to AP and mutually authenticate to AP

Figure 2: Kerberos in action in a wireless network

The performance evaluation of Kerberos security protocol have two different achievements, public key assistance and the addition of a proxy server.

Firstly, they used public-key infrastructures Public Key Cryptography for Initial Authentication in Kerberos (PKINIT), Public Key Cryptography for Cross-Realm Authentication in Kerberos (PKCROSS) and Public Key Utilizing Tickets for Application Servers (PKTAPP). In PKINIT, messages are added to change user secret key authentication to public key authentication. It manages secret keys for large number of clients. Nevertheless, it does not address key management of large number of realms. Additionally, as mentioned above, Kerberos uses key distribution and all tickets in its realm are issued by KDC. Since all authentications pass through the KDC, this causes performance bottleneck. At this point, PKTAPP is used for trying to eliminate bottleneck and reduce communication traffic by implementing authentication exchange directly between client and application server.

Secondly, in the same study they have proposed the use of proxy servers, Initial Authentication and Pass through Authentication using Kerberos V5 and GSS-API (IAKERB) and Charon for mobile communication systems. Former one is used as a proxy server, when a client could not establish a direct connection with KDC. Latter one adapts standard Kerberos authentication to a mobile Personal Digital Assistant (PDA) platform. Charon uses Kerberos to establish a trust relationship between a user and a proxy. However, as a result, it is possible to say that, although some additional public-key infrastructures are added to various stages of Kerberos, in terms of server and network capacity, they are fully suitable for simpler networks and could not work with more than one application server. In addition to these, a proxy is used to increase encryption process for both client and server; however, it produces delays during the transactions of authentication messages between client and server. Additionally, since wireless network speed increases, the proxy became insuffient and affects the response time.

Kerberos assisted authentication in mobile ad-hoc networks has been created by utilizing traditional features of Kerberos. Their logic appears to lack evidence that the notorious flaws of traditional Kerberos have been addressed in their solution. These flaws include replay attacks and distributed session keys. However, their solution seems to address issues of password guessing attacks.

V. CONCLUSION

In this paper Basic terms and techniques used in this research are defined. Kerberos authentication protocol and its basic operation in wireless communication networks are studied. The existing authentication methods developed for Kerberos in wireless communication networks are critically analysed . The

design of authentication protocols, generally, tends towards the adoption of public key infrastructure methods. This trend is a result of the observed weaknesses and limitations of the shared key schemes. In the context of shared key schemes, compromise of the shared key within any host or principal inadvertently compromises the entire system. KDCs bottleneck problem is solved through PKTAPP. Speed is increases. But password guessing attack is possibility still Kerberos is one of the most preferred authentication mechanisms.

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Engineering Economic Analysis - A Case Study

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Abstract- Economic analysis is an effective tool in the decision-making process. The Economic Analysis process is an iterative procedure for evaluating and ranking alternatives that meet an objective. In present case study of problem faced by a small scale industrialist in choosing best alternative manufacturing method is discussed.

I.   INTRODUCTION

Economic analyses are "pre-expenditure" analyses designed to assist a decision-maker in identifying the best new projects or programs to adopt. Program evaluations are "post expenditure" analyses designed to evaluate ongoing approved projects/programs to ensure that objectives will be attained in a cost effective manner. The analyses are based on actual performance.

The Economic Analysis process is an iterative procedure for evaluating and ranking alternatives that meet an objective. Proper performance of this process requires each of the following six key steps be done to completion(fig 1):

Fundamental Rules for the selection and Planning of a manufacturing Process

1. The process must assure a product that meets all design requirements of quality, function and reliability

2. Daily production requirement must be met

3. Full capacity of the machine and its tooling should be utilized

4. Idle operator and idle machine time must be reduced to minimum

fig.1

5. The process must provide the maximum utilization of the minimum amount of material

II.   CASE STUDY

Mr.K.Satyanarayana, entrepreneur, having tool-room and fabrication shop. He got an order for fabrication structure, requires 100nos of blanks of mild steel, Dia 140mm and 5mm thick. He is having the following machinery and equipment..

- • 1.6feet lathe
- • 2.1/2"Dia drilling machine
- • 3.Welding Trans former and allied equipment
- • 4. A tool cutter and grinder
- • 5. Gas cutting equipment

• 6.Hand grinder

And necessary tools and consumables.

Mr.Satyanarayana has to choose best manufacturing method which is economically cheap and viable.

Mr. Satyanarayana's Problem can be found a solution by using the Economic analysis process.

Problem solving method-

Step 1 Objective- To manufacture 100nos of mild steel blanks of dia 140mm and 5mm thickness.

Step 2 Alternatives-Different methods of manufacturing blanks-

1.Blanking operation using mechanical press

2.Gas cutting operation and subsequent machining on lathe.

3.Chain drilling and subsequent machining operation on lathe.

4.Cutting blanks on drilling machine using flying cutter, which can be manufactured in his shop.

Step 3 – assumptions –

1.He is having Semiskilled labour only and no big material handling equipment.

2. It is a one time job and can not afford to invest much money for the above job.

Step 4- Costs involved and benefits, if any in each operation-

1.Blanking operation on mechanical press, which he does not have, and has to be out sourced. The cost of tooling is very high for each blank manufacturing, as the quantity required is very small. More over the technical feasibility of blanking of 100mm and 5mm thickness is very less,as it requires very big mechanical press, (350 tons capacity).

2.Gas cutting of small blanks requires very skilled workman and ,material will get wasted in cutting and machining allowances.

The material required for gas cutting is standard sheet of 1mX3m . The weight of the sheet is more to little bit difficult handle without handling equipment.

3. Chain drilling on the periphery of circle as shown in the figure1 and machining subsequently. In this process extra material will be lost and the sheet metal of size 1mx3m to be used.

4.Cutting blanks on Drilling machine requires a flying cutter as shown in the figure2, can be manufactured at own shop. And the blank not requires any further machining .The material that can be of strips of 150mm width by 3m/6m length. It can be handled easily.The chamfer on one side of the blank helps in fabrication.

Fig 2 required blank

Fig 3 chain drilling

Fig 4 flying cutter

III. CONCLUSION

The same methodology can be extended to new product development, new projects.

SNo	Process description	Cost/ benifit	Remarks
1	Blanking by press	high tooling cost	inhouse not available
2	Gas cutting	high skill labour more material extra machining	inhouse not available
3	Chain drilling	high skill labour more material extra machining	time consuming
3	drilling flying cutter	no high skill labour no extra machining	recommended

Comparison Table

Above table reveals that the process of making the blanks by using flying cutter is most economical and viable for Mr.Satyanarayana.

Fig5 blank prepared with flying cutter

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A study on Paracetamol consumption by undergraduate students in the Faculty of Allied Health Sciences, University of Peradeniya

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Abstract- Self prescribing practices has become a substantial area in health sector due to mal-practices. This study was undertaken to determine the knowledge and perceptions of undergraduate students at University of Peradeniya about the Paracetamol usage by self medication practices. A pre validated questionnaire was administered to 273 randomly selected students in all five courses of Faculty of Allied Health Sciences, University of Peradeniya. Descriptive statistics and multiple logistic regressions were used in data analysis. Associations were evaluated using chi square tests. From all the respondents, 67.4 % were female and 32.6 % were male students. And most of the students were in the age range of 22 – 24years. Most of the respondents were not engaged in exercises or sports. Although self prescription pattern was followed by highest proportion of the study population, the disadvantages of this practice were emphasized by 65 % of students. Main practical reason reported for self prescribing of Paracetamol is having a good knowledge to use it properly and potential source of acquiring Paracetamol was pharmacies and retail shops. "Paracetamol should be taken with a doctor's prescription" was reported to be the main overall concept of majority of students enrolled in all five courses and majority of students reported that self practicing of Paracetamol was harmful. The study determined that self prescription pattern in the use of Paracetamol is more common than doctor's prescription practice among Allied Health Sciences students.

Index Terms- Paracetamol, Self prescribing, students, socio-demographic characteristics

I. INTRODUCTION

Paracetamol is one of the most frequently used drugs in self prescribing situations which is a common practice among university students who allured to use a range of medicines from conventional anti-pains to antibiotics without a doctors' prescription [1]. Self medication is the selection and use of medicines by individuals to treat self recognized illnesses or symptoms [2]. Non-prescription medication taking behavior might lead to problems of misuse [3] and Paracetamol is the commonest agent employed in self poisoning [4]. Illicit use of prescription pain medications may represent a problem among undergraduate students [5]. Because self-medication is one component of self-care, more awareness about the responsible self-medication is needed to foster the level of students' attitudes towards self-medication practices [6] and it is important to consider the manners of drug availability and consumption to decrease unnecessary health risks.

Paracetamol as a drug is prescribed for mild to moderate pain and pyrexia. This drug should be used with caution in hepatic impairment, renal impairment and alcohol dependence. It interacts with anticoagulants, cytotoxics, lipid regulating drugs and metoclopromide and side effects are rare but rashes, blood disorders as thrombocytopenia, leucopoenia and neutropenia are reported. Over-dosage of Paracetamol causes liver damage and less renal tubular necrosis. Administration of activated charcoal is a useful treatment for Paracetamol poisoning [7]. Poor knowledge regarding side effects, over estimation of the lethal dose and wide availability contributed to increase suicidal incidents [4].

A. Methodology to Evaluate Drug Use

A previous study performed to assess the effect of the questionnaire structure on recall of drug utilization in a population of university students using two alternative versions of questionnaire; proved that a better concept about prevalence of medicines can be obtained using a questionnaire consisting drug specific questions [8].

There is no published data on usage of Paracetamol by self prescribing practices in the Allied Health Sciences students of University of Peradeniya is not available. The overall objective of this study was to evaluate the Paracetamol usage by self prescription. This is a significant area of the study because the pattern of self prescribing and the knowledge on Paracetamol usage will be measured through this study. Results of the study will be useful to educate the students about the advantages and disadvantages of self prescriptions and doctors' prescriptions in usage of Paracetamol.

II. METHODOLOGY

A. Study Site

A descriptive cross sectional study was conducted in the Faculty of Allied Health Sciences, University of Peradeniya to evaluate Paracetamol usage among allied health sciences students by self prescriptions.

B. Study Population and sampling

273 students enrolled in the five Allied Health Sciences courses were selected randomly from first year, second year, third year and fourth year students proportionately. Half of the students from each course were selected. The sampling design

was single stage and this method of study which obtained first hand information from the respondents was useful to get better conclusions.

C. Study Design

The questionnaire was prepared in Sinhala medium and English medium for the purpose of better understanding because of the social ethnicity exist in the university. The pre-validated questionnaires were distributed to randomly selected students to collect data. The process followed standardized protocol including informing the purpose of the study and encryption of respondent's response for confidentialities. The whole questionnaire consisted of open ended and close ended questions. The questions were easily accessed and answered by students. The questionnaire was pretested and the comments were incorporated in the final version. The pretesting method was useful to understand information such as the level of understanding the questions, difficulties in obtaining the information, number of non-responses, order of the questionnaire, missing questions and the space for answering the questions.

D. Data Collection and Analysis

Data were collected from participants based on three months experiences and analyzed using SPSS statistical package 17.0. The results were presented as absolute figures and percentages to evaluate the Paracetamol usage among Allied Health Sciences students in University of Peradeniya. Both self prescriptions and doctor's prescriptions were considered as sources to evaluate Paracetamol usage. According to the analyzed results, better conclusions were formulated. The results obtained from students enrolled in all courses were compared with variables as age, gender, economical factors, most common reason for self-prescription or doctors' prescription of Paracetamol, most common sources from which the student gain knowledge on Paracetamol and the most common method to obtain Paracetamol without a prescription. This comparison was very useful to get another better conclusion with regard to the knowledge and

practices of the respondents of five courses. A chi-square test was used for categorical variables. $P < 0.05$ (two-tailed) was considered statistically significant.

Inclusion criteria- Active responses
Exclusion criteria- Non-responses

E. Ethical Issues

To obtain the consent of the respondents prior to data collection, a detailed explanation on the aim and objectives of the study was given and confidentiality was ensured.

III. RESULTS

A. Percentage distribution of the respondents

The data collected from the 273 respondents are presented as percentage distribution according to concerned variables. Percentage distribution of the respondents by courses of Faculty of Allied Health Sciences was 29.7% nursing, 22.0% physiotherapy, 18.3% radiography, 15.8% medical laboratory services (MLS) and 14.3% pharmacy students. Highest proportion of students was enrolled in nursing course while nearly same percentages of others were enrolled in pharmacy, medical laboratory sciences, physiotherapy and radiography. Majority of the respondents were females (67.4%) and nearly one-third were male students (32.6%). 56.8% of students belonged to 22 – 24 years age group. Rest of the students belonging to 20 – 22 years (56.8%) and >24 years (19.8%). When concerning the income level 64.1% of the sample was from families receiving middle monthly income of Rs. 10,000-30,000. Nearly one-fifth of students were from families receiving lower income. 6.6% of students were from families receiving income higher than Rs. 50,000. Health status of the respondents was evaluated by concerning criteria as involvement of sports and frequent exercise. Only 13.6% and 22.3% of students allured to involve in exercises and sports respectively. Majority of respondents had not participated in sports or involve in frequent exercise.

B. Usage of Paracetamol by self prescribing

Figure 1: Patterns of taking Paracetamol

According to figure 1, more than three-fourth of the students had taken Paracetamol without a doctor's prescription. Only few students had taken Paracetamol with a doctor's prescription.

Figure 2: Method of obtaining Paracetamol

The reported main potential source of acquiring Paracetamol was pharmacies and retail shops. Significant number of students had obtained Paracetamol from friends and had used left over tablets. An insignificant percentage of students had obtained Paracetamol from neighbors according to figure 2.

Figure 3: Criteria for self practicing Paracetamol

Majority of respondents (66%) had taken Paracetamol without a doctor's prescription based on their previous experiences on Paracetamol usage. The other respondents had got advices from parents, friends and health practitioners in addition to their experiences as shown in figure 3.

Figure 4: Practical reason to take Paracetamol without a medical prescription

Figure 4 shows that the main practical reason reported for self prescribing Paracetamol is having a good knowledge to use it properly. One-fourth of students revealed the reason for self practicing is as it was not necessary to meet a doctor prior to taking Paracetamol. Other reported practical reasons in minor percentages were to avoid cost and to avoid wasting time.

Figure 5: Self practicing of Paracetamol is harmful

According to figure 5 majority of students reported that self practicing of Paracetamol was harmful. A significant percentage of students reported it as not harmful. However about one-fifth of students had not taken any judgment.

Figure 6: Overall concept of using Paracetamol

When concerning figure 6, although most of the respondents practiced self medication with Paracetamol, they asserted their overall concept on Paracetamol usage as Paracetamol should be taken with a doctors' prescription. About one-tenth of students expressed their overall concept as self prescription with Paracetamol as not harmful. Rest of the students reported self prescription practice is time saving and cost effective.

IV.   DISCUSSION

Paracetamol is an over the counter (OTC) drug which is recommended for indications such as mild to moderate pain and pyrexia according to the British National Formulary [7]. In this descriptive study we have analyzed the impact of several variables on usage of Paracetamol by self prescribing among Allied Health Sciences students. Homogenous nature of the study center and prospectively defined criteria of Paracetamol usage were included as the strength of the study. Randomly selected sample of subjects is representative of all Allied Health Sciences courses; pharmacy, physiotherapy, MLS, radiography and nursing. Multicultural students were included in the study as they have different beliefs and personal views on health and medicines using patterns.

Previous studies revealed that about 83.1% of university students used non-prescription drugs [3] and self medication is the most prevailed pattern in using medications among the subjects [3,9]. According to the outcomes of many researches Paracetamol and non steroidal anti inflammatory agents (NSAIDs) were the most frequently consumed medicines [1, 2, 4, 6] and analgesic usage was very common among university students, which was 98% [2]. The most famous drugs in general practitioners' drug prescribing practices were Phenoxymethylpenicillin, Paracetamol and Diazepam for males and Diazepam, Codeine and Triazolam for females [10].

The overall results of the study which aimed at assessing the usage of Paracetamol by self prescriptions as well as by doctors' prescription could not be compared with the previously conducted studies because they have mainly focused on self prescription patterns instead of considering both self prescription and doctors' prescription patterns. The main reported indications for self prescribing of Paracetamol were headache, common cold and fever [11].

According to a previous study only 38.5% students practiced self medication [1] in contrast to current study which revealed more than 77% students practiced self medication with Paracetamol. Only 8% students of total obtained a doctor's prescription prior to using Paracetamol while 15% students practiced both (figure 1). A previous study determined that there was a significant difference in drug usage between the different courses [12]. When considering patterns of the Paracetamol

usage of five courses separately, 79% students in pharmacy and nursing practiced self-medication with Paracetamol; 76% of medical laboratory sciences and physiotherapy students used Paracetamol without a prescription which was practiced by 73% of radiography students. Nearly one tenth of students enrolled in pharmacy, medical laboratory sciences and radiography reported prescription pattern with Paracetamol. Only 4% of nursing students and 6% of physiotherapy students practiced doctor's prescription method when using Paracetamol. The student population who obtained doctor's prescription prior to taking Paracetamol is relatively low in physiotherapy and nursing when compared with other three courses. There were no statistically significant association between the following courses and the patterns of Paracetamol usage.

A study conducted in Brazil has concluded that the medication knowledge might contribute to increase self-medication [9, 13]. Similarly significant associations between the Paracetamol usage and Allied Health Sciences courses were observed from the outcomes of current study as prevalence of self prescription practice is higher among them (figure 1). Accordingly higher educated people seem to be more animated in self medication. But another research found that there were no significant differences between medical and non-medical students regarding self-medication practices [14].

In current study, figure 4 shows that the highest number of respondents had reported that they used Paracetamol without a prescription because of having a good knowledge about Paracetamol usage while a minimum percentage of respondents reported it was to avoid cost of doctor visit, without a course variance. This attribute was highly characterized by pharmacy students who had not thought that it is not necessary to see a doctor before taking Paracetamol, when compared to other courses. It might be due to their medical knowledge regarding pharmacokinetics, pharmacodynamics and pharmacology related to the drugs. So they might know the risk of not seeing a doctor before taking a drug more than other students. According to literature prior experiences and mildness of the disease were the two main reasons for self medication [1, 6].

This study determined the potential source of acquiring Paracetamol as pharmacies and retail shops which dispense the drugs as Paracetamol without a prescription (figure 2). The highest percentages of the students enrolled in all five courses had obtained Paracetamol from the pharmacies. It is a major issue that the most of the pharmacies do not offer any counseling on the proper use of Paracetamol and supply the drugs such as Paracetamol without prescription only considering on their profit maximization. It is a big responsibility of the pharmacists to reduce the self prescription practice with Paracetamol. A significant percentage of the students had used left over Paracetamol. It is pharmacists' and regulatory authority's duty to

enforce the people to use doctors' prescription with Paracetamol usage to reduce misuses and readmissions. A past study reported that large storages of home medicine cabinets as the potential source of both prescription and OTC drugs for the students attending a private university in Bangladesh [15] and another study revealed that the main source of acquiring drugs is drug retail outlets [6].

Majority of the respondents had used Paracetamol with and without a doctor's prescription on their previous experiences (figure 3). Apiece of half students had practiced doctor's prescription pattern and self prescription pattern with Paracetamol on the advice of a health practitioner. Only one student had used Paracetamol with a doctor's prescription on the advice of the parents. Only one student had got advices from the friends to use Paracetamol with a prescription. According to literature the reported uppermost information sources were self decisions followed by family and friends [6] or peers followed by family members [5]

Socio-economic characteristics cause wide range of variations of self prescribing practices [13]. Statistical outcomes of the study revealed that there was a significant association between the gender and the reasons for self prescribing Paracetamol. Female students used Paracetamol more frequently by self prescribing than males. This fact was proved in a study designed to assess the impact of sex on self-medication patterns and showed that females acquired drugs for self-medication more than male students [16]. This can be justified concerning fact that females used analgesics and antihistamines significantly more frequently [12] and according to a study, 70% of the students with menstrual discomfort used OTC medication for manage discomfort [17]. The highest percentage of both genders had taken Paracetamol without a doctor's prescription because of having a good knowledge (figure 4). Nearly one-fourth of total males and total females had mentioned that it is not necessary to see a doctor before taking Paracetamol. Minimum percentage of female students had used Paracetamol without a prescription to avoid cost. But none of male students had mentioned that cause as a reason for Paracetamol self prescription. According to these results the education and the knowledge was the dominated factor for increase self prescription practice among the students. The sex difference had not significantly impacted on the overall concept of Paracetamol usage (Figure 6). Majority of them had reported that Paracetamol should be taken with a doctor's prescription. But the problem is the motivation of them for self prescribing Paracetamol, knowingly the disadvantages of that.

There was a statistically significant association between the age groups and the method of Paracetamol usage. More than half students with the use of Paracetamol without a prescription were in 22-24 years age group which was females with 15 – 24 years age group in a previous study. Nearly half respondents practiced doctors' prescription method with Paracetamol was also in 22-24 years age group. The lowest percentages of the respondents used Paracetamol with a prescription and without a prescription were in 20-22 and >24 years age groups respectively. In accordance with these results, the self prescription practice was more common among the students in 20-22 years age group. A significant percentage of the students had used both patterns in 22-24 and >24 years age groups.

The statistics of the study showed that there was no significant association between the age groups and the reasons to take Paracetamol without a prescription. The highest percentage of the students had reported that they practiced self prescription with Paracetamol due to having a good knowledge, without an age variance (figure 4). The lowest percentage of the respondents in all age groups had mentioned that they used Paracetamol without a prescription, to avoid cost. So, the age has less effect on the reason of Paracetamol self prescription.

Most of the respondents in all age ranges had mentioned that Paracetamol should be taken with a doctor's prescription (figure 1). Rest of the students in 20-22 years age group had reported that the self prescription with Paracetamol is not harmful (figure 5). None of them had advised to others to take Paracetamol without a prescription, on the previous experiences and had mentioned that the practice of self prescription with Paracetamol saves time and money. A minimum percentage of the students in 22-24 years age group had revealed that they advice others to take Paracetamol without a prescription. The lowest percentage of the students in >24 years age group had reported that the self prescription of Paracetamol is not a harmful practice and it saves the time and money. The results show that the students in all age groups have enough knowledge to understand the importance of a prescription. But the problem is that they feel self prescription as not harmful (figure 5) on their previous experiences.

Majority of the students had taken Paracetamol without a prescription, without an income variance. Only one student with a 30000-50000 rupees income had taken Paracetamol with a prescription; in which the result was similar to >50000 rupees income level. Majority of the students used Paracetamol without a doctors' prescription were in 10000-30000 rupees income level. According to the results of a previous study, self-medication tended to be higher in people with intermediate incomes [13]. But, there were no significant association between the income levels and the reasons to take Paracetamol without a prescription. The highest proportion of the students getting <10000, 10000-30000 and >50000 rupees incomes had used self prescription pattern as they having a good knowledge to use Paracetamol properly. The highest percentage of the students getting 30000-50000 rupees income had reported that it is not necessary to see a doctor before taking Paracetamol. None of the students having 30000-50000 and >50000 rupees income had reported that they used self prescription with Paracetamol to avoid the cost. This result might be obtained because the cost of doctor visit is not such unbearable expenditure for the students having higher income levels. But, with the students having other income levels, the lowest percentage had taken Paracetamol without a prescription to avoid cost.

Most of the respondents who used Paracetamol with or without a prescription had not participated in the sport events; 13 % from the respondents who participated in the sport events had taken Paracetamol with a doctor's prescription while 22% had taken without a doctor's prescription. So participation in the sport events could be explained as a diminutive predictor to Paracetamol using patterns. In accordance with the outcomes of the study, involvement in frequent exercises also could be recognized as a diminutive factor which was insignificantly affected the method of Paracetamol usage.

Previous studies showed that more than half of the students disagreed with the practice of self medication [6] and 90% of all students mentioned that Paracetamol could cause death; while majority of them overestimated the lethal dose [4]. The investigations of current study showed that there was no statistically significant association between the following Allied Health Sciences courses and the overall concept (Figure 6). Although the majority of students in all five courses had practiced self-medication with Paracetamol, their overall concept was "Paracetamol should be taken with a doctors' prescription". Generally a minimum percentage of students except MLS students had reported that they advice others to take Paracetamol without a prescription on their previous experiences. It seems nevertheless majority of students have a good knowledge about the pros and cons of self-medication practices with Paracetamol, they have used to self medication practices due to the traditional acceptance and experiences. Self-medication might be used as a way to cope with the obstacles to medical care.

Finally the results of this study suggest that the self medication practice with the drugs as Paracetamol is more common among the Allied Health Sciences students in University of Peradeniya than the prescription medication pattern. Impact of several factors such as the course and physical activities on the Paracetamol using pattern was insignificant.

V.   CONCLUSION

In accordance with the results of this study self prescription pattern was more common than doctor's prescription pattern among Allied Health Sciences students in University of Peradeniya. These practices of students were not significantly influenced by the socio-demographic factors such as physical habitats, following Allied Health Sciences course. Pharmacies and retail shops are easy accessible sources of drugs such as Paracetamol due to various economic aspects. Not only university students but also general public should be mind imprinted that self medication of drugs such as Paracetamol is not always appropriate to be used to overcome health problems.

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Contract Farming of Potatoes: A Case Study of PEPSICO Plant

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Abstract- Contract farming involves a pre-agreed price between the company and the farmer. The agreement is defined by the commitment of the farmer to provide an agricultural commodity of a certain type at a time and a price and the quantity required by a committed buyer, mostly a large company. The present paper is intended to conduct a case study of PEPSICO Plant, located in village Channo, district Sangrur, Punjab. Present study provides a detailed look on concept of contract farming and relationship between processing firm and farmers in the villages around the plant. The methodology used in the study is the interview schedule by random collection of primary data where the study subjects are the farmers practicing contract farming in the villages. Study concludes that majority of the large farm size farmers are involved in contract farming as compare to small farmers. But on the other hand contract faming provides a more reliable, regular and timely sources of income to farmers. Broadly speaking, it suggested that for the successful implementation of contract farming there should be appropriate co-ordination between the farmers and buyers both acting in organized manner and advisable for both sides.

Index Terms- Contract farming, Large and Small Farmers PEPSICO Plant, Processing firm.

I. INTRODUCTION

Contract farming is a system which refers to production and supply of agricultural produce under a forward contract. It is a commitment to provide an agricultural product at a fixed price, time and required quantity to a known buyer (Singh 2002). It basically, involves four things- pre-agreed price, quality, quantity and time. The way farmers perceive contract farming, it is a relationship with the firm while from the purchaser's point of view, it is a good quality, timely availability of material at a pre-determined price, which is the basic requirement for any successful agro-business firm whether operating at National /International market. Simply, it allows for establishing direct relationship between the farmer and firm, as substitute for open market. It is a flexible means which supports price and production and an assured market in advance. Contract farming is essentially a market driven farming, not like traditional farming, where farmers first produce a product and then search for its market. Contract farming provides provisions in three main areas are given below-

1. **Market Provision**: In this both grower and buyer agree to the terms and conditions of future sale of a product.

2. **Resource Provision**: In this buyer agrees to supply selected inputs like seeds, fertilizers, technical advice regarding the cultivation of crop.

3. **Management Specification**: The grower agrees to follow the recommended production method and input supply from the firm (Eton et al., 2001).

The essence of contract farming is production and supply of agricultural produce under advance contract in which supplier has agreed to produce certain agro –processing produce quantity under pre-decided price. Prices are fixed at planting time and firm provide proper supervision over the production process to the farmers. Generally, contracts provide benefits to both the firm and contracted growers particularly with respect to risk of crop failure conditions. On the other hand, firm also takes advantage like quantity and quality of the product. In this manner relationship between the firm and farmer is find one of the close one.

II. AIM AND OBJECTIVES

The present study explains the concept and behavior of processing firm and farmers towards Contract Farming. With this aim, the following objectives of the study are outlined.
- To explain the concept of contract farming.
- To study the profile of PEPSICO Plant.
- To study the relationship between the size of holdings and adoption of contract farming.

III. METHODOLOGY

The present study is based on an intensive fieldwork conducted in particular villages namely Banera khurd, Ageta, Ageti, Thuhi, Soja, Lalauda from Nabha Tehsil, district Patiala and Channo, Rajpura, Nadampur falling in District Sangrur, Punjab. Present study is micro level study and primarily based on primary data collected randomly through interview schedule. These villages are purposively chosen and 50 farmers are chosen through random sampling method. Most of the farmers from these villages are presently practicing contract farming with PEPSICO Plant. Considering this factor above mentioned villages are selected for the survey. First come first surveyed policy is adopted for interview schedule. It includes the data on total farm size, total area under contract farming, about the purchaser, initial and present area under contract farming, type of contract, duration of contract, price and payment schedule of

company and flexibility of the contract and facilities provided by company.

IV.   RESULT AND DISCUSSION

A.   *Concept of contract farming*: Agriculture is the backbone of Punjab's economy. Punjab is known as granary of India. Punjab has emerged as the dominant state for production of wheat - rice and leads to highest productivity in the country. The most important factor behind this is the presence of good irrigation facilities and mechanization of agriculture in recent years, use of high yielding variety of seeds and chemical fertilizers. Monoculture of these two crops leads to the involvement of large number of farmers. High Yielding Variety seeds have changed the entire situation of Punjab which means traditional agriculture progressively provide way to modern and commercial agriculture. Nowadays, there is a limited possibility of exploiting the potential of these crops to increase their yield. Mono-cropping pattern has adversely affected the ecology and hence has created many problems like lowering of water level, water logging, many diseases for human beings and animals, adversely affected soil health, burning of wheat –paddy straw has lead to air pollution and declining profitability are all accompanied with the monoculture of cropping pattern under green revolution.

An urgent need was felt in mid 1980s to diversify the cropping pattern towards the high value crops considering the agro-climate conditions, availability of land and water resources and market demand both at national and international level. The Expert Committee on Diversification of Agriculture in Punjab (popularly known as Johl Committee) recommended in 1986 that at least 20 percent of the area under wheat and rice must be replaced by other competitive and profitable alternative farm enterprises. But due various reasons, the recommendations of Johl Committee 1986 were not accepted by the Government of India as well as Punjab Government although the policy makers, planners, administrators and agricultural scientists talked about the need for the diversification of Punjab's agriculture (Singh and Asokan 2003). The major decline witnessed in farm income and productivity during the 1ast period so again, to boost the diversification of agriculture in Punjab, Chief Minister's Advisory committee on 'Agriculture Policy and Restructuring', headed by Dr.S.S.Johl submitted its report in October 2002 to Union Government of India through the state government on 'Agriculture Production Pattern Adjustment Program in Punjab for Productivity and Growth', through diversification of Punjab agriculture. The committee recommended that one million hectares of *rabi* sowing for wheat and *kharif* paddy cultivation should be diversified either in terms of variety of crops grown or technologies used. In the meantime, Punjab Government started its own scheme known as 'Contract Farming Scheme', for bringing diversification in Punjab agriculture from *rabi* season 2002-2003. Punjab Agro Food Corporation Ltd (PAFC) was made to act as only a nodal agency for implementing this scheme in the State. Under this scheme, the area was to be shifted from rice and wheat cultivation to other high valued crops like durum wheat, winter maize, hyola, sunflower, barley, basmati rice, vegetables and others. At that time government had planned to

diversify four lakh acres under different crops during 2002-2003, which was targeted for increase to 25 lakh acres in 2007(Dhaliwal et.al.2004, p.2). State Government suggest only one solution for agriculture and that is contract farming which provides infrastructure in the form of cultivation, new technology and labour intensive crops and assured market. No doubt, introduction of contract farming has its roots to prevail over the problems which have emerged by mono-culture of wheat – paddy.

Contract Farming by private companies however, began in early 1990s with the entry of Pepsi Foods – a Multinational Company (PepsiCo) subsidiary into tomatoes and chillies cultivation, and a local firm, Nijjar Agro Food Ltd, into tomatoes. PepsiCo started contract farming of tomatoes in Hoshiarpur district of Punjab. It got further rooted with the selling of its tomato facility by Pepsi to Hindustan Lever Ltd, (HLL) – a multinational company which processes one –tenth of world's tomato production. Since two of the firms (Pepsi and HLL) are export oriented and the local firm (Nijjar) indirectly, through Nestle, supplies tomato paste to Nestle under contract. In 1995, Pepsi entered into potato contracting (Singh 2000). Reliance Life Sciences and McDonalds are some of prominent companies that have started contract project. PepsiCo and other companies have used the contract system for cultivation of basmati rice, chillies and as well as for vegetable crops such as potatoes. Without any central assistance, Punjab Government through the Punjab Agro-food Corporation as a nodal agency undertook the Contract Farming Programme as vehicle to achieve crop diversification.

B.   *Profile of Processing firm/ PEPSICO Plant*

The PepsiCo offers contracts which are procurement and input based contracts under which the firms not only agree to pick the product under contract at a fixed time and price but also provide inputs like seed to farmers which is clearly shown in figure - 2. In return the farmers pay some amount to company in advance according to acreage under contract. The PEPSICO Plant provided two types of varieties to the farmer. One is LR and other is CH1, Duration of the LR variety is 60 days, and Duration of CH 1, is 120 days. The harvesting of crop is done only when the crop get maturity phase. Generally, after 90 to 120 days of sowing, it can be harvested. Grading of the produce is very essential. It ensures a higher income to the growers. After grading potato tubers are further graded by the firm as shown in the figure-1. But, the firm accepts only 45 mm, recommended size of the potato.

Figure 1: size of potato

PepsiCo Plant also provides a kit which includes chemical fertilizers, pesticides, used as liquid spray on the crop. For kit the firm also takes some payment in advance from the farmers. Besides this, the firm provides certain facilities and technical advice to the farmers such as inspection by the field officer after fifteen days, arrangement of meetings and lectures through seminars by technical staff members in the villages, to promote contract farming. And in seminars, discussions about the problems related with contract farming and their solutions. Communication links between farmer and manager is also good as described by the selected farmers. Local knowledge gained from the farmer is accepted by the field inspector. Among these facilities, PepsiCo Plant has also a provision of broadcasting of weather information about rain and frost conditions which is harmful for the potato crop. This information is provided through the tower which is installed at suitable place in the village. These facilities are made available to the farmers free of cost.

In fact the contracts are only written commitments. But farmers are not aware about the written proof which includes acreage and quality conditions. Only the educated farmers are keeping this type of written agreement. In the case of PEPSICO Plant, the acreage for potato crop under PepsiCo Plant's contract should not be less than 5 acres in the region. This is strictly followed by firm. These are the requirements for the farmers to enter in to contract farming. The contract price for contracted crop is fixed by the firm in the beginning. The firm also fixes the time, quality and quantity of the produce with the farmer. Produce testing and quality checking function is also performed by the firms with sophisticated equipments, which causes a lot of tension between the farmers and the firm. Payment schedule is made within week after delivery by cheque in the bank account of the farmer.

The firms do not allow the farmers to sell the produce in open market. But only at certain conditions like, company allows part of the acreage produce to be sold outside if enough procurement is available and the production is higher from the desired expectation. If, company finds farmer's cheating or negative behavior with company and he selling the produce in open market or else, then company declares him as a defaulter and a blacklisted that farmer. Company has not gone in for legal action against the defaulters.

Fig: 2, Profile of PEPSICO Plant

C. *Relationship between the size of holdings and adoption of contract farming:* As already discussed earlier PEPSICO Plant also has its own terms and conditions for signing

agreement with the farmers. Table-1, reveals the size distribution of sample owner farmers contracting with PEPSICO Plant. Clearly the involvement of marginal farmers is totally ignored by the firm. Participation of small farmers is also very less as compared to the semi- medium, medium and large farmers. The firm sets some rules and regulation for contract farming scheme like the acreage for potato should not be less than 5 acres. So the minimum acreage required for contract farming is 5 acres and it is strictly followed by the firm. This firm also favours larger farmers as compared to small -holders. The main reason is behind this is the economic motive of firm. According to the firm, small farmers' lack knowledge about modern inputs; modern technology and proper use of modern inputs are also difficult because of lack of land. So working with the small – scale farmers is difficult for the company. Through the interviews with small farmers it has been found that small farmers earn more profit by leasing -out land on rent than doing agriculture. And off- farm and other opportunities are also attracting them towards the non-agricultural sector. So the firm is biased against the small-holders. There are many scholars like Singh 2000; Glover 1987, who have also argued that firms is biased in their nature in the selection of farmers under contract.

Table-1: Size of holdings and adoption of contract farming

Land owned(in acres)	No. of farmers
Less than 2.5	Nil
2.5-5.00	3
5-10	7
10-25	11
25+	29
Total	50

Source: Field work

Change in area under contract on Farms: The farmers who adopted contract farming in different years have increased their area under contract with PEPSICO Plant. Table-2, shows that in year 1990-91, the initial area under contract with sample growers was only 16 acres. In fact, this was the starting year of contract farming in region. On those farms now 200 acres is under contract. The sample growers who joined in 1992-93 had only 7 acres and presently it has increased to 105 acres. Earlier farmers were not much aware about the contract farming and they were not involving themselves in contract farming. But with time, they became aware about the benefits from the contract farming and slowly and steadily, more and more farmers started involving in contract farming. In 1994 – 95, area under contract

farming was 44 acres, which was much larger area as compared to previous year. The similar expansion was recorded in the following years. Credit goes to the Johl committee which was established in 2002, and it set the target under which minimum 20 percent area was diversified from traditional crops to commercial crops. This triggered the increase in area under contract. After that increase in area under contract farming has been significant. It is quite obvious, that there is a regular increase in the contracted area as compared to the initial area year after year. It has been observed during field visits and interaction with the farmers that the company was reaping huge benefits from the scheme and they promoted potato farming through their favorable policies. This certainly indicates that the potato cultivation under contract farming has been equally profitable for farmers.

Table-2: Change in contract area on different farms under contract farming by selected farmers-

Year	Initial area (in acres)	Present area (in acres)
1990-91	16	200
1992-93	7	105
1994-95	44	110
1996-97	9	50
1998-99	2	7
2000-01	32	131
2002-03	48	256
2004-05	61	176
2006-07	35	215
2008-09	20	51
2010	3	10

Source: Field work

V. CONCLUSION

Potato crop is cultivated in Patiala, and Sangrur districts of Punjab. Irrigation is mainly done with the tube- wells. And only large famers have sprinkler in their fields. All farmers are well versed in growing and harvesting conditions of the crops. Firm signed written contract with farmers. But some farmers have reported that the firm signed written contract but no written proof is given to farmers. On the whole, this fact created awareness among the farmers. Some educated farmers have the written agreement with them. All the farmers were well aware regarding the duration of the contract. Firm provided technical knowledge, motivation and other extension services to the farmers. Firm also provided chemical fertilizers kit to the farmers and took payment in advance from the farmers as per acre under contract. Irrigation mainly operated with help of tube- wells and only 12 percent farmers have sprinklers in their field. Firm also gave incentives to farmers who have sprinklers in their fields. Field officers' mutual understanding with the farmers is congenial and supporting. Transportation is mainly arranged by the farmers who are located near the firm, but farmers who are located far-away from the firm, for them firm provided incentive regarding their transportation cost. Area under contract farming has been gradually increased from the initial area under contract farming by all farmers. Farmers are getting benefit from the contract farming that's why area under contract system has been increasing. The biased nature of the firms against the small holders has a negative effect. These biased contracts create the social problems in the society. These types of contracts also create social differentiation and unrest. The capacity of small scale farmers to participate in the commercial market is much different than large scale farmers. Especially, vegetables are labour incentive, production cost is higher, overhead supervision of labour and paid labour all main factors that enables the farmers to adopt contract farming. Due to these constraints, the companies find difficult to work with small scale farmers. But in spite of these, contract farming has maintained its interaction and advantages for both buyers and consumers. It is also suggested that for successful implementation of contract farming there should be proper co-ordination between farmers and firm then both will be acted in organised manner and advisable for sides.

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Design and Weight Optimization of Aluminium Alloy Wheel

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Abstract- This paper deals with the design of aluminum alloy wheel for automobile application which is carried out paying special reference to optimization of the mass of the wheel. The Finite Element analysis it shows that the optimized mass of the wheel rim could be reduced to around 50% as compared to the existing solid disc type Al alloy wheel. The FE analysis shows that the stress generated in the optimized component is well below the actual yield stress of the Al alloy. The Fatigue life estimation by finite element analysis, under radial fatigue load condition, is carried out to analyze the stress distribution and resulted displacement in the alloy wheels. S-N curve of the component depicts that the endurance limit is 90 MPa which is well below the yield stress of the material and safe for the application. The FE analysis indicated that even after a fatigue cycle of 10^{20}, the damage on the wheel is found only 0.2%.

Index Terms- AlSi7Mg0.3, wheel rim, Design optimization, stress analysis, weight optimization, fatigue analysis.

I. INTRODUCTION

A sport utility vehicle or suburban utility vehicle (SUV) is similar to a station wagon or estate car, and are usually equipped with four-wheeled drive for on- and-off road ability. Automobile Wheels are classified into many types based on their complexity / simplicity and their material strength to withstand worst loading conditions. In the case of heavy loading condition steel wheels (density: 7.8 g/cc) are preferred and for medium and low load condition Al (density: 2.7 g/cc) and Mg (Density: 1.54 g/cc) alloy wheels are suggested essential for aesthetic look. However, in any type of wheel, the basic construction is consisted of a rim, a hub, spokes/arms/wires and tires. Various wheel specifications used for design are PCD, height, offset distance, bead width, humps, drop centre etc. Casting process such as low and high pressure die casting is used widely to make the wheels. Forming processes such as forging, extrusion etc are also being used for making the wheels. A new extrusion process has been developed recently for making automobile wheel out of AZ80 Mg alloy (1). Conducting various tests such as radial fatigue, impact and bending fatigue confirm that AZ80 Mg alloy can meet application requirement of wheel in automobile (1). Additionally, casting and forging processes have been used for the manufacture of Mg alloy automobile wheel (2-5). It has been mentioned that the most accepted procedure for car wheel is to pass through the tests such as radial and cornering fatigue test (6). The recent introduction of alloy wheel for car, which has more complicated design and shape than a regular shape, needs prediction of fatigue life by analytical methods rather than a regular test. Limited research has been carried out on the analysis of wheel disc using finite element analysis (7-9). Ramamurty et. al. (10) have studied the fatigue life of aluminium alloy wheels

under radial loads and reported that the predicted fatigue life of wheel is found to be in close agreement with the experimental observations. Gope (11) has reported that minimum of three specimens are needed to predict the fatigue life using log normal distribution. Wang et.al. have (12) analysed the fatigue life by finite element simulation. ABACUS Software was used for building the static load finite element model. The results of Al alloy wheel rotary fatigue bench test showed that the wheel failed and the crack initiated around the bolt hole area which is closely agreed with the prediction by simulation. It was also reported that during the assembly of wheel disc, considerable amount of stress is developed in the component and alters the mean stress value. Guo et.al (13) have reported that inclusion of clamp load improves the prediction of the critical stress area and fatigue life. In the previous study, it is observed that in most of the cases fatigue life estimation and prediction of suitability of alloy for wheel disc is carried out; however no attempt has been made for mass optimization and design of alloy wheel. Hence, in the present investigation an attempt has been made to analyse the alloy wheel from a solid disc shape to an improved design which resulted into use of less requirement of mass of material with improved design. The objective of this paper is to design an aluminium alloy wheel by meeting all the design standards. In this paper, the area between the rim and the hub is considered for optimization. Topology Optimization has been carried in 5 cyclic cases where the loading conditions are similar for every 72°. This new optimized design is analyzed under radial, bending and lateral loads to determine the stresses induced in static condition of the wheel of automobile. The succeeded model is used to evaluate to determine its life period under radial loading condition.

CAD Design of Wheel

The CAD design of wheel is prepared based on the standard nomenclature at the outer and the hub region of the wheel. Figure 1 shows the CAD design of the wheel rim before optimization

Fig. 1 CAD design of rim before optimization

Material used

In the present investigation Al-Si (B.S.: LM25 alloy) is used. The alloy mainly consisted of 6.5-7.0.0%Si, 0.3-0.4% Mg and rest is Aluminium. The properties of the alloy used is in heat treated (T6) condition. The properties of the alloy are shown in Table 1. The microstructure of the alloy in heat treated condition shows primary Al and near spherical eutectic Si. Fine precipitate of Mg_2Si is responsible for improved properties.

Table 1. Material properties of LM25 aluminum alloy in T6 condition (14)

material properties	Magnitude with units
Tensile Stress	230 MPa
Endurance Limit	56 MPa
Modulus of Elasticity	71 (GPa)

Shear Strength	120 MPa
Tensile Yield Stress	185 MPa
Compressive Yield Stress	185 MPa
Elongation (%)	4
Density	2.685 g/cm^3 at 20°C

II. FINITE ELEMENT ANALYSIS

The FE model is prepared for 36° of its circumference as the remaining part can reflected exactly. The required modifications can also be done in the same portion. Hexahedral and pentagonal elements are used for modeling. Finite element modeling and analysis is carried out using **Hypermesh**. Element size of 5 mm is used for meshing with 100118 elements and 100200 nodes. Figure 2 shows the 2D and 3D elements of the wheel rim and the cross section.

Fig 2: 2D and 3D element representation of Rim and its cross section

Some of the elements are deleted in between to maintain the average element length of 5mm. The FE model prepared for 36° of the rim is rotated completely as shown below.

Loading conditions

Optimization is done to reduce the material consumption hence to reduce the weight of the wheel. Hence the loading conditions were considered based on the automobile weight applied over it. Each wheel in an automobile will carry the load by distributing among them. This load is considered to be along the radial direction and applied it in optimizing the model for mass. Figure 3 shows typical radial Loading of 9000 N.

Fig. 3 Radial Loads with respect to Bolt Location Model Setup for Optimization

The loads on the wheel are transferred by using RB3 elements. The space required optimizing and the standard design space is segregated. The model is optimized by using topology optimization design variables. Figure 4 shows the constraints and loading locations.

Fig. 4: Model Setup shows the constrains and loading location

Weight Optimization

In the recent days considerable efforts are being made to reduce the weight of the components which ultimately reduces the overall weight of the vehicle. It is observed that a proper design brings about useful shape to carry the load applied on the system distributed in a manner to sustain the applied load and which intern reduces the weight of the component.

Optimization of the wheel rim is done through Hypermesh – optimization solver. Optimization is carried out taking special reference to the minimum material requirement to sustain the stresses applied on the wheel during operation. Figure 5a shows the shape of the wheel rim before optimization and Fig. 5b shows the shape of the wheel rim after optimization. Figure 5c shows the actual shape of the wheel. It is observed that the mass of the wheel rim was 26 kg of Al alloy and after optimization the actual mass required for the wheel rim is reduced to 12.15 kg of Al alloy. This shows that there is a reduction of 13.85 kg of Al alloy for making the components. This exercise clearly indicates that a proper optimization of wheel rim considerably reduces the useful mass of Al alloy required to make the component. This clearly shows that a proper optimization may leads to a minimization of material use to 52%. Considering, the cost of Al alloy of Rs. 300 per Kg resulted in a saving of Rs. 4000/- approximately by using proper optimization technique.

(a) (b)

(C) Actual view of the wheel after optimization and removing the unwanted material.

**Fig.5 (a) Initial size and shape of wheel rim and (b) Optimized size and shape of Rim
(c) Optimize view of the wheel rim after removing the unwanted material.**

Boundary conditions

In order to do the Finite Element Simulation, one has to consider boundary conditions. In the present simulation following boundary conditions were used:
(i)   Radial load of 8976 N was used
(ii) Lateral load of 4044 N was used
(iii) Bending load of 4488 N was used.

The wheel fixed to a vehicle experiences different loads due to its position. The loads applied on wheel are divided into six sub – cases and acting on the wheel as depicted in the Figure 6. All the bolt holes are constrained with rigid spiders and connected to the centre of the drive shaft. The driveshaft is represented with a single RB2 element.

Fig. 6 Boundary conditions for applied load on the wheel

Static Analysis of New Design of wheel

On the basis of optimized results, CAD model was developed. Figure 7a shows the typical CAD model of the wheel rim. For carrying out the finite element analysis, mesh was developed using Hyper mesh. Figure 8b shows the mesh model of the optimized wheel rim. Based on the optimization result, the new design of cad and its FE model is created as shown below:

(a)

(b)

F**ig.7 (a) CAD model and optimized design of the wheel rim (b) Mesh model of the wheel rim for finite element analysis.**

Static Analysis

Static analysis is carried out using two loads in each loading condition namely radial load, lateral load and bending load. The stress and displacement on the wheel at each loading condition were found out. Table 2 shows the stress experiences by the wheel rim and the displacement occurred due to stress on the material. It may be noted that the stress value is well below the yield stress of the Al alloy.

Table 2: Results of Static Analysis

LOAD TYPE	STRESS (MPa)	DISPLACEMENT(mm)	Remarks
Radial Load Case 1	94.56	0.73	ok
Radial Load Case 2	93.00	0.71	ok
Lateral Load Case 1	58.86	0.32	ok
Lateral Load Case 2	63.47	0.29	ok
Bending Load Case 1	34.33	0.394	ok
Bending Load Case 2	34.33	0.394	ok

Stress and Displacement contours

   (i)   Radial Load

Fig. 8 Stress and displacement contours for the radial load applied on the wheel rim.

Figures 8 (a & b) show the displacement contours of the wheel rim under radial load condition. The stress distribution of wheel rim of passenger car under radial load condition is done to assess the vehicle condition mainly in off road field area and uneven road. It is noted from the Table 2 that a displacement of 0.73 is obtained by applying a radial load of around 94 MPa. The FE analysis could reveal that the rim flange has the maximum displacement. Figures 8 (c) & (d) show the stress profile by applying the radial load. The maximum stress felt by the wheel rim is around the rim flange area.

   (ii) Lateral Load

Figures 9 (a&b) shows the displacement contours of the FE analysis of the wheel rim when applied lateral load. A displacement of 0.32 is noted by applying the lateral load. A stress of 58-62 MPa is experienced by applying the load. This value is much below the yield stress of the material. Figures 9c & 9d show the stress contour for the application of lateral load. It also shows that rim flange of the wheel felt maximum stress.

Fig. 9 Stress and Displacement contours of the FE analysis for Lateral Load

(iii) Bending Load

Figures 10 a&b show the displacement contours of the wheel obtained by FE analysis . The bending load applied is around 4488 N and the displacement obtained by FE analysis is 39 mm. which experiences near the sproket. The stress contour is showed in Figs. 10c & 10d. It is observed that due to bending load the maximum stress generated is 34 MPa at the sproket region. The stress value obtained is well below the yield stress of the Al alloy selected in the present study.

(a) Load Case - 5

Fig: Displacement Counter for Bending Load-1

(b) Load Case - 6

Fig: Displacement Counter for Bending Load-2

Fig: Stress Counter for Bending Load-1

(c)

Fig: Stress Counter for Bending Load-2

(d)

Fig. 10 Displacement contour and stress of the wheel due to Bending load

Fatigue analysis

Fatigue is one of the important material properties where the component subjected to cyclic loading. Due to cyclic loading, the materials undergone stress and nucleate micro cracks essentially on the surface of the component. It is understood that tensile stress is always assisted in nucleation and propagation of cracks and leads to failure. In the present investigation S-N curve (fatigue curve) is generated through FE analysis for the material used in the present investigation. It is noted from the Figure 11 that for high cycle fatigue test, of the material selected in the present study, the endurance stress is found 90 MPa which is well below the yield stress of the material.

Fig. 11 S-N curve of Al alloy from FE Analysis

Fig: 12 Load -Time history from FE Analysis

The load-time history obtained from the FE analysis is shown in Fig. 12.

Damage Analysis

The development of micro-cracks on the wheel and damage under the stress factors which deform the material has been found out by FE analysis and shown in Fig. 13. It is noted that the probability of damage of the wheel is around the flange as shown by FE analysis. Based on the FE analysis one may

mentioned that the dimensions of the flange section should be enough to sustain the stress. In order to save guard the failure of material one should look into the design aspects and also the strength properties. It is also noted that after a fatigue cycle of 1×10^{20} the damage is only 0.2%. This analysis indicated that even after a fatigue cycle of 10^{20}, the damage on the component is only 0.2%. Fig. 14 shows the FE analysis after life cycle. The fatigue analysis results obtained is shown in Table 3.

Fig 13 FE analysis shows the damage area which is 0.2%

Fig: 14   Life Cycles of Component obtained from FE analysis.

Table 3   Fatigue analysis results of the component.

```
                 FATIGUE ANALYSIS RESULTS
    ------------------------------------------------
    Subcase   Element      Damage        Life
    ------------------------------------------------
        7      390942     2.067E-03    4.8387E+02
        7      390841     1.978E-03    5.0546E+02
        7      391031     1.913E-03    5.2267E+02
        7      390411     1.700E-03    5.8814E+02
        7      397018     1.608E-03    6.2182E+02
    ------------------------------------------------
```

```
              AVERAGE FATIGUE ANALYSIS RESULTS
    ----------------------------------------------------------------------
    Subcase   Damage      Life      Damage      Life      Damage      Life
              Top 0.1%   Top 0.1%   Top 1.0%   Top 1.0%   Top 5.0%   Top 5.0%
    ----------------------------------------------------------------------
        7    1.178E-03  8.490E+02  2.035E-04  4.913E+03  4.080E-05  2.451E+04
    ----------------------------------------------------------------------
```

III.   DISCUSSION

Alloy wheels are usually made of aluminum or magnesium alloys. The advantages of alloy wheel are lightweight, better heat conduction and excellent aesthetic appearance. Because of these interesting properties alloy wheel gaining popularities. Although Mg alloy wheels are developed in 1960 but due to lack of ductility, the alloy wheel lost their favour in vehicle. In the recent technological advancement, considerable attempts are being made to develop Al and Mg alloys to suit to requirement for alloy wheel. Further weight reduction of the wheel hub may be realized by design. Weight reduction is one of the essential criteria of a vesicle as far as the fuel efficiency is concerned. Use of light weight metals and alloys is now becoming the designer's choice. The existing components which are made of steel and cast iron are slowly phased out by replacing with Al and Mg alloys having comparable properties. Considerable research is now being done to enhance the strength properties of Al and Mg alloys so as to find them an ideal replacement of heavier counterpart. Al-Si (LM25) is one such cast alloy having comparable strength, fatigue, Young modulus, yield stress and other related properties and finding place to replace steel and cast iron. In the present study LM25 alloy is used as a potential material for automobile wheel rim application. Zhao et.al (15) have studied the A356 Al alloy for wheel application. A356 Al alloy is similar to the LM25 alloy which was studied in the present investigation.   Their work has emphasized that a sound casting is desirable for wheel hub application. Casting defects such as porosity and inclusions resulted into deteriorate the properties and would not fit for wheel hub applications. CAD is developed using Hypermesh FEA software with standard wheel design norms. The raw design of rim (i.e., non design space) is optimized for mass compliance at cyclic loading conditions. Aluminum Alloy Grade - AlSi7Mg0.3 T6, often known as A354 (LM25) is used in this wheel design. The analysis result is found within the yield stress limit and found safe.

A cyclic radial load of 8976 N is applied for every 36 degrees (10 times) because 5 arms are assumed to be in between rim and hub. This load transfer is done using RBE3 element. The first load is applied exactly normal to the wheel and bolt axis and the second load is applied at 36° from the first load in normal direction to wheel axis.

Optistruct solver is used for computing this problem. The weight optimization analysis shows that there could be a way to reduce the weight of the wheel rim from 26 kg to 12.15 kg. This clearly indicates that there is an ample scope for weight reduction of the wheel rim by using right kind of analysis. A similar study showed that using lighter Mg alloy resulted in saving of energy to an extent of 11-15% the energy (16). While selecting the alloy one has to critically examine the properties and most importantly the elongation. Ravi Kumar and Satya Meher (17) have optimize the A356 Al alloy for wheel application using impact analysis and reported that Al alloy of strain value 4% is ideal for safe use. Strain value less than 4% may assist to crack nucleation and propagation of crack lead to failure of component. In the present investigation, the strain value is considered as 4%. Topology Optimization is carried out by changing the thickness of the rim of the Cast Aluminium Alloy Wheel until the value of the plastic strain is less than 4.0% and the optimized thickness is found 5.9 mm (17)

The new CAD design is developed from the optimized design by smoothing irregular features with fillets and edges considering area of importance available in the form of density range. FE model is build up from the new CAD and boundary conditions are setup for static analysis. To validate the design, model is setup for three loading conditions such as radial, lateral and bending loads. Since the model is cyclic for every 72 degrees (and 72deg of model is symmetric for 36deg), instead of applying load for 10 times, 2 load cases are applied at arm location and between two adjacent arms. The FE analysis confirms that the stress value experienced by the wheel in all load condition is well below the yield stress of the material. The model is checked for the life period under fatigue radial loads

and the same loads are applied in static analysis also. In fatigue analysis, the input load is considered as only radial load. The radial load is checked for number of possible fatigue cycles. Cerit (18) has reported based on the simulated impact test that lug hole is the region of initiation of crack and failure. Satyanarayana and Sambaiah (19) have studied the fatigue study of Al alloy wheel under radial load and reported that rim is to be design properly as maximum load is experiencing at the rim area. The possibility of failure is high at wheel spokes. In the present investigation the model is checked for 2500 amplitudes for analysis and solving. The fatigue analysis results clearly show that material is sustained for 1e20 cycles. Maximum damage occurred till the end of the 1e20 cycles is 0.2%. Present study also inferred that spokes area is the most vulnerable for failure of the wheel hub due to fatigue.

IV. CONCLUSION

1. In the optimization of wheel rim, the wheel structure and its features are divided into two parts, namely design space and non design space. The non design space is the standard design and cannot be modified. The design space is the region for optimizing the weight and shape of the arms. The wheel design space is optimized in order to withstand the existing load of the vehicle with the factor of safety with a least quantity of material and manufacturing cost and losses. The five arm structure is the optimal output of the solver to withstand stresses. Conclusions traced out during the optimization and evaluating the life of the wheel are as follows:

- The weight of rim is optimized from 26 Kg to 12.15 Kg using topology method.
- The shape of the arm's cross section is made easier to manufacture and to distribute the stress induced in the rim.
- The optimized design is analyzed to withstand all the loading conditions acting upon it, such as:

- Radial load used is 8976 N and the maximum stress induced in the wheel is 94 MPa which is less than the yield stress of the material suggested i,e., 185MPa
- Lateral load used is 4044 N and the maximum stress induced in the wheel is 64 MPa which is less than the yield stress of the material i,e., 185MPa
- Bending load used is 4488 N and the maximum stress induced in the wheel is 35 MPa which is less than the yield stress of the material i,e., 185MPa

2. The damage region is found around the flange portion of the rim

3. The fatigue analysis results clearly show that material is sustained for 1e20 cycles.

Maximum damage occurred till the end of the 1e20 cycles is 0.2%.

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Optimal control of two-phase MX/Ek/1 queueing system with server Start-up, N-Policy, unreliable server and Balking

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Abstract- This paper deals with the optimal control policy of two-phase service $M^X/E_k/1$ queues with vacation, N-policy, server break downs and balking. Generating functions method is used to derive the system characteristics. The total expected cost function is developed to determine the optimal threshold of N at a minimum cost. Numerical experiment is performed to validate the analytical results. The sensitivity analysis has been carried out to examine the effect of different parameters in the system.

Index Terms- Batch arrival**,** Vacation, N-policy, Queueing System, Two-phase, Start-up, Breakdowns and Balking.

I. INTRODUCTION

We consider two-phase $M^x/E_k/1$ queuing system with N-policy, server breakdowns and balking. Customers arrive according to a compound Poisson process where the arrival size X is a random variable. Arriving customers receive batch service in the first phase and individual service in second phase. The server is turned off each time the system empties. When the queue length reaches or exceeds N (Threshold) the server is turned on. Before the first phase of service, the system requires a random startup time for pre-service. Arrivals during pre-service are also allowed to enter the batch. As soon as the startup period is completed the server starts the batch service followed by individual service to all the existing customers in the batch. During both batch and individual services, the server may breakdown at any time according to a Poisson process and if the server fails, it is immediately sent for repair, after repair the server resumes concerned service.

Two-phase queuing systems have been discussed in the past for their applications in various areas, such as computer, communication, manufacturing, and other stochastic systems. In many computer and communication service systems, the situation in which arriving packets receive batch mode service in the first phase followed by individual services in the second phase is common. As related literature we should mention some papers [3,8,11,17] arising from distributed system control where all customers receives batch mode service in the first phase followed by individual service in the second phase

Vacation queueing theory was developed as an extension of the classical queueing theory. The vacations may represent server working on some supplementary jobs, performing server maintenance inspection and repairs, or server's failures that interrupt the customer serviceTherefore, queues with vacations or simply called *vacation models* attracted great attention of queueing researchers [9,13,16,19] and became an active research area. Miller was the first to study a queueing system in which the server becomes idle and is unavailable during some random length of time for the M/G/1 queueing system.

The subject of queueing systems wherein the server is subject to breakdowns from time to time is a popular subject which has received a lot of focus for the last five decades. In many real systems, the server may meet unpredictable breakdowns or any other interruptions. Understanding the behaviour of the unreliable server which includes the effect of machine breakdowns and repairs in these systems is important as this affects not only the system's efficiency but also the queue length and the customer's waiting time in the queue. These are the most popular models which have attracted extensive researcher attention [17 ,18] over the past fifty years.

Research studies on queues with batch arrival and vacations have been increased tremendously and still many researchers [1,10] have been developing on the theory of different aspects of queuing.

The concept of customer impatience has been studied in 1950's. Haight (1957) has first studied about the concept of customer behaviour called balking, which deals the reluctance of a customer to join a queue upon arrival, since then a remarkable attention [5,7,12,14] has been given on many queueing models with customer impatience.

However, to the best of our knowledge, for two –phase queueing systems with N-Policy, server breakdowns, there is no literature which takes customers' impatience into consideration. This motivates us to study a two-phase queueing system with N-policy, server start-up, breakdowns and balking. Thus, in this present paper, we consider two-phase $M^X/E_K/1$ queueing system with server Start-up, N-Policy, unreliable server and Balking where customers become impatient when the server is unavailable.

The article is organized as follows. A full description of the model is given in Section. 2. The steady-state analysis of the system state probabilities is performed through the generating in Section. 3 while some, very useful for the analysis, results on the expected number of customers in different states are given in Section. 4. In Section. 5 the characteristic features of the system are investigated. Optimal control policy is explained in section.6, while, in Section. 7, numerical results are obtained and used to compare system performance under various changes of the

parameters through sensitivity analysis. Finally, the conclusions are presented in section .8.

The main objectives of the analysis carried out in this paper for the optimal control policy are:

i. to establish the steady state equations and obtain the steady state probability distribution of the number of customers in the system in each state.

ii. to derive expressions for the expected number of customers in the system when the server is in vacation, in startup, in batch service (working and broken conditions) and in individual service (working and broken conditions) respectively.

iii. to formulate the total expected cost functions for the system, and determine the optimal value of the control parameter N.

iv. to carry out sensitivity analysis on the optimal value of N and the minimum expected cost for various system parameters through numerical experiments.

II. THE SYSTEM AND ASSUMPTIONS

We consider the $M^x/E_k/1$ queueing system with server startup, two phases of service, system breakdowns and balking with the following assumptions:

1. The arrival process is a compound Poisson process (with rate λ) of independent and identically distributed random batches of customers, where each batch size X, has a probability density function $\{a_n: a_n = P(X=n), n \geq 1\}$. Batches are admitted to service on a first come first service basis.

2. The service is in two phases. The first phase of service is batch service to all customers waiting in the queue. On completion of batch service, the server immediately proceeds to the second phase to serve all customers in the batch individually. Batch service time is assumed to

follow exponential distribution with mean $1/\beta$ which is independent of batch size. Individual service is in k independent and identically distributed exponential phases each with mean $1/k\mu$. On completion of individual service, the server returns to the batch queue to serve the customers who have arrived. If the customers are waiting, the server starts the batch service followed by individual service to each customer in the batch. If no customer is waiting the server takes a vacation.

3. Whenever the system becomes empty, the server is turned off. As soon as the total number of arrivals in the queue reaches or exceeds the pre-determined threshold N, the server is turned on and is temporarily unavailable for the waiting customers. The server needs a startup time which follows an exponential distribution with mean $1/\theta$. As soon as the server finishes startup, it starts serving the first phase of waiting customers.

4. The customers who arrive during the batch service are also allowed to join the batch queue which is in service.

5. The breakdowns are generated by an exogenous Poisson process with rates ξ_1 for the first phase of service and α_1 for the second phase of service. When the server fails it is immediately repaired at a repair rate ξ_2 in first phase and α_2 in second phase, where the repair times are exponentially distributed. After repair the server immediately resumes the concerned service.

6. A customer may balk from the queue station with probability b_0 when the server is in vacation or may balk with a probability b_1 when the server is in service mode due to impatience.

III. STEADY-STATE ANALYSIS

In steady – state the following notations are used.

$p_{0,i,0}$ = The probability that there are i customers in the batch queue when the server is on vacation, where i = 0,1k,2k, 3k,…,(N-1)k

$p_{1,i,0}$ = The probability that there are i customers in the batch queue when the server is doing pre-service (startup work), where i = Nk,(N+1)k, (N+2)k, …

$p_{2,i,0}$ = The probability that there are i customers in the batch queue when the server is in batch service where i = 1k,2k,3k,…

$p_{3,i,0}$ = The probability that there are i customers in batch queue when the server is working but found to be broken down, where i = 1k, 2k,3k,…

$p_{4,i,j}$ = The probability that there are i customers in the batch queue and j customers in individual queue when the server is in individual service, where i=0,k,2k,… and j=1,2,3,…

$p_{5,i,j}$ = The probability that there are i customers in the batch queue and j customers in individual queue when the server is working but found to be broken down, where i = 0,1k,2k,… and j = 1,2,3, …

The steady-state equations governing the system size probabilities are as follows:

$$\lambda b_0 p_{0,0,0} = \mu k p_{4,0,1} \tag{1}$$

$$\lambda b_0 p_{0,i,0} = \lambda b_0 \sum_{x=k}^{i} a_x\, p_{0,i-x,0} \; ; 1k \leq i \leq (N-1)k \tag{2}$$

$$(\lambda b_1 + \theta)p_{1,Nk,0} = \lambda b_0 \sum_{x=k}^{N} a_x \, p_{0,k-x,0}. \tag{3}$$

$$(\lambda b_1 + \theta)p_{1,i,0} = \lambda b_1 \sum_{x=k}^{i-Nk} a_x \, p_{1,i-x,0} + \lambda b_0 \sum_{x=i-(N-1)k}^{i} a_x \, p_{0,i-x,0} \, ; i > Nk. \tag{4}$$

$$(\lambda b_1 + \beta + \xi_1)p_{2,i,0} = \lambda b_1 \sum_{x=k}^{i} a_x \, p_{2,i-x,0} + \mu k \, p_{4,i,1} + \xi_2 p_{3,i,0} \, ; k \leq i \leq (N-1)k. \tag{5}$$

$$(\lambda b_1 + \beta + \xi_1)p_{2,i,0} = \lambda b_1 \sum_{x=k}^{i} a_x \, p_{2,i-x,0} + \mu k \, p_{4,i,1} + \xi_2 p_{3,i,0} + \theta p_{1,i,0} \, ; i \geq Nk. \tag{6}$$

$$(\lambda b_1 + \xi_2)p_{3,i,0} = \lambda b_1 \sum_{x=k}^{i} a_x \, p_{3,i-x,0} + \xi_1 p_{2,i,0} \, ; i \geq k. \tag{7}$$

$$(\lambda b_1 + \alpha_1 + \omega)p_{4,0,j} = \mu k \, p_{4,0,j+1} + \beta p_{2,j,0} + \alpha_2 p_{5,0,j} \, ; j \geq 1. \tag{8}$$

$$(\lambda b_1 + \alpha_1 + \omega)p_{4,i,j} = \mu k \, p_{4,i,j+1} + \lambda b_1 \sum_{x=k}^{i} a_x \, p_{4,i-x,j} + \alpha_2 p_{5,i,j} \, ; i \geq k, j \geq 1. \tag{9}$$

$$(\lambda b_1 + \alpha_2)p_{5,0,j} = \alpha_1 p_{4,0,j} \, ; j \geq 1. \tag{10}$$

$$(\lambda b_1 + \alpha_2)p_{5,i,j} = \alpha_1 p_{4,i,j} + \lambda b_1 \sum_{x=k}^{i} a_x \, p_{5,i-x,j} \, ; i \geq k, j \geq 1. \tag{11}$$

To find the steady state probabilities of the number of customers in the system and hence the expected numbers of customers in the system, the following probability generating functions are defined:

$$G_0(z) = \sum_{i=0}^{N-1} p_{0,i,0}z^i \, , \qquad G_1(z) = \sum_{i=N}^{\infty} p_{1,i,0}z^i,$$

$$G_2(z) = \sum_{i=1}^{\infty} p_{2,i,0}z^i, \qquad G_3(z) = \sum_{i=1}^{\infty} p_{3,i,0}z^i,$$

$$G_4(z,y) = \sum_{i=0}^{\infty}\sum_{j=1}^{\infty} p_{4,i,j}z^i \, y^j \, , \qquad G_5(z,y) = \sum_{i=0}^{\infty}\sum_{j=1}^{\infty} p_{5,i,j}z^i \, y^j$$

and $\qquad R_j(z) = \sum_{i=0}^{\infty} p_{4,i,j}z^i.$

Let $A(z) = \sum_{i=i}^{\infty} a_i z^i$ be the probability generating function of the arrival batch size random variable X and $A'(z) \, and \, A^*(z)$ represent the first and second order derivatives of A(z) respectively.

Using equation (2), we get

$$p_{0,i,0} = y_i p_{0,0,0},$$

where $y_i\,'s$ are defined as $y_0 = 1$ and $\quad y_i = \sum_{k=1}^{i} a_k y_{i-k}$,i = 1,2,3,…,N-1.

$$G_0(z) = \sum_{i=0}^{N-1} p_{0,i,0}z^i = p_{0,0,0}\sum_{i=0}^{N-1} y_i z^i = p_{0,0,0}y_N(z) \tag{12}$$

where $y_N(z) = \sum_{i=0}^{N-1} y_i z^i$ with $y_N(1) = \sum_{i=0}^{N-1} y_i$ and $y_N'(1) = \sum_{i=1}^{N-1} i y_i.$

Multiplication of equations (3) and (4) by z^i and adding over i $(i \geq N)$ gives

$$(\lambda b_1(1 - A(z)) + \theta)\, G_1(Z) = \lambda b_0 \, G_0(z)(A(z) - 1) + \lambda b_0 p_{0,0,0}. \tag{13}$$

Multiplication of equations (5) and (6) by z^i and adding over i $(i \geq 1)$ gives

$$(\lambda b_1(1 - A(z)) + \beta + \xi_1)\, G_2(Z) = \xi_2 G_3(z) + \mu k R_1(z) + \theta G_1(z) - \lambda b_0 p_{0,0,0}. \tag{14}$$

Multiplication of equation (7) by z^i and adding over i $(i \geq 1)$ gives

$$(\lambda b_1(1 - A(z)) + \xi_2)\, G_3(Z) = \xi_1 G_2(z). \tag{15}$$

Multiplication of equations (8) and (9) by $z^i y^j$ and adding over Corresponding values of i and j gives

$$\left(\lambda b_1 y(1 - A(z)) + \alpha_1 y - \mu k(1 - y)\right)G_4(z,y) = \left(\alpha_2 G_5(z,y) + \beta G_3(y) - \mu k R_1(z)\right)y. \tag{16}$$

Multiplication of equations (10) and (11) by $z^i y^j$ and adding over Corresponding values of i and j gives

$$(\lambda b_1(1 - A(z)) + \alpha_2)G_5(z,y) = \alpha_1 G_4(z,y). \tag{17}$$

The total probability generating function G(z, y) is given by

$$G(z,y) = G_0(z) + G_1(z) + G_2(z) + G_3(z) + G_4(z,y) + G_5(z,y). \tag{18}$$

The normalizing condition is

$$G(1,1) = G_0(1) + G_1(1) + G_2(1) + G_3(1) + G_4(1,1) + G_5(1,1) = 1. \tag{19}$$

From equations (12) to (19)

$$G_0(1) = y_N(1)p_{0,0,0} \tag{20}$$

$$G_1(1) = \left(\frac{\lambda b_0}{\theta}\right)p_{0,0,0} \tag{21}$$

$$G_2(1) = \left(\frac{\mu k}{\beta}\right)R_1(1), \tag{22}$$

$$G_3(1) = \left(\frac{\xi_1}{\xi_2}\right)G_2(1) \tag{23}$$

$$G_4(1,1) = \left(\frac{\alpha_2\left(\beta G_2'(1)-\mu k R_1'(1)\right)}{\mu k\alpha_2-\lambda b_1 A'(1)(\alpha_1+\alpha_2)}\right)$$
$$= \left(\frac{\lambda b_0 A'(1)p_{0,0,0}\left(\frac{y_N(1)\theta+\lambda b_1}{\theta}\right)\xi_2+\lambda b_1 A'(1)(\xi_1+\xi_2)\frac{\mu k}{\beta}R_1(1)}{\mu\alpha_2-\lambda b_1(1)(\alpha_1+\alpha_2)}\right)\frac{\alpha_2}{\xi_2}, \tag{24}$$

$$G_5(1,1) = \left(\frac{\alpha_1}{\alpha_2}\right)G_4(1,1). \tag{25}$$

The normalizing condition (19) gives,

$$R_1(1) = \frac{\left(\left(t_1\left(1-p_{0,0,0}\left(\frac{\lambda b_0}{\theta}+y_N(1)\right)\right)+(\alpha_1+\alpha_2)\frac{\lambda b_0\left(\lambda b_1+y_N(1)\theta\right)}{\theta}\right)\beta\xi_2\right)}{\mu^2 k^2\alpha_2(\xi_1+\xi_2)},$$

where $t_1 = \left(\mu k\alpha_2 - \lambda b_1 A'(1)(\alpha_1+\alpha_2)\right)$.

Substituting the value of $R_1(1)$ from (22) to (25) gives $G_2(1)$, $G_3(1)$, $G_4(1,1)$ and $G_5(1,1)$.
Probability that the server is neither in batch service nor in individual service is given

$$G_0(1) + G_1(1) = 1 - A'(1)\left(\frac{\lambda b_1}{\beta}\left(1+\frac{\xi_1}{\xi_2}\right)+\frac{\lambda b_1}{\mu}\left(1+\frac{\alpha_1}{\alpha_2}\right)\right)$$

by   .

This gives

$$p_{0,0,0} = (1-\rho)\frac{\theta}{(\lambda b_0+y_N(1)\theta)}. \tag{26}$$

Where $\rho = \left(\frac{\lambda b_1}{\beta}\left(1+\frac{\xi_1}{\xi_2}\right)+\frac{\lambda b_1}{\mu}\left(1+\frac{\alpha_1}{\alpha_2}\right)\right)$ is the utilizing factor of the system.

From Equation (26) we have $\rho < 1$, which is the necessary and sufficient condition under which steady state solution exits.

Under steady state conditions, let $p_0, p_1, p_2, p_3, p_4,$ and p_5 be the probabilities that the server is in vacation, startup, in batch service, in batch service with break down, in individual service and in individual service with breakdown states respectively. Then,

$$p_0 = G_0(1), \tag{27}$$

$$p_1 = G_1(1), \tag{28}$$

$$p_2 = G_2(1), \tag{29}$$

$$p_3 = G_3(1), \tag{30}$$

$$p_4 = G_4(1,1), \tag{31}$$

$$p_5 = G_5(1,1). \tag{32}$$

IV. EXPECTED NUMBER OF CUSTOMERS AT DIFFERENT STATES OF THE SERVER

Using the probability generating functions expected number of customers in the system at different states are presented below.

Let L_0, L_1, L_2, L_3, L_4 and L_5 be the expected number of customers in the system when the server is in idle, startup, batch service, break down in batch service, individual service and break down in breakdown states respectively. Then,

$$L_0 = \sum_{i=0}^{N-1} i\, p_{0,i,0} = G_0'(1) = y_N'(1) p_{0,0,0}, \tag{33}$$

$$L_1 = \sum_{i=Nk}^{\infty} i\, p_{1,i,0} = G_1'(1) = \frac{\lambda b_0 A'(1)(\lambda b_1 + y_N(1)\theta)}{\lambda b_1 \theta^2} p_{0,0,0}, \tag{34}$$

$$L_2 = \sum_{i=1}^{\infty} i\, p_{2,i,0} = G_2'(1) = \left(\frac{\lambda b_1 A'(1)(\xi_1+\xi_2)G_2(1)+\theta\xi_2 G_1'(1)}{t_1\beta\xi_2}\right)\mu k\alpha_2, \tag{35}$$

$$L_3 = \sum_{i=1}^{\infty} i\, p_{3,i,0} = G_3'(1) = \frac{\xi_1(G_2'(1)\xi_2+\lambda b_1 A'(1)G_2(1))}{\xi_2^2}, \tag{36}$$

$$L_4 = \sum_{i=0}^{\infty}\sum_{j=1}^{\infty}(i+j)\, p_{4,i,j} = G_4'(1,1)$$

$$= \frac{\left[\alpha_2\left(\beta G_2''(1)-\mu k R_1''(1)\right)+2\left(\alpha_2-\lambda b_1 A'(1)\right)\left(\beta G_2'(1)-\mu k R_1'(1)\right)\right]}{2t_1}$$

$$- \frac{\left[G_4(1,1)\left(2\left(\lambda b_1 A'(1)\right)^2 - A''(1)\lambda b_1(\alpha_1+\alpha_2)-2\lambda b_1 A'(1)(\alpha_1+\alpha_2+\mu k)\right)\right]}{2t_1}, \tag{37}$$

$$L_5 = \sum_{i=0}^{\infty}\sum_{j=1}^{\infty}(i+j)\, p_{5,i,j} = G_5'(1,1)$$

$$= \frac{\alpha_1}{\alpha_2} L_4 + \frac{\lambda b_1}{\alpha_2} A'(1) G_5(1,1). \tag{38}$$

The expected number of customers in the system is given by

$$L(N) = L_0 + L_1 + L_2 + L_3 + L_4 + L_5. \tag{39}$$

V. CHARACTERISTIC FEATURES OF THE SYSTEM

In this section, we obtain the expected system length when the server is in different states. Let E_0, E_1, E_2, E_3, E_4 and E_5 denote the expected length of vacation period, startup period, batch service period, breakdown period during batch service, individual service period and breakdown period during individual service respectively. Then the expected length of a busy cycle is given by $E_c = E_0 + E_1 + E_2 + E_3 + E_4 + E_5$.

The long run fractions of time the server is in different states are as follows:

$$\frac{E_0}{E_c} = p_0, \tag{40}$$

$$\frac{E_1}{E_c} = p_1, \tag{41}$$

$$\frac{E_2}{E_c} = p_2, \tag{42}$$

$$\frac{E_3}{E_c} = p_3, \tag{43}$$

$$\frac{E_4}{E_c} = p_4, \tag{44}$$

$$\frac{E_5}{E_c} = p_5. \tag{45}$$

Expected length of vacation period is given by

$$E_v = \frac{y_N(1)}{\lambda b_0}. \tag{46}$$

Hence,

$$E_c = \frac{1}{(\lambda b_0 p_{0,0,0})}. \tag{47}$$

VI. OPTIMAL CONTROL POLICY

In this section, we determine the optimal value of N that minimizes the long run average cost of two-phase $M^X/E_k/1$, N-policy queue with server break downs with balking. To determine the optimal value of N we consider the following linear cost structure.

Let T (N) be the average cost per unit of time, then

$$T(N) = C_h L(N) + C_o \left(\frac{E_2}{E_c} + \frac{E_4}{E_c}\right) + C_m \left(\frac{E_5}{E_c}\right) + C_{b1} \left(\frac{E_3}{E_c}\right) + C_{b2} \left(\frac{E_5}{E_c}\right) + C_s \left(\frac{1}{E_c}\right)$$
$$+ C_b \left(\lambda(1 - b_0)p_0 + \lambda(1 - b_1)(p_1 + p_2 + p_3 + p_4 + p_5)\right) - C_r \left(\frac{E_0}{E_c}\right) \tag{48}$$

Where

C_h = Holding cost per unit time for each customer present in the system,

C_o = Cost per unit time for keeping the server on and in operation,

C_m = Startup cost per unit time,

C_s = Setup cost per cycle,

C_{b1} = Break down cost per unit time for the unavailable server in batch service mode,

C_{b2} = Break down cost per unit time for the unavailable server in individual service mode,

C_b = Cost per unit time when a customer balks,

C_r = Reward per unit time as the server is doing secondary work in vacation.

For the determination of the optimal operating N-policy, minimize T (N) in equation 48.
An approximate value of the optimal threshold N* can be found by solving the equation

$$\left. \frac{dT_1(N)}{dN} \right|_{N=N^*} = 0 \tag{49}$$

MATLAB software is used to develop the computational program.

We can consider different batch size distributions like deterministic, Positive Poisson, Geometric etc.
where

   a)   For the Deterministic batch size distribution, the generating function is $A(z) = z^m$.   This gives
$A'(1) = m, \ A''(1) = m(m-1)$.

   b)   For the Geometric batch size distribution, the generating function is

$A(z) = p(z^{-1} - (1-p))^{-1}$.   This gives $A'(1) = \frac{1}{p}$ and $A''(1) = \frac{2(1-p)}{p^2}$.

   c)   For the Positive Poisson batch size distribution, the generating function is

$A(z) = \frac{me^{-\alpha}}{\alpha}(e^{\alpha z} - 1)$, where m= $m = \frac{\alpha}{1-e^{-\alpha}}$.

   This gives $A'(1) = \alpha$ and $A''(1) = m\alpha$.

Here the Geometric distribution is assumed.

VII.   Sensitivity analysis

In order to verify the efficiency of our analytical results, we perform numerical experiment by using MATLAB. The variations of different parameters (both monetary and non-monetary) on the optimal threshold N*, mean number of jobs in the system and minimum expected cost are shown.
We perform the sensitivity analysis by fixing
Non-Monetary parameters as
λ=0.5,μ=8.0,α_1=0.2,α_2=3.0,ξ_1=0.2,ξ_2=0.3,θ=6.0,β=12.0, b_0=0.4, b_1=0.2,p=0.2;
and Monetary parameters as C_r=15,C_{b1}=50,C_{b2}=75,C_m=200,C_0 =50,C_h=5 and Cs=1000;

7.1. Effect of variation in the non-monetary parameters
(i)Variation in λ

For specified range of values of λ the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 1 .

Figure 1: Effect of λ on N*, expected system length and minimum expected cost

It is observed from figure 1 that with increase in the values of **λ**,

a)   N* is increasing function of λ
b)   Mean number of customers in the system is convex function.
c)   Minimum expected cost is convex function.

(ii)Variation in μ

For specified range of values of **μ** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T (N*) are presented in figure 2. Effect of **μ** on N*, expected system length and minimum expected cost

It is observed from figure 2 that with increase in the values of **μ**,

a)   N* is increasing.
b)   Mean number of customers in the system is increasing.
c)   Minimum expected cost is decreasing.

(iii) Variation in α_1

For specified range of values of **α_1** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T (N*) are presented in figure 3.

Figure 3: Effect of α_1 on N*, expected system length and minimum expected cost

It is observed from figure 3 that with increase in the values of **α_1**,

a)   N* is decreasing.
b)   Mean number of customers in the system is slightly decreasing.

c)   Minimum expected cost is slightly increasing.

(iv)Variation in α₂

For specified range of values of **α₂** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T (N*) are presented in figure 4.

Figure 4: Effect of α₂ on N*, expected system length and minimum expected cost

It is observed from figure 4 that with increase in the values of **α₂,**
a)   N* is increasing.
b)   Mean number of customers in the system is increasing.
c)   Minimum expected cost is decreasing.

(v)Variation in ξ₁

For specified range of values of ξ₁ the optimal threshold N*, the mean number of customers in the system L(N*) and minimum expected cost T(N*) are presented in figure 5 .

Figure   5:   Effect   of   ξ₁   on   N*,   expected   system   length   and   minimum   expected   cost

It is observed from figure5 that with increase in the values of ξ₁,
a)   N* is almost insensitive.
b)   Mean number of customers in the system is decreasing.
c) Minimum expected cost is also decreasing.

(vi)Variation in ξ₂

For specified range of values of ξ₂ the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 6 .

Figure 6: Effect of ξ₂ on N*, expected system length and minimum expected cost

It is observed from figure 6 that with increase in the values of ξ_2,
  a)   N* is decreasing.
  b)   Mean number of customers in the system is increasing.
  c)   Minimum expected cost is increasing.

(vii) Variation in θ

For specified range of values of **θ** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 7.

Figure 7: Effect of θ on N*, expected system length and minimum expected cost

It is observed from figure 7 that with increase in the values of **θ,**
  a)   N* is decreasing.
  b)   Mean number of customers in the system is decreasing
  c)   Minimum expected cost is decreasing.

viii) Variation in β

For specified range of values of **β** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T (N*) are presented in figure 8.

Figure 8: Effect of β on N*, expected system length and minimum expected cost

It is observed from figure 8 that with increase in the values of **β,**
  a)   N* is increasing.
  b)   Mean number of customers in the system is increasing.
  c)   Minimum expected cost is increasing.

ix)Variation in b_0

For specified range of values of b_0 the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 9 .

Figure 9: Effect of b_0 on N*, expected system length and minimum expected cost

It is observed from figure 9 that with increase in the values of b_0,
a)   N* is increasing.
b)   Mean number of customers in the system is increasing.
c)   Minimum expected cost is increasing.

x) Variation in b_1

For specified range of values of b_1 the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 10 .

Figure 10: Effect of b_1 on N*, expected system length and minimum expected cost

It is observed from figure 10 that with increase in the values of b_1,
a)   N* is slightly decreasing.
b)   Mean number of customers in the system is decreasing.
c)   Minimum expected cost is decreasing.

xi) Variation in p

For specified range of values of **p** the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 11 .

Figure 11: Effect of p on N*, expected system length and minimum expected cost

It is observed from figure 11 that with increase in the values of **p,**
a)   N* is decreasing.
b)   Mean number of customers in the system is decreasing.
c)   Minimum expected cost is decreasing.

7.2. Effect of variation in the monetary parameters
xii) Variation in C_r

For specified range of values of C_r the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 12 .

Figure 12: Effect of C_r on N*, expected system length and minimum expected cost

It is observed from figure 12 that with increase in the values of C_r,
a)   N* is almost insensitive.
b)   Mean number of customers in the system is almost insensitive.
c)   Minimum expected cost is decreasing.

xiii)Variation in C_{b1}

For specified range of values of C_{b1} the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 13 .

Figure 13: Effect of C_{b1} on N*, expected system length and minimum expected cost

It is observed from figure 13 that with increase in the values of C_{b1},
a)   N* is slightly increasing.
b)   Mean number of customers in the system is almost insensitive.
c)   Minimum expected cost is slightly increasing.

Xiv) Variation in C_{b2}

For specified range of values of C_{b2} the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 14.

Figure 14: Effect of C_{b2} on N*, expected system length and minimum expected cost

It is observed from figure 14 that with increase in the values of C_{b2},
a)   N* is almost insensitive.
b)   Mean number of customers in the system is insensitive.
c)   Minimum expected cost is slightly increasing.

xv) Variation in C_b

For specified range of values of C_b the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 15.

Figure 15: Effect of C_b on N*, expected system length and minimum expected cost   3

It is observed from figure 15 that with increase in the values of C_b,

a)   N* is increasing.
b)   Mean number of customers in the system is increasing.
c)   Minimum expected cost is increasing.

xvi) Variation in C_m

For specified range of values of C_m the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 16 .

Figure 16: Effect of C_m on N*, expected system length and minimum expected cost

It is observed from figure 16 that with increase in the values of C_m,

a)   N* is increasing.
b)   Mean number of customers in the system is increasing.
c)   Minimum expected cost is increasing**.**

xvii)Variation in C_o

For specified range of values of C_o the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T (N*) are presented in figure 17.

Figure 17: Effect of C_o on N*, expected system length and minimum expected cost

It is observed from figure 17 that with increase in the values of C_o,

a)   N* is almost insensitive.
b)   Mean number of customers in the system is decreasing.
c)   Minimum expected cost is increasing.

xviii)Variation in C_h

For specified range of values of C_h the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 18.

Figure 18: Effect of C_h on N*, expected system length and minimum expected cost

It is observed from figure 18 that with increase in the values of C_h

    a)   N* is decreasing.
    b)   Mean number of customers in the system is decreasing.
    c)   Minimum expected cost is increasing.

xix)Variation in C_s

For specified range of values of C_s the optimal threshold N*, the mean number of customers in the system L (N*) and minimum expected cost T(N*) are presented in figure 19.

Figure 19: Effect of C_s on N*, expected system length and minimum expected cost

It is observed from figure 19 that with increase in the values of **Cs,**

    a)   N* is increasing.
    b)   Mean number of customers in the system is increasing.
    c)   Minimum expected cost is increasing.

VIII. CONCLUSIONS

- Two–phase N-policy $M^X/E_k/1$ queueing system with server startup times, breakdowns and balking is studied. The closed expressions for the steady state distribution of the number of customers in the system when the server is at different states are obtained and hence the expected system length is derived.
- Total expected cost function for the system is formulated and determined the optimal value of the control parameter N that minimizes the expected cost.
- Sensitivity analysis is performed to discuss how the system performance measures can be affected by the changes of the both non-monetary and monetary input parameters.

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The Statistical Analysis of Households Survey of Horticulture crops in Tamenglong District of Manipur State.

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Abstract- The North Eastern Region has tremendous scope for expansion of horticulture industries that are environment and eco-friendly. The dietary intakes of food around the world are shifting toward diets from secondary goods to primary goods which are free from chemicals and popular diets are green leafy vegetables usually serve in many dining table teeming with fruits and vegetables in many households, rather than readymade and substitute diets that are usually obtained from secondary sectors. The modern people are aware and concern of their health status and wellbeing. Besides, sustainable development issues are becoming common agenda around the globe. The paper is a humble attempt to explain land use pattern for horticulture crops, to examine potentiality, viability, growth and expansion of horticulture industries in order to bring in an additional income to farmers as well as generation of employment opportunities to marginal farmers and rural peoples who are largely under disguise unemployment and have little knowledge of global climate change and about sustainable development. The paper also tries to explain the role of horticulture to improve their level of living, raise income and promote environment awareness among the rural hub; the statistical tests were carried out to see the possibility to explain research objectives. Further, it tries to examine horticulture income in comparisons to non-horticulture income and also how can it be expanse with government and related organization to come forward and help the farmers in boosting the horticultural production. The paper present the survey of 180 households carried out from purposive selected 8 villages from the district. It also seeks to provide reasonable suggestion and a strategy to reduce poverty of rural India at large.

Index Terms- Horticulture; Environment; Eco-friendly; Diet; Chemical; Disguised unemployment; Sustainable Development; Hub

I. INTRODUCTION

The North Eastern Region of India has tremendous scope for expansion of horticulture industries that are environment and eco-friendly. The topography and geographical features of the region have shown suitability for various horticulture crops such as fruits, vegetables, flowers, tuber, rhizomatous and spices etc. [1] The dietary pattern of food around the world are shifting toward diets that are chemical free and rich in nutrients and vitamins Viz., fruits and vegetables rather than readymade and substitute diets that are usually obtained from industries and factories. Fruits and vegetables have been earning 20-30 times more foreign exchange per unit area than cereals due to higher yields and higher price available in the international market. [2] The modern people are very much aware of their health status and wellbeing. Besides, sustainable development issue are becoming common agenda for all nations. The paper is a humble attempt to see land use pattern for horticulture crops, to examine potentiality, viability and growth of horticulture industries so as to bring in an additional income to farmers and generation of employment opportunities to marginal farmers and rural peoples who are largely under disguise unemployment with marginal productivity nearly zero and have little knowledge of global climate change and about sustainable development. The paper also tries to explain the role of horticulture to improve their level of living, raise income and promote environment awareness among the rural hubs. The studies try to make a strategy to reduce poverty in the rural areas, focuses on malnutrition of pregnant women and children in the study area. The research found that many people are keeping kitchen garden at their backyard or home stead land for self consumption only. However some farmers have started production of fruits and vegetables for commercial purposes. The study reveals that land were available in plenty and people have started earning enough income from farm privately own and manage by meagre saving of the households. The statistical tests were executed in the paper to see the logical reason for making horticulture a strategy for making an income for the rural poor and research objectives were also examine with the data gather through field survey that were done from September 2012 to November 2013.

II. HORTICULTURE AS THE BEST OPTION FOR LIVELIHOOD OF RURAL PEOPLE

The need for horticulture research and development (R & D) are greater than ever in the developing world. Nearly 3 billion people are living on less than 2USD or less per day. Unemployment and poverty are rampant throughout much of the world and conditions are worsening in Sub-Saharan Africa. Horticultural crops as high value crops have got an important role to play in revitalizing rural economies. Horticultural crops production provides jobs more than twice the number of jobs compare to cereal crops production per hectare of production. The shifting of cereal production toward high value horticultural crops is increasing employment opportunities in developing countries. Women have the most to benefit from the rising importance of horticulture. Women in general play a much more

significant role in horticulture crop production as compare to cereal production. Besides creating jobs on the farm, the horticulture sector generates off-farm employment especially for woman. This is the case for export and value added processing industries. Which are importance sectors of economies in Latin America and Africa? In Mexico, for e.g. 80-90% of persons engaged in operations are women and even higher percentages of women workers are involved in fresh produce field operations, evidence from production industries in Africa reflect similar tendencies. Since horticultural production is labour intensive, landless labourers also benefit from the new employment opportunities created by horticultural crops production. These jobs usually provide more income than jobs obtained in most other sectors. To sum up, a strong horticulture sector can become an engine for economic growth in developing countries. [3]

In fact, the people who mostly live in rural India have no other option to be engaged in industry and tertiary sector. Since these people are living with large tract of land and quite many forests are being burnt down every year for the purpose of Jhumming. So horticulture will remain the best option for them to improve their economic wellbeing. To examine this fact 10 villages were survey and the finding reveals that people are interested toward horticultural occupation rather than the traditional jhumming being practice largely since time immemorial.

III. METHODOLOGY

(i) Objectives:
1. To see the land holding areas of horticultural crops in the study areas and to see the scope for expansion of crops under horticulture.
2. To compare the income of horticulture and non-horticulture income benefitting the farmers.

(ii) Tools for Data Analysis:

The Primary data were collected using structured questionnaire at the household level. The surveys were done by purposive random selection of 8 villages two each from every subdivision, since there are four subdivisions in the entire districts. The sample sizes of households were 180 only. To fulfil the objectives of the study, the gathered primary data were tested using t-test with the help of mean and Standard Deviation (S.D.).

IV. STATISTICAL ANALYSIS USING GROUP STATISTICS AND INDEPENDENCE SAMPLES TEST

The research objectives are tested using group statistic and independent sample test as described as follows:

Objective-(IV.I):   In terms of the average land holding areas under Horticulture and
Non-Horticulture crops
H_0: There is no significant difference between average land holding areas under Horticulture and Non-Horticulture crops.

Group Statistics

Type of Land	N	Mean(land holding areas in acres)	Std. Deviation
Land Holding of Horticulture Crops(In acres)	180	4.7356	1.72036
Land Holding Non-Horticulture Crops(In acres)	180	0.9083	0.62863

Independence Samples Test

	t-test for Equality of Means			
Land holding of horticulture and non-horticulture crops(In acres) {Equal variances assumed}	T	Df	Sig. (2-tailed)	P-value
	28.034[**]	358	0.000	P<0.01

*Significant at 0.05 probability level.
**Significant at 0.01 probability level.

Since P<0.01, the difference between average land holding areas under Horticulture Crops and that of Non-Horticulture Crops is highly significant. In other words, the average land holding area occupied by Horticulture crops is significantly larger than the areas occupied by Non-Horticulture crops. Therefore, it is revealed that the land under horticulture crops had been showing more preferences by the farmers rather than the non-horticultural crops in the survey areas.

Objective-(IV.II) In terms of annual revenues from horticulture and non-horticulture
products
H_0: There is no significant difference between average annual revenues from horticulture and non-horticulture crops

Group Statistics

Type of Revenue	N	Mean (In ₹)	Std. Deviation
Annual revenue from horticulture products(In (In ₹)	180	52348.8889	27244.35155
Annual revenue from non-horticulture products(In ₹)	180	28275.0000	15297.99664

Independent Samples Test

	t-test for Equality of Means			
Annual revenues from horticulture and non-horticulture products(In ₹) {Equal variances are assumed}	T	Df	Sig. (2-tailed)	p-value
	10.337[**]	358	0.0000	P<0.01

*Significant at 0.05 probability level.

**Significant at 0.01 probability level.

Since p< 0.01, the difference between average annual revenues from horticulture crops and that of non-horticulture crops is highly significant. In other words that the average annual revenue contributed by horticulture crops is significantly larger than the revenue contributed by non-horticulture crops to the farmers. This indicates the preference for the horticulture products.

Objective (III.III): In terms of total incomes from horticulture and non-horticulture crops.

Group Statistics

Type of Income	N	Mean (In ₹)	Std. Deviation
Total income from horticulture products(In ₹)	180	43,255.1667	23919.33286
Total Income from non-horticulture products(In ₹)	180	16,850.4556	10313.61907

Independent Samples Test

	t-test for Equality of means			
Total incomes from horticulture products and non-horticulture products(In ₹) {Equal Variances assumed}	T	Df	Sig. (2-tailed)	p-value
	13.600	358	0.0000	P<0.01

*Significant at 0.05 probability Level.
**Significant at 0.01 probability level.

Since p<0.01, the difference between average total incomes from horticulture crops and that of non-horticulture crops is highly significant. In other words that the average total income contributed by horticulture crops is significantly larger than that of non horticulture products.

V. DISCUSSION AND ANALYSIS

The Table 1.1 & 1.2 shows that the *mean annual revenue* derived from *horticulture* activities of 180 survey households are ₹ 2, 37,673.3333 and *Standard Deviation* is ₹ 1, 68,477.41410 respectively. Whereas that of *Non-horticulture* mean annual revenue is ₹ 28275.0000 and *Standard Deviation* are ₹ 15,297.99664 respectively. From the table it is reveal that horticulture income is 8-9 times highly rewarding and pay-off occupation than that of Non-horticulture occupation as regards to survey data of 180 households.

VI. LAND HOLDING AREAS OF SURVEY HOUSEHOLDS UNDER HORTICULTURE CROPS

The table 1.3 depicts the survey households land holding areas under horticulture crops. As we have seen from the table that out of 180 households 71 households have 0.50 acres of land under horticulture, 69 households with 1.50 acres, 24 with 2.00 acres, 4 household with 4.00 acres and 12 households with Zero

Land holding or not having any horticulture farm or garden. This clearly indicated the people have not been cultivating optimally despite the huge availability of land. Therefore government and other related agency have to drastically see that they come to the help of farmer for booming the horticulture industries of the study areas under consideration. [4]

VII. CONCLUSION

The Tamenglong District is popular for its poverty, backwardness and remotest amongst nine districts in the state of Manipur but has better chance of developing growth in the economy by mass involvement of farmers in strengthening horticultural activities. Gangmumei Kabui pointed out that Tamenglong is the Abode of Bamboo and the gateway of Manipur to the western world. [5] These activities would become the lifeline and economic based of the people in the villages. If potentialities of land, favourability of horticulture crops are taken into consideration; farmers' income will be increases thereby enhance employment, employment generation will be at their own village periphery and proper dietary and health of the people will drastically improve, pattern and high standard of life can be experienced in villages. This is possible as the world has become globalized village, markets are integrated, trade are liberalized etc. Most interesting Look East Policy and Trans Asian Railway Line is to be finished by 2015-2020, opening up of International Highway I and II would possibly push up this horticulture industry.[5] So, horticultural crops cultivation in the district can make a rapid leap in development front in near future particularly with respect to Tamenglong district in Manipur State.

To sum up, the entire North East India can be a home to all types of Horticulture crops and can really be successfully operated for development of the entire regions once the potentiality of horticulture are optimally utilised.

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APPENDIX:

Table 1.1
Annual Revenue from Horticulture

N	180
Mean(In ₹)	2,37,673.3333
Std. Deviation	1,68,477.41410

Source: Author Survey Data

Table 1.2
Annual Revenue from Non-Horticulture

N	180
Mean(In ₹)	28,275.0000
Std. Deviation	15,297.99664

Table 1.3
Annual Revenue Distribution from Horticulture w.r.t. Land Areas under Horticulture Crops

Annual revenue from horticulture (In ₹)	Land areas under horticulture crops					
	.00	.50	1.50	2.00	4.00	Total
24,000.00	0	1	0	0	0	1
30,000.00	0	0	1	0	0	1
36,000.00	0	1	1	0	0	2
48,000.00	0	0	1	0	0	1
60,000.00	0	2	0	0	0	2
62,400.00	0	1	0	0	0	1
64,800.00	0	1	0	0	0	1
72,000.00	0	2	1	0	0	3
78,000.00	0	2	0	0	0	2
84,000.00	1	6	1	0	0	8
90,000.00	0	1	0	0	0	1
96,000.00	0	3	2	0	1	6
1,02,000.00	0	0	1	0	0	1
1,08,000.00	0	0	1	0	0	1
1,20,000.00	1	2	3	1	0	7
1,44,000.00	0	4	0	1	0	5
1,56,000.00	0	0	0	0	0	1
1,80,000.00	1	10	10	6	0	27
1,92,000.00	1	1	2	1	1	6
2,04,000.00	0	2	2	0	0	4
2,16,000.00	0	7	11	5	0	23
2,40,000.00	3	11	18	6	0	38
3,00,000.00	2	3	7	3	0	15
3,24,000.00	0	0	1	0	0	2
3,60,000.00	0	1	2	0	0	3
4,20,000.00	0	2	3	0	0	5
4,80,000.00	0	2	0	1	0	3
6,00,000.00	1	1	1	0	0	3
7,20,000.00	0	1	0	0	0	1

8,40,000.00	2	2	0	0	0	4
9,60,000.00	0	1	0	0	1	1
1,20,000.00	0	1	0	0	1	1
Total	12	71	69	24	4	180

Source: Authors' calculation

A Study of Relationship between Cultural Intelligence and Decision Making Styles of High School Principals in Izeh County

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Abstract- The purpose of the present research is to study cultural intelligence and decision making styles of high school principals in Izeh county.its method is of descriptive type and sample size equals to statistic community.tools include a questionnaire of 25 questions of cultural intelligence of cultural intelligence measurement in America and a questionnaire of 21 questions of decision making of French,et al(1993).to analyze data deductively correlative coefficient statistics method used.Results indicated that observed r has positive and significant correlation at p≤/05 among strategy,knowledge,motivation and cultural intelligence behavior with perfectibility ,no social opposition,optimistic and principle decision making styles.

Index Terms- cultural intelligence,decision making styles,principals,high school

I. INTRODUCTION

Cultural intelligence regarded as the people ability for personal growth through learning continue and better identification of cultural heritages,traditions and different customs effective behavior with people having cultural background and different perception.Earley and Angh defines cultural intelligence as person ability for effective adaptation to new cultural forms and relates cultural intelligence structure to other intelligence types including emotional and social intelligence.(Earley &Angh,2004). Earley & Angh(2004) are among researchers who offered four dimensions of strategy, knowledge, motivation and cultural intelligence behavior around variables such as cognitive-ultra cognitive, motivational and behavioral variables for cultural intelligence specification.in fact, cultural intelligence is a new range of intelligence which has much relationship to labor environment and regarded as one of effective factors on principals decision making type.Decision making is a process which organizations face frequently in different areas during their life.Thequality of decisions has great effects on success and failure of principals and organizations. (Arabzade,1386).

Alvani(1387) defines decision making as choosing a solution among various solutions.Organizations need to efficient managers and employees to guide the organization towards its goals .manager as the formal agent of organization stands in the head for coordination and proficiency increase. organization success in achieving goals depends on how managers decision making styles and cultural intelligence helps managers across

decision making type .now this is the question whether cultural intelligence has relationship to decision making of high school principals of Izeh county? The present research implemented to answer considered questions.

II. METHODOLOGY

Method:descriptive of correlative type.

Statistics community ,sample size:including total high school principals of Izeh county equals to 76. With respect to statistics community limitation,in the present research sample size equals to statistics community but returned questionnaires were 71. Measurement tools: 2 questionnaires used.

1-Cultural intelligence questionnaire:

This questionnaire prepared by cultural intelligence measurement center in America including 25 questions ranging 5 choices of Likert (absolutely agree, agree, no idea, disagree, absolutely disagree) having 5-4-3-2-1 score, respectively.The questionnaire measures cultural intelligence in 4 components of strategy, cultural intelligence,cultural intelligence knowledge, cultural intelligence motivation and cultural intelligence behavior. Instant validity and questionnaire predictor reported by cultural intelligence measure center in America /80 and /82, respectively.

2-decision making styles questionnaire:

This prepared by French,et al(1993) having 21 questions with the 5 choices range (always,often,occasionally,rarely,never) of 5-4-3-2-1 score,respectively.This studies decision making styles in 7 dimensions. resulted kronbakh_ coefficient in French, et al (1993)research reported between /86 and /79 and its validity /88.in the present research after primary study the questionnaire conducted on 30 Persons of statistics community that resulted coefficient calculated through kronbakh_α equals to /83.

Data analysis methods: to analyze data inferentially correlative coefficient statistics method.

Inferential findings: findings reported in tables 1 to 4 with respect to research hypothesis.

First question: is there any relationship between cultural intelligence strategy component and decision making styles of high school principals of Izeh county?

Significance level	Effect coefficient	r	frequency	source
0/001	0/14	0/38	71	Cultural intelligence strategy component with perfectibility style
0/17	0/02	0/16	71	Cultural intelligence strategy component with control style
0/50	0/006	-0/08	71	Cultural intelligence strategy component with fantastic style
0/001	0/20	0/45	71	Cultural intelligence strategy component with no social opposition style
0/05	0/05	0/23	71	Cultural intelligence strategy component with optimistic style
0/001	0/18	0/42	71	Cultural intelligence strategy component with principle style
0/91	0	0/02	71	Cultural intelligence strategy component with instinct style

Based on results,observed r has positive and significant correlation at p≤/05 level between cultural intelligence strategy and decision making styles of perfectibility,no social opposition,optimistic and principle ones. In other words ,cultural intelligence among principals increases the possibility of decision making styles of perfectibility,no social opposition,optimistic and principle ones and equals to /14,/2,/05,/18 ,respectively .While there is no significant correlation between cultural intelligence strategy and control, fantastic and instinct decision making styles.

Second :Is there any relationship between cultural intelligence knowledge and decision making styles of high school principals of Izeh county?

Table2:results of Pearson correlation coefficient of relationship between cultural intelligence knowledge and decision making of high school principals in Izeh County

Significance level	Effect coefficient	r	frequency	source
0/001	0/21	0/46	71	Cultural intelligence strategy component with perfectibility style
0/08	0/04	0/21	71	Cultural intelligence strategy component with control style
0/64	0/004	0/06	71	Cultural intelligence strategy component with fantastic style
0/001	0/31	0/56	71	Cultural intelligence with no social opposition style
0/04	0/06	0/25	71	Cultural intelligence with optimistic style
0/001	0/41	0/64	71	Cultural intelligence with principle style
0/22	0/02	0/15	71	Cultural intelligence with instinct style

Based on results, observed r indicated positive and significant correlation between cultural intelligence and perfectibility, no social opposition, optimistic and principle decision making styles. In other words, cultural intelligence increases possibility of using perfectibility, no social opposition, optimistic and principle decision making styles and equals to /21,/31,/06 and /41,respectively.while there is no significant correlation between cultural intelligence and control, fantastic and instinct decision making styles.

Third question: Is there any relationship between cultural intelligence motivation and decision making styles of high school principals?

Table3:results of Pearson correlation coefficient of relationship between cultural intelligence motivation and decision making styles of high school principals in Izeh county

Significance level	Effect coefficient	r	frequency	source
0/16	0/03	0/17	71	Cultural intelligence motivation component with perfectibility style
0/85	0	0/02	71	Cultural intelligence motivation component with control style
0/75	0	0/04	71	Cultural intelligence motivation with fantastic style
0/003	0/12	0/35	71	Cultural intelligence motivation component with no social opposition style
0/05	0/05	0/23	71	Cultural intelligence motivation component with optimistic style
0/009	0/10	0/31	71	Cultural intelligence motivation component with principle style
0/07	0/04	0/21	71	Cultural intelligence motivation component with instinct style

Based on results, observed r indicated between cultural intelligence motivation and no social opposition, optimistic and principle decision making styles. In other words, cultural intelligence between principals increases the possibility of using

no social ,optimistic and principle decision making styles and equals to /12,/05,/10 respectively. While there is no significant correlation between perfectibility,control,fantastic and instinct decision making styles.

4th question: is there any relationship between cultural intelligence behavior component and decision making styles of high school principals of Izeh county?

Table 4: results of Pearson correlation coefficient between cultural intelligence behavior and decision making styles of Izeh county

Table 4:results of Pearson correlation coefficient of relationship between cultural intelligence behavior component and decision making styles of high school principals in Izeh county

Significance level	Effect coefficient	r	frequency	source
0/001	0/24	0/49	71	Cultural intelligence behavior component with perfectibility style
0/50	0/006	0/08	71	Cultural intelligence behavior component with control style
0/78	0	0/03	71	Cultural intelligence behavior component with fantastic style
0/001	0/30	0/55	71	Cultural intelligence behavior component with no social opposition style
0/01	0/08	0/29	71	Cultural intelligence behavior component with optimistic style
0/001	0/22	0/47	71	Cultural intelligence behavior component with principle style
0/94	0	0/008	71	Cultural intelligence behavior component with instinct style

Based on results, observed r indicated positive and significant correlation between cultural intelligence behavior and perfectibility, no social opposition, optimistic and principle decision making styles. In other words, cultural intelligence increases the possibility of using no social opposition, optimistic and principle decision making styles and equals to /24,/3 ,/08 and /22 respectively. While there is no significant correlation between cultural intelligence and perfectibility, control, fantastic and instinct decision making styles.

III. DISCUSSION AND CONCLUSION

Findings regarding the relationship between cultural intelligence components and decision making styles of high school principals indicated that there is a positive and significant correlation between cultural intelligence components and perfectibility, no social opposition, optimistic and principle decision making styles. In other words, cultural intelligence components among principals increase the possibility of using perfectibility, no social opposition, optimistic and principle decision making styles. In other words there is no significant correlation between cultural intelligence components and control,

fantastic and instinct decision making styles. subject of the present research reported also in van derail(2011)Prado (2010),tai (2010) smite(2008) van dain (2008) imai (2007) montagliani and giakalon (1998) yazdkhasti (1389) nazemi, et al (1388) naiji and Abbas ali zade (1388) kazemi (1387) delaram (1387) fayazi and Jan nesar ahmadi (1385) and moshabaki and ramous (1385) that indicated correlation of present research and mentioned studies. In the theory of earley and angh (2006) defines cultural intelligence as person ability in accordance with successful adapt to new cultural setting that in conclusion resulted in more efficiency in decision making ability and face to others because who has higher cultural intelligence delays judgments about others until obtain more proper information about other groups and doesn't make a decision based on self knowledge but use existing information to present rational principle and in accordance with setting ,so it can be said that cultural intelligence can increase decision making ability. Thus, cultural intelligence increase judgment and decision making ability since his decisions may be based on full and valid sources that the process leads to efficient decisions of person and brings about beneficial results for organization and society. While Prado(2006) indicated that cultural intelligence results in certain

evaluation and who has higher cultural intelligence had better evaluation of cultural and business conditions and efficiency. Also tai(2010) reported cultural intelligence as an important variable in occupation behavior improvement and indicated that employees had higher cultural intelligence would have higher adapt to organization conditions and better performance to make a proper decision. Also, van derail (2011) reported cultural intelligence as a factor of more efficiency and performance and proficiency improvement and as an important variable across ascendancy of organizations should be considered. So results of the present research are in accordance with referred research it can be concluded that culture intelligence cause employees performance improvement and following organization proficiency. In Simon decision making pattern rational and intellectual decisions obtain great attention and defines it as a factor of organization equilibrium that more intelligent people have better decisions. So decisions making regarded as the most important success factors of principals and the more intelligence the more success possibility factor.

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Cloud Computing in Banking Services

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Abstract- The banking industry is facing several changes. Control is now in the hands of the customer, rather than the bank. Customers are driving new business models. Technology changes the traditional business transformation. Banks need to react to this new customer-driven environment with innovation in business models, operations and IT. For banks, the value proposition for cloud computing affects the entire business. Cloud technology offers a new model for delivering innovative client experiences, effective collaboration, improved speed to market and increased IT efficiency.

Cloud computing provides a platform for optimizing financial services operations while creating and delivering the kind of innovative services that differentiate and propel your business forward. It is agility that will be the lifeblood of successful financial enterprises going forward, and cloud computing is one way of gaining that agility. Cloud services deliver revolutionary performance that empower the banking industry to automate and manage their processes.

Index Terms- A Banking, Cloud computing, cloud, model optimization

I. Introduction

With the rise of existing and new, non-traditional competition, banking faces a changing business landscape. Satisfying customer demands has become more complex as customers demand more convenience and control over their banking services. At the same time, regulators are ushering in a new era of government over-sight. Banks currently face challenges in a number of key areas:

Capital inadequacy that depresses profit margins.

Emboldened customers who expect rapidly evolving new services and offerings

Fierce competition for customers has spawned industry consolidation and the entrance of nontraditional firms

Changing business models have shifted from product-centric to customer-centric.

Enhanced regulation increases government oversight and intervention.

Increasing social and government pressure for financial inclusion.

To drive growth and innovation in banking, it is increasingly necessary to dramatically leapfrog the competition using IT and business model transformation.

Cloud computing can offer financial institutions a number of advantages, **including**:

A. Cost savings
B. Usage-based billing
C. Business continuity
D. Business agility
E. Green IT

But before moving to the cloud, banks must consider issues around data confidentiality, security, regulatory compliance, interoperability of standards, and quality of services.

Why Cloud Computing for Banks?

Cloud computing can help financial institutions improve performance in a number of ways.

A. Cost Savings and Usage-based Billing

With cloud computing, financial institutions can turn a large up-front capital expenditure into a smaller, ongoing operational cost. There is no need for heavy investments in new hardware and software. In addition, the unique nature of cloud computing allows financial institutions to pick and choose the services required on a pay-as-you-go basis.

B. Business Continuity

With cloud computing, the provider is responsible for managing the technology. Financial firms can gain a higher level of data protection, fault tolerance, and disaster recovery. Cloud computing also provides a high level of redundancy and back-up at lower price than traditional managed solutions.

C. Business Agility and Focus

The flexibility of cloud-based operating models lets financial institutions experience shorter development cycles for new products. This supports a faster and more efficient response to the needs of banking customers. Since the cloud is available on-demand, less infrastructure investments are required, saving initial set-up time. Cloud computing also allows new product development to move forward without capital investment. Cloud computing also allows businesses to move non-critical services to the cloud, including software patches, maintenance, and other computing issues. As a result, firms can focus more on the business of financial services, not IT.

D. Green IT

Organizations can use cloud computing to transfer their services to a virtual environment that reduces the energy consumption and carbon footprint that comes from setting up a physical infrastructure. It also leads to more efficient utilization of computing power and less idle time.

What Is Cloud Computing?

The cloud is a **paradigm** shift in computing, by which infinite computing capabilities and resources (servers, storage, networks, applications and services) are delivered as a service to customers using internet technologies. The Microsoft Windows

Azure platform, which serves as the foundation for developing and running applications in the cloud (and offers all the required development tools, management and services from Microsoft), is built to be flexible and give customers the ability to run the technologies they choose and scale as necessary – paying only for what they consume. For banks, running their applications in Windows Azure means they don't have to deal with the basics of the operating system. They have automatic scalability and automatic failover as well as disaster recovery, without having to actively manage and maintain the technology themselves. For smaller banks in particular, cloud computing is the most cost-effective IT solution available on the market today, as it allows them to benefit from the consumption-based pricing model, as well as the scalability of Windows Azure as they grow.

Cloud computing has the capacity to change completely the financial services landscape. By making enterprise-level banking systems and associated technologies available in the cloud on a pay-per-use basis, now anyone, anywhere can have access to modern core banking systems without the cost and other barriers usually associated with this technology.

Cloud computing is a model, not a specific technology. Today, cloud technology is not just a tool being used in IT, but a paradigm shift to an entirely new business model. Cloud computing, allows companies to access IT-based services via the internet. A cloud-based model provides rapid acquisition, low capital investment, relatively low operating costs and variable pricing tied directly to use. Cloud computing services operate at several levels: infrastructure as a service, software as a service, platform as a service and business process as a service. There are several different "flavors" of cloud, each bringing its own specific implications for banks.

The main variants are:

Public clouds

Public clouds extend the data center's capabilities by enabling the provisioning of IT services from third-party providers over a network. The data and processing may be located anywhere in the world on infrastructure that is shared with the cloud provider's other customers, or "tenants".

Private clouds

Private clouds are built by applying virtualization within a bank's own data centers. Because private clouds are not exposed to external "tenants," banks tend to regard them as a more secure environment for customer data.

Hybrid clouds

Hybrid clouds blend public and private clouds depending on the sensitivity of the data and applications in each process, and the degree of business criticality and differentiation. Most banks will follow a "hybrid" cloud strategy which can also be a cloud owned by and located within the bank, but operated by a third-party.

Public "sovereign" cloud

Public "sovereign" cloud is an emerging variant, under which a public cloud provider commits to keeping the cloud data and processing within a specific jurisdiction. This facilitates compliance with data protection regulations forbidding personal data from passing beyond national borders.

II.   DEPLOYMENT VIEW OF CLOUD BANKING

Fig. Deployment Module

The all service layers, regardless of deployment model (private, hybrid, and public), a banking sector must implement a consistent model to govern, provision, and operate activities across all layers. This encompasses provisioning not just the infrastructure, but all components and services required to deploy the bank service, for example, hardware, network services, operating system, database, middleware, application, and third-party service provisioning.

Infrastructure Services—Includes servers, storage, and networking, both inside and outside a banking services for data center. Many banks are currently building an internal cloud IT infrastructure. This layer is often called IaaS.

Platforms Service—A broad technology array, including application hosting environments and tools, middleware technology, development frameworks and tools, and standards applied to specific business services. Even a core banking product includes a development environment such as frameworks, scripts, languages, tools and deployment environment such as deployment scripts, monitoring, and control environment.

Business Services—Core bank services[5] such as corporate and retail banking, wealth management, treasury management, risk management and compliance, trading.
Banks have built these services in-house, the market is replacing these systems with commercial off-the-shelf packages that embrace an SOA. Some business services, such as loan origination and payments, are consumed through an external service provider.

Channel Services—Support diverse channels such as ATM, branch, call center, mail, mobile, online, telephone, video, etc. The services are tailored per channel, built on a channel-specific technology stack with some sharing across channels via bridging technology. As the number of channels, devices, and users explode, banks evolve toward single architecture that supports all channels, delivering a consistent customer experience, services, and information across all channels.

Security (Authentication, Authorization and Access Control) —the critical need for security, privacy, and control in a cloud environment. For applications that need lower levels of security and control, a public cloud may suffice. Where more stringent levels of security and control are called for, a private cloud is the logical choice. For more sensitive banking sector services applications, which call for higher levels of privacy and control, retain them on their existing environment, or consider a utility services solution, or traditional managed hosting services approach.

Scalability—The Cloud service that provide real-time visibility into resource utilization, operation performance, patterns for CPU utilization, disk I/O, and network traffic.
Enabling employees across distributed branches to access trading and banking systems through a security-rich cloud infrastructure

Benefits of Cloud Computing in various banking IT service areas:

Analytics: Integrating customer data across banking platforms to enable near real-time insights.

Collaboration: Enabling employees across distributed branches to access trading and banking systems through a security-rich cloud infrastructure

Cost Savings and Usage-based Billing: With cloud computing, financial institutions can turn a large up-front capital expenditure into a smaller, ongoing operational cost. There is no need for heavy investments in new hardware and software. In addition, the unique nature of cloud computing allows financial institutions to pick and choose the services required on a pay-as-you-go basis.

Desktops and devices: Deploying a private cloud to centralize management of desktops allows for greater remote flexibility without sacrificing control, while enabling banking employees to access the applications and data they need

Development and testing: Enabling a bank's development teams to quickly and easily create virtual environments thus increasing the agility of development and testing

Industry applications: Enabling payment providers to standardize and modernize transaction processing

Infrastructure compute: Allowing capacity to be allocated, expanded and reallocated efficiently gives banks flexibility and agility while resolving the issues of complexity and cost increases related to scaling up traditional network models to accommodate future growth

Infrastructure storage: Providing scalable storage solutions to ensure that the real-time demands of today's trading and analytics processes are maintainable

Managed backup: Backing up a bank's critical business data to ensure that in the event of a disaster a bank can bounce back rapidly and easily

Security: Enforcing active security and endpoint management to ensure corporate governance and banking IT policies are maintained

III.   CONCLUSION

While banks will benefit in a similar way to other cloud users from this particular offering, especially in terms of lower total cost of ownership, enhance their operations and help them develop new offerings with flexibility and a rapid time to market. Cloud computing may soon prove indispensable as an answer to the daunting new demands for agility, transparency, and efficiency. Shrinking markets and global competition pose numerous challenges for banks – the Cloud offers the speed, flexibility and real-time information needed to meet those challenges on a cost-effective basis.

Global economic situation to more stringent regulatory controls, nimble new competitors, and shifting Customer expectations—bankers and others now face a dramatically different market reality. Banks must collaborate and technology must be part of that collaboration. We successfully integrated on promise and cloud-deployed bank sector for web service. The benefits can include not only lower costs, but increased revenue and optimized customer relationships. Cloud computing represents game-changing shifts in how banking services organizations acquire and leverage IT resources. Cloud computing also provides a high level of redundancy and back-up at lower price than traditional managed solutions. The Cloud

vendor provided infrastructure services are used to address scalability, performance, security, availability, disaster recovery, monitoring requirements of the systems.

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A Data Mining: Overview to Distributed Systems

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Abstract- Distribution of data and computation allows for solving larger problems and execute applications that are distributed in nature. Data mining technology has emerged as a means for identifying patterns and trends from large quantities of data. The Data Mining technology normally adopts data integration method to generate Data warehouse, on which to gather all data into a central site, and then run an algorithm against that data to extract the useful Module Prediction and knowledge evaluation. Applications from various domains have adopted this technique to perform data analysis efficiently. Several issues need to be addressed when such techniques apply on data these are bulk at size and geographically distributed at various sites. The system contains modules for secure distributed communication, database connectivity, organized data management and efficient data analysis for generating a global mining model. Performance evaluation of the system is also carried out and presented. New technologies are emerging to make big data analytics possible and cost-effective. This paper describe system architecture and distributed data mining, also known as multi agent based distributed data mining, in terms of significance, system overview, existing systems, and research trends.

Index Terms- Data mining; distributed systems; reliability; performance.

I. INTRODUCTION

The widespread use of computers and the advance in database technology have provided huge amounts of data. The explosive growth of data in databases has generated an urgent need for efficient data mining techniques to discover useful information and knowledge.

Distributed data mining (DDM) is a fast growing area which deals with the problem of finding data patterns in an environment with distributed data and computation. In current era most of the data analysis systems require centralized storage of data, the increasing merger of computation with communication is more demand data mining environments that can utilize the full advantage of distributed computation. Reliability of distributed no longer can be assured by static design because distributed systems are increasingly large, heterogeneous and dynamic. On the one side, large-scale computing grids, clouds and clusters provide computing and data resources with hundreds or even up to thousands of nodes.

Distributed Systems today grow dynamically in terms of new applications, hardware and network components, users and workload changes. Complex interactions between the different layers of a distributed system make systems and effects of faults hard to understand such that faulty behavior and poor performance cannot always be distinguished. Our approach to reliable operation of distributed systems is based on building a dynamic model for the distributed systems from monitored system data.

A fundamental challenge for DDM is to develop mining techniques without having to communicate data unnecessarily. Such functionality is required for reasons of efficiency, accuracy and privacy. In addition, appropriate protocols, languages, and network services are required for mining distributed data to handle the required metadata and mapping.

Distributed Data Mining Architecture

Our proposed mining architecture is a client/server-based system developed for performing knowledge discovery from large distributed sources of data. Due to the diversity of mining algorithms and the diversity of data sources, it is difficult to generate a mining model by combining mining rules on different sites. Our proposed system works independently to combine result from different sites. This section describes the abstract architecture model of the Distributed Data Mining and the interaction between its various subsystems. The architecture has the following subsystems: communication, mining, analyzing, and database.

We want to evaluate collected data of the system with the help of data mining techniques in order to build a model of the system. This model can be used for online prediction of the system's behavior and thus gives the opportunity to react even before faults or errors occur.

System Architecture

In the following, an initial architecture is presented that enables data miners to build a system model for execution time prediction and performance fault detection for distributed data mining algorithms. Fig. 4 depicts the architecture, which is currently being implemented

The following depicts a 5-Step approach on predictive maintenance for distributed systems:

• Step 1 - **Data Gathering (logging, online monitoring)**: This step provides the basis for building the model of the system. Observational data from the operational system is gathered either in an online or an off-line setting. Using data from the real system for model building allows for much more realistic models than a-priori static models or simulations.

• Step 2 - **Model Building**: This step is based on the data mining analysis of the monitoring data. E.g., feature-selection and classification algorithms can be used to determine which parameters of the system are most correlated to failures or performance problems

• Step 3 - **Online-Monitoring and Prediction**: Given that a model of the system gained in Step2 exists, selected parameters can be monitored and short term prediction on potential problems can be made on the basis of this model. Also, predictions regarding parameter settings of the distributed system become possible.

• Step 4 - **Preventive Measures**: In case that the model predicts reliability or performance problems based on the actual observations, measures might be taken to prevent problems, instance system parameters might be changed or load might be reduced

• (Step 5 - **Adaptation of the model**): As the actual system might emerge over the time, adaptations of the model itself might become necessary. Basically, the model building process taking place in Step 2 on the data from Step 1 will have to be checked against long term changes in the actual monitored data. The model adaptation might require human interaction, but also could be foreseen automatically, for instance when re-adjusting thresholds or expected delays.

Distributed Data Mining on Grids
• The Grid extends the distributed and parallel computing paradigms allowing resource negotiation, dynamical allocation, heterogeneity, open protocols and services.

• As Grids and Clouds became well accepted computing infrastructures it is necessary to provide data mining services, algorithms, and applications.
• Those may help users to leverage Grid/Cloud/… capability in supporting high-performance distributed computing for solving their data mining problems in a distributed way.

Grid services for distributed data mining
• Exploiting the SOA model and the Web Services Resource Framework (WSRF) it is possible to define basic services for supporting distributed data mining tasks in Grids
• Those services can address all the aspects that must be considered in data mining and in knowledge discovery processes
• data selection and transport services,
• data analysis services,
• knowledge models representation services, and
• Visualization services.

It is possible to define services corresponding to:

Single Steps - that compose a KDD process such as preprocessing, filtering, and visualization.

Single Data Mining Tasks - such as classification, clustering, and association rules discovery.

Distributed Data Mining Patterns - such as collective learning, parallel classification and meta-learning models.

Data Mining Applications or KDD processes - including all or some of the previous tasks expressed through a multi-step workflow.

Data mining Grid services
• This collection of data mining services can constitute an Open Service Framework for Grid-based Data Mining Open Service Framework for Grid-based Data Mining
• Allowing developers to program distributed KDD processes as a composition of single and/or aggregated services available over a Grid.

- Those services should exploit other basic Grid services for data transfer and management for data transfer, replica management, data integration and querying.

By exploiting the Grid services features it is possible to develop data mining services accessible every time and everywhere.
- This approach may result in
- Service-based distributed data mining applications
- Data mining services for virtual organizations.
- Distributed data analysis services on demand.
- A sort of knowledge discovery eco-system formed of a large numbers of decentralized data analysis services.

II. SUMMARY

- New HPC infrastructures allow us to attack new problems, BUT require to solve more challenging problems.
- New programming models and environments are required
- Data is becoming a BIG player, programming data analysis applications and services is a must.
- New ways to efficiently compose different models and paradigms are needed.
- Relationships between different programming levels must be addressed.
- In a long-term vision, pervasive collections of data analysis services and applications must be accessed and used as public utilities.
- We must be ready for managing with this scenario.

III. CONCLUSION

In this paper, we highlight the problem of the increase in complexity, diversity and scale of data. We introduce a separation of concerns between data mining and integration (DMI) process development and the mapping, optimization and enactment of these processes. We postulate this separation of concerns will allow handling separately the user and application diversity and the system diversity and complexity issues simultaneously.

We introduced an initial architecture for observing the distributed systems and algorithm executions that allows for model building and on-line monitoring based on predicting upcoming reliability and performance problems with previously generated models. Users are enabled to take preventive measures for increased reliability or performance. We presented a concrete scenario of applying this approach in the field of distributed data mining.

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Prevalence of Onchocerciasis among patients attending the NKST Eye Care programme Mkar-Gboko, Benue State, Nigeria.

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Abstract- Onchocerciasis has remained a public health problem, despite several efforts over the years to eliminate it both by the World Health Organization (WHO) and NGO's. Prevalence of human onchocerciasis was conducted amongst 274 patients comprising 154 males and 120 females within the age range of 15 to 40 years and above, who were attending NKST Eye Care Programme at Mkar-Gboko, Benue State, Nigeria from January, 2012 through June, 2013. Onchocerciasis infection was diagnosed by parasitological observations for the presence of microfilariae of *Onchocerca volvulus* in skin biopsies using standard microscopy**.** A total of 37(13.50%) patients were found to be infected with *Onchocerca volvulus,* comprising 26(9.49%) males and 11(4.01%) females. The highest infection rate of 12(4.28%) was observed in patients aged 40 years and above while the least infection was within the age range of 15- 19 years of age 1(0.36%). However, there was no significant difference (χ^2-test, p>0.05) between the prevalence of infection and the age groups. The result shows a significant difference between the prevalence of infection and the patients' occupation (χ^2-test, p<0.05); the farmers were the most infected 30(10.95%) while students were least infected 1(0.36%). The patients from the study area (Mkar-Gboko) had 0 (0%) infection out of the 21 patients examined for the disease while patients who came from the neighboring local government areas had infections as follows; Ushongo, had the highest prevalence rate of 17(6.20%) out of the 76 patients examined. Meanwhile, 97 patients were examined from Buruku with prevalence rate of 7(2.55%) while out of the 80 patients examined from Kwande, 13(4.74%) were infected. Though, the total prevalence rate was low compared to the results of other findings, efforts should be intensified to achieve improved ivermectin coverage and compliance in annual ivermectin treatment in order to completely eliminate onchocerciasis as a public health problem in the affected communities. The public health and socio-economic implications of the findings have been discussed.

Index Terms- Onchocerciasis, Patients, Eye care programme, Mkar-Gboko, Nigeria

I.   INTRODUCTION

Onchocerciasis is increasingly recognized as one of the major diseases of public health importance in endemic parts of the world, especially in Sub-Saharan, Africa (Etya'ale, 2002). West Africa includes the most endemic areas in the world; Nigeria being one of the largest countries of West Africa that has been reported to have a high incidence of onchocerciasis infection (Okonkwo *et al*., 2010).

All the states of the federation are endemic to the disease except Lagos State (Sam-Wobo *et al.,* 2012). Onchocerciasis is basically a rural disease affecting communities sited along fast-flowing rivers with symptoms particularly irritating and disabling, often associated with long-term exposure to infection and this affects the social and economic activities of the inhabitants concerned (Okonkwo *et al*., 2010).

Human onchocerciasis is a major blinding disease in equatorial Africa, Central and South America (Guderian *et al*., 1997), Yemen and Asia (Marroquin, 1981). The latest epidemiological mapping data indicate that the disease is much more widespread than assumed previously and that the number of people infected and the number of disability adjusted life years (DALYs) lost are more than twice as high as originally estimated (Remme *et al*., 2006).

Onchocerciasis is a disease of the warm tropical environment in which the flies that vector the microfilariae live under conditions favourable for their development all year round (Burnham, 1998). In Africa, the disease has been described as a disease of the future because as the development of the hinterlands proceed, particularly as dams and water projects increase, it will cease to be a disease affecting only small, isolated, poverty stricken and primitive communities in the bush and will become more and more a threat to sophisticated development personnel and other such workers (Remme *et al*., 2006).

Onchocerciasis is a chronic parasitic infection caused by the filarial nematode, *Onchocerca volvulus*. The disease is transmitted from one individual to another through the bites of the black fly *Simulium damnosum* of the family Simulidae (Sam-Wobo *et al.,* 2012). The adult worms are usually found in subcutaneous nodules and have an average longevity of around 9-11 years and the adult female worm produces millions of microfilariae which migrate to the skin of the host (Marroquin, 1981).

The microfilariae are the main cause of the clinical manifestations of the disease, including: dermatitis, resulting in very severe itching; papular and lychenified skin lesions; depigmentation and atrophy of the skin; and lymphadenitis (Shibuya, 2006).

The most severe complications of onchocerciasis are irreversible ocular lesions of both the anterior and posterior segment of the eye, resulting first in impaired vision and finally in total blindness (Shibuya, 2006).

It is estimated that onchocerciasis is the second leading infectious cause of blindness in the world only preceded by blinding trachoma (Thylefors, 1992). The World Health Organization (WHO, 1995) estimated that 17 million people were infected and that 900,000 disability adjusted life years (DALYs) were lost due to onchocerciasis in 1990. Recently, an estimated half a million were known to be blind due to the disease and about 1.5 million were severely visually impaired (WHO, 2011). Also, some 90 million people are at risk for becoming infected with the parasite (WHO, 2011). Approximately 37 million individuals are currently infected with onchocerciasis with 99% of its victims residing in sub-Saharan Africa (WHO, 2011). It is endemic in 36 countries in Africa, the Arabian peninsula and the Americas, but its distribution is highly concentrated on the poorest regions of the world -- 30 out of 36 endemic countries are in sub-Sahara African countries where approximately 99% of all those infected live (PBD) (Etya'ale, 2002) and the disease has had a major impact on the economic and social fabric of endemic communities (Burnham, 1998).

Nigeria is believed to have more persons infected with onchocerciasis than any other country in the world, now accounting for over one third of the global cases (Uttah *et al*., 2004). The National Onchocerciasis Control Programme (NOCP, 1993) reported that the disease is present at varying degrees in all states of the federation, and that over 15 thousand Nigerian rural communities are endemic to the disease. According to the report by the World Health Organisation (WHO, 2011), there are 35, 014 hyper-endemic communities in the country and approximately 28 million individuals reside within these communities. The report further states that hyper-endemicity zone for onchocerciasis is within the rain forest zone of the country. Some areas within this zone have low disease burden (Abanobi and Anosike, 2000).

Meso-endemic zones are the savannah zones of the country. Within the mesoendemic zones some areas have high disease burden and new foci are still being discovered (WHO, 1995). Factors that contribute to this include the large size of the countrys' population, and conditions in many parts of the country that favour sustained transmission (Abanobi and Anosike, 2000). Another important factor in the prevalence of onchocerciasis is the human population relative to fly population (Oye, 2008), which is also an important indicator of the man-fly contact.

In Nigeria, most of the work activities of the individuals in these communities include farming, fishing, handicraft, trading etc. Rural dwellers flee from this plaque and migrate to urban cities disrupting the socioeconomic development in their communities (Alonso *et al*., 2009). According to Ubachukwu (2006), some of the social consequences associated with onchocerciaisis include the disruption of family life and relationships as disabled persons desert rural villages to urban cities for better quality of life. However, they are unable to access and secure employment, and thus experience extreme poverty and become beggars on the streets. They end up settling in shanty towns and resort to living in slums. Additionally, the burden of the disease impacts women and children. It affects the age of marriage in young women, limiting their choice of partners such as older men and divorcees. It also prevents infected mother to practice exclusive breastfeeding, reducing bonding between new born and mother. The educational impact of the disease is especially on children as they drop out from school to care for and lead blind family members (Ubachukwu, 2006).

Disease occurrence in human society is normally influenced by environmental factors which include both the physical and behavioural environments (Uttah *et al*., 2004). The complex system of interaction among the physical environment, population and cultural behaviour forms the triangle model of human ecology and forms the basis of disease occurrence in human population (Uttah *et al*., 2004). Onchocerciasis exists virtually throughout the country but there are variations in levels of endemicity.

In Benue State, onchocerciasis is endemic with bulk of the farming settlements situated along river banks due to fertility of the land (Gemade and Dipeolu, 1983), thus the need for this study as a protocol to enhancing preventive and control measures. This paper therefore, presents the findings of a research into the prevalence of onchocerciasis, their relation to age, sex and occupation among patients attending NKST eye care programme in Mkar-Gboko, Benue State, Nigeria. The prevalence of onchocerciasis in relation to the location of the patients among the four local government areas from where the patients came from, is also presented.

II.   MATERIALS AND METHODS

Study Area

Benue State is one of the 36 States in the Federal Republic of Nigeria, a tropical country on the west coast of Africa. The state derives its name from River Benue, the second largest river in the country and is located in the central region of the country where it lies between latitude 7° 13 and 7° 49, longitude 8° 15 and 8° 42. The state covers an area of about 34, 059 square kilometers with a population of over 4.2 million people (National Population Commission, 2007). Majority of the inhabitants live in rural agricultural areas and engage in peasant agriculture. However, the state's reputation as the food basket of the nation is being seriously jeopardized by the socio-economic consequences of parasitic diseases (Omudu and Ochoga, 2011).

Gboko is a fast growing town in the Benue State of North-central Nigeria. The population of the town is over 500,000 people, made up of mostly Tiv people. It is the traditional capital and ancestral home of the Tiv tribe and it has the official residence of the Tor-Tiv, who is the paramount traditional ruler of the Tiv people that spread across Benue, Taraba, Plateau, Nasarawa, and Enugu States. Gboko was also the headquarters of the Tiv Native Authority. Buruku Local Government Area has its headquarters in the town of Buruku. It has an area of 1,246 km² and a population of 203,721 as at the 2006 census. Kwande Local Government Area has its headquarters in the town of Adikpo. It has an area of 2,891 km² and a population of 248,697 at the 2006 census. Ushongo Local Government Area has its headquarters in the town of Lessel. It has an area of 1,228 km² and a population of 188,341 as at the 2006 census (National Population Commission, 2007).

Assessment of skin snips for the presence of *Onchocerca volvulus*

A blood-free skin snip for parasitological examination was taken from each individual during daytime using sterile lancets and razor blades according to the method adopted by Uttah *et al*. (2004). The size of the biopsies is known to average 0.8 mg, with a range 0.4-1.2 mg (Uttah *et al.,* 2004). The biopsies were placed in micro-titre wells containing 0.2ml of 0.85% saline solution. When completed, each plate was covered with cellophane tape and was kept for 24 hours at room temperature. At the end of the 24 hour-incubation period, the skin biopsies were fixed in formalin solution (35% formaldehyde solution) by adding two drops per micro-titre well. Thereafter, emerged microfilariae were observed and counted microscopically using x40 magnification. Thorough physical examinations of individual volunteers were performed by a physician. The leopard skin assessment was reported as present or absent upon examination of the lower limbs for the presence of depigmentation of the skin. Data were analysed using the Chi-square (χ^2) statistic.

III. RESULTS

Out of the 274 subjects examined comprising 154 males and 120 females, 37(13.50%) were infected with *Onchocerca volvulus* of which 26(9.49%) were males while 11(4.01%) were females (Table 1). There were no significant differences in the rate of infection between male and female patients examined, and the age groups (χ^2-test, $p > 0.05$). However, there was a significant difference between the prevalence of infection and the occupation (χ^2-test, $p < 0.05$). Patients within the age group of 40 years and above were the most infected 12(4.28%), while those within the age range of 15 - 19 years were the least infected 1(0.36) (Table 2). In terms of occupation, the farmers were the most infected 30(10.9%) while the students were least infected 1(0.36%) (Table 3). With regards to the localities, the 21 patients who were resident from the study area (Mkar-Gboko) recorded no infection 0(0%). Ushongo was found to have the highest prevalence rate of 17(6.20%), followed by Kwande which recorded prevalence rate of 13(4.74%) while Buruku had the least among the three neighbouring local Government areas with prevalence rate of 7(2.55%) (Table 4).

Table 1: Prevalence of Onchocerciasis among Patients in Relation to Sex at NKST Eye Care   Programme Mkar- Gboko.

Sex	Number examined	Number infected (%)
Male	154	26 (9.49)
Female	120	11 (4.01)
Total	274	37 (13.50)

Table 2: Prevalence of Onchocerciasis among Patients in Relation to Age at NKST Eye Care Programme Mkar, Gboko.

Age (years)	Number Examined	Number Infected (%)	Male Number Examined	Number Infected (%)	Female Number Examined	Number Infected (%)
15-20	21	1 (0.36)	13	1 (0.36)	8	(0)
20-25	30	3 (1.10)	21	2 (0.73)	9	1 (0.36)
25-30	37	5 (1.82)	33	3 (1.10)	4	2 (0.73)
30-35	55	7 (2.55)	21	5 (1.82)	34	2 (0.73)
35-40	58	9 (3.28)	27	6 (2.19)	31	3 (1.10)
>40	73	12 (4.28)	39	9 (3.28	34	3 (1.10)

Total	274	37(13.50)	154	26 (9.49)	120	11 (4.01)

Table 3: Prevalence of Onchocerciasis among Patients in Relation to Occupation and Sex at NKST Eye Care Programme Mkar, Gboko.

Occupation	Number Examined	Number Infected (%)	Male Number Examined	Male Number Infected (%)	Female Number Examined	Female Number Infected (%)
Students	21	1 (0.36)	13	1 (0.36)	8	0 (0.0)
Civil Servants	74	2 (0.73)	37	0 (0)	37	2 (0.73)
Traders	39	4 (1.46)	17	3 (1.10)	22	1 (0.36)
Farmers	140	30 (10.9)	87	22 (8.03)	53	8 (2.92)
Total	274	37 (13.5)	154	26 (9.49)	120	11 (4.01)

Table 4: Prevalence of Onchocerciasis in Relation to Patients' Location from NKST Eye Care Programme Mkar, Gboko.

Locality	Number Examined	Number Infected (%)	Male Number Examined	Male Number Infected (%)	Female Number Examined	Female Number Infected (%)
Ushongo	76	17 (6.20)	46	11 (4.01)	30	6 (2.19)
Buruku	97	7 (2.55)	53	4 (1.46)	44	3 (1.10)
Gboko	21	0 (0)	15	0 (0.00)	6	0 (0.00)
Kwande	80	13 (4.74)	40	7 (2.55)	40	6 (2.19)
Total	274	37 (13.50)	154	22 (8.02)	120	15 (5.48)

IV. DISCUSSION

The prevalence of onchocerciasis has been established in different parts of Nigeria by different authors (Okoye and Onwuliri, 2007; Wogu and Okaka, 2008; Akinboye *et al*., 2010; Okonkwo *et al*., 2010; Sam-Wobo *et al.,* 2012). Its rate of occurrence as reported by these researchers varies from one geographical area to another with highest endemicity of 83% recorded in Ovia North East L.G.A of Edo State (Akinbo and Okaka, 2010) and 54.2% in Ibarapa L.G.A. of Oyo (Akinboye *et al*., 2010). In this study, the prevalence of over 13% observed virtually in all the study Local Government areas showed that many people still harbour *Onchocerca* microfilariae in some communities of Benue State.

Results of this study have demonstrated hypoendemic prevalence of onchocerciasis which is less than the 26.9% recorded by Nwaorgu *et al*. (1994) in onchocerciasis mesoendemic area of Enugu State, Nigeria. It is also relatively lower than 37.3% recorded by Okonkwo *et al*. (2010) in mesoendemic area of Ebonyi State, Nigeria; Sam-Wobo *et al.* (2012) along Ogun River System, southwest Nigeria and 47.5% recorded by Wogu and Okaka (2008) in Okpuje, Owan West Local Government Area, Edo State, Nigeria.

The prevalence of Onchocerciasis recorded in this study indicated a low prevalence probably due to previous mass invermectin treatment in the studied areas. Onchocerciasis prevalence was more in males (9.49%) than in females (4.01%), although the difference was not statistically significant (χ^2-test, p > 0.05). This can be supported by the findings of Gemade and Dipeolu (1983); Nnaji and Ozor (2001); Atu (2003); Uttah *et al*. (2004) and Wogu and Okaka (2008) which revealed that more males were involved in farming in the infected areas than females due to greater exposure of these males in the farms while the females were usually confined to domestic duties within the house.

Benue State occupies large area of fertile land with fast flowing streams and rivers which provide favourable breeding sites for the simulid vectors. Therefore, it is not surprising to notice male dominance in agriculture which exposes them to vector bites. The females only take active part in harvesting, processing, transportation and selling of farm produce (Meludu and Ajayi, 2005).

In rural families, males are usually the breadwinners and they are the ones who acquire and cultivate land and the disease has been reported to be a rural condition usually among agrarian populations (Saporu, 1988; Dozie and Nwoke, 2002). This finding is however, in disagreement with the report by Akinbo and Okaka (2010) in Ovia North East L.G.A of Edo State, Nigeria with 93% onchocerciasis prevalence in females and a corresponding 74.5% in males.

The relationship between man and his environment is symbiotic. Although, it is generally believed that the environment influences human activities, these activities in turn influence the nature of the environment. Physical, social and economic factors are very important factors that determine the severity of onchocerciasis in any given society (Oye, 2008). This study revealed significant difference (χ^2-test, p<0.05) between the prevalence of infection and the occupation. This can be supported by Edungbola (1982) that onchocerciasis is more common among farmers, fishermen, hunters, normads and others who are engaged in outdoor activities that bring them in constant contact with the *Simulium* fly.

Human emigrants from endemic areas bringing patent onchocercal infection can influence the community microfilarial loads (Uttah *et al*., 2004). In such areas where microfilaraemia is largely imported, epidemiological indices most times are not reliable, and according to Sabry (1991), they do not conform to known models. There is no significant relationship (χ^2-test, p>0.05) between age-related infection rates observed in this study, although patients who were 40 years and above were more infected than younger age group. The increase in onchocerciasis with age reported in this study has also been documented in Uttah *et al*. (2004); Nmorsi (2002) and Akinbo and Okaka, (2010) in which they found that increasing age was associated with stabilising (plateau) onchocerciasis, possibly as a result of enhanced immunity and reduced exposure. Exposure factors can be held largely responsible for this pattern of infection because the majority of the individuals in the localities studied were farmers and fishermen. Farming exposes people to an on-going risk of *Simulium* bites and *Onchocerca volvulus* transmission throughout their lives, irrespective of their age.

Despite the prevalence of onchocerciasis in the three neighbouring Local Government areas, there still existed wide differences in onchocerciasis prevalence rate. These differences could be attributed to variations arising from the frequency, duration and degree of exposure to the bites of infected blackflies, the vector of *Onchocerca volvulus*, possibly imposed by differences in the distances of the communities from the breeding site of the vector. This could probably explain why there was variation in the prevalence of infection amongst the neighbouring Local Governments and zero prevalence in the study area where the hospital is located. Alternatively, these differences could reflect the variations in the susceptibility of the residents to the infecting organism or the variations in the amount and regularity of drug treatment.

According to Uzoegwu and Aloh (2004), the role played by proximity is supported by the fact that differences in prevalence rates of onchocerciasis obtained by different diagnostic methods show inverse relationship with the respective distances of the communities from Adada river, the breeding site of *Similium damnosum* as well as the worm-burden results in which Nkpologu, the nearest community to the river exhibited the highest worm-burden of 3.90 Mf/mg skin, while Obimo, the farthest community showed the least worm-burden of 1.25 Mf per mg skin. This could also explain why Ushongo Local Government which is in close proximity to the fast flowing river (River Amile), a tributary of River Benue as well as other tributaries in the region, had the highest prevalence rate while Gboko Local Government which is farthest from the breeding site of *Similium damnosum* had zero prevalence rate. It could therefore, be hypothesised that the incidence of onchocerciasis is a function of population and proximity to disease vector breeding site (Meludu and Ajayi, 2005). This hypothesis will help us to ascertain the extent to which these factors explain the disease prevalence in this study.

V. CONCLUSION

The hypoendemic prevalence observed in all the studied Local Government areas may probably signify the possibility of elimination of onchocerciasis as a public health problem in those communities in Benue State. There is still need to improve people's attitude towards the disease and improve disease awareness through appropriate health education. Improved and consistent ivermectin coverage, coupled with overwhelming compliance in drug usage is required to completely eliminate onchocerciasis as a public health problem in the studied Local Government areas. There is also need for more commitment on the part of the world bodies and the non-governmental development organizations (NGDOs) to get involved in efforts to eliminate onchocerciasis as a public health and socio-economic burden and save the lives of infected individuals in the study areas from the socio-economic consequences of the disease.

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Context based Indexing in Information Retrieval System using BST

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Abstract- Searching of data relevant to our query is done by information retrieval system. Keyword searching is the basic idea of this system which tries to solve the large search space problem as the documents to be searched could be of any length. This means time to search will increase with length of document.
Search time will be reduced by reducing the search space. In this, we are constructing a method which reduces the searching area with the help of indexing that takes the help of stemming method and knowledge of stopwords. Representation of both, a word and more than one word are done by creating Indices using single concept. The recall is improved by including domain knowledge using ontology while searching.

Index Terms- Indexing, Information Retrieval, Keyword searching, ontology, search space

I. INTRODUCTION

The information retrieval takes into account- storing and representation of data as well as retrieval of relevant information according to users need. Searching of data relevant to a given query which is made by few words taken from a general language is called information retrieval system. The documents extracted during the indexing phase are compared with the query. The documents which resemble most are given to the users where they evaluate the relevance of document with respect to their need.

Earlier, the retrieval system was based on keyword searching. The documents and queries are matched by the words they contain in common. The document which have large number of words common with the query, the document will be said to be more relevant. This retrieval system is called to be coordination match system[6]. But, This system as few problem. First, a document can have words in many lexical forms example- word information can have multiple forms as inform, informed ,informing etc. in the keyword matching approach if you want to search word inform , then it should be spelled same although informed and informing could be of use.
Second problem, a set of token words representing their respective files is matched with the query which is very difficult and confusing task. Third problem, sometimes no match situation arise i.e. words in query do not match the files. In this case we have to increase our recall, where recall is fraction of relevant document that are retrieved. The unuseful words should not be saved in search space where token words are saved, these words

are called stopwords. The problem of multiple form can be solved by some stemming algorithm. The query is expanded to add recall to our system using ontology and domain knowledge[4]. To maintain this idea, we use a good stemming algorithm, ontology using domain knowledge and a ranked retrieval approach that performs the ranking on documents based on different user query. A phrased query can also be an important term, therefore retrieving of document is done phrase based and term based separately.

The structure of this paper is as follows. A brief review of previous research is presented in Section 2, followed by Proposed method in section 3. Finally, Section 4 covers conclusions and future work.

II. LITERATURE SURVEY

The earlier used keyword based searching approach has many pros and cons and modification in this has been carried out in a positive way. Some important one are discussed here.
One of the approach of keyword searching is based on precision-oriented search tasks that fulfill above discussion also.
Second approach gave an idea is to produce output in some time limit then these outputs are shown to the user with the different query forms. This solution is checked over real world data by making some experiments for the feasibility of solution.
Third research approach on ontology driven information retrieval. On large-scale search systems, ontologies are efficiently applied for retrieving data. Now the ontology's are become useful in every system as it gives a deep understanding as well as easy integration of different documents[2]. These concepts are adapted for domain basics with the computation of vector space in retrieval system. One more approach made by researchers is comparing which technique is a better, manual or automatic indexing technique. It was presumed that manual indices are better than automatic machine indices. But by performing many demonstrations, it has been found that both techniques are equal for text retrieval techniques. If we take both text and phrase based techniques together then, manual indexing is better than automatic indexing.

III. PROPOSED METHOD

We proposed two types of text retrieval process i.e. term based text retrieval and phrase based text retrieval. They are discussed as follows:

A. Indexing

Preprocessing of document: A new representation is made from the raw documents known as bag of terms formation[4]. This change is called document representatives. For the above representation work, we first take each document and collect the words of it to create the file except the stop words. We order these words in the file so that we could have all important terms in their basic forms. A threshold value is set based on formula consisting of file size. Thereafter frequency of each word is counted and if the frequency count of any word exceeds the threshold value than that word is selected as index term. Index terms are collected for document representation to create index table for that document. The above work is same in phrase based search with a single difference. In this, phrase identification program identifies the phrases by making a check on its frequencies, instead of terms everything is done on phrases. A phrase having suitable count more than threshold value is selected for generating index table as its indices.

B. Query formulation

We must first have the domain knowledge of the query to expand it and create an ontological tree structure. Each word of the query is searched in the above created tree. The word parent, children and siblings are added in the query for some significant reason. As sibling represent similar and parent-children represent relative meaning. When the search is made against files then we can increase our recall. The next step is to apply the Preprocessing approach told above. This is how our query representation is done. Same set of process is used in phrase based search.

C. Comparison

The query given by user is compared preprocessed documents by the system itself and a list of document chosen from it. A classification decision is made for order the documents. These inorder or parts of documents are shown to user. A decision is made by the user if he want a tree or not for expanding the query. The above process of comparing the query with documents is done on the basis of matrix multiplication. In this approach, all document terms are converted into doc_id matrix by which a term matrix is generated. A multiplication is made on different documents with the user query. This multiplication identifies the relevancy of the document with the query. It is shown in the mathematical form as:

Lets consider 2 document (i and j) as:

Doc (i) = (Term (i1), Term(i2)………………Term(ik))
Doc (j) = (Term (j1), Term(j2)………………Term(jl))

Where k and l are no. of terms in respective documents.
So, all document terms are represented as =
[Term (i1), Term (i2)………………Term (ik) U (Term (j1), Term (j2)………………Term (jl)] - [Term (i1), Term (i2)………………Term (ik) ∩ (Term (j1), Term (j2)………………Term (jl)] = [(Term (1), Term (2)………………Term (n)]

 i.e. Term(1)….Term(n)= all distinct terms of both documents i and j.

Weighted values and implication of inverted document frequency (IDF) are compared with each other:

▢Weight value is calculated as the no. of times a term appeared in particular document. Therefore, It implies the relevancy of document.

▢Inverse document frequency calculates the terms which are found in less documents. The less the documents a term occur in, the higher this IDF weight is.

▢Thus, both the factors together will tell the importance of document for particular term.

D. Id by terms matrix generation

1. Weight is calculated for each term in the list.
2. IDF is calculated for each term in the documents as:
    Idf (i) = N/ni;
Where N = no. of documents in repository,
        ni = No. of document in which term i occurred
 3. W(i) is calculated for each term in the list.
    W(i) = weight*Idf(i)
 4. Create a matrix(id X term) as -put W of term where there is match in all term list and doc id list -put 0 where there is mismatch in all term list and doc id list.

IV.   ARCHITECTURE

   The architecture of the proposed indexing is given in figure-1. The indexer module creates a context based index. This index is used by page parser to get token list with framing. Finally the token list is added in bst for frequency etc.

Figure-1 Proposed Architecture of context based indexing using bst

Description of various components

- Crawler

The crawler's job is to download and store the pages in a repository. This repository stores every documents to be indexed and searched for a user query.

- Indexer

The indexer is used to parse the documents of the page repository and make every token's entry in the index. It also assign context to a document. Finding the context of a document is not the area of concern of this paper. It is assumed that a component of the indexer will do this job.

- Thesaurus

A thesaurus is a work that lists words grouped together according to similarity of meaning, in contrast to a dictionary, which provides definitions for words, and generally lists them in alphabetical order.

- BST

BST is a node-based using binary tree data structure where each node has a comparable key and satisfies the restriction that the key in any node is larger than the keys in all nodes in that node's left subtree and smaller than the keys in all nodes in that node's right sub-tree.

V. CONCLUSION

In this paper we have described various problems and tried to solve them. A concept called stemming is used for lexical form word's. Index table length is varied for different documents by creation of threshold. Stopwords are not helpful; therefore search space is reduced by removing them. Our comparing and multiplication method gives the relevant result, therefore became useful as index based retrieval system. Our main objective is to generate the contextual sense for getting the most relevant documents.

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Physicochemical studies of water quality with special reference to ancient lakes of Udaipur City, Tripura, India.

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Abstract- Present work was designed to study the physicochemical parameters of four lakes of Udaipur known as the "City of Lakes" of Tripura state. The studied lakes are Amar Sagar (AS), Dhani Sagar (DS), Jagannath Dighi (JD) and Mahadeb Dighi (MD). To evaluate the water quality of the lakes and to identify the pollution sources random sampling was done during the month of April, 2014. Collected samples were analyzed according to APHA (2005) for different physicochemical parameters and the results were compared with standard values prescribed by WHO (1997) and BIS (1991). Obtained results of physicochemical water quality parameters of studied lakes revealed the fact of pollution load in the lakes. Average Biochemical Oxygen Demand (BOD) as well as the value of ammoniacal nitrogen (NH_3-N) is found high during analysis which conveys high bacteriological load, organic matter disposal and animal waste contamination into the lakes. The main pollution sources are identified as, four numbers of canals flowing municipality waste into the AS and one in DS, organic waste disposal into the lakes by local residents, agriculture practice inside the AS during dry season and contamination of domestic waste from run over drains in various parts of different lakes. Consequences of such human activities and discharge of sewage water makes the existence of the lakes more vulnerable. It is the prime necessary to take immediate remedial action to prevent all anthropogenic activities in the studied lakes or else the lakes will become biologically barren and will be lost forever.

Index Terms- Udaipur, Physico-chemical, Water quality, Bacteriological load, BOD, Ammoniacal-nitrogen

I. INTRODUCTION

From time immemorial ancient lakes has played a great role in human civilization as a precious life sustaining water resource. Antique architect and city planners were very much aware about the fact that lakes can improve the life quality of human civilization (Naselli-Flores, 2008). Thus they have usually constructed big lakes in almost all developed cities for great many purposes such as drinking water source, bathing and cleaning, agricultural irrigation, fishery, sustainable use for industry, boosting of natural ground water level, aesthetic value and many other livelihood. A healthy lake eco-system could conserve natural and social balance by contributing healthy environment of its location. Nowadays naturally existing dynamic equilibrium of water bodies like rivers, lakes and estuaries are affected by the human activities (Tamiru, 2004; Mahananda et al. 2010; Mehari and Mulu, 2013). In present scenario urban lakes are under direct threat of qualitative and quantitive degradation by means of pollution from both fixed-point and non-point sources. There are numerous sources of pollutants that could deteriorate the quality of water resources (Tamiru, 2004). Factors that are directly or indirectly polluting the lake ecosystems includes population growth, unplanned growth of city area, urbanization, agricultural land expansion and lack of awareness among the local residents. All such activities and pollution causing factors are decreasing the utility of water day by day (Tank and Chippa, 2013). Accessible man maid urban lakes and all other natural wetlands have gained the thrust of conservation in recent years due to their important functions in different hydrological processes. To take decisions and formulate policies concerning conservation, management and sustainable use of lakes and water resources, accurate spatial inventory is required (Finlayson and Davidson, 1999). Thus, sequential and continuous interpretation of physical, chemical and biological status of water quality and characterisation of the pollution sources along with quantitative contribution of significant pollution causing parameters is important for demeanour pollution control management of urban lakes (Zhou et al., 2011). This will generate baseline data of water resources to evaluate the rate of change in water quality over a period of time.

In this view the present study was conducted to study the physicochemical parameters of four ancient lakes of Udaipur city, Tripura, North-East India. Review of literature suggested that very limited study on water quality has been done in Tripura state, whereas the state is rich in inland fresh water lakes and wetlands including a Ramsar site (Ramsar site no. 1572). Therefore, this present study generates a important baseline database for lakes of the Tripura state which would be helpful to evaluate the status of the water quality and degree of change in water quality of studied lakes over a time gap.

II. Materials Methods

Study Area:

Udaipur was the former capital of Tripura state (latitude 22°57' to 24°33' N and longitude 91°10' to 92°20' E) in the 14th centaury till 1760 A.D. Udaipur is located between 23°53'N and 91°48'E in Gomati district of Tripura. Udaipur is famous for the Tripura Sundari temple and the artificial lakes located here. Four ancient lakes namely Amar Sagar (AS) [23°32'.02.50"N, 91°29'.37.67"E], Dhani Sagar (DS) [23°31'.51.42"N, 91°30'.07.14"E], Jagannath Dighi (JD) [23°31'.51.42"N, 91°30'.07.14"E] and Mahadeb Dighi (MD) [23°32'.13.72"N, 91°29'.55.26"E] were surveyed to study the physico-chemical parameters of the water (Figure 1). Each of the studied lake was located in the heart of the city. Among the lakes AS is the biggest one (3684×906 ft^2) followed by DS (2400×720 ft^2), JD (1650×400 ft^2) and MD (750×450 ft^2).

Sample Collection:

Water samples were collected from four different sites (S_1, S_2, S_3, and S_4) of each lake (AS, DS, JD and MD) during the month of April, 2014. The samples were collected in plastic container between 10:00 am to 4:00 pm and brought to the laboratory in an icebox jar to avoid unusual change in water quality. Standard methods for sample collection and preservation were followed during the study (APHA, 2005). Some physical data like, temperature, pH were recorded in the field at the time of sample collection. Geo coordinates for the studied lakes were taken by the GPS system.

Analysis:

Water samples were collected from 16 different sites (4 sites in each lake) and are analysed for 17 different physico-chemical parameters of water quality, followed by standard methodologies of APHA (2005). That includes 7 physical and 10 chemical parameters such as pH, temperature, Electrical conductivity (EC), total dissolve solids (TDS), total suspended solids (TSS), dissolve oxygen (DO), biochemical oxygen demand (BOD), total hardness (TH), alkalinity, chloride etc. Obtained results of the different parameters are compared with standard value prescribed by BIS (1991) and WHO (1997). Results of the parameters are presented in Table 1.

III. Result and Discussion

Natural water body contains uniform water solution which undergoes unremitting physicochemical transformation due to circulation in the environment that greatly affects the water quality composition. Variation in results is found between different lakes as well as within different sites of the lakes. However there could be always a chance for difference in test result in different laboratories because of laboratory approach, sample preservation, quality of chemicals used and testing methods applied (Weldemarim, 2013). Results of the physicochemical parameters obtained from this study are discussed bellow-

Temperature:

Temperature is one of the essential physical parameter of water quality to measure because it influences the aquatic life by alter the dissolve oxygen (DO) concentration in the water making oxygen less available for respiration and metabolic activity of aquatic organisms (Tank and Chippa, 2013; Jalal and Sanalkumar, 2012). Water temperature is an affective factor to control the chemical reactions and its rate within the water body that determines the usefulness of the water (Metcalf and Eddy, 2003). Temperature of the studied water bodies were measured by digital thermometer during sample collection and average temperature is recorded between 28.25^{o}C to 31.50^{o}C. The standard temperature for sustaining aquatic life varies between 28.00^{o}C to 30.00^{o}C (Weldermeriam, 2013). The average water temperature is found highest (31.50^{o}C) in AS whereas lowest average temperature (28.25^{o}C) is recorded in MD. High temperature of AS among the studied lakes is might be due to contamination of municipality sewage (Figure.2) which is supported by the study of Gopalkrushna (2011) in Akot city, Maharastra, India.

pH:

pH that maintain the acidic or basic property, is a vital characteristic of any aquatic ecosystem since all the biochemical activities and retention of physico-chemical attributes of the water are greatly depend on pH of the surrounding water (Jalal and Sanal Kumar, 2013) . Most of the similar study suggested that water samples are slightly alkaline due to presence of carbonates and bicarbonates (Tank and Chippa, 2013; Gopalkrushna, 2011; Verma et al., 2012). The higher range of pH indicates higher productivity of water (Gopalkrushna, 2011) because availability of carbonates and bicarbonates in water enhance dissolve carbon dioxide level by dissociation and acts as a raw material for photosynthesis. The pH value of all the studied water samples is measured by digital pH meter and average pH is recorded between 8.12 to 8.66 which was found very approximate to the high limit (6.5 to 8.5) prescribed by the BIS (Bureau of Indian Standard). The highest and lowest pH is recorded in DS (8.66) and AS (8.12) respectively.

Colour:

Colour is an optical parameter that absorbs a fraction of visible spectrum and is reflected by the dissolved substances, colloidal substances and suspended particles present in the water. Colour of any water body is depended on the natural vegetation (decay of plant matter, algae, plankton etc.) and also altered by different anthropogenic sources viz. effluents from industries and mills. Colour of water in not an important parameter for health effect but responsible for humiliate aesthetic value. Colours of the studied lakes are found yellowish green to pale green and average value is measured between 1.73 to 3.93 HU.

Turbidity, Total Suspended Solids (TSS) and Total Dissolve Solids (TDS):

Turbidity of water is the expression of optical property by which light is scattered by the colloidal particles present in the water. Phytoplankton, microscopic organisms, clay, slit and other organic matter makes a lake turbid (Das and Shrivastaba, 2003). High turbidity signify presence of large amount of suspended solids (Verma et al. 2012), this is again indicate the high rate of siltation so as to decrease the depth of the water body. Turbidity of the studied lakes are measured by the Turbidity meter and average value is recorded between minimum 7.57 NTU in MD to maximum 62.55 NTU in AS. Obtained turbidity is very high in all the studied lakes and found above the prescribed limits by BIS (10500-91). Comparatively high turbidity in AS may be due to the contagion of large amount of sewage water and organic pollutants from the surrounding locality. The increase in turbidity by organic pollutants resulting eutrophication of water bodies which consequently dwindle the light transmission into water and thus gradually condense overall productivity. Total suspended solids (TSS) are the composition of carbonates, bicarbonates, chlorides, phosphates, nitrates of alkali and alkaline earth metals, organic matter, salt and other particles. Water with high suspended solids is not suitable for bathing (Trivedy, 1990; Gay and Proop, 1993). Among the studied lakes average TSS is recorded 5 mg/l, 10 mg/l, 18 mg/l, 71.5 mg/l and in MD, JD, DS and AS respectively which are within the standard limit (150 mg/lit) prescribed by WHO in terms of inland surface water. Type and quantity of TDS define the color and electrical conductivity of the water body (Tank and Chippa, 2013). The amount of total dissolve solids (TDS) in water indicates salinity of water and may also be used as an indicator for rapid plankton growth and sewage contamination. In this study average TDS value is measured 162 mg/l, 336 mg/l, 348.5 mg/l, and 428.5 mg/l in DS, JD, MD and AS respectively.

Electrical Conductivity (EC):

EC is the measure of the ability of an aqueous solution to transmit an electric current. Conductivity depends upon the presence of cations and anions, their total concentration, mobility, valence and temperature of water which is a good measure of total amount of salt present in water. In the present study the average EC is recorded as 14.43 μS/cm, 14.68 μS/cm, 16.95 μS/cm and 20.60 μS/cm for JD, MD, AS and DS respectively.

Alkalinity:

Alkalinity express the buffering capacity of the water which appreciably maintain the pH by absorbing access H^+ ions and protects the water body from pH fluctuation. The main species responsible for alkalinity are carbonates, bicarbonates, hydroxide ions, ammonia, organic acid etc. Alkalinity acts as a buffer against rapid pH change. Alkalinity is recorded within prescribed range and found to be related with hardness of the water because water contains metallic carbonates (mostly $CaCO_3$) is high in alkalinity as well as hardness because metals like Ca, Mg are the main contributor of water hardness. Whereas carbonates and bicarbonates associated with sodium and potassium contribute only alkalinity not hardness because of incapability of sodium and potassium to form complex with electron donor ligands. Average value of alkalinity is obtained 60.68 mg/l, 76.72 mg/l, 97.33 mg/l and 116.79 in MD, JD, DS and AS respectively.

Total Hardness (TH):

Hardness is caused due to presence of cations like Ca^{+2}, Mg^{+2}, Fe^{+3} etc. This is the property of water to precipitate soap by formation of complex with calcium, magnesium present on water. TH of the studied lakes are found within prescribed limit and the average value is recorded 27.08 mg/l, 28.15 mg/l, 28.63 mg/l and 36.64 mg/l in DS, MD, JD and AS respectively which is the measure of total amount of Ca^{+2} and Mg^{+2} ions.

Calcium (Ca^{+2}) and Magnesium (Mg^{+2}):

Calcium and magnesium are exists in surface and ground water mainly as carbonates and bicarbonates. Lake water contributed calcium as due to higher proportion of calcium in the surrounding rocks and soils which is essential for plant precipitation of lime, bone building etc. The main source of magnesium is sewage inflows and minerals generate from soil erosion and are

important for enzyme activation, growth of chlorophyll and phytoplankton (Ramesh and Seeta, 2013; Verma et.al, 2012). According to the result obtained in the present study calcium and magnesium content is found within the permissible limit given by BIS.

Dissolved Oxygen:

Dissolve oxygen which indicates the health of the ecosystem refers to the volume of oxygen present in water body. It is an important water quality parameter to be measure because it prevail biological and physicochemical attributes of surrounding water. Oxygen enters into the water by aerial diffusion and as a photosynthetic byproduct of aquatic plants and algae. The DO depends upon the temperature, salinity and pressure of the water. The DO value indicates the degree of pollution in the water bodies (Gupalkrushna, 2011). The aquatic life distressed when DO levels drops to 4-2 mg/lit. (Francis and Floyd, 2003) and as DO level falls undesirable changes in odor, taste and color reduce the usefulness of water (Tank and chippa, 2013). In this study the average DO is measured between 5.27 to 6.96 mg/lit whereas the highest concentration in MD is found 7.56 mg/ lit. and lowest concentration in DS is 4.77 mg/ lit.. DO level of studied water bodies are found within the prescribed range of BIS.

Biochemical Oxygen demand (BOD):

Biochemical oxygen demand (BOD) is an important parameter of water quality which measures the quantity of oxygen consumption by microorganisms during decomposition of organic matter. BOD is usually used for determining the oxygen demand of municipal or industrial discharge. High BOD indicates high scale contamination of organic matter in the water. Though high BOD is always accompanied by low DO level, counter result is obtained in our study which is comparable to the study of Anhwange on river Benue, Nigeria (Anhwange et al. 2012). High BOD than the prescribed value is found in all of the studied lakes where the maximum average value is found 22.90 mg/l in AS and lowest is found in MD (3.20 mg/l). Water can only hold a limited supply of dissolve oxygen in a water body and is fluctuate with diurnal cycle of the aquatic ecosystem. The probable reasons for high BOD as well as normal DO in the studied lakes suggested that there is high nitrogenous oxygen demand (NOD) than carbonaceous biochemical oxygen demand (CBOD). NOD is the result of the breakdown of proteins into ammonia, which is readily converted to nitrate in the environment. The conversion of ammonia to nitrate requires more than four times the amount of oxygen as the conversion of an equal amount of hydrocarbons to carbon dioxide and water. Agricultural practice and sewage runoff in AS increase nutrients such as nitrate and phosphate in the water which endorses the growth of aquatic plants eventually, leads to an increase in plant decay and a greater move to and fro in the diurnal dissolved oxygen level. We collected the samples between the mid hours of a day (1000 to 1600 hrs), so normal DO despite high BOD is acceptable in the studied lakes where sewage runoff and agricultural run off as well as domestic waste contamination are the main problem.

Ammoniacal Nitrogen (NH_3-N):

Ammonia in surface water can be of various sources like organic origin, inorganic origin and the air deposition. This is one of several forms of nitrogen and considered as most important indicator for soil contamination (excessive use of ammonia rich fertilizer), excretion of nitrogenous wastes from animals, and sewage contamination in aquatic environments. Although ammonia is a nutrient required for life, it is toxic for aquatic organism and excess of ammonia can accumulate in the organism cause alteration in metabolism or increase body pH. NH_3-N of the studied lakes are found higher than the prescribed value of BIS and average value is ranges between 0.06 to 3.20 mg/l. Highest value in AS is recorded 4.20 mg/l whereas lowest in MD is obtained 0.00 mg/l. High NH_3-N level in AS and DS evidently signify the affect of remarkable sewage contamination as well as significant organic effluence into the lakes.

Chloride (Cl^-):

Chloride is present in all natural surface and ground water from as low concentration to high concentration. Chlorides are mainly come from inorganic salts like NaCl, KCl and $CaCl_2$ etc. which are generally provided by soil, natural layers of chloride salts, municipal and industrial sewage and animal wastes (Gopalkrushna, 2011). Chloride is not harmful to humans but high concentration of chloride increase the corrosive property of water. The chloride content of studied water samples were within permissible limit prescribed by BIS and average values are recorded as 26.13 mg/l, 28.40 mg/l, 30.67 mg/l and 36.35 mg/l, for JD, MD, DS and AS respectively.

Nitrate (NO_3^-):

Inorganic nitrogen that present in water as Nitrate (NO_3^-) is the main nutrient that accelerates the growth of hydrophytes and algae. Nitrate occurs in water from various natural sources and due to human activities like food production, agriculture and manure disposal of domestic and industrial sewage. High level of nitrates is found in rural areas because of extensive application of

nitrogenous fertilizers in agriculture. In urban areas sewage water rich in nitrates contaminate surface water thus increases the nitrate amount. (Tank, 2013; Gopalkrushna, 2011). A small amount of nitrate is common in all kinds of surface water. In this study relatively larger amount of nitrate is found in the studied lakes though obtained levels are within range prescribed by BIS. Nitrate stimulates the growth of hydrophytes and phytoplankton that consequently increase the nutrient in water body leading to eutrophication. The average nitrate value in studied lakes is found between 9.82 mg/lit to 48.30 mg/lit where minimum and maximum is obtained in MD and AS respectively.

Phosphate (PO_4^{-3}):

Phosphate has a limited source in nature and also acts as a limiting factor for productivity of water body. Phosphate may occur in lake as result of domestic waste, detergent and agricultural run off containing fertilizer (Gopalkrusna, 2011). The average value of phosphate recorded in the studied lakes ranges between 0.05 to 0.37 mg/l. Comparatively high amount of phosphate is recorded in AS (0.37 mg/l) and in DS (0.11 mg/l) which is might be due to discharge of municipality sewage and dumping of domestic waste into the lakes (Benjamin et al, 1996).

Sources of Pollution in the Lakes:

During the study so many pollution sources are found which are badly affecting the water quality of the studied lakes. Four number of municipality drains were found discharging municipality sewage in the AS on western side of the lake. In northeastern corner agriculture practice was also evidenced in a dry plot of AS. Local peoples are found depositing domestic waste into all of the studied lakes. On the west corner of DS the biomedical waste is discharge into the lake from the district hospital. Anthropogenic pressure is found moderate in JD and MD.

IV. Conclusion

The results obtained from this study revealed that BOD, NH_3 –N and Turbidity are above desirable limit suggested by BIS. The results show that the lakes of Udaipur city receives very high amount of pollutants from the surroundings and the lake water is highly contaminated by sewage effluents. Local peoples are ignorantly polluting the lakes and the dreadful conditions of the lakes are also visible from the satellite photo. Due to high organic matter contamination hydrophytes are growing drastically and deposited into the lake after death which consequently reducing the depth of the lake day by day. If present condition is continue for the longer period, very soon the lakes will become ecologically barren. So concern authority should take firm decision on urgent basis to resolve the problems of the lakes of Udaipur city.

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Figure 1. Location Map of Lakes of Udaipur City

Figure 2. Sewage discharging canal into Amar Sagar (AS)

Table I: Results of the physic-chemical parameters of different sites of the studied lakes in Udaipur city

	Parameters	Amar Sagar					Dhani Sagar					Jagannath Dighi					Mahadeb Dighi				
		S1	S2	S3	S4	Avg.	S1	S2	S3	S4	Avg.	S1	S2	S3	S4	Avg.	S1	S2	S3	S4	Avg.
PHYSICAL	Temparature (°C)	30.00	32.00	32.00	32.00	31.50	29.00	30.00	30.00	28.00	29.25	29.00	29.00	28.00	29.00	28.75	28.00	29.00	28.00	28.00	28.25
	pH	8.52	8.11	8.12	7.71	8.12	9.05	8.51	8.59	8.48	8.66	8.21	7.79	8.49	8.49	8.25	8.32	8.78	8.34	8.39	8.46
	Colour (1/m)	4.00	3.40	1.20	2.50	2.78	4.40	5.50	2.60	3.20	3.93	3.20	2.30	3.60	3.30	3.10	0.90	1.50	3.30	1.20	1.73
	Turbidity (NTU)	104.00	34.90	34.90	76.40	62.55	42.00	55.10	52.50	59.10	52.18	17.40	27.00	16.00	21.40	20.45	8.52	6.37	7.78	7.59	7.57
	TSS (mg/l)	32.00	64.00	88.00	102.00	71.50	36.00	4.00	16.00	16.00	18.00	8.00	24.00	4.00	4.00	10.00	4.00	0.00	12.00	4.00	5.00
	TDS (mg/l)	392	380	444	498	428.50	168	148	164	168	162	324	321	344	352	336	316	288	392	398	348.50
	Conductivity (μS/cm)	19.14	18.82	18.99	10.84	16.95	20.70	21.10	20.30	20.30	20.60	14.88	14.51	14.08	14.26	14.43	14.44	14.61	14.78	14.90	14.68
CHEMICAL	Alkalinity (mg/l)	119.08	114.50	114.50	119.08	116.79	91.60	96.18	96.18	105.34	97.33	68.70	68.70	100.76	68.70	76.72	73.24	59.54	54.96	54.96	60.68
	Total Hardness (mg/l)	36.64	36.64	32.06	41.22	36.64	32.06	22.09	22.09	32.06	27.08	32.06	27.48	27.48	27.48	28.63	27.12	26.89	31.10	27.48	28.15
	Ca^{+2} (mg/l)	11.01	9.17	11.01	11.01	10.55	9.17	9.17	7.34	7.34	8.26	11.01	9.17	7.34	7.34	8.72	9.17	7.34	9.17	9.17	8.71
	Mg^{+2} (mg/l)	2.22	3.33	1.11	3.33	2.50	2.22	1.11	1.11	3.33	1.94	1.11	2.22	1.11	2.22	1.67	3.33	3.33	2.22	2.22	2.78
	DO (mg/l)	4.99	5.20	5.32	5.55	5.27	7.46	4.87	5.77	4.77	5.72	5.97	5.37	5.87	5.87	5.77	6.16	7.06	7.56	7.06	6.96
	BOD (mg/l)	23.20	22.00	20.60	25.80	22.90	19.70	15.30	15.90	24.10	18.75	4.98	5.02	4.98	5.18	5.04	3.59	1.93	3.53	3.73	3.20
	NH_3-N (mg/l)	3.60	2.90	4.20	2.10	3.20	1.63	2.52	2.37	2.12	2.16	0.98	0.84	1.12	0.72	0.92	0.12	0.00	0.00	0.11	0.06
	Chloride (mg/l)	40.89	36.35	31.80	36.35	36.35	31.80	31.80	27.26	31.80	30.67	27.26	22.72	27.26	27.26	26.13	27.26	27.26	31.80	27.26	28.40
	NO_3^{-1} (mg/l)	42.08	48.30	44.88	43.56	44.71	39.67	42.74	40.80	39.95	40.79	16.89	18.84	17.21	16.43	17.34	12.20	11.42	9.82	10.43	10.97
	PO_4^{-3} (mg/l)	0.39	0.36	0.31	0.40	0.37	0.02	0.12	0.23	0.09	0.11	0.02	0.01	0.06	0.09	0.05	0.10	0.03	0.09	0.05	0.07

A Study of Aromatic Plant Species Especially in Thoubal District, Manipur, North East India

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Abstract- The present paper deals with an extensive study of aromatic plants in twelve sites of Thoubal district of Manipur. Aromatic plants of the district were available in varying forms ranging from thickest bush to food plants with medicinal value. Altogether 80 aromatic plant species under 35 families were collected. *Allium ascalonicum, A. hookeri*, *A. sativum* Linn, *A. tuberosum, Coriandrum sativum, Curcuma aromatic, Elshotiza blanda, Eryngium foetidum*, *Foeniculum vulgare*, *Hedychium flavum, Houttuynia cordata, Mentha arvensis, Meriandra benghalensis, Ocimum canum, Polygonum posumba, Sesbania sesban* and *Zingiber officinale* were mainly used as vegetables as well as medicine. For cultural and offered to God, the species of *Aegle marmelos, Artabotrys hexapetalous, Eupatorium birmanicum, Gardenia jasminoides, Nyctanthes arbor-tristi, Pandanus foetidus, Plectranthus ternifolius* and *Plumeria rubra* were used. *Artemisia nilagarica, Citrus aurantifolia, Dicrocephala latifolia* and *Gynura cusimba* were employed mainly for hair lotion. Amongst collected plant species *Aquilaria malaccenesis* was found critically endangered. *Artabotrys hexapetalous, Curcuma caesia, Elshotiza blanda, Ocimum basilicum* and *Plectranthus ternifolius* were thinly distributed.

Index Terms- Aromatic plants, *Plectranthus ternifolius*, Thoubal, Traditional healers.

I. INTRODUCTION

Aromatic plants are those plants that give sweet fragrance or pungent smelt due to the presence of odorous volatile compounds in the form of essential oil in one or more parts of the plant and they belong to family Asteraceae, Apiaceae, Lamiaceae, Rutaceae, Zingiberaceae etc. (Verma, 2012). Aromatic Plants play a valuable and important role in economic, social, cultural and ecological aspects of local communities and also have the medicinal properties. Therefore these plants are known as medicinal and aromatic plants (MAPs) that provide people with medicines to prevent disease, maintain health or cure ailments (Elaine Marshall, 2011). MAPs grow in almost all terrestrial and in aquatic ecosystems around the world. However increasing demand on plants and human exploitation become a great threatening in their indigenous habitation. Several works on aromatic plants in relation to their utilization and conservation have been conducted in different parts of the world (Joy *et al.*2001), (Lyle, 2007), (MAPs, 2009), (M. Gogoi. *et al.* 2010), (Sukhdev *et al.* 2008) (Pasupuleti Sreenivasa *et al*. 2008), (J.S. Elangbam *et al.* 1989). Manipur, the north eastern region of India has a wide range of biodiversity because of two hot spots amongst the bio-diversities of the world viz. Eastern Himalayas

and Indo Myanmar, forming a unique biogeography province harboring major biomes recognized in the world (P.K. Singh, 2011). It has the richest reservoir of plant diversity and supporting about 50% of India's biodiversity (Mao and Hynniewta, 2000). Out of nine districts in Manipur, Thoubal is one of the valley districts that occupies the bigger portion of the eastern half of the Manipur valley and takes the shape of an irregular triangle with its base facing north (Fig.1). It lies between 23°45' N and 24°45' N latitudes and 93°45' E and 94°14' E longitude with an area of 514 sq. km. and its average elevation is not very much different from the rest of the Manipur valley, which is about 790 msl (Singh, 1991), (Yoirntomba *et al.* 2007). In Manipur, the aromatic plants are associated with religious ceremony and cultural activities and also therapeutically used as diuretic, antiseptic, antihelmintic, antirheumatic, stimulant, carminative, analgesics and counter irritant by the local medicinal practices called Maiba (male) and Maibi (female) from time immemorial. The aromatic plant species like orange, lemon, lime, mints, cedar*,* citronella, lemongrass, basil, *Eucalyptus*, geranium, lavender, *Litsea cubeba, Osmanthus fragrans,* patchouli, rose, tuberose, jasmine, sandalwood, bergamot, coriander, etc. were used for commercial production of essential oils. Manipur has about 1200 plants (FRLHT Database) are used by Maibas-Maibis in traditional remedies (Tombi, 2011). Rapid destruction of forests and terrestrilisation of wetlands for human settlement and urbanization make most of medicinal and aromatic plants (MAPs) were threatening.

II. MATERIALS AND METHODS

An intensive study of aromatic plant diversity was conducted in twelve different sites of Thoubal district viz. Thoubal Khunou Ching, Laurembam Ching, Wangoo Tampha Leirembi Ching, Pallel, Tentha Khunau, Kaina Ching, Ekop Lake and Thoubal river bank of Manipur during the month of December, 2012 to 2013. Plant specimens of tree, shrub and herb were collected, and make herbarium for identification. Information on the aromatic plants and its products were collected from well known Maibas-Maibis (Traditional healers), headman, and village elders through personal contact and also through actual experiences. In case of different information of the same plant species, efforts were made to get the correct uses in order to get the correct nomenclature properly by following the standard field and ethno botanical methods (Brickell, 1993), (Vedaja, 1998). Herbaria of these plants are maintained in the Institutional Biotech Hub, Laboratory, Waikhom Mani Girls' College, Thoubal Okram, and Manipur.

Medicinal and aromatic plants and their uses:

The botanical name, family, common name and local name along with its medicinal uses were presented under its plant species (Table 1).

Table 1: Distribution of wild and cultivated aromatic plant species of Thoubal.

Sl. No.	Botanical name	Family	Common name & Local name	Medicinal uses
1.	*Mangifera indica* L.	Anacardiaceae	Mango Heinou	Diabetes, tonic, gastric disorders, constipation
2.	*Spondias pinnata* (L. f.) Kurz	Anacardiaceae	Indian Hog plum Heining	Dysentery, diarrhoea, sprain
3.	*Plumeria rubra* L.	Apocynaceae	Temple Tree Khagi Leihao	Antirheumatic, skin eruptions, herpes, dysentery, syphilis, itches, fevers, coughs
4.	*Cinnamomum verum* J. Presl	Lauraceae	Cinnamon Ushingsha	Flavour, digestion, diabetics, flu remedies, relax muscle
5.	*C. camphora* (L.) J. Presl	Lauraceae	Camphor Karpoor	**Cough, diarrhea, dysentery**
6.	*C. tamala* (Buch.-Ham.)	Lauraceae	Bayleaf Tejpata	Antifungal, throat, headache, diarrhea, vomiting, excessive menstruation
7.	*Magnolia champaca* (L.) Baill.	Magnoliaceae	Fragrant Champaca Leihao	Perfumery, antibacterial
8.	.*Azadirachta indica* A. Juss.	Meliaceae	Neem	Toothache, leprosy, fever, abortions, malaria, skin diseases
9.	*Toona ciliata* M. Roem.	Meliaceae	Red Cedar Tairel	Dyestuff , insecticides
10.	*Acacia catechu* (L.f.) Wild	Mimosaceae	Babul Bark Chinggonglei	Digestion, cough, fever, diarrhoea, astringent, infection, piles
11.	*Artocarpus lakoocha* Wall.	Moraceae	Monkey Jack Tree Hari-Konthong	Tonic, purgative, antibacterial, heart & skin diseases
12.	*Myristica fragrans* Houtt.	Myristicaceae	Nutmeg Jayphal	Antifungal, aphrodisiac, digestive, toothache, skin problems, rheumatism

13.	*Eucalyptus tereticornis*Sm.	Myrtaceae	Eucalyptus Nashik	Aromatherapy & sinusitis
14.	*Syzygium cumini* (L.) Skeels	Myrtaceae	Java Plum Jam	Diabetes &digestion disorders
15.	*S. jambos* (L.) Alston	Myrtaceae	Rose Apple Gulamcha	Asthma, dysentery, diarrhoea, fever, rheumatism, smallpox, diabetics, bronchitis, epilepsy
16.	*Pinus kesiya* var. *kesiya*	Pinaceae	Baguio Pine Uchan	Arthritic pains, antibacterial, expectorant
17.	*Zanthoxylum armatum* DC.	Rutaceae	Toothache Tree Muthrubi	Rheumatism, fever, hypertension, purification of blood
18.	*Z. acanthopodium* DC.	Rutaceae	Prickly Ash Muthrubitingkhangpanbi	Antimicrobial
19.	*Z. rhetsa* (Roxb.) DC	Rutaceae	Indian Pepper Ngang	Astringent, digestive, flavor, anti-inflammatory
20.	*Citrus aurantiifolia* Christm.	Rutaceae	Mexican Lime Champra	Astringent, tonic, bronchitis, asthma, disinfectant, cool fevers, sore throats
21.	*C. hystrix* DC.	Rutaceae	Khasi Papeda Heiribop	Hair lotion, purify blood, flavouring
22.	*C. maxima* (Burm. f.) Merr.	Rutaceae	Pomelo *Nobap*	Cold, influenza, hemorrhoids
23.	*C. reticulata* Blanco	Rutaceae	Orange Komla	Hypertension, coughs, arthritis
24.	*Aegle marmelos* (L.) Corrêa	Rutaceae	Indian bael Harikhagok	Diabetes,dysentery
25.	*Santalum album* L.	Santalaceae	Sandalwood Cha-Chandan	Coughs, dry eczema, irritability, sedative, tonic
26.	*Aquilaria malaccenesis*	Thymalaeaceae	**Eagle wood**	**Dyspepsia, cough, skin disease,**

	Lam.		Agor	**arthritis, kidney disease**
27.	*Gmelina arborea* Roxb.	Verbenaceae	Gumhar Wang	Stomachic, ulcers, diuretic, piles, fevers
28.	*Artabotrys hexapetalus* (L. f.)	Annonaceae	Tail Grape Chini Champa	Aromatherapy, perfume
29.	*Artemisia nilagarica* L.	Asteraceae	Indian Worm Wood Laibakngou	Hair lotion, tonic, antiseptic, analgesic, stomachic
30.	*A. maritima* L.	Asteraceae	Old Woman Ching Laibakngou	Flavouring, fevers, stomachic, antispasmodic, tonic,
31.	*Blumea balsamifera* (L.) DC.	Asteraceae	Nagai Camphor Tree Karpoor	Analgesic, coughs, hair lotion, insomnia, sinusitis, bronchitis, rheumatism,hypertension
32.	*Cannabis sativa* L.	Cannabaceae	Marijuana Ganja	Indigestion, wounds, tonic, sedative, anodyne
33.	*Sesbania sesban* (L.) Merr.	Fabaceae	Egyptian Pea Chuchurangmei	Antitumor, catarrh, headache, epilepsy
34.	*Clerodendrum serratum* (L.) Moon	Lamiaceae	Bharmgi Moirangkhanambi	Headache, dyspepsia, asthma, rheumatism, appetizer, fevers, ophthalmia, antihistamine, tumours, skin disease
35.	*Ocimum tenuiflorum* L.	Lamiaceae	*Holy Basil* *Tulsi*	Stomachic, bronchitis, expectorant, analgesic, hypertension, diarrhoea
36.	*O. kilimandscharicum* Baker	Lamiaceae	Camphor Basil Tulashi amuba	Insecticide, cough, flavouring
37.	*Isodon ternifolius* (D. Don) Kudo	Lamiaceae	*Khoiju*	*Antifungicide,* disinfectants
38.	*Ardisia crenata* Sims	Myrsinaceae	Coralberry Uthum	Cough, diarrhea

39.	*Jasminum nitidum* Skan	Oleaceae	Angelwing Jasmine Warakundo	**Diabetes, headaches, insomnia, gallstones, fracture, muscle pain, cancers**, **coughs**
40.	*Nyctanthes arbor-tristis* L.	Oleaceae	Coral Jasmine Singarei	*Fevers, cough, gout, astringent, carminative, rheumatism, skin infection, hair tonic
41.	*Pandanus foetidus* Roxb.	Pandanaceae	Ketukee	Leprosy, small pox, syphilis, scabies, diabetes, heart & brain diseases
42.	*Gardenia jasminoides* J.Ellis	Rubiaceae	Cape Jasmine Kaboklei	Jaundice
43.	*Murraya paniculata* (L.) Jack	Rutaceae	Orange Jasmine Kamini kusum	Diarrhea, dysentery, abortive, joint pain, body aches, anti-inflammatory activity
44.	*Lantana camara* L.	Verbenaceae	Largeleaf Lantana Nongbanlei	Antibacterial, diabetes, antiinflammatory, anthelmintic, antifungal
45.	*Paederia foetida* L.	Rubiaceae	Stinkvine Oinam	Dyspepsia, flatulence, gastritis, digestion, dysuria, diarrhoea, stomachache, flatulence,
46.	*Andrographis paniculata* (Burm. f.) Wall.	Acanthaceae	Andrographis Bhubati	Inflammation, fever, dysentery, diarrhoea, sore throat
47.	*Acorus calamus* L.	Acoraceae	Sweet Flag Ok-Hidak	Asthma, rheumatism, epilepsy, dyspepsia, skin ailments, diarrhoea, dysentery
48.	*Allium hookeri* Thwaites	Alliaceae	Hooker Chives Maroi Napakpi	Flavoring, heart diseases
49.	*A. tuberosum* Rottler ex Spreng.	Alliaceae	Garlic chives Maroi Nakupi	Hair growth, heart diseases, urinary problems

50.	*A. sativum* L.	Alliaceae	Garlic Chanam	Cough, skin and menstrual problems, hypertension
51.	*Coriandrum sativum* L.	Apiaceae	Coriander Phadigom	Digestive, flavoring, appetizer, carminative, insomnia
52.	*Eryngium foetidum* L.	Apiaceae	Coriander Awaphadigom	Hypertension, fevers, epilepsy, constipation, stomachache, asthma, diarrhea, malaria
53.	*Foeniculum vulgare* Mill	Apiaceae	Fennel Hop	Flavoring, breath freshener, menstrual pain, digestion
54.	*Catharanthus roseus* (L.) G. Don	Apocynaceae	Periwinkle Sahib Lei	Leukemia**, rheumatism, diabetes, hypotension**
55.	*Blumea densiflora* (Wall.) DC.	Asteraceae	Sambong Karpoor	Hair lotion, flavoring, fevers, kidney stones, insomnia, hypertension, cystitis
56.	*Ageratum conyzoides* L.	Asteraceae	Goat weed Khongjainapi	Diarrhoea, dysentery
57.	*Eupatorium cannabinum* L.	Asteraceae	Burma Agrimony Langthrei	Inflammation, hypertension, cough, insomnia, body pain
58.	*Cardamine hirsuta* L.	Brassicaceae	Hairy Bitter Cress Chantruk Maan	Digestion, detoxification, regulate blood sugars
59.	*Ocimum basilicum* L.	Lamiaceae	Sweet Basil *Naoseklei*	Skin diseases, cough, digestive, antispasmodic, toothaches
60,	*O. americanum* L.	Lamiaceae	Hoary basil Mayangba	Flavoring, epilepsy, diabetic
61.	*Mentha arvensis* L.	Lamiaceae	Wild Mint Nungshihidak	Fever, headache, vomiting, antispasmodic, diarrhea, carminative, dyspepsia, heat sensation, coughs, colds
62.	*Salvia bengalensis* K. D.	Lamiaceae	Bengal Sage	Highpertension, tonsillitis,

			Koenig		Kanghu-maan	dyspepsia, urinary problem

No.	Species	Family	Common/Local Name	Medicinal Uses
			Koenig	Kanghu-maan	dyspepsia, urinary problem
63.	*Anisomeles indica* (L.) Kuntze	Lamiaceae	Indian Catmint Thoiding Angouba	Toothache, rheumatism, cold
64.	*Elsholtzia ciliata* (Thunb.) Hyl.	*Lamiaceae*	Crested Mint Tekta	*Stomach disorder, antibacterial, antiviral, antiinflammatory*
65.	*Leucas aspera* (Willd.) Link	*Lamiaceae*	Thumbai Meiteilembum	Sinusitis, headaches, intestinal, worms, fevers
66.	*Elsholtzia blanda* Benth.	Lamiaceae	Lomba Lomba	Cough, sore throat
67.	*Allium ascalonicum* L.	Liliaceae	Shallot Tilhou Macha	Anthelmintic, antiseptic, antispasmodic, tonic oral anti-inflammatory, diuretic, expectorant, stomachic,
68.	*Cymbopogon citratus* (DC.) Stapf	Poaceae	Lemon Grass Haona	Diuretic, tonic, digestive, carminative, antifungal, rheumatic pains
69.	*Imperata cylindrica* (L.) Raeusch.	Poaceae	Blady Grass Ee Nakuppi	Tonic, carminative, diarrhea, dysentery, gonorrhea. sweats, piles, rheumatism
70.	*Polygonum posumba* Ham.	Polygonaceae	Smartweed Phakpai	Antipyretic, dyspepsiac
71.	*Houttuynia cordata* Thunb.	Saururaceae	Chameleon Toning kok	Detoxification, boils, allergy, antipyretic, anti-inflammatory, tumors, asthma, analgesic, diuretic, hemorrhoids
72.	*Nicotiana plumbaginifolia* Viviani	Solanaceae	Tex-Mex Tobacco Meiteihidakmana	Insecticide, toothache
73.	*Viola canescens* Wall	Violaceae	Himalayan White Violet	Stomach ulcer & cardio -

			Mansang	vascular diseases
74.	*Alpinia galanga* (L.) Willd.	Zingiberaceae	Greater Galangal Kanghoo	Rheumatism, fever, dysentery, skin diseases, respiratory diseases
75.	*Curcuma angustifolia* Roxb.	Zingiberaceae	East Indian Arrow Root Yaipan	Antifungal, antibacterial, bronchitis, coughs, dyspepsia, diarrhea, colitis
76.	*C. aromatica* Salisb.	Zingiberaceae	Wild Turmeric Lam-Yaingang	Antibiotic, cancer, tonic, antidote to snake bite, indigestion, rheumatism, dysentery
77.	*C. caesia* Roxb.	Zingiberaceae	Black Turmeric Yaimu	Dysentery, cough, tumours, diarrhea, asthma, epilepsy, toothache, skin problems, tonsillitis, piles
78.	*Hedychium coronarium* J.König	Zingiberaceae	White Ginger Lily Takhellei Angouba	Headache, arthritis, antifungal, antimicrobial activities
79.	*Hedychium flavum* Roxb.	Zingiberaceae	Yellow Ginger Loklei	Flavouring, bronchitis, tonsillitis
80.	*Zingiber officinale* Roscoe	Zingiberaceae	Ginger Sing	Antiemetic, anti-inflammatory, rheumatism, coughing, neurological disorders, cancer

The ethnobotanical survey recorded 80 species of medicinal and aromatic plants (Table 1), representing 35 families. Of all the families Lamiaceae recorded the highest number of species (12) followed by Rutaceae (9), Zingiberaceae (7), Asteraceae (6); Lauraceae, Alliaceae, Apiaceae, Myrtaceae, (3 species each), Anacardiaceae, Apocynaceae, Meliaceae, Oleaceae, Poaceae Rubiaceae and Verbenaceae (2 species each). However twenty families were represented by one species (fig.2). During the survey, most of the aromatic plant habitats were found in the order herbs (44%) > tree (34%) > shrubs (21%) > climber (1%) (fig.3).

Fig.2. Family distribution of aromatic plant species

Fig.3. Composition of MAPs species richness to each life form

III.   RESULTS AND DISCUSSION

In the present study, a total of 80 aromatic plant species are recorded from twelve sites of Thoubal district of Manipur (table 1) that was enlisted alphabetically of the respective families and botanical name followed by local name. The survey of aromatic plants is done by selecting few plants, which had aromatic value, rich bioresource and sustainability. This research programme will be useful in the exploration of aromatic plant wealth in a place where almost botanical unexploration prevailed. Out of the total aromatic plant species *Aquilaria malaccenesis, a critically endangered species of different places* was found in this district. *Artabotrys hexapetalous*, *Curcuma caesia, Elshotiza blanda, Pandanus foetidus, Plectranthus ternifolius* and *Ocimum basilicum* (Vedaja, 1998) were thinly distributed. The aromatic plant species is higher in Lamiaceae followed by Rutaceae, Zingiberaceae, Asteraceae and *Aquilaria malaccenesis* of Thymalaeceae. However on species wise distribution of aromatic plants, it is evident that aromatic herb species were found maximum (44%) habitat followed by tree (34%), shrub (21%) and climber (1%).

Majority of the aromatic plants of the district were found growing in the wild. Commercial exploitation, unsustainable use, cultural changes and lack of institutional support have threatened resources and local traditional knowledge (Rajendro *et al.* 2009). The main constraints in commercial exploitation of aromatic plants are due to the fact that the people of the region lack of post-harvest treatment practices, lack of proper domestication, lack of research and development on product and process development and lack of latest technologies and market information. It is obvious that in the hilly areas of Thoubal district, many valuable wild medicinal and aromatic plants are found extinct due to traditional Jhum cultivation. Therefore, it is quite needed for coordination among the researchers, governments, NGOs, farmers and traditional healers for conservation of aromatic plant species. On the other hand traditional way of identification of unknown wild species is not an easy one that consumes time and even causes error in some case if the species are morphologically similar. Therefore, genetic level of identification is required and for this DNA barcodes are developed which provide unambiguous identification of species (Sukhdev *et al.* 2006) and it focus was mostly on assessing the relative efficiency of molecular markers that had been used in various phylogenetic studies (Vijayan *et al.* 2010). Therefore it is needed for in-situ and ex-situ conservation of aromatic plant species in the Thoubal district.

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Occupational Stress among Women Moulders: A Study in Manual Brick Manufacturing Industry of West Bengal

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Abstract- Manual brick manufacturing is an age-old profession practiced all over the world and brick is a very important building material for a developing country, especially like India to improve infrastructure. Women have become an integral part of manpower resources in these unorganized sectors, but unfortunately the female workers here suffer a silent agony. The present study examines the occupational profile, impact of work factor in terms of physiological, biomechanical, musculoskeletal and psychosocial discomforts prevalence among workers in brick kilns. A study was conducted on female moulders engaged in different brick-kiln of West Bengal. Physical parameters such as body weight, height, grip strength; occupational status based on socioeconomic profile; physiological parameters like pulmonary status, biomechanical assessment; and psychosocial assessment were studied. From the result it is seen that 18% of the sample population falls under severe Grade III chronic energy deficiency. More than 90% of body pain is felt in wrists, back, both knees, both thighs and both ankles due to the awkward postures adopted by them. Postural assesment by REBA, RULA and OWAS method shows that most of the posture adopted during work should be corrected immediately. Majority of the workers are in the borderline tending towards development of Chronic Obstructive Pulmonary Disease. The workers worked for more than 8 hours per day, with very less monthly income. Long working hours without adequate rest, low wages, job insecurity and bullying by superiors contribute to various physiological and psychosocial stress which in turn tends workers to various addictive behaviors. Thus, immediate ergonomic interventions are required to improve the quality of life of these workers so that they can continue working for a longer period under the conducive and safe work condition which in turn will influence the social security, health and safety of the workers.

Index Terms- Brick-kiln, women workers, moulders, unorganized sectors, posture.

I. INTRODUCTION

The Indian brick industry is an age old unorganized sectors and the second largest in the world employing large numbers of migrant women workers (Khan & Vyas, 2008). The industry has an annual turnover of more than 10000 crores and it is one of the largest employment generating industries (Khan & Vyas, 2008). In the developed countries some mechanization was introduced but in India the conditions have not improved and human drudgery still prevails. Various studies showed that the workers working in the brick manufacturing units suffered from musculoskeletal problems due to awkward working postures (Heuer et al., 1996; Chung & Kee, 2000; Trevelyan & Haslani, 2001). Studies from developing countries like India, shows that these workers suffer from assorted health problems due to handling of heavy loads without taking adequate rest breaks (Mukhopadhyay, 2008; Sett & Sahu, 2008). Moreover, some studies had reported that women had a higher prevalence rate of work-related musculoskeletal disorders (MSDs) to that of men (Treaster & Burr, 2004; Basu et al., 2008). Work-related MSDs are common causes of pain and functional decline which in turn lead to significant distress and disability (Rempel et al., 1992; Shaw et al., 2002). Various risk factors are involved including biomechanical and environmental conditions such as physical work load, unfavorable body posture, vibration, psychosocial factors such as time, pressure and repetitive or monotonous tasks (Ariens et al., 2000; Bongers et al., 2002; Cromie et al., 2002; Salerno et al., 2002). Although advancement in mechanization has greatly reduced physical stress on the brickfield workers, it still remains the most physically demanding occupation (Gallagher, 1999). Therefore, a field study was conducted on female laborers working in several manual brick manufacturing units of West Bengal, to understand the nature of work, analyze their socio economic status, find out the occupational stress on the workers and to give some suggestive remedial measures for humanizing working condition of brick workers. The process of brick making involves several steps of which, moulding is one of the essential part performed by a group of workers designated as 'moulders'.

II. METHODOLOGY

A. Selection of site and subjects.

The brickfields under study were situated around Uttarpara (District Hooghly) and Dhibdhibi (District South 24 parganas). 55 brick moulders with mean age of 24.4± 4.16 years and having minimum 2 years of working experience was randomly selected for the study. The volunteers were selected with no history of chronic or acute illness, not having hypertension, no acute rheumatic problem, not currently consuming any medicine and not pregnant. The study was done in the month of March and April, as during this time the work go in full swing.

B. Assessment of physical characteristics

The height of the subjects was measured by the Martin type anthropometric rod (mfg by Seiber & Heigner, Switzerland) and weight by a portable, calibrated bathroom weighing machine.

Hand grip strength was determined by using a hand grip dynamometer (Inco, Ambala, India) to test the maximum voluntary contraction (Ravishankar et al., 2005). The best of three trials were accepted with three minutes rest in-between (Chien et al., 2002).

C. Occupational profile of the women workers

An interview schedule was constructed for collecting several data like the nature of employment, duration of employment, daily working hours and monthly income by means of questionnaire.

D. Occurrence of occupational health problems related to Physiological factors.

i). Biomechanical analysis - Work posture assessment

Complete work cycle video were recorded on each subjects by using Sony camera (model no. HDR-XR100E) which was fixed on the tripod.Working postures was then evaluated and analyzed by the following methods:

OWAS method (Ovako Working Posture Analysis System) (Karhu et al., 1977).

RULA method (Rapid Upper Limb Assessment) (McAtamney & Corlett, 1993).

REBA method (Rapid Entire Body Assessment) (Hignett & McAtamney, 2000).

ii). Nordic Questionnaire study and Subjective methods of discomfort

Modified Nordic questionnaire study was done for knowing the occurrence or frequency of pain felt in different parts of their body due to posture at work (Kuorinka et al., 1987). The intensity of pain was measured by modified Body Part Discomfort (BPD) scale. The scale consists of Grade from 0 to 3, with Grade 0 signifies no discomfort at all, Grade 1 signifies just noticeable discomfort, Grade 2 signifies moderate discomfort and Grade 3 signifies intolerable discomfort. As most of the volunteers were illiterate it was very difficult to use 5 point or 10 point scale (Corlett & Bishop, 1976), as they felt difficulty and are very confused in rating their pain in the two extreme points of the scale, as seen in pilot study. So this 3 point scale was used which they feel comfortable.

iii). Assessment of Pulmonary status

To evaluate the lung function capacity, Lung Function test was performed by using automatic Lung function machine & software (Kokko, Finland). Subjects were asked to take a deep inspiration. While breathing out, they were instructed to expire through a connecting tube with maximum effort to continue for 6 sec without any inspiration. From the graph, the Forced vital capacity (FVC) and Forced expiratory volume at 1.0 sec ($FEV_{1.0}$) were collected. The volumes were expressed in terms of Body Temperature, Pressure and Saturated (BTPS) condition.

E. Occurrence of occupational health problems related to psychosocial factors.

This was assessed by means of questionnaire study. Data were collected by using pre tested interview schedule.

III. RESULTS AND DISSCUSSION

Table I: Physical Characteristics of the sample population (n=55)

Variables	Mean $\pm$ SD
Age (yrs)	24.4± 4.16
Body weight (kg)	39.6±3.44
Height (cm)	149.0± 4.62
Body Mass Index (BMI) kg/m^2	17.9±1.80
Ponderal Index (PI)	12.0±1.43
Maximum grip strength in Left hand (kg)	24.6 ± 3.96
Maximum grip strength in Right hand (kg)	25.0 ± 4.06

The physical characteristics of the brick kiln workers were presented in Table I. The mean body weight of the sample population was found to be less with reference to their age and height (Rao & Balakrishna, 1995). According to the World Health Organization (WHO), there is a very simple relationship between BMI and the risk of the simultaneous presence of two chronic diseases or conditions in a patient (co-morbidity), in which a normal range of BMI is considered to be between 18.5 and 22.9 kg/m^2 in Indian women (Das & Bose 2010). In the present study, the mean BMI for the subjects was found to be 17.9 kg/m^2 which is indicative of the possible high risk for health complications (WHO, 2004).

Figure 1: Distribution of women workers according to body types.

It was observed that out of the 55 subjects, 42% fell in the normal category while rest 58% of the women fell in the underweight category, in which 18% of the sample population was under severely thin Grade III chronic energy deficiency with BMI <16 kg/m^2 as recommended by WHO (Figure 1). The risks of being underweight may be due to malnourishment, compromised immune function, respiratory disease, tuberculosis (an infection of the lung), digestive (stomach) disease, cancer, osteoporosis etc. Result from the Ponderal Index showed that the majority of the women belonged to the Ectomorphic group with value < 21.5 and having a thin, linear appearance with narrow waist, hips and shoulders.

Table II. Occupational profile of the women workers (n=55)

Occupational details	Frequency	Percentage (%)
Nature of occupation		
Temporary	55	100.00
Duration of employment		
< 3 years	8	14.55
3-5 years	29	52.73
Above 5 years	18	32.73
Daily working hours		
8 hours or more	55	100.00
Monthly income		
≤ 2000 rupees	51	92.73
≥ 2000 rupees	4	7.27

The occupational profile of the women workers based on socioeconomic profile is shown in Table II. All the women workers engaged in temporary jobs thus it is very clear that the industry did not provide any jobs security. The total duration of the employment is about 3 to 5 years. All the women worked for more than 8 hours per day, with monthly income of less than Rupees 2000. Wages are paid on the basis of the number of bricks made by them.

Table III. Postural assessment of the brick moulders

Postures	OWAS code	Action level	RULA score	Action level	REBA score	Action level
Cutting mud	2,1,6,1 (2)	Corrective measures in near future	7	Investigate and change immediately	12	Very high risk, implement change
Inserting mud in mould	2,1,6,1 (2)	Corrective measures in near future	7	Investigate and change immediately	10	High risk, investigate & implement change
Take out brick from mould	4,1,6,1 (2)	Corrective measures in near future	7	Investigate and change immediately	12	Very high risk, implement

						change

Posture of work is the body positioning required during the performance of work. The entire process of manual brick moulding was divided into certain components for postural assessment as shown in Table III. Different standardized methods were applied for each component to identify the risk factors associated with a particular task. Cutting mud, inserting mud into the mould and take out brick from the mould, were the main task components. Assessment by OWAS method revealed that all the postures were highly risky and corrective measures were required as soon as possible. In every stages of brick moulding, RULA score of 7 with action level 4 suggested interventions and changes are immediately required. REBA score was 10 or more than 10 in all the postures indicating corrective action including further assessment is immediately required. Based on postural evaluation scores from the above table it was clear that adoption of sustained squatting posture and moulding the bricks by forward bending, for hours after hours throughout the day, is very detrimental for the workforce. It was evident from the result that prolonged sitting in squatting posture caused numbness in the lower leg resulting from lack of blood supply due to sustained muscle compression, which in turn leads to MSDs and ultimately injury to different body parts. Changes in work posture by implementing better work station and associated tools need immediate attention.

Figure 3: Job related body pain as reported by the volunteer group

Job related body pain by Nordic questionnaire as reported by the volunteer group is given in Figure 3. It was observed that more than 90% of body pain were felt in wrists, upper back and lower back, both knees, both thighs and both ankles. Thus it was seen that the brick moulders had more pain in the wrists and lower part of the body compared to upper part, because most of the time they use to sit continuously in the same awkward squatting posture for long hours to mould the bricks without taking frequent rest interval.

Table IV. Body Part Discomfort Scaling (BPD) Scale (n=55)

Body Parts	No. of subjects	Body Part Discomfort Scaling					
		Grade 0	Grade 1	Grade 2		Grade 3	
				Frequency	Percentage	Frequency	Percentage
Head	26	-	2	17	65.38%	7	26.92%
Neck	47	-	-	15	31.91%	32	68.08%
Both Shoulders	40	-	-	8	20.00%	32	80.00%
Both Elbows	42	-	-	4	9.52%	38	90.47%

Both Hands	46	-	-	4	8.70%	42	91.30%
Both Wrists	52	-	-	3	5.76%	49	94.23%
Upper Back	48	-	-	6	12.50%	42	87.5%
Lower Back	53	-	-	2	3.92%	51	96.23%
Hip	50	-	-	3	4.00%	47	94.00%
Both Thighs	51	-	-	2	3.92%	49	96.08%
Both Knees	53	-	-	2	3.77%	51	96.22%
Both Ankles	54	-	-	1	1.85%	53	98.15%
Both Feet	49	-	-	5	10.20%	44	89.80%
Total	**611**	**0**	**2**	**72**		**537**	
Percentage		**0 %**	**0.35%**	**11.78%**		**87.89%**	

The intensity of pain or discomfort measured by Body Part Discomfort (BPD) scale is shown in Table IV. The result from the present study shows that 87.89% of the women workers experience severe pain and 11.78% workers feel moderate pain due to strenuous posture at work. It was seen that more discomfort zones were concentrated to the whole body especially in the both arms and lower part of the body. Most of the workers suffers pain in intolerable range (grade 3), as the brick moulders go on moulding in the same awkward sitting posture for long hours and their task is designated as repetitive in nature contributing to their major discomfort level.

Table V. The Pulmonary parameters of brick moulder (n=55)

Parameters	Mean $\pm$ SD
Forced vital capacity FVC (lit)	2.1±0.60
Forced expiratory volume at 1.0 sec FEV1.0 (lit)	1.5±0.41
% FEV1.0 /FVC	74.4±9.85

Physiological strain in the female moulders is expressed in Table V. It was observed that the workers work in a very dusty environment for long hours without taking adequate rest. According to the National Institute of Clinical Excellence, the diagnosis of Chronic Obstructive Pulmonary Disease (COPD) is made when the %FEV$_1$/FVC ratio is less than 70. The result shows that the mean %FEV$_1$/FVC is 74, so the workers are in the borderline tending towards development of COPD. The exposure towards dust and smokes in the field area might be the reasons for this.

have % FEV$_1$/FVC ratio more than 70 (Figure 2). But, it should be noted that pulmonary function tests might seems to be normal initially, however with disease progression; a restrictive and/or obstructive pattern may emerge in the near future (Swanney et al 2008). In some subjects flow parameters altered, that might happened due to the airway obstruction resulting from fibrosis (Sahebjami & Gartside 1996). In few cases, both the FEV1 and FVC value reduced proportionally results in a normal or even increased ratio, which might be a result of decreased lung compliance.

Table VI. Frequency of Occupational Health problems related to psychosocial factors (n=55)

Parameters	Frequency	Percentage (%)
Headache	32	58.18
Depression	35	63.64
Frustration	37	67.27
Worry	23	41.81
Low self esteem	33	60.00
Boredom	19	34.55
Lack of sleep	25	45.45

Figure 2: Distribution of women workers according to their lung function test.

Thus, it was found that the % FEV$_1$/FVC ratio was less than 70 for 38% of the sample population, rest 62% of the workers

Frequency of occurrence of Occupational Health problems related to psychosocial factors is shown in Table VI. From the result it was observed that 58% of the women workers experienced headache due to long working duration in awkward posture. The other problems felt were frustration, lack of sleep and boredom. Upadhayay (1980) reported that the heath and efficiency of the workers depends on the number of hours they have to work. In case of long working hours, the workers are bound to be tired and slacken in their duties. Job security is the

sense of guarantee of not losing the job. Due to temporary nature of the job 60% of women workers always felt that their self-esteem was hurt. The other frequent problems faced were frustration, depression and worry. Selvarani (1992) reported that lack of job security aggravates mental health problems and employers make use of this sort of insecurity to exploit workers.

Table VII. Frequency of different modes of addiction (n=55)

Parameters	Frequency	Percentage (%)
Mode of taking tobacco		
Chewing	52	94.55
Smoking	15	19.35

Long working hours without adequate rest, low wages, job insecurity and bullying by superiors contributed to these various psychosocial stresses. Both physiological and psychosocial stress tends workers to various addictive behaviors like smoking, chewing tobacco etc. as shown in Table VII.

IV. CONCLUSION

Thus the physiological evaluation provided an understanding that the ailments of the women workers are multifactorial and the health problems are positively associated with biomechanical, psychosocial, nutritional, clinical and pulmonary aspects. Biomechanical analysis indicated that the workers are constantly adapting awkward postures, such as, squatting, bending and lifting of load on their hands which resulted in severe back pain and constant aches in the upper and mainly in lower extremities of their body. From the view point of nutritional status, most of the women were thin and skinny. Prevalence of clinical deficiency signs is pronounced in majority of the women. Emphasis needs to be given on improving their eating patterns through dietician's suggestion and nutrition awareness programs which will ultimately improve their physical efficiency. Lung function study revealed that lung efficiency is less than normal in most of the women workers under study. Though at present no supporting clinical evidences was obtained but if the respiratory protection kits are not introduced, this might lead to serious respiratory disorders in the long run. Thus there is also a requirement of awareness program in parallel to the community. It is needless to mention that the importance lies in a systematic intervention between the designer and the users to attain a safer, comfortable work condition. In contrary, the management should stipulate the personal protective equipment required for the specific activity to be performed and ensure that the workers abide by these stipulations. It is important to create awareness of occupational health hazards both to the workers and the management, considering the literacy level and socio-economic condition.

V. RECOMMENDATIONS

Considering most of the workers being illiterate, awareness campaign on safe work practices should be developed for making the workers aware about the impact of the job on personal health. Proper rotation of duty, proper shift system, yoga and physical exercises should be introduced to reduce boredom, frustrations, stress and anxiety. Ergonomics and safe practices to do work have to be established to reduce work related vulnerabilities and thereby increasing over all wellbeing of workers. The workers should be aware how to use the work related tools and protective aids. Organization should be aware of better workplace layout to minimize movements, twisting and asymmetrical lifting or lowering. Re-scheduling of work should be done to allow short breaks for muscle recovery, especially if the workers perform some stretching exercises. Nutritional status of the workers may be related to the prevalence of work related health problems. Nutritional status must be improved by proper counseling of food habits and maintaining hygienic condition to reduce musculoskeletal disorders of the workers. Last but not the least employers must pay attention to the human aspect and promote worker's development by better payment and incentives.

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Soy isoflavones (Glycine max) protect free radical induced red blood cell damage and plasma protein degradation. Evidence for antioxidant activity of soy isoflavones

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Abstract- Oxidative stress and red cell damage underline most pathological consequences. Isoflavones are group of compounds derived from soya beans. There is confusion in the literature regarding the antioxidant property of isoflavones. Hence, the present study was conducted to evaluate the antioxidant property of soy isoflavones and its protective role on red cells against free radicals and plasma protein degradation. Isoflavones were extracted from soya bean and free radical scavenging capacity was assessed by DPPH assay. It was found that the free radical scavenging capacity of isoflavones was 6.23 ± 1.04 µM/L equivalents of Gallic acid. To assess the antioxidant property of isoflavones, the red cells were incubated with 60µg/ml and 120µg/ml of isoflavones and were exposed to glucose at physiological and pathological concentrations for 24 hours. In another experiment, the plasma was incubated with 30µg/ml, 60µg/ml and 120µg/ml of isoflavones and were exposed to 100mM AAPH for 2 hours. After incubation, the glycated hemoglobin (HbA1c), glucose, malondialdehyde, reduced glutathione, red cell count and hemoglobin indices, plasma malondialdehyde, protein carbonyl content and protein separation were estimated. The glycated hemoglobin, RBC and plasma malondialdehyde and plasma protein carbonyl levels were significantly higher, red cell count and hemoglobin concentration were significantly reduced in red cells incubated with 50mM glucose and AAPH incubated plasma. The increase in HbA1c, RBC and plasma malondialdehyde, protein carbonyl content and decrease in the red cell count were blocked significantly when red cells and plasma were pre-incubated with isoflavones. Microscopic analysis revealed that the red cells incubated at 50mM concentration of glucose possessed morphological abnormalities. However, these abnormalities were prevented in cells when pre-incubated with isoflavones of 120µg/ml concentration, but not in 60µg/ml. Similarly, electrophoresis of plasma proteins revealed that there was significant protein degradation in AAPH treated plasma and this effect was blocked by soy isoflavones treatment. Taken together, our study suggests that the soy isoflavones protect red blood cells and plasma protein degradation from oxidative stress.

Index Terms- Soy isoflavones, Glycated hemoglobin, Lipid peroxidation, Glutathione.

I. Introduction

Red blood cells (RBCs) are unique, highly specialized and the most abundant cells in the human organism. It plays a crucial role in effective anti-oxidative systems that make them mobile free radical scavengers, providing antioxidant protection not only to themselves but also to other tissues and organs in the body [1, 2] . A number of in vitro/ in vivo studies have proved that several erythrocyte parameters are negatively affected by oxidative stress and the red cells are one of the first cells to be affected by changes in the redox status of the body [3–5] . Alterations in red blood cells are widely used as one of the earliest steps in the diagnoses of a number of pathological conditions. Constant exposure to high concentrations of oxygen radicals, the lack of nucleus and mitochondria, inability to synthesize the new proteins and degradation of detoxifying enzymes make red blood cells (RBCs) uniquely vulnerable to oxidative stress [6]. Owing to its importance, any abnormality in the red blood cell has major consequences.

Membrane lipids and proteins are considered crucial in the maintenance of the RBC's shape. Even minimal changes in the surface area may lead to morphological and functional abnormalities which can cause pathological consequences [7]. Considerable evidence indicates that the generation of free radicals increases the red cell damage/ hemolysis by causing the membrane lipid peroxidation and protein glycation [8]. It has been proposed that stress induced protein glycation and its product accumulation participate in the cellular and tissue damage [9, 10]. A combination of oxidative stress and protein glycation underline most cases of diabetes, renal failure and coronary heart diseases like atherosclerosis [11]. Hence, any compound / medicinal plant which can inhibit the free radical generation and its induced lipid peroxidation and protein glycation may open the new therapeutic target for the treatment of red cell related pathological consequences.

Isoflavones, mainly derived from soybean are a group of biologically active substances with a chemical structure similar to that of estrogen [12, 13] . Evidence suggests that the isoflavones derived from soybean has a potential antioxidant property [14]. Since the compound is able to scavenge free radicals, they are believed to have potential in the prevention of atherosclerosis, diabetes and their complications [15]. Recently, some studies reported that soy isoflavones improve diabetic

complications through their anti-oxidative, mild estrogenic activity [16]. In contrast data from some interventional studies have failed to show an antioxidant effect from soy isoflavones supplementation [17–19]. Research supports the concept that soy intake aids against oxidative stress as indicated by the measurements of conjugated dienes in LDL fraction [20]. Still it is controversial whether isoflavones have antioxidant property or not and the problem has not been adequately addressed. In lights of the above in literature, we have made an attempt to evaluate the antioxidant property of isoflavones extracted from soybean hypocotyls by assessing its protective effect on red blood cell damage as well as plasma protein degradation induced by oxidative stress.

II. MATERIALS AND METHODS

Sample preparation: Blood samples were collected into tubes containing disodium salt of ethylenediaminetetraacetate (EDTA-disodium salt) from healthy normal human volunteers after overnight fasting of 10-12hrs. The sample was centrifuged (6000rpm, 10mins at 4^0C); the clear plasma and buffy coat layers were discarded. Then, the red cell suspension was washed three times with cold saline (0.15 M sodium chloride) and the cells were suspended to 10 % haematocrit in phosphate buffered saline (PBS containing 0.016mol/L Na_2HPO_4, 0.001 mol/L NaH_2PO_4 and 0.14 mol/L NaCI, pH 7.4). This study was approved by institute human ethic committee and written consent form was obtained by the participants.

Extraction of isoflavones from soybean hypocotyls (*Glycine max*): Isoflavones were extracted from soybean hypocotyls according to the method described by Yoon-Bok Lee et al [21] . The soybean hypocotyls were mixed with 10 volumes of 80% aqueous methanol and stirred for 4hr at room temperature. The methanol extract was concentrated in a rotary evaporator at 50^0C. The final step of the preparation involved freeze – drying the concentrated methanol extract. The Isoflavone extract was stored at -40^0C for further analyses.

Assessment of free radical scavenging capacity of Soy Isoflavones extract:

2, 2'- dipicryl 2'- phenylhydrazine (DPPH) assay: The free radical scavenging capacity of soy isoflavones was assessed by 2, 2'- dipicryl 2'- phenylhydrazine (DPPH) assay [22]. A standard graph was plotted using Gallic acid as a standard in the range of 0 - 100μM/L concentration. It was found that the free radical scavenging capacity of soy isoflavones was 6.23 ± 1.04 μM/L equivalents of Gallic acid.

***In vitro* treatment with high glucose concentration:** All the glass wares and reagents used for this experiment were autoclaved prior to use to prevent the hemolysis. Washed red blood cells were suspended to 10% haematocrit in phosphate buffered saline (PBS containing 0.016mol/L Na_2HPO_4, 0.001 mol/L NaH_2PO_4 and 0.14 mol/L NaCI, pH 7.4). Aliquots of the cell suspension were placed in autoclaved RIA tubes, after which a freshly prepared stock solution of glucose/soy isoflavones mixture was added. Concentrations are expressed in terms of total cell suspension. Red cells treated with 5mmol/l glucose were considered as control. The tubes were incubated at 37^0C for 24hrs with mild agitation. All preparations kept for incubation

contained 300 μg of penicillin/ml of cell suspension to prevent any microbial growth. Glucose treated red cells were washed twice with PBS (pH 7.4) before biochemical as well as hematological analysis. All analyses were repeated six times.

***In vitro* treatment with soy isoflavones extract:** In order to examine the antioxidant property of soy isoflavone extract, red cells were pre-treated with isoflavones extract in the concentration of 60μg/ml and 120μg/ml for 1 hr at 37^0C with mild agitation. Then, the pre-treated red cells were incubated with glucose of either at 5 or 50 mmol/L at 37^0C for 24hrs.

Measurement of RBC-membrane lipid peroxidation (RBC-MDA) and reduced glutathione (RBC-GSH): Malondialdehyde was measured using the established thiobarbituric acid (TBA) method [23]. This assay is based on the formation of red adduct in acidic medium between thiobarbituric acid and malondialdehyde, a colorless product of lipid peroxidation, measured at 532nm. The MDA values were calculated using the extinction coefficient of MDA-TBA complex (1.56 X 10^5 1 X mol $^{-1}$ X cm $^{-1}$ at 532nm). The erythrocyte reduced glutathione content was determined by the method of Beutler et al [24]. The hemoglobin content of the cell suspension was estimated using Drabkin's solution following manufacturer's instructions. The reduced glutathione values were expressed as mg/g Hb.

Estimation of Glycated hemoglobin (HbA1c) and glucose: The glucose levels were estimated using glucose oxidase method and glycated hemoglobin HbA1c was measured immunoturbidometrically using Olympus AU400 fully automated Clinical Chemistry Analyzer (Bayer's Diagnostics, USA).

Measurement of red cell count and RBC indices: The red cell count and RBC indices like hemoglobin concentration, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and red cell distribution width (RDW-SD) were estimated using reagent kits adapted for the fully automated blood cell count analyzer (XS-1000*i* ^{TM}, SYSMEX, Japan).

Microscopic analysis of red cell morphology: Microscopic characteristics of red cells of different groups were observed using CKX 31 Standard Cell Culture Inverted Microscope System (Olympus, Japan). The magnitude of 400X was used for all observations.

***In vitro* treatment of plasma with AAPH:** The plasma was diluted with normal saline (1:1, V/V) and were treated with AAPH for 2 hours at 37^0C. AAPH, a compound which produce free radicals when dissolved in the medium. In order to examine the antioxidant property of soy isoflavone extract, the plasma were pre-treated with isoflavones extract in the concentration of 30μg/ml, 60μg/ml and 120μg/ml for 1 hr at 37^0C.

Measurement of plasma parameters: After incubation period, the plasma protein carbonyl content was estimated by the method described previously. The plasma malondialdehyde was measured by the method of Yogi et al. The plasma proteins were separated by sodium dodecyl sulfate–polyacrylamide gel electrophoresis (Bio – Rad, China). The total plasma protein and albumin levels were measured using reagent kits adapted for fully Automated Clinical Chemistry Analyzer (Olympus AU400, Japan) according to the manufacturer's instruction.

Statistical analysis: Results were expressed as mean ± SD unless otherwise stated. Data were analyzed statistically using *one way ANOVA analysis* followed by *Tukey post-Hoc method*. The Statistical Package of Social Service (SPSS version 16 software) was used for all analysis. A P value less than 0.05 was considered as significant.

III. RESULTS

The effect of soy isoflavones on hemoglobin glycation is shown in Fig 1. High concentration of glucose caused an increase in HbA1c levels. The increase in HbA1c was inhibited by supplementation with isoflavones extract. Additionally, the inhibitory effect of isoflavones on protein glycation was greater with increasing concentrations of isoflavones in cell suspension.

In Fig 2, the glucose level was significantly higher in the groups treated with 50mM glucose than 5mM glucose. But the glucose concentration in the supernatants of 50mM glucose treatments was found to be significantly reduced when pre-incubated with isoflavones. The inhibitory effect of isoflavones on the supernatant glucose concentration was proportional to the concentration of isoflavones. However, the above mentioned observations were not found with erythrocytes incubated with 5mM glucose.

Fig 3 shows that the effects of isoflavones on lipid peroxidation (MDA) in erythrocytes in the presence of 5mM and 50mM concentrations of glucose. The MDA levels were significantly elevated in red cells treated with 50 mM glucose than the cells treated with 5mM glucose. Treatment with isoflavones reduces the MDA levels significantly and this reduction was greater with increasing the concentration of isoflavones. Furthermore, the isoflavones did not have any significant effect on reduced glutathione levels in all the groups (fig 4)

Table1 showed that, the red cell count and hemoglobin concentration were significantly decreased in RBC treated with 50mM glucose concentration when compared to the 5mM glucose concentration. The effect was inhibited when the RBCs were pre-incubated with soy isoflavones at 60μg and 120μg concentrations. The soy isoflavones did not have any significant effect on other RBC indices like MCH, MCV, MCHC and RDW-SD.

Fig 5 shows the effect of soy isoflavones extract on red cell membrane damage after generating the oxidative stress using 50mM glucose. Increase in oxygen radicals leads to red cell membrane damage resulting in hemolysis. In this present study, we found that the cell membrane rapture and damage in the groups treated with pathological concentration of glucose (50mM) was higher when compared to the groups treated with physiological concentration (5mM). Pre-incubation with 120μg/ml soy isoflavones might have reduced plasmas membrane damage from free radicals. However, no significant effect was found at the concentration of 60μg/ml of isoflavones. The plasma protein carbonyl content and malondialdehyde were significantly increased and total protein and albumin levels were significantly reduced when plasma was treated with AAPH. Supplementation of soy isoflavones extract reduced the plasma malondialdehyde and protein carbonyl contents (Table 2). Electrophoresis of plasma protein revealed that AAPH treatment

significantly caused protein degradation and this effect was blocked when plasma was pre-incubated with soy isoflavones (Fig 6).

IV. DISCUSSION

Exposure to high concentrations of oxygen radicals, the lack of nucleus and mitochondria, inability to synthesize new protein and degradation of detoxifying enzymes makes red blood cells uniquely vulnerable to oxidative stress. In the laboratory, red blood cells are a reliable model for the study of oxidative stress. They are one of the first cells to be affected by adverse conditions and any alteration in their structure causes pathological consequences [1, 5]. In this present study, we therefore selected RBCs as an oxidative stress model to study the protective effects of soy isoflavones against oxidative stress. The free radicals were generated by exposing the RBCs with higher concentration of glucose (50mM). Higher glucose concentration can result in increased oxidative stress from excessive oxygen radical production from the auto-oxidation of glucose, glycosylated protein, or stimulation of cytochrome P450 - like activity by the excessive NADPH produced by the glucose metabolism [25].

Higher concentration of glucose can promote the glycation of several proteins of RBCs including hemoglobin by non-enzymatic mechanisms [26]. In our study, we found that the hemoglobin glycation as indicated by the levels of HbA1c were significantly elevated at pathological concentrations of glucose (50 mM) when compared with cells exposed to physiological concentrations (5mM). The increased glycation of proteins themselves can act as a source of free radicals [26] The increased production of free radicals change lipid/protein ratio of membranes by affecting polyunsaturated fatty acids. A lipid peroxidation causes functional irregularities of several cellular organelles [27]. Treatment with soy isoflavones significantly reduced the hemoglobin glycation (HbA1c) in the group treated with high concentration of glucose. This inhibitory effect of isoflavones on protein glycation may help in the reduction of glycation induced free radical generation. Furthermore, we also observed that soy isoflavones have a potential ability to scavenge the free radicals which was indicated by the DPPH assay. This free radical scavenging capacity of isoflavones might have contributed to its ability in reducing the supernatant glucose concentration as well as in inhibiting further protein glycation. Furthermore, these effects may bring down the free radical generation which follows a vicious cycle.

Lipid peroxidation is another free radical-related process, which is potentially harmful because of its uncontrolled, self-enhancing nature. This causes disruption of bio-membranes, lipids and other cell components [27]. Malondialdehyde, an end product of lipid peroxidation is increased when the cells are exposed to oxidative stress. We found significant increase in the level of MDA in red cells with pathological concentration of glucose when compared to the red cells with physiological concentration of glucose. Research supports the concept that malondialdehyde (MDA) can promote the process of protein glycation. But the mechanism is not clearly addressed. It is presumed that the aldehyde groups of malondialdehyde act as an anchor between sugar and protein moieties, thereby enhancing

the formation of glycated proteins [28]. Treatment of red cells exposed to pathological concentration of glucose with isoflavones significantly reduced the MDA levels. This might have helped in subsequent inhibition of protein glycation and its induced free radical generation.

The microscopic analysis of RBCs shows that there was a significant morphological abnormality in the membrane of RBCs exposed to high glucose (50mM) concentration than the cells exposed to normal concentration of 5mM glucose. These morphological changes could be attributed to the cumulative effects of increased membrane lipid peroxidation and protein glycation promoted by oxidative stress. However, the stress induced damage of RBCs was not observed in the group pre-treated with soy isoflavones at the concentration of 120 μg/ml, but not at 60 μg/ml. Treatment with isoflavones significantly decreased both the protein glycation and lipid peroxidation and this might have protected the RBCs against oxidative damage. Furthermore, we estimated the red cell count after the treatment period and found a significant reduction in the red cells in the group treated with pathological concentrations of glucose. The enhanced membrane lipid peroxidation and glycation of protein might have resulted in membrane damage and subsequent cell death. Treatment with isoflavones markedly increased the red cell count. The increase in the red cell count might have improved the glucose utilization and resulted in the reduction in the supernatant glucose after incubation.

Furthermore, the antioxidant property of soy isoflavones extract was further evaluated using plasma as a invitro model of oxidative stress. The plasma was incubated with free radical generating compound known as AAPH. When the plasma was treated with AAPH, the plasma malondialdehyde and protein carbonyl contents were increased and total protein and albumin levels were reduced. Treatment with soy isoflavones extracted significantly reduced the plasma malondialdehyde and protein carbonyl contents. In lights of the above results in RBC, the results of plasma also supporting the evident that soy isoflavones have the potent antioxidant property which might help in protecting the red cells and plasma protein degradation from oxidative stress.

Taken together, the results of the present study concluded that, the soy isoflavones extract protect red blood cells and plasma protein degradation from oxidative stress. This protective effect of isoflavones extract on red cells may be due to the inhibition of protein glycation and membrane lipid peroxidation by its antioxidant properties.

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Figures:

Fig 1: Effect of soy isoflavones extract on hemoglobin glycation (HbA1c). Values are Mean ± SD (n=6). # P < 0.05 when compared to incubations with 5mM glucose concentration. * P < 0.05 when compared to the incubation with 50mM glucose concentration in the absence of isoflavones. (One way analysis of variance with Tukey post hoc test, SPSS 19.0)

Fig 2: Effect of soy isoflavones extract on the glucose concentration in the medium after incubation. Values are Mean ± SD (n=6). # P < 0.05 when compared to incubations with 5mM glucose concentration. * P < 0.05 when compared to the incubation with 50mM glucose concentration in the absence of isoflavones. (One way analysis of variance with Tukey post hoc test, SPSS 19.0)

Fig 3: Effect of soy isoflavones extract on lipid peroxidation (RBC - MDA) in RBC treated with different concentrations of glucose. Values are Mean ± SD (n=6). [#] **$P < 0.05$ when compared to incubations with 5mM glucose concentration.** [*] **$P < 0.05$ when compared to the incubation with 50mM glucose concentration in the absence of isoflavones. (One way analysis of variance with Tukey post hoc test, SPSS 19.0)**

Fig 4: Effect of soy isoflavones extract on RBC reduced glutathione (RBC-GSH) concentration. Values are Mean ± SD (n=6). (One way analysis of variance with Tukey post hoc test, SPSS 19.0)

Fig 5: Effect of soy isoflavones extract on RBC morphology in 5mM and 50mM glucose treated red cells. The red cells images were observed using CKX 31 Standard Cell Culture Inverted Microscope System (Olympus, Japan). The magnitude of 400X was used for all observations.

Fig 6: SDS PAGE separation of plasma protein. Ten percentage separating gel was used for separation. AAPH treatment caused reduced total proteins and albumin levels and this was inhibited when plasma was pre-treated with soy isoflavones extract. Image was captured in Image Densitometer GS 710 (Bio Rad, China) and analysis were done using Quantity One software.

Table 1: Effect of soy isoflavones extract on red cell count and RBC indices

Parameters	5mM Glu	5mM Glu + 60µg SIF	5mM Glu + 120µg SIF	50mM Glu	50mM Glu + 60µg SIF	50mM Glu + 120µg SIF
RBC count (millions/m^3)	0.84±0.04	0.84±0.03	0.84±0.02	0.76±0.02 [*]	083±0.02 [#]	0.84±0.01 [#]
Hb (g%)	2.33±0.05	2.38±0.04	2.37±0.05	2.13±0.05 [*]	2.37±0.05 [#]	2.37±0.05 [#]
MCV (fl/cell)	92.73±0.12	91.97±1.58	93.13±1.45	93.05±0.58	92.87±0.94	92.72±0.74
MCH (pg/cell)	28.18±0.79	29.05±0.55	28.62±0.65	28.58±0.38	28.75±0.66	28.88±0.91
MCHC (%)	30.52±0.80	31.22±0.78	31.02±1.14	30.63±0.40	31.07±0.88	30.65±1.2
RDW – SD	39.7±0.70	39.2±1.05	39.3±0.98	39.5±0.70	39.8±0.61	39.7±0.34

Glu – Glucose, SIF – Soy isoflavones, Hb – Hemoglobin, MCV – Mean corpuscular volume, MCH – Mean corpuscular hemoglobin, MCHC – Mean corpuscular hemoglobin concentration, RDW-SD – Red cell distribution width (standard deviation)
Values are Mean ± SD (n=6). [*] $P < 0.05$ when compared to incubations with 5mM glucose concentration. [#] $P < 0.05$ when compared to the incubation with 50mM glucose concentration in the absence of isoflavones. (One way analysis of variance with Tukey post hoc test, SPSS 19.0).

Table 2: Effect of soy isoflavones extract on plasma malondialdehyde and protein carbonyl contents

Parameters	MDA	PCO	TP	Alb
Plasma Control	9.38 ± 0.21	7.88 ± 0.48	9.04 ± 0.74	5.09 ± 0.31
AAPH Control	12.61 ± 0.75 [a]	8.68 ± 0.42 [a]	7.68 ± 0.45 [a]	3.63 ± 0.52 [a]
SIF (30µg) control	7.91 ± 0.38	7.68 ± 0.46	8.73 ± 0.49	5.15 ± 0.18
SIF (60µg) control	8.19 ± 0.85	7.43 ± 0.89	7.92 ± 1.12	5.11 ± 0.2
SIF (120µg) control	8.23 ± 0.55	7.05 ± 0.64	8.58 ± 0.58	4.77 ± 0.73
AAPH + SIF (30µg)	12.88 ± 0.55	8.03 ± 0.73	7.55 ± 0.63	3.88 ± 0.41
AAPH + SIF (60µg)	11.08 ± 0.54	7.58 ± 0.78	8.26 ± 0.22	4.44 ± 0.29
AAPH + SIF (120µg)	8.99 ± 0.5 [b]	6.83 ± 0.7 [b]	8.55 ± 1.26 [b]	4.91 ± 0.17 [b]

MDA – malondialdehyde, SIF – Soy isoflavones, PCO-protein carbonyl content, TP – total protein, Alb-albumin
Values are Mean ± SD (n=6). [a,b] $P < 0.05$ statistically significant. a – in comparison with control. b – in comparison with AAPH control. (One way analysis of variance with Tukey post hoc test, SPSS 19.0)

Theoretizing the Models of Disability Philosophical Social and Medical Concepts- An Empirical Research based on existing Literature

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Abstract- Over the years, perceptions towards disability have varied significantly from one community to another in time to time. Limited literature is available in disability history, concepts and varied models. This situation continues to pose a great challenge to governments, policy makers, other agencies and students of disability studies. In their endeavour to trace the development and formation of policies and perceptions towards persons with disabilities. It is towards this end, this article seeks to present a coherent literature review of disability studies based on existing literature. That influence perceptions and policy matters towards children, women and adults with disabilities. This article provides a few diagrammatical representation that illustrate different models of disability. These models are being taken by the academicians, international community, several bodies and countries to improve disability perception and betterment of policy decisions. Construction of disability from different perspectives and its implications have been a major challenge in the modern and developing world order. The generally adopted and accepted concepts of disability narrowing the definitions of disability and confines and limited it to "blindness; low vision; leprosy-cured. In each of these models there is a practical issue, How does the model and its way of thinking, relate to the outcomes for people with disabilities and their families? Such a question assumes that individuals who deal with policy in any aspect based on these varied models in mind will deliberately or not, reach some conclusions about people with disabilities and their families. And also the policies that should apply to them. There is a danger in discussing issues related with disability, that is it will end up with more models and concepts than a clear one . The implementation of policies for the empowerment of disabled population based of different concepts and varied models ultimately leads to worsen their conditions in real life.

Index Terms- Disability, Medical Model, Social Model, Administrative Model, Economic Model, Culture-linguistic Model, Provisional Model, Charity Model.

I. INTRODUCTION

According to United Nations (UN) estimates, there are more than 600 million persons with disabilities throughout the world, 70% of them in developing countries. Disability is caused by disease, malnutrition, incorrect treatment or non-treatment, physical or mental violence and war, accidents due to inadequate protection at the workplace and in traffic situations, and, increasingly, age-related diseases. Persons with disabilities suffer from discrimination throughout the world and are frequently excluded from social, economic and political processes in their societies. Disability was long considered an individual problem that was treated from a medical and charitable viewpoint, but neglected in terms of equal rights for disabled persons. The Decade of Disabled Persons (1983-1992) proclaimed by the UN, and the World Programme of Action2, triggered a change from the care approach to a human rights approach, by including the equal rights of disabled persons to participate in social processes. The core element of this viewpoint is that it considers disabled people, their families and organizations as active partners in implementing these rights. It also allows disabled persons to make better use of their own potential.

According to the World Health Organisation (WHO), disability can be defined as "an umbrella term, covering impairments, activity limitation, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is difficulty encountered by an individual in executing a task of action; while a participation restriction is problem experienced by an individual in involvement in life situations. Thus disability is complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives.

There are various definitions of disability, depending on (national) social legislation and cultural standards. What is considered a disability in one country may not be perceived and labelled as such elsewhere (examples are mental disability or female infertility). This makes it more difficult to establish reliable data on the number of persons affected. The figure most frequently cited is that of 600 million disabled persons in the world, published by WHO, which corresponds to approximately 10% of the global population. The prevalence in developing and industrialized countries diverges widely due to different reference systems and the lack of registration systems. Whereas industrialized countries have a percentage of persons with recognized disabilities of between 8 and 20%, often the developing countries only acknowledge much lower percentages officially.

II. Review of Literature

The data was collected from existing studies, published articles, and reports of various national and international bodies and non-governmental agencies and various other sources. Information gathered was summarized for theoretical context and analyzed conceptually. Information was depicted under categories of model shapes of disability and its historical, philosophical characteristics, The study is purely an empirical study based on past data address the problem in policy formation based of differential models and concepts of disability.

Relevance and Importance of the Study

There are various ways of thinking about disability; various models that reflect how any one of us conceptualizes disability as a condition, how any one of us responds to that condition in others, and how any one of us and, ultimately, how all of us, through the policy-making processes-respond to people with disabilities and the claims they assert. We have based these models in part on the perspectives that our respondents shared as they engaged in focus groups or individual interviews related to the core concepts of disability policy. We also have based these models on the statutes and cases that we set out in the Matrix. By no means have we been comprehensive in describing the policies (statutes and cases) that attach to these models or in exemplifying the models. We have, however, suggested that the perspectives of policy leaders and of their constituents do ultimately reflect how they—and how "we the people"--think about disability and thus how we structure our public policy responses to it and to people who have disabilities.

One cannot understand the under structures of the core concepts of disability policy without also acknowledging and beginning to understand the ways in which we and others think about disability. Finally, we have argued that for each of the models, there is a practical issue: How does the model and its way of thinking relate to the outcomes for people with disabilities and their families? Such a question assumes that individuals who deal with policy in any aspect with these various models in mind will, deliberately or not, reach some conclusions about people with disabilities, their families, and the policies that should apply to them. In reaching these points, that is, in coming to the "so what" challenge, they can advance the interests of people with disabilities of and their families by connecting to the core concepts. Is it appropriate for their thoughts about disability to relate to a core concept? We think so, because thinking implies action, and action in policy should be related to what is core.

Philosophical and historical Concept of Disability.

The Plato's *Republic* as one of the first, foundational philosophical texts to specifically argue that an ideal city governed by reasonableness should actively kill individuals with intellectual and physical disabilities because such individuals embody injustice as the lack of order. Although the programs of *euthanasia* found within the *Republic* have been largely analyzed simply as historical facts about ancient Greek culture, Plato should be understood as one of the first philosophers to introduce a conception of normative human embodiment based on rationally-identifiable criteria in direct contradistinction to a defective form of embodiment (see Moravcsik 1976; Galton

1998; Carrick 2001; MacFarlane and Ronald 2004). That is, Plato's argumentation in effect creates a philosophical conception of disability as a type of deficiency when compared to that which is considered fully rational, healthy, or ideally human. Despite the relative dearth of scholarship on this particular issue, there are some notable exceptions that focus on Plato's considerations of disability without adequately addressing the philosophical and rational sources of such argumentation (Jowett 1986; Goodey 1992; Stainton 2001; Becker 2005).

Souls, Bodies, and Cities

Before turning to the specific argumentation concerning the treatment of individuals with disabilities in the *Republic*, a brief analysis of Plato's teleological conception of human embodiment must be understood. More specifically, the reasoning put forth behind the proposal of using rationality to manipulate individual human bodies and collectives is fundamentally important for understanding the relationship between philosophy and disability insofar as the rationalization of individuals with disabilities follows from others commitments concerning the nature of the world, health, and the human soul.The conception of human embodiment put forward in the *Republic* by Plato, and by correlate the rejection of defective human embodiment in the form of *euthanasia*, marks an important development in Platonic thought. In the early, so-called "Socratic" dialogues, Plato has Socrates argue in large part for a type of dualistic intellectualism whereby the reasoning faculty (*nous*) of the human soul (*psychē*) is prioritized over and above the physical body (Reynolds 2004). That is, the physical body is primarily equated with the transient nature of matter within the realm of becoming (*genesis*) as distinct from and ultimately contrary to philosophical wisdom because the body through itself has no rational access to the intelligible realm of ideas (Reynolds 2004; cf. *Phaedo* 73b-74b; *Meno* 81b-82b). However, and despite this apparently crude prioritization of the soul over the body in the early and early-middle dialogues, Plato presents a much more nuanced understanding of human embodiment in the *Republic* by introducing a tripartite conception of the soul divided into three interrelated though distinct aspects, the rational (*nous*), spirited (*thumos*), and appetitive (*epithumia*) parts (*Republic* 437b5-441b in Hamilton & Cairns 1961; Brickhouse and Smith 2002).

Based upon a theological and naturalistic conception of human embodiment and influenced by Pythagorean and Empedoclean conceptions of nature (*physis*), medicine, and health (*hygeia*), Plato understood bodily and psychical health not merely as medical states of the body but indications of the proper functionality of human nature itself (Carrick 2001, 37). Specifically, maintaining health and the equilibrium of humors is most explicitly tied to the teleological end of human nature in book IV of the *Republic* wherein Socrates argues that "to produce health is to establish the elements in a body in the natural relation of dominating and being dominated by one another, while to cause disease is to bring it about that one rules or is ruled by the other contrary to nature" (444d3-6). Health is thus characterized not as the contingent condition of a particular individual's body considered in isolation, but as an objective good associated with order, beauty, and proper functionality as a type of harmony (*harmonia*). Contrastingly, disease and dysfunction are associated directly with disorder, ugliness, the

bad condition of the soul, and most importantly for the *Republic, in*justice as a type of *dis*harmony.

Philosophical discourse is predicated upon rationality and the application of rational principles, the exclusion of individuals with disabilities due to considerations of normative conceptions of embodiment will always remain an inherent possibility within human reasoning. The application of rational principles entails that incongruous, wasteful, and otherwise defective elements must be removed, and if such principles are instrumentally applied to human embodiment, then the result is that certain human beings themselves embody that which is inimical to reason and must be purged. However, as normative considerations of rationality and human embodiment will remain an inherent possibility, such attempts will also necessarily fail to adequately address human embodiment insofar as such rationalized schemas exclude some individuals and deny inevitable borderline cases to *appear* rationally coherent. The attempt to use rational principles to derive an intelligible basis for human embodiment exists only by denying those individuals that lie outside of and beyond reason, strictly construed. Thus rationalized conceptions of normative human embodiment cannot be fully deduced from philosophical principles alone without incompleteness, and only empirical rather than *a priori* rational considerations can adequately address the individuality and contingency of concrete human embodiment.

While the exclusion of individuals with disabilities based upon philosophical or rational grounds in particular is beginning to currently decrease, understanding the motivation behind the philosophical attempt categorize a normative conception of embodiment is important as such exclusion will remain a possibility in the future. Additionally, numerous contemporary philosophers still appeal to a normative conception of embodiment when considering whether or not a being is a "person" who ought to enjoy certain medical and ethical considerations owing to cognitive criteria or considerations of physical ability. This contemporary trend is most explicit in the work of some bioethicists and utilitarian thinkers who attempt to categorize rationally-identifiable criteria for accepting or rejecting individuals based upon considerations of normative embodiment and the failure to achieve this embodiment as represented by disability; I refer mainly to thinkers such as Michael Tooley (1983), Peter Singer (1993), Helga Kuhse (1987), James Rachels (1986), and most recently, Alberto Giubilini and Fracesca Minerva (2012).

III. MODELS OF DISABILITY

THE SOCIAL MODEL OF DISABILITY

The Social Model of Disability locates disability as being socially constructed through the creation of artificial attitudinal, organisational and environmental barriers. Impairment is regarded as being a normal part of the human condition, with everyone experiencing impairment differently and having different access needs. Life is accepted as including negative experiences, and impairment may be - but is not necessarily - one of them. Disabled people are defined as being people who experience the unnecessary barriers created by society within their daily life. Social model of disability has gained ground in

the international debate. This views disability as a social construct and emphasizes society's shortcomings, stigmatization and discrimination in its reaction to persons with disability. It distinguishes between functional impairments (disability) both of a physical and psychological nature, and the loss of equal participation in social processes that only arises through interaction with the social setting (handicap). These developments have contributed to a new (WHO) model, which bears in mind social as well as functional and individual factors in its classification of health and health-related areas.

INDIVIDUAL AND SOCIAL MODELS

There are two fundamental points that need to be made about the individual model of disability. Firstly, it locates the 'problem' of disability within the individual and secondly it sees the causes of this problem as stemming from the functional limitations or psychological losses which are assumed to arise from disability. These two points are underpinned by what might be called 'the personal tragedy theory of disability' which suggests that disability is some terrible chance event which occurs at random to unfortunate individuals. Of course, nothing could be further from the truth. The genesis, development and articulation of the social model of disability by disabled people themselves is a rejection of all of these fundamentals (Oliver 1990). It does not deny the problem of disability but locates it squarely within society. It is not individual limitations, of whatever kind, which are the cause of the problem but society's failure to provide appropriate services and adequately ensure the needs of disabled people are fully taken into account in its social organisation. Further, the consequences of this failure does not simply and randomly fall on individuals but systematically upon disabled people as a group who experience this failure as discrimination institutionalised throughout society. It would be possible to devote the rest of this paper, and much more, to discussing different models.

THE MEDICAL MODEL OF DISABILITY

The Medical Model of Disability locates disability as being a medical condition experienced by the individual affected, and disabled people are often referred to and defined by their impairments e.g. 'the blind', 'the deaf', 'epileptics', 'schizophrenics' etc. People with the same condition are expected to share the same experiences of their impairment and to have the same access needs, rather than each individual having different experiences and needs (as is actually the case). The medical model represents the notion of deafness as an impairment or problem that needs to be corrected. Many people who experience deafness later in life either suddenly or slowly over timeare likely to identify with this model. It is also the first model that parents are likely to apply or see applied by doctors to their deaf children upon diagnosis.Why then is the medicalisation of disability inappropriate? The simple answer to this is that disability is a social state and not a medical condition. Hence medical intervention in, and more importantly, control over disability is inappropriate. Doctors are trained to diagnose, treat and cure illnesses, not to alleviate social conditions or circumstances. Justification for this criticism rests upon the distinction between illness and disability and the fact that they are not the same thing;

some illnesses may have disabling consequences and many disabled people have illnesses at various points in their lives. Further, it may be entirely appropriate for doctors to treat illnesses of all kinds, though even here, the record of the medical profession is increasingly coming under critical scrutiny. Leaving this aside however, doctors can have a role to play in the lives of disabled people: stabilising their initial condition, treating any illnesses which may arise and which may or may not be disability related. The problem arises when doctors try to use their knowledge and skills totreat disability rather than illness.

Scientific Model of Disability

A Scientific Model of Disability include the belief that science is all-powerful and will soon eliminate abnormality forever. This is despite the fact that experienced scientists do not believe this at all, since their work proves daily that it is not true. However, scientists are largely unable to admit this in public because their ability to attract funds for their research depends on their fulfilling society's stereotypes. In reality, as the old saying goes, the more they learn, the more they realise they have yet to learn. Despite this, most people believe that scientists are experts in the most absolute sense, and this belief must form part of a Scientific Model of Disability.As we have seen, disabled people are of interest to scientists primarily because we help to advance the understanding of the 'normal' human body. Within a Scientific Model of Disability, then, normal people are the important ones. This is often voiced overtly by society, for example when urging drug testing to be carried out on disabled people rather than healthy volunteers.

In fact, scientists rarely meet a disabled person in the course of their working week, either as colleagues - I was the first wheelchair user to have worked at the National Institute of Medical Research that anyone could remember, despite lab work being so easily adaptable to disabled people's access needs - or as research subjects, since research is now carried out largely at the cellular level. Similarly, within a Scientific Model of Disability, disabled people ourselves are invisible.

Charity model of disability

The charity model of disability views the person with disabilities as the problem and dependent on the sympathy of others to provide assistance in a charity or welfare mode.

Right Base Model of Disability.

Right Base Model of Disability builds on the insights of the social model to promote creation of communities, which accept diversities and differences, and have a non discriminating environment in terms of inclusion in all aspects of the life of society. It took time to build consensus on a conceptual framework that reflected dimensions of disability beyond the medical. The International Classification of Impairment, Disability and Handicapped (ICIDH) from WHO in 1980 was a breakthrough in this evolution, It recognised that personal, social and environmental   factors are all that play in " creating" disability . This acknowledged that not only physical or mental impairments but the attitudes and institutions of society had significant impact on the opportunities of PWD.

Model of Human Capacity

The Model of Human Capacity Studies deals generally with the sciences of human development: how individuals acquire various capacities. There are at least three submodels: medical/public health, psychological, and educational. Each has played and continues to play a large part in disability policy and ser vices and thus in the impact that core concepts and partnerships have on family quality of life. The medical/public health submodel generally regards the person with a disability as having a disease or condition that renders him or her "sick" and that is properly addressed through the usual means whereby physicians treat their patients. There are two aspects to the medical/public health model: physical medicine and psychiatry. That physical medicine and psychiatry have played significant roles in disability policy and in the lives of families cannot be doubted. The psychological submodel regards behaviour as a learned consequence to external stimuli. It holds that in order to modify behaviour, it will be necessary to control the environments and the conditions within these environments that produce behaviour. These conditions include relationships between the individual with a disability and others. The psychological submodel gave rise to the intervention known as applied behaviour analysis and, more recently, to the intervention known as positive behavioural supports.

Educational submodel

The educational submodel holds that everyone can learn; there is no such person as one who is ineducable; and that, accordingly, all people who are of school age have a right to attend school if even one such person has the right to attend school. This submodel arose from research on language acquisition, was the foundation for the assertion in the early right-to-education. This submodel is associated with the core concept of anti-discrimination. The education submodel is also reflected in IDEA's principle of non-discriminatory evaluation and especially in the requirement for an evaluation of a student's cognitive capacities. It is also inherent in IDEA'S provisions that the student with a disability should have access to the general curriculum where, it is assumed, the student will learn certain skills (with accommodations) that will lead to an independent, economically self- sufficient, productive, and fully participatory life. This submodel thus is associated with the core concepts of integration, productivity and contribution, and autonomy (independence). It is responsible for a variety of teaching techniques tailored to the needs and capacities of the student, which collectively are expressed as individualized and appropriate education and related services.

Model of Public Studies

The Model of Public Studies subsumes various disciplines that are linked to each other because each is basically concerned with the relationship between government and individuals. Along with the Model of Human Capacity, this was the most dominant way of thinking about disability in the United States during the 20th century, especially during the last 30 years of it. This is ot difficult to understand: The civil rights revolution that began when advocates for African -American students insisted that racially segregated education is inherently unequal set the precedent for the disability-rights movement, which began in earnest in the early 1970s when advocates for people with

disabilities successfully established the rights to education and rehabilitation in the least restrictive (most normal) settings. The core concepts associated with this model are antidiscrimination, autonomy, liberty, privacy and confidentially, integration, cultural responsiveness, service coordination and collaboration, empowerment/participatory decision making , professional and system capacity-building, and classification.

The Model of Public Studies contains six submodels: law, political science and philosophy, political economy, demographics, public administration, and social welfare. None is entirely separate from the others; in fact, they tend to overlap significantly. The law submodel is concerned with the rules of a community-particularly the rules that derive from governments and their enforcement. It regards disability as an unalterable trait that thus should not be the basis for invidious treatment by governments; this is the core concept of antidiscrimination.

The law submodel also regards disability as a condition that should evoke a positive response by government. As such, its concerns are with the substantive rights and entitlements of people with disabilities and their families, and with the procedures whereby those rights and entitlements are made available and their denial is remedied.Political science is the study of how governments work (the practice of government)and of the institutions of government; political philosophy is concerned with how to deploy or limit public (governmental) power so as to maintain the sanctity and quality of life of the governed.

The political science and philosophy submodel conceptualizes disability as a human condition that should be addressed through political processes and that justifies, or does not justify, various governmental responses. Accordingly, some practitioners of this submodel are concerned with whether the majoritarian democratic processes are available to people with disabilities and their advocates, and, if so, how and with what results. Other practitioners are concerned with the nature and extent of the claims that people with disabilities legitimately may make on others and on the body politic; their issues are ones of the philosophy of government as applied to people with disabilities. Whatever the precise concern of the political scientist, the core concepts involved in this area are antidiscrimination, autonomy, privacy and confidentially, liberty, empowerment/ participatory decisionmaking, and classification.

Political economy is the study of the ways in which economics and government politics interact. The political economy submodel addresses disability from the bases of (a) the allocation of resources in the public and private sectors of a national or subnational economy and (b) the maximization of effectiveness, efficiency, and choice (responding to the needs and preferences of individual consumers). It comes into play in such diverse arena.

Demographics is the study of human populations, including their size, growth, density, and distribution, and it relies on statistics concerning birth, marriage, age, income, disease and disability, and human life. This discipline is concerned with population trends and the distribution of people throughout the nation or parts of the nation. In this submodel, the core concepts are antidiscrimination and, to a lesser degree, individualized and appropriate services and service coordination and collaboration. Public administration is the study of government organizations

and their relationships to other government organizations; it is concerned with how these organizations work and how they can be made more effective and efficient in carrying out the responsibilities assigned to them by appropriate branches of government. This submodel addresses how policies are administered, that is, how authorized services are imple mented and why those who are charged with implementation act in various ways when providing or denying services to people with disabilities and their families. public administration are the core concepts of capacity-building (at the system level), service coordination and collaboration, individualized and appropriate services, and accountability.

Social welfare is the field of human service that is generally aimed at enriching and enhancing individual and group development or at alleviating adverse social and economic conditions. This submodel proceeds from a purposefully "caring" or "empowering" perspective about people with disabilities and their families. In this arena, the concern is with the core concepts of autonomy, privacy and confidentially, liberty, integration, cultural responsiveness, empowerment/participatory decision-making, and classification.

Model of Cultural Studies

This model approaches disability and the role of the individual and family affected by disability from the perspective of how they are viewed within their particular society. Unlike the Model of Human Capacity Studies, it is only very tangentially, if at all, concerned with understanding the causes of disability that may lie within the person and thus with the interventions that maybe addressed specifically and sometimes solely to the individual. Instead, it is more concerned with how people with and without disabilities regard the fact of disability, with how disability is conceptualized by various cultures, and with how disability is expressed or portrayed through the various modes of expression available to a culture or group of people. The core concepts associated with this model are cultural responsiveness, classification, family integrity and unity, family centeredness, autonomy, liberty, and protection from harm. There are five sub models: cultural anthropology, sociology, literature, the performing arts, and history.

Model of Ethical and Philosophical Studies

This model is concerned with the ethics and philosophies that shape the Cultural Studies and Public Studies models. Ethics is the study of moral standards and how they affect individual and group conduct. Its concerns are with the "right and wrong" of decisions about people with disabilities and their families, that is, about the morality of decisions affecting them. The core concepts associated with this model are protection from harm, prevention and amelioration, autonomy, and cultural responsiveness. Theology is the study of religion, and religion refers to people's beliefs and opinions concerning the existence, nature, and worship of one or more deities and those deities' intervention in the universe and in people's lives. Religion is concerned with how people think about deities and how that thinking affects their behaviour toward people with disabilities, their families, and the societies in which disability exists. Under this area fall debates about "wrongful life" and "wrongful birth" cases, about the quality and sanctity of life, about the essential attributes of being

human, and about the rightfulness/ wrongfulness of aborting a fetus diagnosed as having a disability or at risk of being born with a disability. These debates are cast in terms of what is "morally/ethically right" or what "God" commands our personal, societal, and policy responses to be. Like the Cultural Studies Model, this model shapes one's understanding about the existential or metaphysical meaning of disability.

Model of Technology Studies

This model is concerned with the "built" or "constructed" environment, with the physical world that people with disabilities and their families inhabit. The core concepts associated with this model are antidiscrimination, productivity, integration, appropriate and individualized services, and capacity-building.This model is similar to the Human Capacity Studies Model and the Public Studies Model in that it has been applied directly in disability policy-making and service provision. Three sub models of this model are architecture, industrial engineering, and ergonomic cs. Technology Studies Model, The concern is with the core concepts of productivity, integration, individualized and appropriate services, capacity-building (that is, building the capacity of the individual, through individualized services, to be productive and integrated), and prevention.

The Administrative Model of Disability.

The administrative model comes into effect when the deaf person is assessed post-diagnosis for benefits or an education. It may mark the point at which he starts to "come out.".The model point out the effect within which the disabled person is examined as the normal person or as the abled people to inculcate some benefit. This approach is emerging and developing intime.

The Provisional Model of disability.

This is adhered to by those who believe that deaf people's access requirements have been met once they start using their designated equipment or the services of a lip speaker, note taker or sign language interpreter (SLI).

The Culturo-linguistic Model of Disability.

Born deaf or prelingually deaf people, Deaf families and Deaf communities are likely to relate to this model because they regard deafness not as a disability, but as a cultural identity. This model is the most diametrically opposed to the medical model because it emphasises what the person has gained (as opposed to lost) through being deaf, i.e. a strong community, a language with its own syntax and grammar, enhanced visual perception, and a culture that he can truly empathise with. Some prelingually deaf people who learn BSL later in life also identify with this model due to long held beliefs commonly supported by evidence of discriminatory barriers that continue in adult hood that mainstream society or education has failed them.

The Economic Model of Disability.

Evolution from the medical to social model of disability saw a major shift in attitude from one that concentrated on teaching an individual how to cope with a disability in an otherwise hostile environment to changing social attitudes to manipulate the environment to be more accessible to a person with a disability. It was a rights issue and based on the premise that

society had an obligation to assist those with a disability. The final evolution is to stop concentrating on the "disability" but rather the needs and abilities in a customer focused environment. An economic model of disability changes the basic driver from a rights and compliance issue to a market demand driver. The economic model will change that focus by changing how access is looked upon. Once any industry appreciates that the disabled and their friends are a large market they will start to research their interests. The economic model is suggesting that the market already exists and is growing rapidly with the retiring baby boomers. The real issue is attracting them by providing the facilities and services that they need.This group will not identify with the disability sector but will simply want to keep doing those things that they have always done and even relive their youth in their retirement. Their abilities will not be what they were in their 20's but they will still expect be able to fulfil their aspirations. This impetus of new demand for more accessible facilities and service will change the paradigm for the disability sector. The business case is about making the industry aware of the market size and redefining disability away from the concept that it is an homogenous group to regarding it as significant group of people with differing levels of ability desires and needs.

Economic model and realize that any disability is simply a different level of ability. We are not all equal in a number if ways. Physical ability is just one set in the total capability set of the human being. If we do take physical ability as the cornerstone of the push for greater accessibility then we need to put it into context. Evolution from the medical to social model of disability saw a major shift in attitude from one that concentrated on teaching an individual how to cope with a disability in an otherwise hostile environment to changing social attitudes to manipulate the environment to be more accessible to a person with a disability. It was a rights issue and based on the premise that society had an obligation to assist those with a disability. The final evolution is to stop concentrating on the "disability" but rather the needs and abilities in a customer focused environment.

The Human Rights Approach

The international development community is increasingly guided by a rights-based approach. This is an inclusive approach which calls for the participation of all groups of the population, but particularly disadvantaged persons in the development process, and for all people to have equal access to public services such as health and education. Inclusive development builds on the idea of a Society for All in which all people are equally free to develop their potential, contribute their skills and abilities for the common good and to take up their entitlements to social services. The human rights approach focuses not only on prevention and rehabilitation but also on equal rights to participation. It emphasizes strengthening the rights of people with disabilities, and fosters their participation in all aspects of society.

IV. CONCLUSION

Here there is a danger that in discussing issue related to disability, that we will end up with more models than one. This is dangerous in that, if we are not careful we will spend all of our

time considering what we mean by the medical model or the social model, or perhaps the psychological or more recently, the administrative or charity models of disability. These semantic discussions will obscure the real issues in disability which are about oppression, discrimination, inequality and poverty. Construction of disability from different perspectives and its implications have been a major challenge in the modern and developing world order. The generally adopted and accepted concepts of disability narrowing the definitions of disability and confines and limited it to "blindness; low vision; leprosy-cured; hearing impairment; locomotor disability; mental retardation; and mental illness". As opposed to this, the Disability Convention of UN recognises that "disability is an evolving concept" and avoids listing specific conditions and severities and broadly casts "persons with disabilities" to "include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others." The barriers of disability Laws are mainly from the concept level , that makes complexities and hindrens to the fruits of that statutes, That the differences in the Conceptual Models of Disability taken from different perceptions leads to a pathetic situation that may lead to worsen the present conditions of Disabled people . The different concepts and models of disabilities adopted by different agencies ultimately make hindrances to the fruits and flowers of all endever that would have been beneficial to disabled communities.

Case:1

The number of disabled population in developing countries are vary according to differences in approaches. In the case of developing India, the estimates vary, there is growing evidence that people with disabilities comprise between 5 and 8 percentage of the Indian population (around 55-90 million) individuals. The main sources of the estimates are of the National Sample Survey (NSS), 2001 census, The official estimates of disability are low (around 2 percent), alternative estimates using better method and more inclusive definitions suggest a higher incidence of disability (of at least 5-8 percent). 11th Five year plan acknowledges that at least 5-6 percent of the population have disabilities. WHO estimates of the disabled population of India are considerably higher again. The 2001 census found 21.91 million persons with disabilities (2.13 percentage of the population), while the NSS round's disability estimates is 1.8 percentage of the population. Alternetive estimates from variety of sources suggests that the actual prevalence of disability in India could be easly around 55 million people, and as high as 90 million if more inclusive.From the case study it is found that the differences in approaches and methods in defining and considering disability leads to false estimates of disabled population and thereby incorrect policy formation for their betterment.

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Markers of Inflammation and Insulin Resistance in Age and Body Mass Index Matched Subjects with Prehypertension and Normotension

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Abstract- Background: Hypertension, an important risk factor for cardiovascular disease (CVD), accounts for 57% and 24% of deaths due to stroke and coronary artery disease, respectively. Even blood pressure (BP) in prehypertension category (systolic BP 120-139 mm Hg and/or diastolic BP 80-89 mm Hg) hold 3 times more risk for CVD than normal BP (systolic BP <120 mm Hg and diastolic BP <80 mm Hg). We sought to compare the markers of inflammation and insulin resistance in age and body mass index (BMI) matched prehypertensive and normotensive subjects, and to evaluate the association of prehypertension BP status with markers of inflammation and insulin resistance.

Methods: A total of 572 participants in the age group 20-60 years of both gender without any known CVD from the community were recruited (Aug 2010 to Dec 2011). After considering the BP, inclusion and exclusion criteria and written informed consent, a total of 186 participants were grouped into prehypertensives (n=104) and normotensives (n = 82). We have measured basal physiological parameters, insulin resistance (HOMA-IR) and markers of inflammation, such as, C-reactive protein, tumor necrosis factor-α and interleukin-6.

Results: Markers of inflammation and insulin resistance were significantly elevated in prehypertensive subjects as compared to that of age and BMI matched normotensive subjects. Cardiovascular risk factors significantly reduced the association of BP with insulin resistance, but not with inflammatory markers. Regression analysis revealed the better relationship between inflammatory markers (CRP and TNF- α) and prehypertension BP status.

Conclusion: Although, insulin resistance and inflammatory markers were elevated in prehypertensive subjects as compared to age and BMI matched normotensive subjects, the inflammatory markers alone significantly associated with BP status, independent of cardiovascular risk factor.

Index Terms- Prehypertension, insulin resistance and inflammatory markers

I. Introduction

Worldwide, cardiovascular disease (CVD) is the foremost cause of morbidity and mortality. Hypertension is one of the major contributor or modifiable risk factors for CVD mortality and morbidity (1). In India, hypertension accounts for 57% of stroke deaths and 24% of coronary heart disease deaths (2). Globally, it is affecting approximately 26.4% of the adult population and accounting for 13.5% (approximately 7.1 million) of global deaths, and its occurrence is expected to be more than 1.5 billion by 2025 (3, 4).

After considering the increasing evidence of CVD and its strong association with BP, even starting from the BP range of 115/75 mm Hg (5). Joint national committee on detection, evaluation, prevention and treatment of high blood pressure (JNC 7) emphasized a new BP category, prehypertension, BP range of 120/80 mm Hg to 139/89 mm Hg (6).

Insulin resistance, a resistance to insulin stimulated glucose uptake in insulin-dependent cells is the primary underlying defect, associated with CVD (7). Xu et al., proposed that the insulin resistance plays an important role in the metabolic abnormalities of hypertension (8). Nonetheless, prehypertensive subjects with insulin resistance also present with accentuated cardiovascular risk profile (9). Homeostasis model assessment of insulin resistance (HOMA-IR) is accepted as a reliable tool in the assessment of insulin resistance even before the clinical diagnosis of diabetes, applied to quantify insulin resistance in subjects with or without glucose intolerance (10).

Inflammation is defined as body's natural defense against invading pathogens by producing various inflammatory proteins. Excess or chronic expression of pro-inflammatory cytokines can lead to the development of tissue injury and damage, as is evident in atherosclerosis (11, 12). Preston et al., demonstrated increased plasma levels of the primary inflammatory cytokine TNF-α, IL-6, and CRP in hypertension (13). Previous studies also observed elevated inflammatory marker in prehypertensive subjects as compared to normotensive subjects (14, 15) and a strong association between prehypertension and inflammatory markers (14).

Of note, worldwide, conventional cardiovascular risk factors, such as ageing, high cholesterol, overweight or obese, smoking, and physical inactivity in association with BP contribute about 80–90% of ischaemic heart disease and 70–75% of stroke (16). Especially, the obesity and advancing age play an important role in the process of insulin resistance and inflammation (17, 18),

and also contribute in the association between BP and insulin resistance (19).

Therefore, in the present study, we evaluated the markers of inflammation and insulin resistance in prehypertensive subjects and compared it with the age and BMI matched normotensive subjects, and the association between inflammation, insulin resistance and prehypertension BP status.

II. METHODOLOGY

2.1 Study approval:

The study has been approved by JIPMER scientific advisory committee and JIPMER ethics committee for human studies. The present study (cross-sectional) data is a part of the Ph.D., thesis work, thus the study protocol was also approved by the panel of Ph.D., doctoral committee.

2.2 Subjects recruitment:

After the approval from the human ethics committee, we have conducted community-based hypertension screening camps in Puducherry, India, between August 2010 and December 2011, to recruit study subjects. During the camp, after the period of comfortable rest, BP was recorded three times in the sitting posture with five minute interval between the recordings (by the same observer), using digital automatic BP monitor (CH432B, Citizen Systems, Japan Co., Ltd, Japan). The average of these three recordings was considered as the final reading. Based on the BP and medical history, a total of 572 were recruited for the study after considering the inclusion (systolic BP < 140 mm Hg, diastolic BP < 90 mm Hg, aged 20–60 years) and the exclusion (history of chronic illness, CVDs, diabetes, primary autonomic insufficiency, or kidney diseases; sports person; under medication for prehypertension and chronic illness). The study protocol was explained to the individuals, and written informed consent was attained before their participation in this study.

2.3 Laboratory measurements:

The volunteers were requested to report to Autonomic lab, department of Physiology, JIPMER, Puducherry between 07.00 a.m. to 09.00 a.m., after overnight fasting. The BP was recorded once again in the lab by the same observer with the same instrument used in camp, in sitting position after comfortable rest. Two readings were taken with 5 minute interval and the average of the readings was considered for categorizing the volunteers. A total of 82 normotensives (BP: <120/80 mm Hg) and 104 prehypertensives (BP: 120-139 and/or 80-89 mm Hg) were included in the study after obtaining the written informed consent. The details of subject recruitment and categorization are depicted in Figure 1.

2.3.1 Anthropometric measurements:

Anthropometric measurements: Body mass index was calculated using body weight and height of the individual.

2.3.2 Biochemical tests:

Fasting plasma glucose (FPG) was assessed by glucose oxidase-peroxidase method (Genuine Biosystem, India). Plasma insulin was measured using chemiluminescence immunoassay (Siemens, USA). Homeostatic model assessment of insulin resistance (HOMA-IR) was calculated based on the FPG and insulin values, i.e., fasting insulin (mU/L) X [fasting glucose (mmol/L)/22.5], high score denotes reduced insulin sensitivity i.e., insulin resistance (20). Inflammatory markers: hs-CRP

(DBC, Canada), IL-6 and TNF-a (Orgenium, Finland) were measured using ELISA kit, and the manufacturer's instructions were followed.

1.4 Data analysis:

Continuous data were presented as mean ± SD, and the categorical data as frequencies. Comparison of continuous data between groups were done by Student t test. Between groups difference in frequency were compared using the $\chi2$ test. Entire cohort (n=186) was used for the correlation and regression analysis. The association between the parameters was analyzed using Pearson correlation. The contribution of the independent variable on the variance of dependent variable was assessed using linear regression. Data analysis was performed with Statistical Package for Social Sciences version 19.0 for Windows (SPSS Inc., USA). $P < 0.05$ was considered as statistically significant.

III. RESULTS

In total, tests performed on 186 participants (82 normotensives and 104 prehypertensive subjects), after considering the inclusion, exclusion criteria, and obtaining written informed consent. The participants recruited in the age group of 20 to 60 years. Mean age of the subjects recruited were similar between normotensive and prehypertensive group, 41 and 43 respectively. The BMI also did not different significantly between normotension and prehypertension group. Difference in the distribution of gender was statistically significant between normotension and prehypertension group, i.e., more male subjects (67.31%) recruited in prehypertension group, because men are prone to develop prehypertension than women of peer age group (21), Table 1.

Family history of diabetes was equally distributed between normotensive and prehypertensive subjects (27% vs 30%), but the family history of hypertension between the groups were statistically different between the groups (26% vs 45%). The 5% and 9% of the subjects in normotension and prehypertension group, respectively, did not know about their family history of diabetes and family history of hypertension. The history of smoking and alcohol intake were not significantly different between normotension and prehypertension.

The mean systolic and diastolic BP of normotensive subjects were 109 mm Hg and 73 mm Hg, respectively. The detail of BP, mean arterial pressure and heart rate of both the groups are presented in Table 1. The markers of inflammation (CRP, TNF-α and IL-6) and insulin resistance were significantly elevated in prehypertensive subjects as compared to that of normotensive subjects, but the level of insulin was not statistically different between the groups.

Entire cohort was used for the correlation and regression analysis. The BP (both systolic and diastolic BP) showed a significant direct association with insulin resistance and markers of inflammation (CRP, TNF-α and IL-6), Table 2. This association remained robust after adjusted for cardiovascular risk factors like, age, family history of hypertension, BMI, smoking habit and fasting plasma glucose, but not with insulin resistance. The association between heart rate and inflammatory markers, except with CRP, and insulin resistance were also reduced

significantly when cardiovascular risk factors were fixed, Table 3.

By linear regression analysis, markers of inflammation and insulin resistance explained 28.6% of the variance in the presence of prehypertension BP status, i.e., normotension vs prehypertension, but the CRP and TNF- α alone significantly contributed in the variance, Table 4.

IV. DISCUSSION

In this study of age and BMI matched subjects with normotension and prehypertension, we observed elevated inflammatory markers and insulin resistance in subjects with prehypertension as compared to that of normotensive counter parts. The direct association between BP (both systolic and diastolic BP) and inflammatory markers was robust even after adjusted for cardiovascular risk factors, but not with the state of insulin resistance. Regression analysis further revealed the significant contribution of inflammatory markers in the variance of prehypertension BP status.

Prehypertensive subjects hold more than 3 fold risk for developing hypertension and CVD in the future when compared to normotensive subjects ([22]) and at the same time the level of BP is directly correlated with mortality ([23]). Meta-analysis of 12 studies, including a total of over five lakh participants, demonstrated that prehypertension was associated with an increased risk of stroke ([24]). Studies have also demonstrated subclinical atherosclerosis and target organ damage in prehypertensive subjects ([25]).

Of note, the exact cause of high BP is not clear. This cross-sectional data analysis also could not reveal the cause-effect relationship of increasing BP with inflammation and insulin resistance, i.e., whether the increased in inflammatory markers or insulin resistance state caused the elevation in BP or the increase in BP with other risk factors preceded the alteration in the markers of inflammation and insulin resistance. An epidemiological study by Reaven et al., stated that the individuals with insulin resistance has increased chance for developing hypertension ([26]). A study by Blake et al., revealed the importance of inflammatory markers as an independent risk factors for the development of hypertension ([27]).

In the present study, we observed elevated inflammatory markers in prehypertensive subjects as compared to that of normotensive subjects. This is in accordance with a study conducted in the ATTICA region on 3,042 prehypertensive subjects without clinical CVD ([14]). Numerous epidemiological studies demonstrated elevated inflammatory proteins in patients with CVD and even in healthy subjects ([28], [29]). We also detected a strong positive association between BP and inflammatory markers, and the association remained robust after adjusted for cardiovascular risk factors like, age, smoking habit, BMI and fasting plasma glucose. NHANES III study also found independent relationship between inflammatory proteins and BP ([15]). Our observation indicates that the prehypertension might be a proinflammatory condition, progress to subclinical atherosclerosis.

Similar to the inflammatory markers in prehypertension, we observed increased insulin resistance in prehypertensive subjects as compared to that of normotensive subjects. Previous studies also demonstrated the presence of increased insulin resistance in prehypertensive subjects as compared to normotensive subjects and their accentuated cardiovascular risk ([9], [30], [31]). Nonetheless, the positive association between insulin resistance and BP was not significant after adjusted for cardiovascular risk factors. In agreement, previous studies also demonstrated the association between BP and insulin resistance and the significant contribution of cardiovascular risk factors ([31], [32]). But, a study by Hwu et al., demonstrated the association between BP and insulin resistance, independent of cardiovascular risk factors ([33]).

The existence of increased insulin resistance (18%), and markers of inflammation, such as, CRP, TNF-α and IL-6 by 48%, 30% and 24%, respectively, in prehypertensive subjects as compared to that of age and BMI matched normotensive subjects, indicates that the subjects with prehypertension present with a state of inflammation and insulin resistance. Thus, this study highlight the importance of prehypertension BP category, because the increased inflammatory markers and insulin resistance present in prehypertensive subjects are well known for its association with the development of CVD. The strong association between BP and inflammation and the significant contribution of inflammatory markers (CRP and TNF-α) on the variance of prehypertension BP status, indicates the importance of a state of inflammation in individuals with prehypertension. Further, the influence of cardiovascular risk factors on the association of BP with insulin resistance and inflammatory markers, emphasizes the importance of targeting lifestyle factors in the reduction of BP and metabolic derangements, so as to reduce the occurrence of CVD.

V. LIMITATIONS

The cause-effect relationship between BP, insulin resistance and markers of inflammation cannot be imputed, because the present study is cross-sectional. Longitudinal studies with more number of subjects can reveal the exact association. 24 hours ambulatory BP monitoring could have added more information in the clinical setting about the BP status of the subjects.

VI. CONCLUSION

The presence of elevated inflammatory markers and insulin resistance in prehypertensive subjects, and the strong association of inflammatory markers with BP status, independent of other comorbid risk factors like, age, BMI, smoking habit and fasting plasma glucose designates their higher risk for conversion to hypertension, development of subclinical atherosclerosis and CVDs in future. By considering the influence of risk factors on the association of BP with insulin resistance and inflammation, it is advisable to introduce lifestyle interventions right from the stage of prehypertension for delaying the disease progression and the incidence of CVD. This may obviate the need for expensive and complicated therapies.

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Table 1. Comparison of demographic profile, anthropometric measurements, blood pressure, markers of inflammation and insulin resistance between normotensive and prehypertensive subjects.

Parameters/ Group	Normotension (n=82)	Prehypertension (n=104)
Age (year)	41.23 ± 8.51	43.17 ± 9.02
Gender distribution (Male/ Female)	39/43	70/34 **
Body mass index (kg/m^2)	25.32 ± 4.01	26.16 ± 3.53
Smoking habit (Yes/ No)	10/72	22/82
Alcohol intake (Yes/ No)	09/73	22/82
Systolic blood pressure (mm Hg)	109.07 ± 6.71	126.43 ± 6.64 ***
Diastolic blood pressure (mm Hg)	72.54 ± 5.64	84.36 ± 4.17***
Heart rate (beats/min)	71.83 ± 7.28	74.50 ± 10.10*
Mean arterial pressure (mm Hg)	84.72 ± 5.26	98.38 ± 4.00***
Fasting plasma glucose (mg/dL)	86.73 ± 11.91	92.72 ± 15.39**
Fasting plasma insulin (µU/L)	13.75 ± 7.66	15.45 ± 5.93
HOMA-IR	3.02 ± 1.82	3.57 ± 1.51*
High sensitive C-reactive protein (µg/mL)	3.95 ± 2.13	5.86 ± 1.75***
Tumor necrosis factor-α (pg/mL)	61.72 ± 19.09	80.31 ± 15.23***
Interleukin-6 (µg/mL)	19.33 ± 6.67	23.91 ± 7.81***

Data are expressed as mean ± SD or frequency. Abbreviations: HOMA-IR, homeostatic model assessment-insulin resistance. $P < 0.05$, considered statistically significant.
*$P < 0.05$, **$P < 0.01$, and ***$P < 0.001$, difference between normotension and prehypertension

Table 2. Correlation between blood pressure, insulin resistance and markers of inflammation

Parameters	IR	Hs-CRP	TNF-α	IL-6
Systolic blood pressure	0.311***	0.504***	0.492***	0.297***
Diastolic blood pressure	0.285***	0.464***	0.456***	0.343***
Heart rate	0.224**	0.237**	0.159*	0.157*
Mean arterial pressure	0.317***	0.504***	0.498***	0.338***

Abbreviations: hs-CRP, high sensitive C-reactive protein; IR, insulin resistance; IL-6, interleukin 6; TNF-α, tumor necrosis factor-alpha. $P < 0.05$, considered statistically significant. *$P < 0.05$, **$P < 0.01$, and ***$P < 0.001$

Table 3. Correlation between blood pressure, insulin resistance and markers of inflammation after adjusting for age, smoking habit, body mass index, family history and fasting plasma glucose.

Parameters	IR	Hs-CRP	TNF-α	IL-6
Systolic blood pressure	0.093	0.342***	0.339***	0.201**
Diastolic blood pressure	0.107	0.354***	0.333***	0.236**
Heart rate	0.133	0.206**	0.043	0.114
Mean arterial pressure	0.108	0.372***	0.359***	0.238**

Abbreviations: hs-CRP, high sensitive C-reactive protein; IR, insulin resistance; IL-6, interleukin 6; TNF-α, tumor necrosis factor-alpha. $P < 0.05$, considered statistically significant. *$P < 0.05$, **$P < 0.01$, and ***$P < 0.001$

Table 4. Contribution of independent variables (inflammatory markers) in the variance of dependent variables (prehypertension BP status and insulin resistance) by linear regression

Relationship between markers of inflammation and prehypertension BP status (R^2 = 0.286)		
	β co-efficient ± SE	p Value
Hs- C-reactive protein (µg/mL)	0.065 ± 0.017	<0.001
Tumor necrosis factor-α (pg/mL)	0.009 ± 0.002	<0.001
Interleukin-6 (µg/mL)	-0.001 ± 0.005	0.781
Insulin resistance	-0.004 ± 0.02	0.855

Abbreviations: BP, blood pressure; SE, standard error. A$P < 0.05$, considered statistically significant.

Figure 1. Participant recruitment and categorization in to groups

Comparative Analysis of Different Types of Planer EBG Structures

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Abstract—In this paper three types of Electromagnetic Band Gap (EBG) structure is presented. This paper analyze the parametric performance of different factors that influence band gap properties of EBG structures. Planer Electromagnetic Band Gap (EBG) structures are considered very promising in microwave engineering. It is found that EBG structures used to reduce interference, surface wave and mutual coupling. This paper includes three designs of EBG structures including Fractal shaped, Fork shaped and Spiral shaped. The array of theses EBG structures has been also analyzed to investigate the Band Gap Properties of these structures. Finally the comparison of band gap properties of all three EBG structures has been compared, discussed and concluded.

Keywords—Electromagnetic Band Gap Structures(EBG), Surface Wave, Mutual Coupling, Interference*.*

I.   INTRODUCTION

Electromagnetic band gap structures are normally periodic in nature. EBG strctures are equivalent to magnetic surface at the resonance frequency and have very high impedance. These structures are extensively used in Band Gap phenomena for used in practical used both in optical domain and microwave areas. The EBG structures are also very compact in nature, this is because compactness is very much preferred in wireless communications. [1]

Surface wave propogation can be suppressed by using periodic structures called Electromagnetic Band Gap structures. EBG structures can be implemented as metallic-dielectric and purily dielectric. [2]

        The band gap property of any EBG structure is dependent on the dielectric constant , thickness of the substrate as well as on the EBG structure geometry. During the early phases of research on EBG structure, it is mainly focused on the three dimensional geometries. These three dimensional EBG structures are very complex in designing and fabrication. Later on researchers have found planer types of EBG structures. The advantage of planer types of EBG structure is in its fabrication is very easy also the manufacturing cost is very less as compared to three dimensional EBG structures. [3]

        In this paper we have designed three types of EBG structures which are planer in nature. The array contains the periodicity of dielectric structures designed on metal.

We proposed fractal type of EBG structure. The important property of fractal type of structure is that a long electrical length can be incorporated in a small area. The self similarity of fractal geometry generats multiple notch band and thus the wide band response is created. The second one is fork shaped EBG structure. This type of structure is very simple to design also the band gap is very large. The third structure is spiral shaped EBG structure. The design and band gap properties of all three structures are compared in the next sections.

II . DESIGN OF EBG STRUCTURES

In this paper purily dielectric planer types of EBG structures is designed to suppress surface waves. The EBG structures are designed on the FR-4 substrate having dielectric constant 4.4, thickness 1.6 mm and loss tangent 0.02. The unit cell of EBG structure in all three types is taken as 5mm x5mm.

A.   FRACTAL TYPE EBG

Fractal EBG strcture is a two dimensional planer type EBG structure. The transmission characteristics depends on the size of patch and structure. The transmission characteristics also depends on the thickness and type of substrate material used. The single unit of fractal EBG is shown below.

Fig-1: Unit cell of fractal EBG

The optimum parameters of the proposed fractal EBG are following: Wf1= 3 mm, Wf2= 2 mm , Wf3= 3 mm., Wf4=4mm,

Lf1= 4 mm, Lf2= 5 mm and Lf3= 2mm. The width fractal is 1 mm.

We take only left side of parameters because the structure is symmetric so right hand side parameters are same as left hand side.

B.   FORK TYPE EBG

The fork type EBG structure is very eas to design as compared to fractal EBG. The unit cell of fork type EBG structure is shown below.

Fig- 2: Unit cell of Fork EBG

The parameters of the cell are given as : L1=7 mm, L2= 7 mm, L3= 4mm, W1=6 mm. the width of the structure is 1 mm.

C.   SPIRAL TYPE EBG

The schematic proposed spiral EBG unit cell is shown in figure 3. The gray part in the structure is metal, which is etched on the dielectric substrate. The planer spiral EBG is simple to design as there is no vias connected.

Fig-3: Unit cell of spiral EBG

The optimized parameters of the EBG cell are as follows: Ls1= 4 mm, Ls2= 6 mm, Ls3= 8 mm, Ls4= 8 mm, Ws1= 4 mm, Ws2= 6 mm, Ws3= 8 mm. the width of spiral is 1 mm.

III . BAND GAP CHARACTERIZATION OF SINGLE EBG STRUCTURE

The designed EBG structures are simulated using the CST microwave studio. Only the transmission coefficient (S21) is calculated to characterized the band gap behavior of EBG structure.

From the figure 4 it can be shown that the maximum band gap is provided by fork like EBG structure.

The frok like EBG structure have -10 dB band gap from 7.7 Ghz to 15 Ghz, fractal shaped EBG strcuture have -10 dB band gap from 8 Ghz to 15 Ghz, spiral shaped EBG structure does not have wide band gap as fractal and fork shaped.

Fig-4: Comparision of Band gap behavior of Unit cell Spiral, Fractal and fork shaped EBG

IV . DESIGN OF ARRAY OF EBG STRUCTURE AND CHARACTERIZATION OF THEIR BAND GAP BEHAVIOUR

Now we will design and compare the array of EBG structure. In the array of EBG structure the single unit is same as designed above. We have designed 6 x6 array and 7 x7 array of fractal, fork and spiral EBG structures.

The simulation is done in CST microwave studio.

A.   DESIGN AND CHARACTERIZATION OF 6X6 ARRAY EBG STRUCTURES

First we will design 6x6 array of EBG structure of fork, fractal and spiral types of EBG structures and simultaneously show their transmission characteristics.

Fig-5: Front view of Array of Fork EBG structure

Fig-6: Tansmission coefficient of 6x6 array of Fork EBG Structure

Fig-7: Front view of Array of Fractal EBG structure

Fig-8: Transmission coefficient of 6x6 array of Fractal EBG strcture

Fig-9: Front view of Array of Spiral EBG structure

Fig-10: Transmission coefficient of 6x6 Array of Spiral EBG Structure

Now we will see the comparision between all three 6x6 array EBG structures.

Fig-11: Comparision of Band Gap behavior of Array of Different EBG structures

B . DESIGN AND CHARACTERIZATION OF 7X7 ARRAY EBG STRUCTURES

Array of 7x7 EBG structures has been designed. It can be shown from the results in this section that 7x7 array E BG structures gives more Band Gap than 6x6 Array of EBG structure.

Fig-12: Front view of 7x7 Fork EBG structure

Fig-13: Transmission coefficient of 7x7 Array of Fork EBG Structure

Fig-14: Front view of 7x7 Array of Fractal EBG structure

Fig-15:Transmission coefficient of 7x7 Array of Fractal EBG structure

Fig-16: Front view of 7x7 Array of Spiral EBG structure

Fig-17: Transmission coefficient of 7x7 Array of Spiral EBG Structure

Fig-18: Comparative Analysis of Band Gap behavior of 7x7 Array of Different EBG structures

V. CONCLUSION

A comparative analysis of planer types of EBG structures has been presented in this paper. The band gap characteristics along with physical dimensions of the structure have been determined and simulated using CST microwave studio 2010. Three types of electromagnetic band gap structures are investigated. The effect of number of array in an EBG structure is studied. As the number of element increases the band gap increases also the band gap shifts to the lower frequency region. Among three EBG structures the fork type EBG structure gives better performance in terms of simplicity, compactness and band gap. The proposed EBG structures can be used for microstrip patch antennas in terms of bandwidth, gain, reduction of mutual coupling and surface wave. Hence the antenna performance can be enhanced.

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The Effect of Different Treatments on Semi-Hardwood Cutting Propagated Tea (*Camelia sinensis* L.) Clone

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Abstract- This study was carried out to determine the suitable time for preparation of cuttings, type of cuttings, and various IBA concentrations to root semi-hardwood cuttings of Turkish tea clone cultivars in Rize (Turkey), during 2010 and 2011. The cuttings were collected on 15 July and 1 August. After pre-treating with 0, 2000, 4000 and 6000 ppm IBA, the cuttings with full leaf and half leaf cuttings were rooted in perlite medium at the unheated but mist propagated glasshouse. Semi- hardwood cuttings were exposed to the rooting media for 60 days, and then, they all were removed from media to determine the survival rate, rooting rate, root number, root length, root diameter and root quality. In 2010, the survival rates were between 66.7 – 91.7 %; the rooting rates were between 38.3 – 85.0 %; the root numbers were between 3.2 – 6.4 units; the root lengths were between 8.5 – 14.8 cm; the root diameters were between 0.68 – 1.27 mm and the root qualities were between 1.91 – 3.52. In 2011, the survival rates were between 65. – 91.7 %; the rooting rates were between 51.7 – 85.0 %; the root numbers were between 3.1 – 8.5 units; the root lengths were between 8.3 – 16.6 cm; the root diameters were between 0.81 – 1.23 mm and the root qualities were between 2.33 – 3.65. The highest rooting and rooting quality were from semi hardwood cuttings prepared with full leaf cuttings on 1 August. All the cuttings were treated with 4000 and 6000 ppm IBA. The lowest rooting and rooting quality were from control (0 ppm) treatment.

Index Terms- Cutting type, IBA, collection time, rooting, *Camelia sinensis* L.

I. INTRODUCTION

The first tea cultivation in Turkey started with seeds, brought from Georgia after 1924. Today, tea has been cultivated in 75.889 hectares of total area by 201.957 farmers (PMTSI, 2012). In tea gardens of the country, mostly the genetic purity of seeds has not existed because of seed replicated plant seedlings. Generally Chinese varieties have dominated in the gardens and, in addition, many of other types occurred with different forms of morphology, physiology, quality, and yield. Continuing tea production by seed would unavoidably result in new low yielding and quality types (Ayfer et al., 1987a,b; Altındal and Balta, 2002). For these reasons today, tea has been farmed by vegetative propagation.

Vegetative propagation is a clonal method, where hybrid characters and/or genetically different off springs have not occurred. This propagation method applies grafting, cutting, tissue culture methods, and most commonly cutting. Propagation with cutting, a quicker sapling production, could overcome some difficulties, observed in grafting (Hartmann et al., 2002).

In 1928, the first experiments on cutting propagation of tea started in India, where types and varieties had important differences for rooting capabilities. Subsequent research revealed that cuttings of *Sinensis* varieties and its hybrids were rooted easily, but those of *Assamica* had some difficulties (Kinez, 1967). In Turkey, the first study on tea propagation by cutting was performed by Özbek et al. (1961), reporting auxin applications stimulated the rooting significantly. Similar results were also reported for auxin in a subsequent study on Fener tea clone (Kinez, 1967). The existence of leaf on cuttings was reported to have a positive effect generally on root formation (Hartmann et al., 2002).

To reach the desired level for tea cultivation in Turkey, it is compulsory that clonal cuttings should be produced from high yielding and quality tea types and tea plantations should be established by these cuttings. As literature revealed, no study was performed on tea production by semi hardwood cuttings in Turkey in the last decade. In the present study, the aim was to determine the effects of different cutting times, the type of cuttings, and the effect of plant growth regulators (IBA) on rooting percentage and quality of a hardly rooting tea clone, Pazar-20.

II. MATERIALS AND METHODS

The research was performed in tea garden and greenhouse of the Rize Atatürk Tea Research Institute of during 2010 – 2011. In this study, the tea plant material Pazar-20 clones were used. The garden providing the cuttings was established on a flat field (North: 41° 01 ', East: 40° 30', Altitude: 106). Soil structure was sandy – loamy. Soil analyses on soil taken in 20 cm below of soil surface were the following:

- pH: 4.65 - 5.35   - Organic matter : 0.14 - 3.96 %
- Total nitrogen content: 0.14 – 0.24   - Available P_2O_5: 13 -30 ppm
- Exchangeable K_2O: 80-370 ppm

The 20-year-old stud plants for cuttings were pruned in December and cuttings were taken from newly emerged shoots in two different times on 15 July, and 1 August respectively. Well-developed disease free cuttings with full-leaf and half-leaf shoots, 3.5 to 4 cm in length were prepared and disinfected by a fungicide (Benlate) against fungus infections. Cuttings, after treated by IBA doses of 0 (control), 2000, 4000, and 6000 ppm were transferred to rooting medium including perlite for 60 days.

Rooting was performed in unheated glasshouse and the upper part rooting media was shaded by using of porous polyethylene with 70% light transmittance. For rooting, time-dependent automatic mist-propagation system was set at 70-90% level. Accordingly, fogging period and intervals were adjusted based on the glasshouse interior temperature and relative humidity. When relative humidity increased and temperature decreased the fogging range was extended to 15 seconds in 1 hour. Fogging units are turned off in cloudy days, between the hours of 08:30 to 18:00. On rainy days, it was completely turned off.

At the end of rooting period, survival rate (%), rooting rate (%), root number (quantity), root length (cm), root diameter (mm) and root quality were determined. Experimental design was a randomized complete block design in a split plot arrangement with three replications, each having 20 cuttings. Data expressed as percentage (rooting rate and survival rate) were transformed using the arc-sin√x transformation, and statistical analyses of transformed data were done by MSTAT-C pocket program (Russell D. Freed, Crop and Soil Sciences Department, Michigan State University). Duncan's Multiple Range Test was used to indicate the differences between the averages. The differences between the level of significance in evaluating the results were explained at 5% as important and 1% as very important.

III. RESULT AND DISCUSSION

Experiment carried out in the glasshouse where relative humidity (%) and mean temperature (°C) were recorded during July 15 to October 1 in both years (Figure. 1 and 2). As shown in Figure 1, 2 mean daily temperatures varied from 18.6 °C to 29.9 °C in 2010 and from 12.9 °C to 28.6 °C in 2011. Mean daily relative humidity varied from 61.3 % to 88.3% in 2010 and from 62.3 % to 89.3% in 2011. These temperature and relative humidity values were compatible with those reported previously (TSMS, 2013).

Figure. 1. Changing of mean temperature and relative humidity during the days after cutting (2010)

Figure. 2. Changing of mean temperature and relative humidity during the days after cutting (2011)

Survival ratio (%), rooting ratio (%), and root numbers were given in Table 1. According to these data tea cuttings had a significance effect (5%) on the survival rate in 2010, cutting time and a triple interaction. The cutting times and IBA applications had a significance (1%) effect in 2011. Other applications had insignificant effect. The survival rate varied from 66.7% to 91.7 % in 2010 and from 65.0% to 91.7% in 2011. The best results for cutting time were once in every two years (82.3%, 81.3% respectively), on July 15; for type of cuttings full leaf cuttings in 2010 (79.6%), half leaf cuttings in 2011 (79.4%); 6000 ppm IBA applications for the first year (85.1%), second year in a 4000 ppm (87.5%). The rooting rate was very significant applications of IBA (every two years), cutting time and cutting time x IBA applications (in 2011) important effect. Rooting rate varied from 85.0% to 38.3% in 2010 and from 51.7% and 85.0% in 2011. The best results were obtained for the cuttings on 15 July on the full leaf leaved 4000-6000 ppm IBA treatment. The control group had the lowest results for cuttings. When looked at the impact on the root number of applications in 2010, cutting time, type of cutting, and IBA applications had a significant effect. In 2011, the IBA applications and cutting time had a significant effect. The number of root varied from 3.2 to 6.4 units in 2010 and from 3.1 to 8.5 units in 2011. The best results in 2010 and 2011 (6.4 units and 8.5 units, respectively) taken on August 1 and 6000 ppm IBA treatment based on the full leaf cuttings were prepared.

The results of the most improved root length (cm), the diameter (mm) and the root quality (0-4 points) were in Table 2. Based on these results over, the improved root length in 2010, IBA applications significant, type of cutting was very significant; in 2011, the cutting time is significant, cutting type and doses of IBA were very significant impacts. The root lengths varied from 8.5 to 14.8 cm in 2010 and from 8.3 to 16.6 cm in 2011. The best results (14.8 cm and 16.6 cm respectively) were taken from the full leaf cuttings prepared on August 1, in 2010 4000 ppm, in 2011 6000 ppm IBA application. On the root diameter in 2010, cutting time, the cutting type and IBA applications were very important; in 2011, only application of IBA was very significant. The root diameters varied from 0.81 mm to 1.27 mm in 2010 and from 0.81 mm to 1.23 mm in 2011. The best results (1.27 mm and 1.23 mm respectively), taken on August 1 prepared the full leaf cuttings; in 2010 0 ppm (control), in 2011 4000 ppm IBA has been application. Analyzed data on the root quality in 2010, the cutting type and cutting time x cutting type x IBA application is important, IBA application is very important; in 2011, the IBA application was very significant, cutting time x cutting type x IBA application was significant. The quality of the root varied from 1.91 to 3.52 in 2010; from 2.33 to 3.65 in 2011. Every two years, the best result (3.52 and 3.65) was prepared on August 1 and 6000 ppm IBA treatment on the full leaf cutting has been made.

As a result of all these findings, among all parameters the best cutting type was full leaf cutting, 4000 and 6000 ppm IBA was the most appropriate dose. Survival and rooting rate parameters on July 15 was the most suitable time for cutting time, for the other parameters August 1 was determined. As a result, applications of IBA increased rooting. Indeed, Weaver (1972) stated that growth regulators changed the number and the type of root and IBA was a manufacturer of the strong fringe root. Khan

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et al. (1991) and Gyana (2006) also reported that treating cuttings with auxins (IBA) increased the percentage of rooting, root initiation, root number and as well as uniformity of roots in *Camelia sinensis*. Researchers, who studied the cutting reproduction of tea (Özbek et al., 1961; Ayfer et al., 1987a) obtained similar results. In terms of cutting time, rooting was better on 1 August. Kinez (1967), in a tea propagation study by cutting in Rize, cuttings taken in the beginning and in the middle of August resulted in higher results. Eliadze et al. (1978), tea cuttings taken during June to October, and vitality and rooting rate of cuttings increased from June to August, and then decreased. Also Gabrichidze et al. (1976) in their study cutting taken in April, August and October. The cuttings taken in August compared with April, October due to the low N and high sugar levels in August described as were the best cutting time in terms of rooting and root number. In terms of type of cutting to the full-leaf cutting had better results than a half-leaf cuttings. In cutting the leaves and buds, prepared had a positive effect on the number of root and root formation, Hartmann et al. (2002), the presence of leaf cuttings physiological and morphological report of activities carried out more quickly.

This study was conducted with for standard varieties, which is an important step to increase the yield and quality in this study for the production of seedlings, propagated the possibilities of usage tea cutting; cutting time, cutting type and different applications of growth regulators effects on rooting percentage and root quality were determined. As a result of this study, rooting of Pazar-20 Turkish tea clones cuttings for rooting in order to ensure a successful, good selection of cuttings and appropriate conditions must necessary. Therefore misting and shading systems unit cutting should be rooting under system with. In addition, tea cuttings on August 1, as a single full leaf should be prepared and 4000 - 6000 ppm IBA should be applied. Perlite is used then as the rooting medium.

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Table 1. Effect of tea cutting of different collection time, type of cutting and IBA dozes cutting survival rate (%), rooting rate (%) and root number (unit/cutting)

| Year | Collection Time | Type of Cutting | Survival Rate (%) IBA Hormone Doses (ppm) | | | | | Rooting Rate (%) IBA Hormone Doses (ppm) | | | | | Root Number (unit / cutting) IBA Hormone Doses (ppm) | | | | |
			0	2000	4000	6000	Ortalama	0	2000	4000	6000	Ortalama	0	2000	4000	6000	Ortalama
2010	15 July	Half – Leaf	91.7 a	66.7 b	86.7 ab	80.0 ab	81.3	70.0	45.0	80.0	70.0	66.3	3.5	3.9	4.0	3.5	3.7
		Full – Leaf	81.7 ab	86.7 a	73.3 ab	91.7 a	83.4	48.3	71.7	61.7	85.0	66.7	3.2	5.0	5.8	6.1	5.0
		Mean	86.7	76.7	80.0	85.9	82.3 a*	59.2	58.4	70.9	77.5	66.5	3.4	4.5	4.9	4.8	4.4 b**
	1 August	Half – Leaf	66.7 b	70.0 ab	70.0 ab	91.7 a	74.6	40.0	50.0	63.3	83.3	59.2	4.2	3.4	4.8	5.1	4.4
		Full – Leaf	73.3 ab	73.3 ab	80.0 ab	76.7 ab	75.8	38.3	58.3	76.7	76.7	62.5	5.0	5.4	5.9	6.4	5.7
		Mean	70.0	71.7	75.0	84.2	75.2 b	39.2	54.2	70.0	80.0	60.9	4.6	4.4	5.4	5.8	5.1 a**
	Overall Mean Half – Leaf		79.2	68.4	78.4	85.9	78.0	55.0	47.5	71.7	76.7	62.7	3.9 c	3.6 c	4.4 c	4.4 c	4.1 b**
	Overall Mean Full – Leaf		77.5	80.0	76.7	84.2	79.6	43.3	65.0	69.2	80.9	64.6	4.1 c	5.2 b	5.9 ab	6.2 a	5.3 a**
	Overall Mean IBA		78.4	74.2	77.6	85.1	78.8	49.2 c	56.3 bc	70.5 ab	78.8 a	63.7	3.9 c	4.4 bc	5.2 ab	5.3 a	4.7

LSD5% (Collection time x Type of Cutting x IBA): 14.57 (IBA): 0.73, LSD5% (Type of Cutting x IBA): 0.76   LSD1% (IBA): 10.27   LSD1%

Year	Collection Time	Type of Cutting	0	2000	4000	6000	Ortalama	0	2000	4000	6000	Ortalama	0	2000	4000	6000	Ortalama
2011	15 July	Half – Leaf	71.7	76.7	91.7	86.7	81.7	56.7	68.3	85.0	81.7	72.9	3.1	5.8	7.7	8.1	6.2
		Full – Leaf	68.3	75.0	90.0	90.0	80.8	51.7	70.0	83.3	85.0	72.5	3.3	6.2	7.9	8.2	6.4
		Mean	70.0	75.9	90.9	88.4	81.3 a**	54.2 d	69.2 c	84.2 a	83.4 a	72.7 a*	3.2	6.0	7.8	8.1	6.3 a*
	1 August	Half – Leaf	65.0	71.7	85.0	86.7	77.1	53.3	63.3	76.7	78.3	67.9	3.3	6.0	7.6	7.9	6.2
		Full – Leaf	66.7	70.0	83.3	85.0	76.3	51.7	70.0	78.3	75.0	68.8	3.4	6.2	8.4	8.5	6.5
		Mean	65.9	70.9	84.2	85.9	76.7 b**	52.5 d	66.7 c	77.5 b	76.7 b	68.3 b*	3.4	6.1	7.8	8.2	6.4 b*
	Overall Mean Half – Leaf		68.4	74.2	88.4	86.7	79.4	55.0	65.8	80.8	80.0	70.4	3.2	5.8	7.6	8.0	6.2
	Overall Mean Full – Leaf		67.5	72.5	86.7	87.5	78.6	51.7	70.0	80.8	80.0	70.6	3.3	6.2	8.0	8.3	6.5
	Overall Mean IBA		68.0 c	73.4 b	87.5 a	87.1 a	79.0	53.4 c	67.9 b	80.8 a	80.0 a	70.5	3.3 c	6.0 b	7.8 a	8.2 a	6.4

LSD1% (IBA): 1.66   LSD1% (IBA): 2.31, LSD5% (Collection time x IBA): 3.43
LSD1% (IBA): 0.46

* Values not associated with the same letter are significantly different (P<.005)   ** Values not associated with the same letter are significantly different (P<.001)

Table 2. Effect of tea cutting of different collection time, type of cutting and IBA dozes the root length (cm), diameter (mm) and root quality (0-4 poin)

| Year | Collection Time | Type of Cutting | Root Length (cm) IBA Hormone Doses (ppm) | | | | | Root Diameter (mm) IBA Hormone Doses (ppm) | | | | | Root Quality (0-4 points) IBA Hormone Doses (ppm) | | | | |
			0	200	400	600	Mean	0	200	400	600	Mean	0	200	400	600	Mean

				0	0	0			0	0	0			0	0	0	
2010	15 July	Half – Leaf	10.0	12.1	13.3	9.2	11.2	0.81	0.84	0.83	0.68	0.79	2.83 ac	3.14 ac	2.95 ac	2.80 ac	2.93
		Full – Leaf	8.5	12.2	13.7	12.8	11.8	0.95	0.85	0.83	0.80	0.86	2.32 cd	2.95 ac	3.20 al	3.49 a	2.99
		Mean	9.3	12.2	13.5	11.0	11.5	0.88	0.85	0.83	0.74	0.82 b**	2.58	3.05	3.08	3.15	2.96
	1 August	Half – Leaf	9.9	9.8	12.0	11.0	10.7	1.20	1.03	0.99	0.92	1.04	2.47 bd	1.91 d	2.81 ac	3.33 a	2.63
		Full – Leaf	13.0	14.1	14.5	14.8	14.1	1.27	1.21	1.03	1.05	1.14	3.01 ac	3.01 ac	2.90 ac	3.52 a	3.11
		Mean	11.5	12.0	13.3	12.9	12.4	1.24	1.12	1.01	0.99	1.09 a**	2.74	2.46	2.86	3.43	2.87
	Overall Mean Half – Leaf		10.0	11.0	12.7	10.1	11.0 b**	1.01	0.94	0.91	0.80	0.91 b**	2.65	2.53	2.88	3.07	2.78 b*
	Overall Mean Full – Leaf		10.8	13.2	14.1	13.8	13.0 a**	1.11	1.03	0.93	0.92	1.00 a**	2.67	2.98	3.05	3.51	3.05 a*
	Overall Mean IBA		10.4 b	12.1 ab	13.4 a	12.0 ab	12.0	1.06 a	0.98 ab	0.92 bc	0.86 c	0.96	2.66 b	2.75 b	2.97 al	3.29 a	2.92

LSD₁% (IBA): 0.49   LSD₅% (IBA): 1.97   LSD₁% (IBA): 0.09   LSD₅%

(Collection time x Type of Cutting x IBA): 0.73

				0	0	0			0	0	0			0	0	0	
2011	15 July	Half – Leaf	8.3	13.4	15.1	15.1	13.0	0.81	0.86	1.04	1.09	0.95	2.33 d	2.64 bd	3.47 a	3.53 a	2.99
		Full – Leaf	8.4	14.7	15.9	15.7	13.7	0.81	0.93	1.09	1.10	0.98	2.40 cd	2.77 bc	3.56 a	3.63 a	3.09
		Mean	8.4	14.1	15.5	15.4	13.3 b*	0.81	0.89	1.07	1.09	0.97	2.37	2.71	3.52	3.58	3.04
	1 August	Half – Leaf	8.5	13.8	15.4	15.6	13.3	0.83	0.89	1.01	1.04	0.94	2.36 d	2.87 b	3.51 a	3.57 a	3.08
		Full – Leaf	8.6	15.1	16.6	16.1	14.1	0.87	0.89	1.23	1.09	1.02	2.39 cd	2.97 b	3.57 a	3.65 a	3.15
		Mean	8.6	14.5	16.0	15.8	13.7 a*	0.85	0.89	1.12	1.07	0.98	2.37	2.92	3.54	3.61	3.11
	Overall Mean Half - Leaf		8.4	13.6	15.3	15.4	13.2 b**	0.82	1.02	0.84	1.16	0.95	2.34	2.76	3.49	3.55	3.04
	Overall Mean Full - Leaf		8.5	14.9	16.3	15.9	13.9 a**	0.88	1.06	0.91	1.10	1.00	2.40	2.87	3.57	3.64	3.12
	Overall Mean IBA		8.5 c	14.3 b	15.8 a	15.6 a	13.5	0.83 b	0.89 b	1.09 a	1.08 a	0.99	2.37 c	2.82 b	3.53 a	3.60 a	3.08

LSD₁% (IBA): 0.24   LSD₁% (IBA): 0.64   LSD₁% (IBA): 0.11   LSD₅%

(Collection time x Type of Cutting x IBA): 0.35

* Values not associated with the same letter are significantly different (P<.005)   ** Values not associated with the same letter are significantly different (P<.001)

Association between Body Mass Index and Cognitive Performance in Rugby Players

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Abstract- Poor cardiovascular fitness has been implicated as a possible mechanism for obesity- related cognitive decline, though no study has examined whether BMI is associated with poorer cognitive function in persons with excellent fitness levels. The aim of this study is to investigate the relationship between body mass index and cognitive performance in rugby players. Thus, fifteen rugby players male aged 24.7 ± 0.9 voluntarily participated in this study, whose body mass index (BMI) was greater than 30. The intercorrelations matrix between BMI and the five ImPACT composite scores showed that BMI is negatively correlated with verbal memory (r= -0.181; p<0.01), visual memory (r= -0.172; p<0.01) and visual motor speed (r= -0.103; p<0.05). Also, the results showed that there was no significant correlation between BMI and reaction time or between BMI and impulse control. The findings of the current study indicate that BMI is negatively associated with cognitive function in a sample expected to have better than average cardiovascular fitness. BMI was found to be associated with reduced cognitive performance in rugby players, but only in specific areas of functioning. Notably, measures of memory had the greatest associations with BMI while no association was found on measures related to executive function and attention.

Index Terms- Body mass index, cognitive performance, rugby players

I. INTRODUCTION

Overweight and obesity are a major public health issue. Despite increased awareness, the prevalence of obesity continues to rise in many countries. In 2008, an estimated 1.5 billion people worldwide were overweight (BMI $\geq$ 25–29.9 kg/m^2), with 500 million considered obese (BMI $\geq$ 30 kg/m2) [1].

Overweight and obese individuals are at elevated risk for numerous health problems, including cardiovascular disease, type 2 diabetes, musculoskeletal disorders, and even some forms of cancer [1, 2].

There is growing evidence that obesity is also associated with adverse neurocognitive outcomes including Alzheimer's disease [3], stroke, and vascular dementia [4]. Research also demonstrates an association between obesity and impaired cognitive functioning long prior to the onset of these conditions. Even after controlling for comorbid medical conditions, obese individuals exhibit deficits in multiple cognitive domains, including attention, executive function, and memory [5, 6].

The mechanisms for obesity-related cognitive dysfunction remain poorly understood. Neuroimaging studies link obesity to structural and functional changes, including greater atrophy, development of white matter hyperintensities [7], reduced neural connectivity [8], and decreased blood flow in frontal brain regions [9]. Other work demonstrates aspects of glycemic controls, including altered insulin sensitivity and insulin resistance, as important contributors to obesity-related cognitive dysfunction [10, 11].

Another likely contributor to obesity-related cognitive dysfunction is reduced cardiovascular fitness. Many obese individuals have poor cardiovascular fitness, perhaps attributable to low levels of physical activity found in this population [12, 13]. In turn, low levels of cardiovascular fitness are associated with reduced cognitive function in a variety of healthy and patient samples [14, 15], and improvements in cardiovascular fitness correspond to improved neuropsychological test performance [8, 14, 16, 17]. Similarly, a weight loss program combining diet and exercise was associated with improved neurocognitive functioning in obese adults [18].

The regular practice of physical activity is now recognized as an important element of good physical and mental health and this for all ages. The effect of physical activity on the brain, particularly on cognitive function is a recent approach. The most obvious benefits are observed in the elderly in whom physical activity helps people to slow cognitive decline associated with aging [19, 20, 21].

Childhood is a critical period in the development of certain cognitive functions [22, 23] and young people are confronted daily with learning situations. Thus, determining the effects of physical activity on cognitive functioning in children appears an important public health issue. However, a deterioration of the physical condition of young observed in recent decades [24]. Thus, further knowledge about the relationship between physical activity, cognitive functioning and physiological mechanisms underlying this relationship could guide the development of public health policy and education.

The effects of physical activity induce a transient modification of the cognitive performance in children and adolescents [25].

This is the case of Pesce et al. [26] who examined the short-term memory and long term memory in students of 11 and 12 years who participated in either circuit training or a team sport. The two types of physical exercise were similar intensity and duration, that is to say approximately 40 minutes at an average of about 140 bpm FC. This research reveals that team sport has been beneficial to both types of memory while circuit training

has only been beneficial to the long-term memory. Budde et al. [27] found a race of 12 minutes at an average intensity (between 50 and 65% of maximum heart rate) was beneficial for adolescents who initially showed a low capacity of working memory. The execution of same exercise at a higher intensity (between 70 and 80% of maximum heart rate) was not effective. Some recent studies have examined executive functions in schools have also been documented. First, Kubesch et al. [28] examined the effect of physical exercise two conditions on the performance of an inhibition test in older adolescents between 13 and 14 years. The results suggest that physical education classes of 30 minutes are beneficial for executive functions, but not a short session of aerobic exercise class in five minutes. Furthermore, Hill et al. [29, 30] have shown that 10-15 minutes of moderate-intensity aerobic exercises were beneficial to executive functions in children aged between 8 and 12 years, even if the cognitive tests were completed nearly an hour after cessation of exercise. However, it should be noted that the benefits were only observed in children who had previously been exposed to the tests used.

Physical exercise does not seem to systematically induce positive effects on cognitive functioning. Thus, some research suggests differential effects depending on the age of the participants [31], nature [32, 26] and the amount of exercise [33, 34, 27, 28].

However, obesity is defined as overweight with excess body fat has adverse consequences for health. The measurement of body fat is difficult to achieve in clinical practice, estimates of overweight is used to define obesity: body mass index (BMI), which is equal to the weight (in kilograms) divided by height (in meters) squared. According to the classification adopted by the World Health Organization [35]: underweight is defined as a BMI less than or equal to 18.5 ; normal is defined by a BMI greater than or equal to 18.5 but less than or equal to 24.9 ; overweight is defined as BMI greater than or equal to 25 but less than or equal to 29.9 ; obesity is defined as a BMI greater than or equal to 30.

Obesity itself is divided into three classes: class I or moderate obesity ($30 \leq BMI \leq 34.9$); class II or severe obesity ($35 \leq BMI \leq 39.9$); class III or morbid obesity ($BMI \geq 40$). In children and adolescents (<18 years) [36, 37], underweight is defined as BMI <3rd percentile; the normal weight is defined by the $3rd \leq BMI <97th$; overweight is defined as $BMI \geq 97th$ and obesity is defined by a threshold $\geq IOTF-30$ [38].

Despite these findings, the contribution of physical fitness to obesity-related cognitive function remains unclear as risk factors often comingle. For example, rugby players often have cardiovascular risk factors and type 2 diabetes [38], despite excellent fitness levels. No study to date has examined the association between body composition and cognitive function in a sample of persons expected to have better than average fitness levels. To do so, we examined BMI and cognitive function in a sample of rugby players.

Based on the independent effect of obesity on cognition in past work, we expected that higher BMI would be associated with poorer cognitive function.
Thus the aim of this study is to investigate the relationship between body mass index and cognitive performance in rugby players

II. METHODS

2.1. Subjects

Fifteen rugby players male aged from 21 to 26 years voluntarily participated in this study, whose body mass index (BMI) was greater than 30.

None of the subjects were using drugs or other therapy for obesity, and none had prior histories of disease or injury that would prevent daily exercise.

All of these players selected at random and did not receive at any time a special diet instruction. Before enrolling in the study, subjects were informed of the experimental procedures, as well as the potential risks and benefits associated with the study. However, they were not informed of the study's purpose. To be included in the study, each subject provided written consent in accordance with the Declaration of Helsinki.

Table 1: Characteristics of study subjects.

	Obese
Age (Years)	24.7 ± 0.9
Body mass (kg)	109.84 ± 7.2
Height (m)	1.82 ± 0.09
Body mass index (kg/m^2)	33.16 ± 3.7

2.2. Procedures

Subjects were asked to be alone and away from any other person so that there is no communication during the experiment. Encouragement, criticism or any other form of investment have been banned.

2.2.1. Immediate Post Concussion Assessment and Cognitive Testing (ImPACT)

The ImPACT is a computerized neuropsychological test battery designed to assess attention, memory, and processing speed. After completion of the test, five composite scores as well as a total score are generated, including verbal memory, visual memory, visual motor speed, reaction time, and impulse control [39]. The ImPACT has high convergent validity [40] as well as excellent sensitivity and specificity [41] in college athlete populations.

2.2.2. BMI Calculation

BMI was calculated from self-report of height and weight collected during the demographic section of the ImPACT. Weight and height were measured among participants in an upright position, wearing light clothing and bare foot. The size of the subjects was measured using a stadiometer, to the nearest centimeter. Subjects were also weighed on scales Seca (alpha model 770), 100 grams. Overweight was defined as a body mass index (BMI [weight/height^2] ≥ 25).

2.3. Statistical analyses

All statistical tests were processed using STATISTICA Software (StatSoft, France).

To check whether a higher BMI was associated with lower performance on composite scores of the ImPACT. A Pearson

correlation study was conducted to identify the relationship between BMI and composite scores of the ImPACT.

Statistical significance was set at p < 0.05.

III. RESULTS

Table 2. Correlations between BMI and composite scores for rugby players

	BMI	Verbal memory	Visual memory	Visual motor speed	Reaction time	Impulse control
BMI	-	–0.181**	–0.172**	–0.103*	0.015	0.024
Verbal memory		-	0.527***	0.318***	–0.141*	–0.082
Visual memory			-	0.372***	–0.186**	–0.350***
Visual motor speed				-	–0.384***	–0.276***
Reaction time					-	–0.187**
Impulse control						-

*Significant at $p \leq 0.05$.
**Significant at $p \leq 0.01$.
***Significant at $p \leq 0.001$.

The intercorrelations matrix between BMI and the five ImPACT composite scores showed that BMI is negatively correlated with verbal memory (r= -0.181; p<0.01), visual memory (r= -0.172; p<0.01) and visual motor speed (r= -0.103; p<0.05).

Also, the results showed that there was no significant correlation between BMI and reaction time or between BMI and impulse control.

IV. DISCUSSION

The aim of this study is to investigate the relationship between body mass index and cognitive performance in rugby players.

The findings of the current study indicate that BMI is negatively associated with cognitive function in a sample expected to have better than average cardiovascular fitness. BMI was found to be associated with reduced cognitive performance in rugby players, but only in specific areas of functioning. Notably, measures of memory had the greatest associations with BMI while no association was found on measures related to executive function and attention.

One factor that may be responsible for these differential effects is cardiovascular fitness. Cardiovascular fitness is known to have a beneficial effect on cognitive functioning [42], including measures of executive function [43] and attention [44]. Such findings raise the possibility that fitness helps to moderate the effects of BMI on some aspects of cognitive function (i.e. memory) but not others (i.e. executive function).

The results of the current study indicate that BMI is related to poor cognitive function but the exact mechanisms for this association are unclear. It is possible that athletes with a high BMI who over exert themselves are more likely to exhibit impaired performance on testing.

Other possibilities include the known physiological effects of higher BMI, including reduced glycemic control [45] and even reduced perfusion to the frontal brain regions [46]. Future prospective studies are needed to clarify the underlying mechanisms which may be at work, especially studies quantifying physical activity level.

The current study is limited in several ways. An important limitation for the current study involves the manner in which BMI was quantified. BMI is known to be limited in several ways, including poor adjustment for demographic factors (e.g. age, sex), concerns regarding the cut-points for BMI groups, and failure to directly measure body fat [47]. As a result, an individual can be lean with high muscle mass and may still be classified as obese according to BMI. This concern may be particularly relevant in a sample of athletes. However, it is noteworthy that greater BMI was still associated with poorer cognitive function in the current sample, despite these concerns. The majority of studies, both in adults and children, found that overweight/obesity was associated with reduced cognitive ability and school outcomes [48, 49, 50, 51]. In a large group of children and adolescents between 8 and 16 years of age, overweight children performed poorly in tests measuring visuospatial organization and general mental ability even after adjusting for a number of potential confounders [51].

However, some studies show a continuous relationship between BMI and cognitive performance that is not limited to overweight players. Alternatively, obesity could have some adverse effect on brain function, possibly due to the secretion of hormones, pro-inflammatory cytokines or growth factors by adipose tissue that can cross the blood brain barrier [52].

Cournot et al. [53] showed that the performance of individuals with high body mass index were lower than those of low BMI individuals. For example, when the memory test, subjects whose BMI was 20 kg / m² retained an average of 9 out of 16 words, while those with a BMI ≥ 30 kg / m² or remembered only 7 words. In addition, high BMI appear to be associated with a slight decline in memory over 5 years. These results were obtained after elimination of many potential biases, including the level of education of the subjects, the presence of diabetes or high blood pressure, factors that could affect the results.

However, available evidence suggests that obesity among adults in the general population is associated with decreased cognitive performance [53], independent of age and comorbid metabolic disorders (e.g., hypertension, diabetes type 2) [54, 55]. Notwithstanding the longitudinal progression of cognitive decline, decreased cognitive performance has been reported to occur more rapidly among individuals with metabolic abnormalities (e.g., metabolic syndrome) when compared to individuals with normal metabolic profiles [56, 57].

Physical exercise does not seem to systematically induce positive effects on cognitive functioning. Thus, some research suggests differential effects depending on the age of the participants [31], nature [32, 26] and the amount of exercise [33, 34, 27, 28].

V. CONCLUSION

In summary, the results of the present study indicate that higher BMI is associated with reduced verbal and visual memory in rugby players.

Further work is needed to identify the mechanisms by which obesity adversely impacts cognitive function, particularly studies involving neuroimaging.

Physical activity has beneficial effects on the vascular system, including reduction of atherosclerotic plaque accumulation [58], decreased blood pressure [59], and subsequent reduction of cardiovascular disease risk [60].

However, a sporting activity is necessary to limit the diseases related to obesity and improve cognitive performance.

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Status of Tourism development in Bodoland Territorial Area Districts

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Abstract- Tourism refers to travel to a certain place for recreation and this act of such travel contributes immensely to the socio-economic and cultural progress of the society of destination regions. For a newly formed autonomous region like the Bodoland Territorial Area Districts (BTAD), created after having a turbulent past, development is now a big challenge. The Bodoland Territorial Area Districts (BTAD) is a decade old Autonomous Council, lying towards the north west of Assam along the Bhutan foothills. Nature has been benevolent towards the region and has endowed it with rich flora and fauna, and beautiful natural surroundings. The rich flora and fauna, natural surroundings and the rich culture of the people inspired by nature, gives testimony to the immense tourism potentiality in BTAD which can help boast the economy. However, inspite of having immense physical and cultural resource, the BTAD could not attract many tourists and tourism has not progressed as expected. There are many reasons behind this which needs to be addressed. This research paper throws light on the trends and prospects as well as the challenges of tourism development along with meaningful suggestions to eradicate these problems to develop tourism, contributing to all round development of the BTAD.

Index Terms- Tourism, Autonomous, flora and fauna, tourism potentiality, Development.

I. INTRODUCTION

Tourism is a psychological need of man that has become a major worldwide industry. It is continuing to grow and the developing economies like India are also experiencing an increased demand for travel. Enveloped in diverse cultural and physical resources, India has every possibility to be a golden star in the world tourism map. But, tourism has not yet developed in India as expected. It is still bleak in its northeastern region including Assam. Within the state of Assam, is the Bodoland Territorial Area Districts, an autonomous council, formed a decade ago after a turbulent past. Now, as a newly formed region, development here seems to be the biggest challenge. However the region lies to the north bank of the Brahmaputra River, to the foothills of Bhutan, where the Manas Biosphere Reserves, rich in flora and fauna, falls. Thus there is an ample opportunity to develop the region, both socially and economically through tourism. But along with potentialities, there are challenges too. To refine the potentiality and develop tourism, one must have an overall look over the situation around and chalk out measures with all the pros and cons so that development that can be sustained be achieved here.

The study area: The Bodoland Territorial Area Districts (BTAD)

Bodoland Territorial Areas Districts, is an autonomous region lying between 90°5'E to 92°20'E and between 26° N to 26°55'N. The region has an area of about 8970 sq km and is located on the north bank of Brahmaputra river in Assam in the North-East India by the foothills of Bhutan and Arunachal Pradesh. The region is inhibited predominantly by Bodo language speaking ethnic group and Bengalis, Assamese, Rabha, Rajbongshi, Garo, and other indigenous Mongoloid tribes. The BTAD consists of four contiguous districts — Kokrajhar, Chirang, Baksa and Udalguri.

The Bodoland Territorial Area Districts (BTAD) is administered by the Bodoland Territorial Council (BTC) which is a territorial privilege established according to the Memorandum of Settlement of February 10, 2003. This territorial privilege is an outcome of the long struggle by the Bodos in the name of self-determination in late 80's. After a decade long agitation, the Bodos have been granted the Bodoland Territorial Council (BTC), an autonomous administrative body having within its jurisdiction the present district of Kokrajhar and three other disticts fromed from the parts of existing districts of Darrang, Sonitpur, Kamrup, Barpeta, Nalbari, Bongaigaon and Dhubri . After its creation several plans and programs were put forward by the both governmental and nongovernmental organizations as well as individuals for its development. But still development, as expected from a resource rich region is not seen here. Today after a decade of its formation, the region faces the problems of unemployment, poor infrastructure, unrest and some armed struggle by the unsatisfied extremists. Under such a circumstance attaining development seems a great challenge.

With a forest area of about 3539.95 Sq. Km, The Bodoland Territorial Area Districts has most of its area located along the boundary with Bhutan. The entire forest landscape along the Indo- Bhutan Boundary is almost contiguous and its biogeography has Indo- Tibetan, Indo-Malayan and Indo Gangetic influences. The BTAD area is situated in the moderately heavy rainfall area, because of which there is in no dearth of natural beauty, exquisite flora and fauna. The multifarious cultural groups of people with their distinct identity and picturesque cultural legacy, nurtures the wealth of cultural festivals and celebrated with great devotion throughout the year. All this gives testimony for immense potentiality of tourism development in the region which can contribute a lot towards all round development of the region.

Map of the BTAD

II. TOURISM DEVELOPMENT

The BTAD (Bodoland Territorial Area Districts) popularly known as BTC (Bodoland territorial Council) covering four districts namely, Kokrajhar, Chirang, Baksa and Udalguri runs all along the borders of the Bhutan Himalayan foothills. This green area with unmatched biodiversity is a part of Dooars (Duars), which is a continuous stretch of forests both in West Bengal and Assam. The Assam Dooars is now a part of Bodoland, which has a rich history of trade, war and friendship with Bhutan. The hunting grounds of the Maharajas of Coochbehar, Gauripur and the British were here. Manas Tiger Reserve here is the 'Jewel in the Crown of Bodoland' and dominates most of the landscape. The Bodo people themselves are the greatest interest of the region, who has managed to conserve their rich cultural heritage in its original form. In spite of these great natural and cultural resources, the region was never been in much public eye due to several reasons like almost nil promotion and publicity, its isolation due to lack of infrastructure etc. when on March 2, 1987 the Bodoland Movement for an independent state of Bodoland started, it put a pause to the alround development of the region including tourism. During the early 1990s, the Bodo's insurgency had a significant impact on forests and wildlife populations of the forests in this region. The forests were used by the insurgents as hiding places. They practiced in large scale, poaching of rhinos and swamp deer, in particular which severely diminished the stocks of these endangered species, to the point where they are said to be locally extinct. The damage caused by the insurgency is the main reason why the Manas wildlife sanctuary was on the World Heritage Council Danger List since 1992 to 2011. The Bodoland Territorial Council (BTC) was finally established as per the Memorandum of Settlement (MoS) signed between the Government of India, the Government of Assam and the Bodo Liberation Tigers (BLT) on February 10, 2003, with the immediate surrender of the BLTF cadres (insurgent group). The total Area of Bodoland is approximately 8,970 square km and there are over 3082 villages in Bodoland. The BTC was given legislative, Administrative, executive and financial powers over 40 subjects including forest and tourism. Since adorned with immense natural resources, the need to develop tourism for contributing to the all round development of this one of the most underdeveloped regions of the country was felt. In this context, thus several plans and programs, both by the governmental and private institutions have been undertaken. After the creation of the BTAD, several projects have been undertaken by the BTC administration. The construction of ecotourism places in Kokrajhar including Gaurang Park and Deeplai beel with public utilities, boating facilities, suspension bridge is a step towards it. These parks are complete and are Government of India sanctioned. The tourism department of Bodoland Territorial Area Districts (BTAD) has also constructed a Bodoland movement cemetery at Debergaon with a total cost of Rs 496 lakh.

To develop adventure tourism like rafting along the Sankosh river which has fast River current, the tourism centre has constructed eco tourism centre at Srirampur (entry point to Assam from West) at the estimated cost of 16 lakh rupees. For accommodation provision the BTC government has constructed a tourist lodge at Kokrajhar at the 67 lakh. One tourist lodge each in Ultapani as well as at Choraikhola is also being constructed. The Directorate of Museums has already established District Museum Office at Kokrajahr. There is a plan to construct one museum in each of the district headquarters of the other three

districts of the BTAD. The Museum in Kokrajhar town is almost complete. The BTC administration is encouraging the participation of travel and trade fairs, showcasing the tourism potentiality of the region. Very recently, in the Travel and Tourism Fair, 2013 in Kolkata the representatives of the Bodoland Territorial Council (BTC) set up a stall promoting tourism of the region. Rs 35 crore has been allocated this year (2013) to construct 110 tourist accommodations spread across Kokrajhar, Chirang and Baksa districts, which will later be handed over to the NGOs to run. The plans comprise a five-star hotel being developed at Manas by an Australian company under FDI, a treetop adventure park in Kokrajhar, a long-range elephant safari being developed by a Swedish Company, trekking routes and paragliding in Kokrajhar.

When the Manas National park completed 100 years of conservation history in 2005, To commemorate this occasion and to promote tourism in Manas National Park along with other tourist spots in the council area, the Bodoland Territorial Council (BTC) with collaboration with NGOs organized the Centenary celebration in Bansbari from 12th to 15th 2005 which was celebrated with great pomp and show. The closing ceremony was organized in December 2006. Later, The Forest Protection Task Force was formed by the BTAD government along with some Non governmental organizations to keep vigil of the forest resources in its four districts i.e. Chirang, Kokrajhar, Baksa and Udalguri. There are 20-25 young volunteers in every camp, taking shifts to patrol and protect the forest area on foot without much remuneration or surety for future benefits. Very recently, the first five-day Baukhungri festival was organized from10th April till 14th April 2013 to mark the age old tradition of climbing the Baukhungri hills on the day of Sankranti. This five day festival was considered as a successful leap by the Bodoland Tourism Department as there was a mammoth gathering in all the five days throughout the festival. This festival aimed at promoting tourism wherein demonstration of traditional cultures, indigenous games, ethnic food habits and attires of different communities were highlighted.

Non Governmental Organization efforts-

The efforts made by the non governmental organizations are immense in Bodoland Territorial Area Districts. There are several non-governmental institutions operating within the BTAD to develop and uplift the tourism in the BTAD, such as, Aaranyak of Guwahati, the Green Forest Conservation of Kachugaon,, the Green Heart Nature Club of Kokrajhar, the Natures Foster of Bongaigaon and the New Horizons of Koila Moila.

Each of the organizations focuses on sections of the golden langur range of Assam. Each NGO works with communities adjacent to the Reserve Forests or protected areas to initiate community forest protection and reforestation programs. These NGOs work with village groups under the Joint Forest Management system that began in 1998 in Assam. Each village has been replanting, maintaining and protecting forest adjacent to their village both for the wildlife and for their own future use and benefit. Tree seedlings are grown in village nurseries and then replanted. Villagers are actively protecting their forests by keeping encroaching woodcutters out and even placing signs declaring village ownership. They also contact the Assam Forest Department to stop the encroachers and inform the authorities if they find any illegal encroachment and deforestation acts taking place.

Another significant NGO, The Manas Maozigendri Ecotourism Society (MMES), a community group, was formed east of the Manas Tiger Reserve in 2003. Some leading NGOs, individual well wishers , tourists and along with BTC, some government undertaking institutions have donated with some kind of logistics and money so as to run the conservation activities of MMES. The MMES is engaged in patrolling and protecting the forests against illegal hunters and developed an ecotourism program. When the BTC supported the Bodoland Forest Protection Force they supported MMES as well. With the support of ABSU, local activist poachers, insurgents and local Bodo youths of surrounding areas got together to relive their more than a century old conservation tradition and formed the MMES. Some local youths are also given training to become travel guides. There is shortage of manpower in the forest department of BTC for patrolling the forest. For this, the MMES has provided about 80 ex poachers as conservation guards from the fringe village of Manas National Park, thus providing them employment. The department of forest BTC is providing MMES a monthly recurring fund of 1500 rupees per head with rupees 900 meant for ration for 30 conservation guards. Now efforts are on to train and help the local villagers in the adjoining village of Khamardwisa to provide home stay facility to the tourists visiting the national park. According to a survey conducted on 55 international and 120 domestic tourists, 45 international tourists and 92 domestic tourists showed interest in being guests to a local family and enjoy homestay facility.

During the 2005 centenary celebration of Manas National Park many villages on the fringe of the Manas National Park were greatly enthused by the excellent work being done by MMES in protecting the National Park. The villagers of Ultapani and Labanyapur, who participated in the celebration, got very much inspired and understood the importance of conserving their forests and they formed an organization by the name of "Biodiversity Conservation Society". The voluntary organization initially got itself involved in community awareness, primary health programs, cattle vaccination programs as well as village development works through participation of the villagers. The "Biodiversity Conservation Society" (BCS) initiated their primary activity of protecting the forest by involving the local youth and villagers for conservations of the rich flora and fauna of the area. Considering the necessity of organized patrolling for protection of the biodiversity of the area, urgency was felt to form a volunteer protection group at Ultapani involving the village youths of the locality. In 2007 they started a forest protection camp with 50 volunteers. Due to their persistent efforts illegal wood felling drastically decreased from 400 per month to about 30 per month. The improved health of the forest has ensured resurgence in wildlife population, elephants are now seen roaming about freely and recently there have also been quite a few tiger sightings.

About 2 kms away from main Koilamoila market (Kalamati area) is the Forest Protection Task Force camp maintained by New Horizon, a community-based conservation Non Governmental Organization. New Horizon has been engaged in some awareness programs through community meetings,

children groups, and sometimes at individual level. The Task Force periodically seizes equipments used by the woodcutters/ poachers during their regular patrolling. However, during the last few years, individuals and groups from all different parts of the world like WWF have started supporting some of the Task Force groups in BTAD area with small grants for uniform, shoes, ration, equipment, torch, etc. Today there are 19 NGOs that are offshoots of the community tourism initiative. Because of their initiative, poachers have now become protectors. Since they know the forests like the back of their hand, most of them act as expert guides at the park.

It is worth mentioning that, the community based forest & wildlife restoration program has convinced the authority for the Removal of 'in Danger' tag from Manas National Park which was a dark spot in the name of this National park since 1992 to 2011.

III. Existing and potential tourist attractions in the BTC area

With immense tourist spots in the region, the BTC region has one National Park, i.e., Manas National Park and two Wild life sanctuaries, i.e., the Chakrashila Wildlife Sanctuary and the Barnadi Wildlife Sanctuary. Besides, there are other attractions and potential attractions like the Ultapani, Kalamati, Kochugaon Reserve Forest, Jamduar , Jalimukh, Deeplaibeel, Bogamati, Bhairavkunda and religious places like the Mahamaya, Snanghat temples.

1. Manas National Park

The world famous, Manas National Park is the only national park in India with five conservation status. Declared a world heritage site on 1985, the National park has also the pride of being a Project Tiger Reserve, an Elephant Reserve, an Important Bird Area (IBA) and a Biosphere Reserve. It is the most visited place within the Bodoland Territorial Area districts. The Manas National park, stretches partly in Baksa and Chirang district, to the foothills of the Bhutan Himalayas. The enchanting Manas river flows into the National Park from the gorges of Bhutan forming spectacular site at Mathanguri lying just at the border of India and Bhutan.

2. Chakrashila Wildlife Sanctuary:

The Chakrashila Wildlife Sanctuary is a hilly tract and it lies to the south west of Kokrajhar along the border with Dhubri district. With an area of 45.65 sq.km the Chakrashila Wildlife Sanctuary is the only Wildlife sanctuary in the world for the Golden Langurs, held sacred by the people in the Himalayan region. The sites of interest in and around Chakrashila are: Sikhri-Sikla, Jarnagra, Baukhungri peak, Dangdufur, Deeplai Beel, Bhalukjhora, Nayekgaon Rubber Garden (Golden Langur viewing). The sanctuary has an accommodation facility at Choraikhola which is about 7 km from the Kokrajhar town.

3. Barnadi Wildlife Sanctuary:

Barnadi Wildlife Sanctuary with an area of 28.22 sq km, lies within the buffer zone of the Manas Tiger Reserve and is located in Udalguri district. Pigmy hog, elephant, gaur or Indian Bison, Slow Loris, Tiger, Leopard, Capped Langur, Sambar, Barking Deer, Hog Deer, Peacock, Hispid hare and 4 species of Hornbill are the main attraction of this wild life sanctuary. The Barnadi wildlife sanctuary is 70 km from Mangaldai and 120 km from Tezpur .

4. Kalamati:

Located in Chirang district, Kalamati literally means 'black soil' and it is an integral part of Manas Reserve Forests in the western buffer zone of Manas National Park. The place is called so because of its salty, mineral rich black soil that attracts Elephants, Gaurs and Sambars, Dhole, hispid hare to lick this natural salty soil. The forest here comes alive in spring with the flowering of trees. Just 3km from Kalamati is Golthek point, the orange collection point, which is a potential tourist spot.

Kalamati is located at a distance of about 39 km via Bijni and 24 km. via Chapaguri from Bongaigaon, the nearest railway station.

5. Ultapani :

The Ultapani reserve forest lies in the western part of the Manas Biosphere Reserve in Assam, is one of the best place in India for observing butterfly and orchid as well as golden langur, the great pied and wreathed hornbill and peacocks. The BTAD also boasts of Ultapani, home to more than 300 species of butterflies The region derives its name from the fact that unlike other rivers on the north bank of Brahmaputra, the river here flows from west to east. Ultapani is about 45 Kms from Kokrajhar towards north via Jharbari.

6. Kochugaon Reserve Forest:

It is a famous reserve forest of timber treasure of Vintage Sal trees. The famous attraction of this spot is the historical remains of the steam engine along with the shed and the tram line that has been now abandoned. Animal sighting include Elephant, Golden Langur, Spotted Deer, Wild Dog, Yellow throated Marten, Peafowl, etc. Kochugaon Reserve Forest can be reached from Kokrajhar which is at a distance of about 45kms.

7. Jamduar :

Jamduar is the tri junction of Bhutan, Assam and West Bengal. A place with magnificent scenic beauty of the river Sankos with good prospect for river rafting. The region lies geographically at Bhutan but visited by the many Indian visitors for picnic. Jamduar is about 90 kms from Kokrajhar and can be reached by private taxis and cabs.

8. Mahamaya temple:

Mahamaya Dham or Mahamaya, Temple regarded as one of the greatest Shakti Pithas for Hindu Pilgrims is located at Bogribari. One can have a cab or taxi from Kokrajhar to reach the Mahamaya temple.

9. Mahamaya Snanghat temple:

This temple is situated at a few kilometers away from the main Mahamaya Temple. It is located near the river and is believed that Goddess Mahamaya used to take bath here. The temple is beautifully crafted and there is a place of worship for all Hindu Gods and Goddess.

10. Onthai gwlao:

Onthai gwlao, is a religious place of the bodos, located in Chandrapara near the bank of river Gwrang. It can be approached from Kokrajhar town in a cab or a taxi available in Kokrajhar town.

11. Bhairabkunda:

This picnic spot is located at a distance of 22 Kms from Udalguri town by road, on the Indo Bhutan border with enormous beauty surrounded by hills, rivers and greenery. It is also an important pilgrim destination for "Shiva" devotees, who flung to the temple which geographically lies at the Bhutan territory but visited by Indians to offer prayers.

12. Bogamati:

Bogamati located at the foothills between the hills ranges of Indo- Bhutan border, along the Bornadi river flowing downhill, is a popular spot for picnic. The Bogamati area is located in the Indo-Bhutan border 30 km off Goreswar. A Buddha statue is under construction at Bogamati, which constructed with a view to attract the people from Bhutan.

13. Jalimukh:

Jalimukh, a beautiful picturesque spot in Bhutan border is 10 km form Nonoi Forest Range. This way from the range office to Jalimukh takes one through dark and deep forests of the Kalingduar reserve forest with all the tall trees and creepers. Sometimes wild animal can also be sighted and there are narrow and small streams with ice cold waters on all the way to Jalimukh which is very refreshing.

14. Deeplaibeel:

It is about 30 mins drive from Kokrajhar town. The Beel is home to a large number of migratory and resident birds and different species of amphibians; like fish, dolphin etc. there is a beautiful park with a hanging bridge built there by the BTC authority. One can also enjoy Boat-rides in this beel.

15. Kokrajhar town and its surrounding:

The Kokrajhar town itself is a cultural centre. It is the capital of the BTAD with the assembly as well as many important offices and headquarters present here with a good network of transport and communication. The town itself with its surrounding can be established as a tourist circuit with Gaurang park on the bank of Gaurang river towards its north west outskirt, the State museum with a good collection of culture and tradition of the Bodos, towards the north west, The Kalicharan Brahma Mandir situated almost at the heart of the town and the Deeplai beel and the florican garden just about at 30 minutes driving distance from it. Besides, as a cultural center, the Kherai and Bwisagu festivals in Kokrajhar, attract huge cultural enthusiasts every year. In the Kokrajhar District Sports Ground, there is a great cultural function organized during Bwisagu. The local handicrafts are also an attraction here which can be acquired by the tourists in the shops and emporium like the BRAWFED (Bodoland Regional Apex Weavers and Artisans Co-operative Federation).

Culture

The Bodos are the largest tribes of Assam and largest in number in the BTAD with a very colorful culture. The famous Bagurumba and Kherai festivals enthrall everyone's heart and mind in Bodoland. The Kherai and Bwisagu festivals attract a huge cultural enthusiasts every year. During the bwisagu festival that is in mid April, there is a great cultural function organized in the Kokrajhar District Sports Ground.

Weaving has always been an important part of the culture of the Bodos. It occupies a prominent position not only for its bearing on the economy of the people but also for its profound influence on their culture, tradition, customs and religious beliefs. It is unique in the sense that perhaps nowhere in the country a whole community pursues the weaving so universally.

Bodos Kachari tribal people are known for their marvelous craft art and skills. By developing this skill into a serious culture would help encourage the weavers to earn precious revenue and improve the socio-economic condition of the people at large. This needs proper training and education of the weavers. The Handloom & Textiles Department of the BTC has attempted to make this sector organized by imparting modern techniques, introduce latest machinery and pump in sufficient funds to significantly increase productivity and earn precious revenue. The aim is to increase socio-economic development of the weaker section especially women by focusing on empowerment, trainings, holding of exhibitions/fairs/handloom melas, thus also promoting cultural ecotourism. The BRAWFED (Bodoland Regional Apex Weavers and Artisans Co-operative Federation) was established with the opening of emporium in 9th August 2010 in Kokrajhar in collaboration with Development Commissioner, Ministry of Textile , Government of India. They encourage the local weavers and handicraft artists and make them economically viable through their art and also to preserve the culture of the Bodo community. One can get many traditional Bodo dokhna, jwmgra , shawls, aronais etc., bamboo furniture, things for decorations etc all woven and made by traditional weavers and artists. Similar emporiums are to open in Delhi, Guwahati and Mushalpur.

IV.   TREND OF INFLOW OF TOURISTS IN MANAS NATIONAL PARK

Other than the Manas National Park, inflow of tourist is almost negligible in Bodoland Territorial Area Districts. However during the recent times, tourists' inflow has seen some positive trend in other places also like the Ultapani, Chakrashila Wild life Sanctuary. The trend of tourist inflow in the Manas National Park is as follows-

Sl.no.	Tourist data Year	Tourist data month	Indian	foreign
1	1997	November & December	612	07
2	1998	January & February	618	12
3	1999	January to June	621	Nil
4	2000	January to December	232	1
5	2001	January to December	1005	Nil
6	2002	January & February	3219	Nil

7	2003	October & November	300	21
8	2004	January to April	215	88
9	2005	January to December	13648	234
10	2006	January to December	2029	289
11	2007	January to December	1089	69
12	2008	January to December	2127	239
13	2009	January to December	6109	19
14	2010	January to December	435	118
15	2010-11	September 2010 to January 2011	7022	115

Source: Bansbari Range Office

Revenue earned by Manas National park :

Year	Revenue collection (in Rupees)
2007-2008	743890
2008-2009	1318435
2009-2010	1696766

Source: Economic Survey Assam, 2011-12

V. PROBLEMS AND CHALLENGES TO TOURISM DEVELOPMENT

With the rich forests here, home to several wild animals, a few of them being unique to this area only and the rich and vibrant culture, BTC has so much to offer to the tourists. However, In spite of so many tourist attractions and potential tourist attractions, not many tourists, visit this region. Reasons are many. Some of the glaring reasons are-

1. Sense of insecurity among the tourists.
2. Poor or negligible campaign about tourism in the region.
3. Minimum investment by the government in tourism sector in this region.
4. Inadequate infrastructure.
5. Lack of accommodation for the tourists.
6. Poor maintenance of the tourist places.
7. Lack of travel agencies in the region.
8. Lack of tour guides.
9. Lack of tourist information or query cells.
10. Severe biotic interferences in the forest regions.
11. Lack of consciousness among the people about the tourism potentiality of the region and that it can be a sustainable source of their livelihood.

BTC, before its creation, has experienced a violent past. There are still several political issues making news in many negative ways. Such things bring a sense of insecurity among the people about the region. It is also seen that there is a very poor campaign and publicity about the tourism of this region. As a result, people outside Assam or even many people within Assam outside BTC are not much aware of any tourist attraction except the Manas National Park in the BTAD. Investment in tourism sector by the government is minimum. Hence, there are inadequate tourism facilities like accommodation. For instance, tourists visiting the Barnadi Wildlife Sanctuary do not have any nearby resort or other accommodation facility to stay. Barnadi National Park is in fact one of the least maintained Wild life Sanctuary in Assam. This is one of the impacts of improper implementation of plans and programs that the government undertakes. There is a need for proper tourism information cell which can provide adequate information about the different tourist spots here. In addition, there is also the problem of lack of any local travel agency or travel and tour guide here. People in this region are actually still not very conscious about the tourism potentiality here and how tourism can be the source of their livelihood. Incidentally, there have been immense biotic interferences like the constant felling of trees and large scale encroachment in the Chakrashila Wildlife Sanctuary posing a serious threat to the home of the Golden Langur and other wild species. The Barnadi Wildlife Sanctuary faces similar problem of encroachment. These are the main reasons why these Wildlife Sanctuaries are not able to attract tourist in large scale in spite of huge potentialities.

VI. SUGGESTIONS TO DEVELOP TOURISM IN BTAD

After evaluating the potentialities and problems of tourism development in BTAD, the following solutions are out forward:

1. There is high need for formulation of need based tourism policy. The state government, BTC government and private agencies should join hands in the process of tourism planning and policy making for the region.
2. Intensive campaign should be carried out by the government and private agencies through the print and electronic media and by active participation in regional, national and international tourism fairs showcasing and projecting the richness and positive image of the region.
3. There is a need for establishment of more accommodations. As such, more hotels, and resorts and guest houses should be set up nearby the tourist spots.
4. The governmental and non governmental organizations should encourage travel agencies and tourist information centers well equipped with adequate facilities and trained staffs offering information round the clock
5. There should be training of the local youths to become tourist guides, thus providing employment to the local youths.
6. There should be vehicles exclusively maintained by the tourism department or other private organizations for tourism purposes including the sight seeing. Rental cycling and motor bike facilities can also be provided which are popular especially among the foreign tourists. Such cycling ventures can give the tourists chance to have a glimpse of the local tribal lifestyle.
7. Considering the rich natural environment of the region, ecotourism practices should be initiates and encouraged. As ecotourism needs less economic investment, it may prove to be quite suitable in the context of present economic position of the region.

8. There should be education and training of the local villagers near and around the National park and Wildlife Sanctuaries or reserve forests about the importance of forests and Wildlife and then their involvement in conservation activities.

9. Cultural tourism should also be promoted by encouraging the handicraft and weaving with proper training and education and holding of exhibitions/fairs/handloom melas etc.

10. Lastly, and very importantly, research in the field of tourism in BTAD is the need of time. It is very necessary to understand the trend, potentiality, problems, prospects, demands of tourism in this region.

VII. CONCLUSION

Tourism brings peace. Tourism brings about interaction between the visiting tourist and the host people. This exchange and understanding of culture can eradicate a lot of misconceptions in the mind of both sides. The BTAD being formed only a decade ago has a lot of challenges before it. To overcome such challenges and ensure development, tourism can be a great source. However, in spite of immense potentiality, tourism could not be developed here as expected. Some steps are undertaken and ventured by the governmental and nongovernmental organizations regarding infrastructures and investments. There are as many as 19 NGOs that are active in this region, educating the people about environment awareness through many community conservation programs. Hence, though having a long way to go, there are hopes of bright future for tourism here in BTAD.

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Golden langur in Chakrashila Wildlife Sanctuary

Manas National Park

Mahamaya temple

Bodo woman weaving

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Optimizing the Placement of Wavelength Converters in WDM Optical Networks

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Abstract- Wavelength Division Multiplexing (WDM), transmitting signals on different wavelength channels simultaneously through an optical fiber, is rapidly becoming a technology-of-choice to meet the tremendous bandwidth demand of the next generation wide-area networks. Wavelength Converters are still very expensive. Hence, it is desirable that just a limited amount of Wavelength Converters are used in the whole network. In this case, a vital question arises: how many converters are enough and where to place these converters. This motivated to do the research in the wavelength converter placement problem. Hence to define the research solution rather than applying conventional methods, intelligence based approach is taken. Fundamentally the concepts inspired by nature like Evolutionary Computation.

Index Terms- Wavelength Conversion, light-path, Optical Networks, Wavelength continuity,Wavelength-Division Multiplexing (WDM), Optimization.

I. INTRODUCTION

Optical-transmission techniques have been researched for quite some time, Optical "networking" studies have been conducted only over the past dozen years or so. The field has matured enormously over this time, a large number of start ups have been formed, and optical WDM technology is being deployed in the marketplace at a very rapid. Multiple Wavelength Division Multiplexed channels can be operated in a single fiber simultaneously, fundamental requirement in fiber-optic communication is that these channels operate at different wavelengths so as not to interfere with one another. These channels can be independently modulated to accommodate dissimilar data format, including some analog and some digital if so desired. A connection between source and destination nodes is realized by determining a path between the two nodes and allocating a free wavelength on all links of the path. Such an optical path is commonly referred to as light-path or Wavelength path. In simple WDM networks, a light-path must use the same wavelength on all links along the path. This is known as Wavelength Continuity constraint and results in high blocking probability. The restriction imposed by wavelength continuity constraint can be avoided by the use of wavelength converters. Moreover, the blocking probability does not decrease linearly with the number of converters.

Research and development on Optical WDM networks have matured considerably over the past few years, and they seem to have suddenly taken on an explosive form, as evidenced by recent publications A number of experimental prototypes have been and are currently being developed, deployed, and tested mainly by telecommunication providers including a plethora of startup companies. It is anticipated that the next generation of the Internet will employ WDM-based optical backbones. Current development activities indicate that this sort of WDM network will be deployed mainly as a backbone network for large regions, e.g., for nationwide or global coverage. WDM technology is being deployed by several telecommunication companies for point-to-point communications. This deployment is being driven by the increasing demands on communication bandwidth. When the demand exceeds the capacity in existing fibers, WDM is turning out to be a more cost-effective alternative compared to laying more fibers. A study compared the relative costs of upgrading the transmission capacity of a point-to-point transmission link.

There are many factors which affect the optimal solution to the converter placement problem. Placing a converter at a node that has a high transit traffic rate but does very little mixing (or switching) of traffic may not be desirable, as it would result in a simple swapping of the assigned wavelengths. On the other hand, if the transit traffic rate at a node is very low, then the optimal strategy may not place a converter at that node, even if it mixes a significant amount of traffic. Furthermore, the distances between converters are likely to affect the optimal placement. As the distance between converters increases, the blocking probability increases.

- Wavelengths are another kind of resource in WDM networks. The number of wavelengths available in a network is always limited due to the complexity of hardware structure.
- Quality of service, achieving load wavelength assignability, the number of wavelengths needed in a system is made minimal, the low bound of the number of wavelengths required is equal to the maximal link load.
- The Optimal Placement Converter (OPC) in multihop WDM networks has great implications to network design and applications.

II. METHODOLOGY

- Particle Swarm Optimization (PSO), a relatively recent addition to the field of natural computing.
- Evolutionary Computation techniques that may be applied in many of the same domains.

- Hybridisation is a growing area of intelligent systems research, which aims to combine the desirable properties of different approaches to mitigate their individual weaknesses.
- A range of PSO hybrids have been postulated, usually in the context of some specific application domain for which that hybrid is particularly well suited.
- Hybridisation with Evolutionary Algorithms (EAs), including Genetic Algorithms (GAs), has been a popular strategy for improving PSO performance. With both approaches being population based, such hybrids are readily formulated.

2.1 Proposed system:

Elements inspired by the social behaviour of natural swarms, and connection with Evolutionary Computation. Particle Swarm Optimization, in its present form, has been in existence for roughly a decade. It has gathered considerable interest from the natural computing research community and has been seen to offer rapid and effective optimization of complex multidimensional search spaces, with adaptations to multiple objective and constrained optimization. A selection of these approaches is briefly surveyed here.

2.2 Evolutionary Algorithm:

A second generation multi-objective evolutionary algorithm (MOEA), successfully used to solve several engineering problems [2]. SPEA is based on three populations: the current population (PA) which is replaced by individuals from the evolutionary population (PX), and an external population (PE) that keeps the best individuals calculated during the evolutionary cycles.

In this multi-objective optimization context, the best individuals (or solutions) are known as non-dominated. Let us consider individuals x and x1. It is said that x dominates x1 (x> x1) if every objective function of x is better than or equal to the same objective function of x1, and x is strictly better than x1 in at least one objective [2].

Optimization is a process to achieve the optimal value of objective function along with satisfying the constrains if exist.

2.3 Algorithm

Each begins with a population of contending trial solutions brought to a task at hand. New solutions are created by randomly varying the existing solutions.

Fig. : Problem solution using evolutionary algorithms

III. RESULTS

EXPERIMENTAL STUDIES: Optimization using Evolutionary programming

Population size taken for all cases equal to 100;

Case1:

Function Name: Generalized Rastringin's Function
Nature of problem: Multimodel characteristics
fun=20+x1.^2+x2.^2-10*(cos(2*pi*x1)+cos(2*pi*x2));

MINIMIZATION OF OBJECTIVE FUNCTION WITH GENERATION BY BEST CHROMOSOME

INITIAL RANDOM DISTRIBUTION OF PARAMETER VALUE

FINAL GENERATION DISTRIBUTION OF PARAMETER VALUE

CONVERGENCE OF PARAMETERS WITH GENERATION

Parameter	Evolved obtained value	Optimal value
X1	0.4778e-6	0
X2	-0.0139e-6	0
Obj.function	2.2524e-12	0

Case2
Nature of problem: Multimodal characteristics
fun=(1+(x1+x2+1).^2.*(19-14*x1+3*x1.^2-14*x2+6*x1.*x2+3*x2.^2))   .*(30+((2*x1-3*x2).^2).*(18-32*x1+12*x1.^2+48*x2-36*x1.*x2+27*x2.^2));

MINIMIZATION OF OBJECTIVE FUNCTION WITH GENERATION BY BEST CHROMOSOME

CONVERGENCE OF PARAMETERS WITH GENERATION

INITIAL RANDOM DISTRIBUTION OF PARAMETER VALUE

FINAL GENERATION DISTRIBUTION OF PARAMETER VALUE

Parameter	Evolved obtained value	Optimal value
X1	0	0
X2	-1	-1
Obj.function	3.0	3

3.1 Objective function f(x):

When there is any problem the purpose associated, practically that purpose transform as a mathematical equation and is objective function.

The 2 possibilities existing with the objective function interms of minimization or maximization.

To make the solution computationally efficient many times maximization of objective is transformed as minimization.

3.2 Analysis:

1. Learning is different from optimization, especially in evolutionary computation.

2. Population contains more information than any single individual. Exploiting useful population information can be achieved for different kinds of population-based learning, either evolutionary or non-evolutionary.

IV. FUTURE ENHANCEMENT

One possible future research avenue is to carry out more extensive studies on the design of a single generic wavelength converter placement algorithm that can achieve good performance under different RWA algorithms.
The reality could be that some iterative approaches be taken in order to achieve better overall blocking performance. This is currently under investigation.

V. CONCLUSION

Particle Swarm Optimization is used to find out how to achieve near-ideal performance of the network using minimum number of wavelength converters.

The number of available converters is limited, a judicious placement of converters is necessary to balance these tradeoffs.

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Profile of Clinical Analysis Questionnaire among Depressive Patients

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Abstract- Depression literally means the state of being pushed down. It is commonly used to refer to emotional states of sadness, despair, numbness, emptiness, hopelessness and feelings of blue. Mood is a pervasive and sustained feeling that is experienced internally which influences the person's behavior and his/her perception of the world. In such condition it is proven that the impact of illness on the personality variables. Very few studies were presented based on Clinical Analysis Questionnaire (CAQ). Current study seeks to establish the profile of depressive individuals on personality questionnaire. We assessed (n=43) depressive patients and (n=45) control group using CAQ. It was found that the patients with depressing are tend to score high in clinical scales like schizophrenia index (Sc) and show negative correlation on personality variable like Dominance (E), and Impulsivity (F).

Index Terms- Clinical Analysis Questionnaire, Personality profile, Depression.

I. INTRODUCTION

Hippocrates defines depressive disorder essentially as excessively prolonged sadness. The disorder was initially thought to be caused by an imbalance in black bile and thus was labeled as melancholia; in contrast, normal sadness and negative moods in response to circumstances or due to a generally negative temperament were referred to as melancholy (Rick E. Ingram 2009).

The prevalence of depression in Western countries is high. Current estimates of 1-year prevalence in Europe and North America are 5 to7 percent (Kessler et al., 2003). The lifetime prevalence of depression, anxiety, and stress among adolescents and young adults around the world is currently estimated to range from 5 to 70 percent. This cross-sectional study was conducted by (Sahoo et al., 2010), determine prevalence of current depressive, anxiety, and stress-related symptoms. Depressive symptoms were present in 18.5 percent of the population, anxiety in 24.4 percent, and stress in 20 percent. The study indicates that the clinical depression was present in 12.1 percent and generalized anxietydisorder in 19.0 percent. Comorbid anxiety and depression was high, with about 87 percent of those having depression also suffering from anxiety disorder. Especially, for depression they observed prevalence rate of 06.4 percent (Mild depression), 06.7 percent (Moderate depression), and 03.5 percent of Severe depression were estimated. It is approximately twice as common among women as it is among men. It is estimated that approximately 25 percent of women in the United States will experience at least one significant episode of depression during their lives which is contrary to the popular misconception that, depression is the most common disorder among the elderly. The cornerstone of treatment of depressive disorder is pharmacotherapy and psychological therapy, in which CBT has been proved to effective for depression. For the successful therapy outcome in-depth investigation of the individual will have a crucial part in the determination of treatment modality. The very few existing literature suggest that personality traits always have significant impact on the treatment (Bagby R et al 2008).

However, there has been a dearth of literature on the specific personality variables and pathological traits of depressive patients. In the backdrop of this, the present study was designed to assess both personality traits and pathological traits using clinical analysis questionnaire.

II. RESEARCH ELABORATIONS

Objective: The main aim of this research has been to find the relationship of personality in depression and compared with normal control group. It was hypothesized that person with depression have tendency to show deviation in the normal personality and to score high in pathological scale.

Design: This study employed a between group design.

Sample: The participants in the depressed group were self referred, Psychiatrist referred who were attending the clinics for the regular follow up and the control group was the relatives of the patient who accompanied them to the clinic and from Sweekaar Institute of Rehabilitation were included in the study after getting the permission from the higher Authorities of the respectable Institutions. Sample consisted of 92 adults of either gender, residing at Andhra Pradesh were included. In depressed group n=47, whereas in control group, n=45 adults were included.

Participant were eligible for participation in the study in the depressed group, if they were 1) aged between 16 and 40 years 2) who are all fluent either in English or telugu language 3) minimum educational qualification of inter or degree 4) meeting the criteria for depression according to ICD-10 Diagnostic Criteria for Research (DCR), 5) participants who accepted were invited to sign an informed consent form.

Procedure: Participant were eligible to participate in the control group in the study if they were 1) aged between 16 to 40 years 2) without any (past/present) history of any psychiatric

illness 3) accepted individuals were invited to sign an informed consent form.

Series of Questionnaires was administered to screen the participant. For the depressed group Beck Depression Inventory was administered first to assess the severity of depression. Whereas in the control group, General Health Questionnaire was administered to find risk individuals for developing any psychiatric disorders, the score of ≥4 in GHQ was excluded from the study. Clinical Analysis Questionnaire was commonly used for both depressed and control group. The following exclusion criteria were applied for recruiting subjects into study.

Exclusion criteria:

1. Age of below 16 years and above 40 years
2. Illiterate
3. BDI score < 13
4. Co-morbid psychiatric disorders
5. Substance use disorder
6. Head injury or other organic cause
7. Not completed the whole questionnaire
8. Unwilling to take part in the study

Measures used

Beck Depression Inventory (BDI-II): BDI-II is a 21-item self-report instrument for measuring the severity of depression in adults and adolescents aged 13 years and older. The instrument was developed by Aaron T. Beck, Robert A. Steer, Gregory K. Brown in the year 1996.

Clinical Analysis Questionnaire (CAQ): CAQ is 272 item self-report for measuring the normal and pathological trait levels and this multidimensional instrument is basically an extension of the Sixteen Personality Factor Questionnaire to the abnormal personality trait domain. Thus the 16 normal personality trait dimensions from the 16PF as well as an additional 12 pathological trait factors are included in the CAQ. In particular, there are seven depression subscales, along with factors measuring Paranoia, Psychopathic Deviation, Schizophrenia, Psychasthenia, and Psychological Inadequacy. Joint factoring of the 16PF with the MMPI served as the basis for including the five additional psychopathological factors in the CAQ apart from the depression factors. This instrument was developed by Cattell and Sells, 1974; Krug, 1980.

III. RESULTS

Table: 1. Demographic characteristics of Depressed Group (n = 45) and Control group (n = 47).

Variables	Depressed Group		Control Group	
	Freq. (%)	Mean (±SD)	Freq. (%)	Mean (±SD)
<u>Sex</u>				
Female	3 (6.4)	-	5 (11.1)	-
Male	44 (93.6)	-	40 (88.9)	-
<u>Age</u>		32.44 (±5.24)		32.48 (±5.02)
20-29	17 (36.1)	-	12 (26.4)	-
30-39	26 (55.4)	-	30 (66.5)	-
≥40	4 (8.5)	-	3 (6.7)	-
<u>Domicile</u>				
Rural	21 (44.7)	-	5 (11.1)	-
Urban	26 (55.3)	-	40 (88.9)	-
<u>Education</u>				
>12th standard	47 (100)	-	45 (100)	-

Family Type				
Nuclear	42 (89.4)	-	39 (86.7)	-
Joint	5 (10.6)	-	6 (13.3)	-
SES				
Low	14 (29.8)	-	-	-
Middle	33 (70.2)	-	45 (100)	-
Treatment				
On Treatment	44 (93.6)	-	-	
			-	
BDI Score	-	33.17 (6.26)	-	-

Table 2: Shows Mean (±SD), 't' scores on Clinical Analysis Questionnaire (CAQ) in Depressed group and for control group.

Factors	Depression Group Mean (± SD)	Control Group Mean (± SD)	't'	'p'
A (Warmth)	5.78 (1.06)	8.40 (0.83)	13.07	0.001
B (Intelligence)	4.68 (1.36)	6.77 (1.50)	6.99	0.001
C (Emotional Stability)	1.31 (1.23)	5.84 (0.95)	19.61	0.001
E (Dominance)	2.72 (0.57)	5.20 (0.78)	17.25	0.001
F (Impulsivity)	1.74 (0.92)	7.13 (0.84)	29.26	0.001
G (Conformity)	4.14 (0.72)	5.82 (0.49)	12.95	0.001
H (Boldness)	2.91 (0.71)	7.08 (0.59)	30.28	0.001
I (Sensitivity)	7.17 (1.08)	3.91 (0.99)	14.95	0.001
L (Suspiciousness)	6.00 (1.33)	1.62 (0.74)	19.28	0.001
M (Imagination)	2.70 (1.88)	3.93 (0.75)	4.07	0.001
N (Shrewdness)	6.61 (1.49)	6.68 (1.45)	0.23	0.816
O (Insecurity)	8.87 (0.82)	4.06 (0.53)	32.94	0.001
Q1 (Radicalism)	5.10 (0.72)	7.40 (7.40)	16.24	0.001
Q2 (Self-sufficiency)	4.55 (1.24)	7.55 (0.72)	14.03	0.001
Q3 (Self-discipline)	3.57 (1.31)	5.31 (0.76)	7.70	0.001
Q4 (Tension)	8.14 (0.75)	5.24 (0.64)	19.85	0.001
D1(Hypochondriasis)	7.38 (0.96)	6.68 (0.59)	4.11	0.001
D2 (Suicidal Depression)	7.91 (0.90)	6.95 (0.29)	6.76	0.001
D3 (Agitation)	5.57 (1.55)	3.73 (1.19)	6.34	0.001
D4 (Anxious Depression)	8.40 (1.19)	5.17 (1.19)	12.97	0.001
D5 (Low Energy Depression)	7.44 (0.92)	5.60 (0.61)	11.18	0.001
D6 (Guilt & Resentment)	6.97 (1.43)	5.57 (0.75)	5.81	0.001
D7 (Boredom & Withdrawal)	8.80 (0.79)	6.44 (0.62)	15.78	0.001
Pa (Paranoia)	7.21 (0.72)	6.37 (0.64)	5.82	0.001
Pp (Psychopathic Deviation)	2.51 (0.80)	1.20 (0.40)	9.80	0.001
Sc (Schizophrenia)	7.40 (0.71)	6.57 (0.58)	6.07	0.001
As (Psychasthenia)	5.70 (1.15)	5.00 (0.97)	3.13	0.002
Ps (Psychological Inadequacy)	7.44 (0.54)	6.28 (0.66)	9.18	0.001

Table 3: Relationship between BDI score and CAQ subscales this showing significant relationship.

Factors	"r"	"p"
E (Dominance)	-0.43	0.03
F (Impulsivity)	-0.34	0.018
Sc (Schizophrenia)	0.42	0.03

IV. CONCLUSION

The nature of relations between the personality traits and depression is complex, and our understanding is still limited. Several line of evidence suggests that the relevance of personality to depression is evident; and thus the hypothesis got enormous attention that their association has received over the years in the clinical and research literatures. Although the theories and research underlying the personality-depression and their relationship has varied widely, the idea that personality is important to understand the cause, manifestation, or outcome of depression has persisted. The findings of the present study lend empirical evidence for such a hypothesis demonstrating a significant difference in personality traits among the depressed and normal individuals in adult group. Also, the study demonstrates a robust relationship between personality traits and severity of depression.

Studies on clinical samples typically report that understanding the association between personality and depression has implications for elucidating etiology and comorbidity, identifying at risk individuals, and tailoring treatment (Daniel N. Klein, 2011). However, research in clinical sample suggests that, the affective temperament types, like depressive temperament has been the most systematically studied, the terms "depressive temperament," "depressive personality," and "depressive personality disorder" have been used interchangeably in the literature to refer to the following constellation of traits: introversion, passivity, and non-assertiveness; gloominess, cheerlessness, and joylessness; self-reproach and self-criticism; pessimism, guilt, and remorse; being critical and judgmental of others; conscientiousness and self-discipline; brooding and given to worry; and feelings of inadequacy and low self-esteem (Akiskal et al. 2005).

The majority of established risk factors for depressive disorders are either unchangeable (i.e. socio-demographic characteristics) or reaction pattern to the short term stressful life events. In contrast, personality is at least somewhat changeable, especially in youth, but may forecast the onset of depression, which makes traits a potentially attractive means of identifying individuals at risk and informing selection of interventions. Based on this view, the present study suggested interactive pattern of personality and depression, in which the individuals with depression have personality aberrations which can be explainable on the basis of severity level and duration of the depressive episode. The results of the present study were discussed about the personality among the depressed individuals.

Table 1 show that there is higher percentage of males in depressed group and control group. Also, mean age, family type, area of living were slightly differ regarding depressive group and control group. The distribution of age, gender, socio-economic status (Middle), unemployment, appeared contrary to the previous study by Sandeep Grover (2010), in which they found that depression is common in young adults, in women and low socio-economic status. Regarding family type, the distribution is similar to the study Sethi et al. (1980), in which they suggested that individuals' those who are residing in nuclear family are vulnerable to depression.

It is evident from the table 2 that there is a significant difference in personality traits between the two groups were the mean scores of the subscales in the first part of the CAQ is significant. In reference to the higher scores of scales I-Sensitivity, L-Suspiciousness, O-Insecurity, and Q4-Tenssion, which indicate that depressed individuals were more dependent, jealous, critical, irritable, moody, experience guilt, gets angry quickly, and difficulty in getting sleep. This findings are in agreement with the previous study conducted by (Samuel E. Krug, 1980-CAQ Manual), who found that certain personality traits of depressed individuals are appear to be associated with the high scores in the scales I-Sensitivity, L-Suspiciousness, O-Insecurity, and Q4-Tenssion. However, the other scales of the CAQ part-I, shows the significant difference between two groups-the mean is lower in the depressed group with respect to the scales A-Warmth, B-Intelligence, C-Emotional stability, F-Dominance, G-Conformity, H-Boldness, M-Imagination, Q1-Radicalism, Q2-Self-sufficiency, and Q3-Self-dicipline. These results are line of agreement with the previous study conducted by (Samuel E. Krug, 1980-CAQ Manual), in which they found that depressed individuals have concentration difficulty, unsatisfying relationships, overwhelmed by the day to day activities or goals, passive aggressive, internalize their feelings, sociopathic, react to the stress easily, unconcerned about day to day activities, withdrawn, obsessional, and these individuals are not effective problem solvers. In the opinion of Kameoka V A (1986), depressed individuals personality traits are appear to be strongly associated with scales of B-Intelligence, E-Dominance, F-Impulsivity, G-Super ego, H-Parmia/Boldness, I-Sensitivity/Premsia, L-Suspiciousness/Protension, Q1-Radicalism, Q2-Self-sufficiency, and Q4-Ergic tension.

Though the mean score of the scale N-Shrewdness was similar to the previous findings (Samuel E. Krug, 1980-CAQ Manual), in the present study, it is statistically not significant between two groups, which can be explained in terms of, individuals prefer to be in sophisticated environment, and they tend to be diplomatic about handling other people.

When compared to the control group, the mean score is higher in the clinical scales of the CAQ (Part-II). In reference to the scales D4-Anxious Depression and D7- Boredom and withdrawal is highly elevated and the score is significant between the groups. Which indicates that, severely depressed individuals were clumsy, shaky in handling things, lacks self confidence, confused, unable to cope up with the sudden demands, profoundly disturbed, feels that life is too pointless; tendency to avoid people, these people feels happier when they are away from the people. This findings of the present study is in line of agreement with the previous study conducted by Welsh's (1956), in which they found that the elevation of the scores on the subscales D1- Subjective Depression, D4-Mental Dullness, D5-Brooding, and Hy3- Lassitude-Malaise of scale 3; Pd4-Social Alienation and Pd5- Self-Alienation of scale 4; Pa2-Poignancy of scale 6; Sc1-Social Alienation through Sc4- Lack of Ego Mastery (Conative) of scale 8; and the Si3 subscale. Which shows that depressed patient has general maladjustment and shows some characteristics like socially withdrawn, timid, dependent, and self-conscious, depressed, ruminative, and sad, self-reports of fatigue, tiredness, and sleep difficulties, this general maladjustment factor 1 highlight the depression factor as primary form of emotional distress? On the other hand the average high score is seen among other clinical subscales (D1-Hypondriac Depression, D2-Suicidal Depression, D3-Agitated Depression, D5-Low-energy Depression, D6-Guilt and Resentment, As-Psychasthenia, and Ps-Psychotic tendency) in the depressed group when compared to the control group, which is in line of agreement with the previous findings of (Samuel E. Krug, 1980-CAQ Manual) which indicates that depressed individuals shows tendencies like preoccupation with bodily dysfunction, feels emptiness and meaningless, thoughts/wishes of death, frequent feelings of sadness and gloom, difficulty in getting sleep, blame themselves, feels guilt, self-critical, little self control, think themselves as doomed or condemned. However, in the present study the mean score of the clinical subscales Pa-Paranoia and Sc-Schizophrenia is slightly high, when compared to the previous findings of (Samuel E. Krug, 1980-CAQ Manual), and this could be interpreted as, high scored individuals were suspicious, jealousy, cynicism about human nature, difficulty getting their ideas into words, feels that world is unsympathetic, feeling of rejection, feels themselves as little important to others. Also, in the previous study suggests that the moderately high elevation occurs in neurotics. Among the clinical subscales the Pp-Psychopathic deviation is only the scale which the mean score is in low range which indicates that depressed individuals were socially inhibited. As a whole, these findings are in line of agreement with the previous study (Kameoka VA, 1986) which indicates that D1-Hypondriac Depression, D2-Suicidal Depression, D3-Agitated Depression, D5-Low-energy Depression, D7-Bored Depression, Pa-Paranoia, Pp-Psychopathic deviation, Sc-Schizophrenia, As-Psychasthenia, and Ps-Psychotic tendency these scales are strongly associated with the depression.

From table 3 it can be observes that there is a highly significant, positive correlation of the scores of schizophrenia in CAQ scale and the BDI score, this means that, those who are in severely depressed shows the schizophrenia like traits that is withdrawn themselves from the others, they see themselves as little worthy to others. Whereas the negative correlation was found in the two domains in the first part of the CAQ (normal personality), E-Dominance and F-Impulsivity which can be interpreted as severely depressed individuals are tend to show characteristics like being away from the people, and less impulsive respectively.

V. CLINICAL IMPLICATIONS

The literature on the relation between personality and depression is large, but it has many gaps and inconsistent findings. Personality traits predict, and may in fact influence, the course and treatment response of depression. Meta-analytic evidence indicates that existing preventive interventions can reduce the incidence of depressive disorders by 25% (Cuijpers et al. 2008). Another advantage of traits is that they can be assessed relatively easily and efficiently and thus are ideal for screening. Few studies have examined personality facets, but preliminary evidence suggests that lower-order traits can add substantially to the prediction of treatment response (Bagby et al. 2008). Among the depressed individuals the self-criticism which is one of the personality traits was found to forecast poor treatment outcomes (Blatt et al. 1995).

Under DSM-IV or ICD-10, it is not unusual for clinicians to make diagnoses by counting the required 5 out of 9 symptoms needed for a diagnosis of "major depressive episode." This practice can sometimes be associated with the routine prescription of antidepressants and with a failure to consider the possibility of offering psychotherapy. What this approach to diagnosis really fails to address is the enormous heterogeneity of patients meeting the criteria for major depression. If we take personality into account, we would be in a better position to individualize treatment choices for patients. Thus, the present study made an attempt by using the comprehensive measure of CAQ to explain the relationship of the normal and pathological traits of personality in depressed patients.

VI. LIMITATIONS

1. The sample size of the study has been small
2. Role of gender, severity level of depressive episode is also important factor; present study included more males and severely depressed individuals.
3. The study primarily focused on the first order personality factors.

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Assessment and Characterization of Peroxidase Activity in Locally Grown Bean varieties from Ghana

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Abstract- The presence of peroxidase enzyme in four locally grown bean varieties, red beans, Bambara beans, black-eyed beans and soybeans was demonstrated. The enzyme showed a much higher activity at elevated temperatures than at room temperature with peak activity at about 50℃. The activity of the enzyme appears to be highly dependent on the pH of the medium. The optimum pH for the enzyme from all bean extracts is about 6 but the extract from bambara beans was shown to maintain its activity over a wider range of pHs than the rest. Such stability will make peroxidase from Bambara beans a useful enzyme for applications at higher pH as may be found in certain wastewaters.

Index Terms- Peroxidase activity, bean varieties, phenol removal, temperature, pH.

I. INTRODUCTION

Peroxidases (EC.1.11.1.7.) are enzymes which catalyze redox reactions between hydrogen peroxide (H_2O_2) as an electron acceptor and a variety of substrates in which oxygen, water or both are liberated. They are heat stable enzymes and are found in plants and animals. (In: Brill, 1996). Their potential application in the removal of phenols from waste water is well documented in the literature (Aitken, 1993; Nair *et al*, 2007; Hamid and Khalil-ur-Rehman, 2009). Phenol contaminants, alongside other contaminants, are found in various industrial wastewaters such as petroleum refineries, coal processing factories, plastics, textiles, iron and steel manufacturing and also in the pulp and paper manufacturing industries. (Dyer and Mignone, 1983; Michalowicz and Duda, 2007).

The recent discovery of petroleum deposits in commercial quantities in Ghana has generated tremendous activity in the oil sector ranging from intensified exploration to establishment of new refineries. The expected expanded activity in the petrochemical industry will result in the discharge of large quantities of phenolic compounds as waste. Majority of phenols are very toxic, some have even been classified as hazardous waste and others have been suspected of containing carcinogens. About 0.005mg/L of phenol will cause odors and objectionable taste when it combines with chlorine to form chlorophenols (Lanouette, 1977). There are also long-term effects on ecosystems related to the release of toxic components over a prolonged period. (Samanta *et al.*, 2002).

Several conventional methods are available for the removal of phenols from wastewaters including extraction, bacterial and chemical oxidation (Mark, 2003), adsorption on activated carbon (Grutsch and Mallat, 1981; Riaz and Abdul, 2002),

electrochemical techniques and irradiation. These methods have their individual disadvantages that make them economically unfeasible. Chemical oxidation may be expensive for high strength waste treatment due to the high cost of chemicals. Also, hazardous by-products may be formed during the processes, the purification is incomplete and even low efficiencies have been observed (Stanisavljevic and Nedic, 2004). Enzyme- based treatment has been suggested as alternative method for phenol removal. Peroxidase enzyme extracted from soybeans has been shown to be highly thermo-stable and able to catalyze the removal of phenolic compounds from waste water (McEldoon and Dordick, 1996; Wright and Nicell, 1999). In this report, the presence and characteristics of the peroxidase enzyme in locally grown and readily available bean varieties is assessed as an alternative source of the enzyme for potential phenol removal applications.

II. MATERIALS AND METHODS

Four (4) locally grown bean varieties, namely Black-eyed bean (*Vigna unguiculata unguiculata*), Bambara beans (*Vigna subterranean*), Red bean (*Phaseolus vulgaris)* and soybean (*Glycine max*) were obtained from the local market (Kumasi, Ghana). All chemicals used in this study were of analytical grade and obtained from commercial sources.

Crude Enzyme Extraction

All procedures were carried out on the selected bean varieties at room temperature. 50 g of each bean variety were soaked for 12 hours in 200 mL of distilled water. The mixture was blended to homogenize it and the solution was centrifuged at 10,000 rpm for 15 minutes. The clear supernatant, containing the peroxidase enzyme was placed in a water bath at 65°C for 5 minutes to inactivate any catalase enzyme present. The extract was finally stored at 4 °C.

Test for the presence of Peroxidase

Two methods were used to demonstrate the presence of peroxidase in the extract, the iodometric titration method and the spectrophotometric method using o-dianisidine dye.

a. Iodometric method

This method is a modification of the Kingzett method for the determination of peroxide (Zabicky, 2006; Kingzett, 1881). The basis of the method is the oxidation of iodide to iodine in the presence of a catalyst, in this case peroxidase enzyme. 0.05 M of sodium thiosulphate was prepared prior to the experiment and kept aside. 0.2 mL of 30% hydrogen peroxide solution was added

to a solution of 5 mL enzyme extract in 45 mL distilled water in each of 4 Erlenmeyer flasks labeled 60 seconds, 120 seconds, 180 seconds and 240 seconds respectively. 10 mL of 1% solution of freshly prepared potassium iodide (KI) was added. At the appropriate time, a drop of concentrated HCl (5M) was then added to each of the flasks and the mixture was titrated with 0.05 M sodium thiosulphate solution using starch indicator. A drop in the concentration of the H_2O_2 is an indication of the peroxidase activity.

b. Spectrophotometric method

The test for the presence of peroxidase was carried out according to the method of Malik and Singh (1980) with modifications. 2mL each of the enzyme extract was added to a mixture of 0.1mL of o-dianisidine dye (extinction coefficient 11.3) and 1mL of 30% H_2O_2 in a test tube. The development of an orange color indicates the presence of the peroxidase enzyme in the sample.

Effect of Enzyme Concentration on Activity

A stock dilution of each enzyme concentration was prepared as follows:

i. 5 test tubes were thoroughly washed with distilled water and labeled 1-5.
ii. 2mL of the enzyme extract was added to test tube 1.
iii. To test tube 2 was added 2mL of the enzyme extract and diluted with 2mL of distilled water.
iv. 2mL of the diluted sample in test tube 2 was taken into test tube 3 and diluted with 2mL of distilled water.
v. 2mL of the diluted sample in test tube 3 was taken into test tube 4 and diluted with 2mL of distilled water.
vi. Finally, 2mL of the diluted enzyme sample in test tube 4 was taken into test tube 5 and diluted with 2mL of distilled water

The reaction mixture for the effect of enzyme concentration on the consumption of H_2O_2 was prepared by mixing 4.0 mL of 0.05M phosphate buffer (pH 7), 0.1 mL of o-dianisidine dye solution, 1.0 mL H_2O_2 solution and 0.1 mL of enzyme extract from each of the test tubes above. A control was set up with 0.1 mL distilled water in place of the hydrogen peroxide solution and enzyme extract from test tube 1.

For each mixture, the addition of the enzyme extract marks the start of the reaction. The absorbance at 460 nm of the mixture was immediately read and also at 30 second intervals for 3 minutes. The enzyme activity is a reflection of the rate of the reaction and is measured by the change in the concentration of the substrate per unit time. The unit of activity is defined as the amount of enzyme extract that decomposes 1 µmole of H_2O_2 per minute.

Effect of Substrate Concentration on activity

The reaction mixtures and reagent blank were prepared as indicated in table 3. 0.1 mL of the undiluted enzyme extract was added to the mixture in tube 5 and the absorbance at 460 nm of the mixture was measured at 30 second intervals for 3 minutes. The procedure was repeated for all the mixtures. The rate of change of absorbance is a reflection of the reaction velocity.

Table 1: Reaction Mixtures for effect of substrate concentration

Tube No.	mL, pH 7 phosphate Buffer	mL of Dye	mL of dH$_2$O	mL of H$_2$O$_2$ solution	mL of Enzyme mixture
1	4.0	0.10	0.90	0.10	0.10
2	4.0	0.10	0.80	0.20	0.10
3	4.0	0.10	0.60	0.40	0.10
4	4.0	0.10	0.40	0.60	0.10
5	4.0	0.10	0.20	0.80	0.10
6	4.0	0.10	----	1.0	0.10
7	4.0	0.10	1.0	----	0.10

Effect of pH on activity

A set of reaction mixtures as used in the effect of substrate concentration were prepared but the buffer solution was substituted with buffer of varying pH from 3 to 9. 0.1 mL of enzyme extract with dilution factor 1 was added to the reaction mixture in test tube 1 and the absorbance at 460 nm was measured at 30 second intervals for 3 minutes. For pH range 3-5, acetate buffer was used and phosphate buffer was used for pH range 6-9. The procedure was repeated for all the reaction mixtures.

Effect of Temperature on activity

5 mL of the enzyme solution with a known activity (measured previously) were placed in different test tubes and dipped in water bath maintained at temperatures ranging from 30ºC to 80ºC at the optimum pH of 6. The enzyme solutions were removed after 30 minutes and the activity test conducted on the samples as described earlier.

III.   RESULTS AND DISCUSSION

Presence of Peroxidase
Spectrophotometric Method

O-dianisidine is oxidized by hydrogen peroxide in the presence of peroxidase to an orange colored product according to the following equation:

$$H_2O_2 + Colorless\ dye\ (reduced) \xrightarrow{peroxidase} H_2O +\ Colored\ dye\ (oxidized)$$

An orange color was observed for all samples when the extract was added to a mixture of H_2O_2 solution and o-dianisidine dye, indicating the presence of the enzyme in all bean varieties under consideration.

Iodometric Method

H_2O_2 oxidizes iodide to iodine in the presence of peroxidase enzyme. The iodine formed is titrated with thiosulfate solution, using starch indicator. The reaction in the iodometric titration method is as follows:

$$H_2O_2 + 2KI + 2H^+ \rightarrow I_2 + 2H_2O$$
$$I_2 + 2S_2O_3^{2-} \rightarrow S_4O_6^{2-} + 2I^-$$

The drop in the concentration of the hydrogen peroxide showed the presence of the peroxidase in the extract as compared

with the control where no appreciable change in concentration of H_2O_2 was observed. The change in concentration of H_2O_2 versus time is shown in figure 1 using the extracts of the four bean varieties indicating the presence of peroxidase in all cases. The enzyme from red beans appears to be most active in catalyzing this particular reaction.

Figure 1: Effect of the various bean extracts on concentration of hydrogen peroxide

Effect of Enzyme Concentration

The enzyme activity is a reflection of the rate of the reaction and is measured by the change in the concentration of the substrate per unit time. At different concentrations of enzyme, the reaction velocities, reflecting the activities of the enzyme from the different bean varieties are shown in figure 2.

Figure 2: Effect of enzyme concentration on reaction velocity

In general an increase in enzyme concentration results in higher rates of reaction provided the substrate is not depleted in the reaction mixture. In the limit, the active site of the enzyme will be saturated and the reaction rate becomes constant. The enzyme concentration corresponding to this substrate limitation could be a measure of the total concentration of enzyme active sites in the extract. The lower saturation velocities recorded for the extracts from soybeans and bambara beans indicate that they contain a higher concentration of active sites such that the substrate is depleted more rapidly by these enzyme species. The ratio of substrate to the total enzyme concentration is also

reported by several workers to affect the activity of the peroxidase enzyme. (Klibanov *et al*, 1980; Nicell *et al*, 1992; Bassi *et al*, 2004; Miland *et al*, 1996).

Effect of Substrate Concentration and kinetic parameters

Enzymes generally follow saturation kinetics with respect to the substrate. It is believed that the substrate occupies specific active sites on the enzyme to be properly oriented for a round of reaction (Rodgers and Gibson, 2009). As the substrate concentration increases, all the active sites might be occupied and any further increase in substrate concentration does not affect the rate of reaction. Figure 3 shows the effect of substrate concentration on the activity of the enzyme in the four bean extracts. Peroxidases from all the bean varieties exhibit saturation kinetics with hydrogen peroxide as the substrate.

Figure 3: Effect of substrate concentration on reaction velocity

An important deduction about the mechanism of enzyme catalysis is that the substrates bind to specific regions of the enzyme, the active site, forming enzyme-substrate complexes that may eventually decompose to form products (Copeland, 1996). The implication is that, there must be a finite number of enzyme molecules, and consequently active sites, available at any given time. Substrate molecules, if present in enough concentration, should be able to saturate these binding sites.

Figure 4 shows the Lineweaver-Burk plot of the effect of H_2O_2 concentration on the rate of reaction to determine the maximum velocity (V_{max}) and K_m, the equilibrium constant in the Michaelis-Menten model of enzyme kinetics. The results are summarized in table 2. K_m is dissociation constant and indicates the level of affinity of the enzyme towards a particular substrate, in this case H_2O_2. The low value of K_m for bambara beans shows the enzyme from this source has the highest affinity for H_2O_2 within the concentration range under consideration. This may be important in selecting the source of the enzyme for particular applications.

Figure 4: Lineweaver-Burk plot of effect of substrate concentration on velocity

Table 2: Kinetic parameters

Bean variety	Kinetic parameters	
	V_{max} (mmol/L/min)	K_m (mmol/L)
Red	0.131	0.0656
Bambara	0.077	0.0232
Black-eyed	0.151	0.0411
Soybean	0.236	0.0780

Effect of Temperature on relative activity

The thermal stability of soybean peroxidase is reported to be extremely high such that about 80% of its activity is maintained at 60°C (McEldoon and Dordick, 1996). The relative stability of the peroxidase from the four bean varieties studied is shown in figure 5.

Figure 5: Effect of temperature on enzyme activity

The enzymes from all bean varieties show higher activities at elevated temperatures than at room temperature. The optimum

activities for all extracts were recorded between 40 and 50°C. It is also observed that all samples show retention of more than 60% of the maximum activity at 60°C. In applications, this allows for the higher operating temperatures at which most substrates are more soluble in the aqueous solution.

Effect of pH

All enzymes display a characteristic range of pH at which they are most active. This pH optimum may be due to several factors involving the structure and ionic state of the enzyme, substrate, or cofactors. The pH dictates the ionization of residues at the active site of the enzyme. Figure 6 shows the effect of pH on the relative activities of the enzymes from the four bean varieties. The activity is equivalent to the change in absorbance with time at the different pHs under consideration.

Figure 6: Effect of pH on Activity

Generally, all the enzyme extracts had their optimum pH around 6. Wright and Nicell, (1999) report a pH optimum of 6.4 for soybean peroxidase. The figure also shows that the enzyme from bambara beans maintains its activity over a wider range of pHs than those from other varieties. Though the absolute activity from this extract is low, it is significant that it maintains more than 60% of its activity at a pH of 8 which should make it more versatile over wider applications.

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Study of Uveitic macular edema using Stratus OCT.

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Abstract- **Objectives:** To describe the patterns of macular edema in uveitis using Stratus optical coherence tomography and know the correlation between tomographic features and visual acuity

Design: Hospital based, cross sectional, analytical retrospective study

Methods: 50 patients with uveitis with fundoscopic evidence of macular edema in at least one eye who visited vitreo retina department of minto ophthalmic hospital were considered for the study. Patients underwent complete ophthalmic examination including best corrected visual acuity using Snellen visual acuity chart, slit-lamp examination, fundus biomicroscopy, indirect ophthalmoscopy and optical coherence tomography. Fluorescein angiography was performed if needed. The patterns of macular edema were noted along with the central retinal thickness on OCT for each eye observed and the findings were correlated with the best corrected Snellen visual acuity. Any other significant findings observed during the examination and investigation were noted and described.

Results: Sixty eyes of 50 patients were found to have uveitic macular edema. 3 types of macular edema were found on OCT; namely, diffuse macular edema (DME), cystoid macular edema (CME) and serous retinal detachment (SRD). 4 eyes had epiretinal membrane (ERM). DME was seen in 44 eyes (72%), CME in 7 eyes (12 %) and SRD in 10 eyes (16%). The mean CMT was 313.13 +/- 144.84µ. Mean BCVA was 6/18 (Snellen). The CMT had a moderately strong correlation with BCVA (Pearson r 0.546; p <0.0001). The correlation was significant in the DME and SRD groups, not in CME group.

Conclusion:3 types of macular edema were found on OCT-CME, DME and SRD. CMT correlated negatively with BCVA.

Index Terms- Uveitis; Macular edema; Optical coherence tomography; Visual acuity; Cystoid macular edema.

I. INTRODUCTION

Macular edema is a common and vision limiting complication of uveitis. Recent studies have shown that three different types of macular edema-cystoid macular edema (CME), diffuse macular edema (DME) and serous retinal detachment (SRD) can be made out on optical coherence tomography associated with uveitis.[1, 2]Cystoid macular edema is considered to be a common type causing visual loss in uveitis patients.[7] Until recently, fluorescein angiography was used to detect and confirm macular edema. It is an invasive technique and has rare serious side effects like anaphylaxis[1]. Detailed interpretation of OCT images can replace fluorescein angiography for detection and monitoring of macular edema, especially in uveitis cases.[5]Optical Coherence Tomography(OCT) has been shown to be a safe, non invasive and effective diagnostic modality for investigation of macular diseases by allowing morphological assessment of macular edema by producing two dimensional images of the retina. It can be used to quantify macular edema objectively.[1]It is not compromised by a low or medium degree of optical haze.[4] It is more sensitive than slit-lamp biomicroscopy to small changes in retinal thickness[6] and can be used to objectively monitor patients with macular edema. In patients with cystoid macular edema (CME), a potential for vision recovery has been identified. DME is associated with a poor visual prognosis and a poor prognosis for vision recovery. SRD is associated with a high probability of vision recovery when observed alone or underlying CME eyes.[2]Many studies of uveitic macular edema have shown moderate to strong correlations between macular thickness measured by OCT and visual acuity.[1, 2, 3] Hence, it is important to detect macular edema early in the course of the uveitis disease and to know the morphological type so that appropriate treatment can be initiated at the earliest. Also, it is important to be able to quantitatively follow up the macular edema to know the response to treatment. Here, OCT forms an invaluable tool. This study aims to evaluate the different morphologic patterns of uveitic macular edema using OCT and correlate the patterns of macular edema and central retinal thickness with visual acuity.

II. MATERIALS AND METHODS

Records of Patients with uveitis and fundoscopic evidence of macular edema attending vitreo retina department at Minto Ophthalmic Hospital during the period of November 2010 to October 2012.Fifty patients with uveitis with fundoscopic evidence of macular edema in at least one eye were considered for the study. Patients underwent systemic and complete ophthalmic examination including best corrected visual acuity, slit-lamp examination, fundus biomicroscopy, indirect ophthalmoscopy and optical coherence tomography. The patterns of macular edema were noted along with the central retinal thickness on STRATUS OCT for each eye observed and the findings were correlated with the best corrected visual acuity. Any other significant findings observed during the examination and investigation were noted and described. Pearson's correlation was used for correlation. Unpaired t test was used for comparing the means between the subgroups to test for statistical significances. NOVA was used where appropriate. Data were analyzed using GraphPad InStat version 3.10

III. SELECTION CRITERIA

Inclusion criteria: a).Patients with uveitic macular edema b).Adequate media clarity for fundus visualization.

Exclusion criteria:a).Presence of coexisting ocular disease limiting visual potential b).Posterior uveitis lesions involving foveola, Macular edema due to other causes.

IV. OPTICAL COHERENCE TOMOGRAPHY

All OCT scans were performed through a dilated pupil. The macula was scanned first with fast macular thickness scan protocol and then line scan protocol in horizontal and vertical meridians as appropriate. The scans were taken with 6 mm length centered through the fovea as confirmed by the red free image on the computer monitor of the OCT scanner .The central macular thickness was taken from the central 1mm of the OCT scans. The scans were analyzed using the retinal thickness volume tabular protocol using the fast macular scans. The fast macular scans provided normative data for age matched controls which is colour coded. For qualitative analysis various protocols like proportional, normalize+align, gaussian smoothing, scan profile was used as appropriate. These various patterns of uveitic macular edema were scored based on their unique appearance on OCT imaging:

(1) Diffuse macular edema as increased retinal thickness (defined as greater than 200μm) with reduced intraretinal reflectivity and expanded areas of lower reflectivity, especially in the outer retinal layers greater than 200 μm in width

(2) Cystoid macular edema was identified by the localization of intraretinal cystoid-like spaces that appeared as round or oval areas of low reflectivity with highly reflective septa separating the cystoid-like cavities

(3) Taut posterior hyaloid without retinal detachment was defined as a highly reflective signal arising from the inner retinal surface and extending towards the optic nerve or peripherally.

(4) Foveal serous retinal detachment was defined as an accumulation of sub retinal fluid (which appeared dark) beneath a highly reflective elevation, resembling a dome, of the detached retina. The identification of the highly reflective posterior border of detached retina distinguished subretinal from intraretinal fluid; and

(5) Vitreo foveal traction or Vitreo-macular traction with detachment defined as a peak-shaped detachment of the retina.
The patients included in the study had the following 3 patterns as on STRATUS OCT

a). Diffuse macular edema b). . Cystoid macular edema c). Serous retinal detachment

Some patients also had epiretinal membrane (defined as hyper reflective band on the inner/anterior retinal surface with global or focal adhesions to the retinal surface[56]).

V. RESULTS

Fig (5.1): Age distribution of patients   Fig (5.2): correlated with type of macular edema

Tab (5.1): Age of patients correlated with type of macular edema

Age (in years)	Number of eyes with CME	Number of eyes with DME	Number of eyes with SRD	No. of patients
10-20	0	7	0	5
21-30	4	13	4	17
31-40	1	10	4	13
41-50	0	11	1	10

| >50 | 2 | 3 | 1 | 5 |
| Total | 7 | 44 | 10 | 50 |

Most of our patients in this study were between the age group of 21- 30 years. DME seems to be the most common type of macular edema irrespective of age of patients.

Fig(5.3): Correlation of age with clinical types of uveitis

Tab(5.2): Correlation of age with clinical type of uveitis

Age (in years)	Anterior uveitis	Posterior uveitis	Intermediate uveitis	Panuveitis	Total
10-20	3	1	0	3	7
21-30	4	11	1	5	21
31-40	4	5	2	4	15
41-50	7	1	3	1	12
>50	4	1	0	1	6
Total	**22**	**19**	**6**	**14**	**61**

Anterior uveitis seems to be more common in patients above age 40 years. Number of posterior uveitis cases was most in the age group of 21-30 years. Between the ages of 31-40 years, all types of uveitis cases were seen with almost equal distribution.

Fig (5.4): Gender distribution

Tab(5.3): Gender Distribution of Patients

	Male	Female
Unilateral	27	12
Bilateral	9	2
total	36	14

Most of our patients were males. The bilaterality of uveitis also seems to be more in male patients.

Fig(5.5): Types of macular edema on OCT

Table 5.4: Types of macular edema on OCT

Type of macular edema on OCT	Number of eyes
CME	7
DME	44
SRD	10
Total	61

DME was the most common type of macular edema that we saw on OCT (72%).

Fig(5.6): Anatomic types of uveitis

Anterior uveitis was the most common type of clinical uveitis in our study, followed by posterior uveitis.

Tab 5.5: Anatomic types of uveitis

Anatomic type of uveitis	Number of eyes	Percentage %
Anterior	22	36
Intermediate	6	10
Posterior	19	31
Panuveitis	14	23

Figure 5.7: Clinical types of uveitis correlated with type of macular edema

Tab 5.6: Clinical type of uveitis correlated with type of macular edema

	CME	DME	SRD
Anterior Uveitis	1	20	1
Posterior uveitis	5	5	9
Intermediate uveitis	0	6	0
Pan Uveitis	1	13	0
Total	7	44	10

Among anterior and panuveitis cases, diffuse macular edema was most commonly seen. In cases of posterior uveitis, SRD was the most common type of macular edema. It is interesting to note that in cases of intermediate uveitis, we found only DME and no other type of macular edema.

Figure 5.8: Distribution of CMT on OCT

Tab 5.7: Distribution of CMT on OCT

CMT in µ	number of eyes	Percentage %
200-300	41	67
301-400	9	15
401-500	7	11
>500	4	7

Most of our cases had CMT between 200-300 µ.

Fig(5.9): Correlation between CMT and type of macular edema

Table 5.8: Correlation of CMT with type of macular edema

CMT in µ	CME	DME	SRD
200-300	2	38	1
301-400	2	4	3
401-500	2	1	4
>500	1	1	2

Most of our cases with CMT between 200-300µ had DME. The SRD cases had CMT most commonly between 300-500µ. The CME cases had almost equal distribution among all groups of CMT.

Fig 5.10 and Table 5.9: Correlation of CMT (in µ) with VA

	200-300	301-400	401-500	>500
6/6-6/12	28	3	2	0
6/18-6/60	12	4	4	0
<6/60	1	2	1	4

Most of our patients with CMT between 200-300 µ had good VA. As the CMT increased, the VA dropped. In fact, we found a moderately strong correlation between log MAR VA and CMT (Pearson's correlation r was 0.546).

Fig 5.11.a: Correlation between logMAR VA and CMT in eyes with CME

Correlation between CMT and logMAR VA in the CME group was not so significant (Pearson's r was 0.2).

Fig 5.11.b: Correlation between CMT and logMAR VA in DME group

The correlation between CMT and logMAR VA in DME group was significant (Pearson's r was 0.5181).

Fig 5.11.c: Correlation between CMT and logMAR VA in SRD group

The correlation between logMAR VA and CMT in SRD group was extremely significant (Pearson's r 0.851).

Tab 5.10.a: Comparison of means of CMT between RE and LE

	MEAN CMT (in μ)	STD. DEVIATION (in μ)
RE	339.64	180.12
LE	281.89	79.355

Difference in means between the 2 eyes was not statistically significant (p value 0.3581).

Table 5.10.b: Comparison of mean log MAR VA between RE and LE

	Mean log mar VA	Number of eyes
RE	0.5284+/-0.6073	33
LE	0.4534+/-0.4149	28

Difference in mean log MAR VA between the 2 eyes was not statistically significant (p value 0.5823).

Figure 5.12: Comparison of logMAR VA between the 2 eyes

Figure 5.13: Distribution of VA

Table 5.11: Distribution of VA

Visual acuity	Number of eyes	Percentage %
6/6	11	18.12
6/9	12	19.6
6/12	10	16.4

6/18	11	18.12
6/24-6/36	8	13.1
≤6/60	9	14.75
total	61	100

The mean VA was 6/18. Distribution of visual acuity was even among the VA groups considered here.

Fig(5.14): Mean CMT of the 3 groups of macular edema

Tab(5.12): Overall mean CMT and VA

Variables	Mean CMT (in µ)	Mean log mar VA	Approximate Mean VA in Snellen
Overall (of all 61Eyes)	313.13+/-144.84	0.4854 +/- 0.4932	6/18

Table 5.13: Mean CMT and VA among the groups of macular edema

Variables	Mean VA(in log mar)	Mean CMT
CME	0.9476+/-0.87	463.29+/-238.34
DME	0.3842+/-0.42	257.14+/-60.909
SRD	0.6595+/-0.47	454.4+/-170.95

There was a significant difference in means of CMT between CME and DME groups and also between DME and SRD groups ($p < 0.001$), but not between CME and SRD groups (p 0.926).The difference in mean logMAR VA between the 3 groups was significant on ANOVA. Difference between CME and DME group was significant (p 0.0079); between DME and SRD group, it was not significant (p 0.1193). The difference between CME and SRD group was also not significant in terms of mean logMAR VA (p 0.3934).

Fig(5.15): Differences between the mean and median logMAR VA among the 3 groups

The mean logMAR VA of patients with DME seems to be the best. In fact, there is a statistically significant difference between the 3 groups on ANOVA, with DME group showing the best VA.

Fig(5.16): Comparison of VA among clinical types of uveitis

When the logMAR visual acuities were plotted in ascending order, it appears from the graph that patients of anterior uveitis seem to have the best vision.

VI. DISCUSSION

Optical Coherence Tomography(OCT) has been shown to be a safe, non invasive and effective diagnostic modality for investigation of macular diseases by allowing morphological assessment of macular edema by producing two dimensional images of the retina. It can be used to quantify macular edema objectively.[1]It is not compromised by a low or medium degree of optical haze.[4] It is more sensitive than slit-lamp biomicroscopy to small changes in retinal thickness[6] and can be used to objectively monitor patients with macular edema. Detailed interpretation of OCT images can replace fluorescein angiography for detection and monitoring of macular edema, especially in uveitis cases.[5] In this study, the morphologic patterns of uveitic macular edema were evaluated using OCT and the CMT was assessed for correlation with VA among the 3 sub types of macular edema

that were found on OCT. The patterns of macular edema that were found in this study are: diffuse macular edema (DME), cystoid macular edema (CME) and serous retinal detachment (SRD). DME was seen in 44 eyes (72%), CME in 7 eyes (12%) and SRD in 10 eyes (16%). Of the 10 SRD eyes, 5 were DME with SRD and 5 CME with SRD. In a study conducted by Markomichelakis et al[1], they found that DME was observed in 60.7 % cases, CME in 39.3% cases and RD in 20.2% cases (of 17 RD eyes, 5 were DME with SRD and 12 were CME with SRD). Of the 44 eyes with DME in our study, 4 eyes (9.1% cases of DME) had ERM and one had PVD. In the study by Markomichelakis, ERM was seen in 40.5% of cases of uveitic macular edema. The correlation of CMT with visual acuity was moderate in our study (using Pearson correlation r=0.5465, r^2=0.2986). Markomichelakis et al also found similar correlation (r^2=0.29). Among the sub groups of macular edema in our study, correlation was moderate in DME group (r^2=0.2684), very significant in SRD group (r^2=0.7241) and not so significant in CME group (r^2=0.0628). In our study, using multiple regression analysis, we found that age of the patient did not have a significant bearing on visual acuity (p value 0.1640) whereas CMT correlated significantly with VA (p < 0.0001). In the study by Markomichelakis et al, they found that age of the patient also correlated negatively with VA.The age distribution of patients in our study varied from 12 to 75 years with a mean age of 37 years. Most of the patients were aged between 21-30 years and 31-40 years with 17 and 13 patients (of the 50 patients) in the groups respectively. Only 5 patients were above the age of 50 years and 5 between 10- 20 years. Diffuse macular edema was the most common type of macular edema among all age groups; with diffuse macular edema being the only type of macular edema found in the 7 eyes of patients aged between 10-20 years. Between the ages of 10-20 years, anterior uveitis and panuveitis were seen in 3 eyes each. In the age group of 21-30 years, posterior uveitis was the most common type of uveitis seen with 11 eyes being diagnosed with posterior uveitis. The types of uveitis were evenly distributed in the age group of 31-40 years. Anterior uveitis was the more common type of uveitis seen in patients more than 40 years of age. Our study group consisted mostly of male patients- 36 of 50 patients were males. 27 of the 36 had unilateral uveitis; the other 9 patients had bilateral uveitis. 12 of the female patients had unilateral uveitis while the other 2 had bilateral uveitis. Among the anatomic types of uveitis seen in our study, anterior uveitis was seen most commonly- 36% (22 of 61 eyes had anterior uveitis), followed by posterior uveitis- 31% (19 of 61 eyes). Panuveitis and intermediate uveitis cases made up 23% (14 eyes) and 10% (6 eyes) respectively. It is interesting to note that a major chunk of eyes with OCT detected macular edema in our study had anterior uveitis as the anatomic diagnosis (36%).In eyes with anterior uveitis, DME was by far the most commonly seen type of macular edema (20 of 22 eyes). Among eyes with posterior uveitis, SRD was seen in 9 of 19 eyes and CME and DME seen in 5 eyes each. Interestingly, among the eyes with intermediate uveitis in our study, all 6 eyes had DME; in contrast to CME seen in most other studies. According to Malinowski et al[9], CME is clinically present in 28% to 64% of patients with intermediate uveitis and leads to permanent visual impairment in 8.5% of the cases.Among eyes with panuveitis, DME was seen in 13 of 14 eyes. In the study conducted by

Markomichelakis et al[1], only 3 of their 60 patients had anterior uveitis, while 42 of 60 (70%) patients they studied had intermediate uveitis as their anatomic diagnosis. There have not been many reports of occurrence of macular edema in cases of anterior uveitis. In a study conducted in Pakistan, cystoid macular edema was seen in 8 of 46 eyes of anterior uveitis studied (17%).[57]

In another study conducted by Roesel et al[58], they correlated retinal thickness as measured by OCT with VA and found that VA correlated negatively with retinal thickness (r=0.38). Epiretinal membrane formation was seen in 70% of their cases. 36% of their 31 cases also had anterior uveitis as the anatomic diagnosis; which was similar to our study. Most of the patients in our study had a CMT between 200-300μ-41 eyes (67%). Of these 41 eyes, 38 eyes had diffuse macular edema, 2 eyes had CME and one had SRD.Eyes with SRD had CMT most commonly above 300μ (9 of 10 eyes with SRD), with 4 eyes with SRD having CMT between 400-500μ and 2 eyes above 500μ. Eyes with CME had CMT varying from 200 to > 500μ, with even distribution among the subgroups. The difference in means of CMT between the right and left eyes was not statistically significant, nor was the difference in means of log MAR VA between the 2 eyes. The overall mean CMT considering all 61 eyes was 313.13+/- 144.84 μ. Among the CME, DME and SRD groups it was 463.29 +/-238.34, 257.14 +/- 60.909 and 454.4 +/- 170.95 μ respectively. The difference in mean CMT among the subgroups was statistically significant on ANOVA (p <0.0001). The difference between CME and DME groups as well as the difference between the DME and SRD groups was statistically significant on doing unpaired t test (p <0.001). The difference in mean CMTs between SRD and CME groups was not statistically significant (p 0.926 on unpaired t test).

The differences in mean log MAR VA between the CME, DME and SRD groups was statistically significant on performing ANOVA. On unpaired t test, the difference between CME and DME groups was statistically significant (p value 0.0079). Difference between DME and SRD group was not significant (p value 0.1193). Difference between CME and SRD group was also not statistically significant (p value 0.3934). In spite of the differences not being statistically significant between the DME and SRD groups and between CME and SRD groups, patients with DME tended to have better visual acuities, compared to CME patients at least (p value 0.0079).

The overall mean CMT in our study was 313.13 +/- 144.84 μ and mean log MAR VA was 0.4854 +/- 0.4932. In the study conducted by Roesel M et al[58], the mean CMT was 369.4 +/- 161.4 μ and mean log MAR VA was 0.41 +/- 0.32. In the study by Markomichelakis et al[1], the mean log MAR VA was 0.2552 and mean CMT was 333 +/- 171μ. They also found that eyes with CME had significantly greater CMT than eyes with DME; a finding similar to our study.

Iannetti L et al[3] studied the use of OCT in macular edema in uveitis and found that both cystoid macular edema (CME) and diffuse macular edema (DME) correlated negatively with VA. Also that CME had higher mean foveal thickness than DME (p < .01). Negative correlation between foveal thickness and VA (p < .05) was observed. All these findings are similar to what we observed in our study. We were able to establish a diagnosis in 10 of our 50 patients (13 eyes). One patient had HIV immune

recovery uveitis, one had Toxoplasmosis and another had syphilitic granulomatous anterior uveitis. 7 patients had retinal vasculitis with choroiditis (Eales disease). In the other studies that we reviewed[1,58], there was no patient in whom syphilis had caused a uveitic reaction. In our study as well, only one patient had syphilis with granulomatous anterior uveitis of both eyes, with one eye having macular edema detectable on OCT. It seems to be a decreasingly rare cause of uveitis.

VII.   CONCLUSION

Stratus OCT was used to evaluate the morphological patterns of uveitic macular edema and 3 patterns were found on OCT evaluation, namely diffuse macular edema (DME), cystoid macular edema (CME) and serous retinal detachment (SRD).

DME was the most common type of macular edema we found. Some cases of DME were associated with ERM and PVD. Not all cases of ERM were picked up clinically.

Overall, CMT had a moderate correlation with log MAR VA which was comparable to other studies. Also, we found that patients with CME and SRD tended to have worse VA than patients with DME.

A significant percentage of the cases we studied (36%) had anterior uveitis as their anatomic diagnosis; with most of these patients having DME. This may suggest that even in cases of anterior uveitis, macular edema may form a significant cause of visual morbidity. And that the macular edema may not always be seen clinically and may be picked up only on OCT evaluation. This needs to be recognized early to initiate appropriate treatment and prevent complications.

Further studies with larger sample sizes will be required to establish macular edema as a significant cause of visual morbidity in anterior uveitis cases. As macular edema is a common vision limiting complication of uveitis, it needs to be identified and quantified early to initiate appropriate treatment. OCT evaluation of uveitis cases helps in early detection of macular edema (including subclinical macular edema) and morphological assessment in an objective, reliable and non invasive way. This may lead to better prognostication, treatment and better visual outcome in uveitis cases.

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List of abbreviations used

AAU	Acute anterior uveitis
AIDS	Acquired immune deficiency syndrome
BCVA	Best Corrected Visual Acuity
BRB	Blood retinal barrier
CAU	Chronic anterior uveitis
CME	Cystoid macular edema
CMO	Cystoid macular oedema
CMT	Central Macular Thickness
DME	Diffuse Macular Edema
ERM	Epi retinal membrane
FA & FFA	Fluorescein angiography
HIV	Human immunodeficiency virus
HM	Hand movements
IOP	Intra ocular pressure
IU	Intermediate uveitis
KP	Keratic precipitates
LE	Left eye
LogMAR	Logarithm of Minimum Angle of Resolution
MS	Multiple sclerosis
NFL	Nerve fibre layer
OCT	Optical Coherence Tomography
PP	Pars planitis
PVD	Posterior vitreous detachment
RD	Retinal detachment
RE	Right Eye
RPE	Retinal Pigment Epithelium
SD	Standard Deviation
SRD	Serous retinal detachment
VA	Visual Acuity

A study on lead uptake and phytoremediation potential of three aquatic macrophytes of Meghalaya, India

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Abstract- Laboratory experiments were performed to evaluate the Pb uptake capacity by three aquatic macrophytes (*Scripus mucronatus*, *Rotala rotundifolia* and *Myriophyllum intermedium*). The selected macrophytes were transferred to the laboratory containing nutrient solution and working Pb standard solutions of different concentrations (1.0, 2.0, 4.0, 8.0 and 16 mg L^{-1}) and harvested at regular time interval of 2, 4, 6, 8 and 10 days. The Pb uptake by these macrophytes showed a linear relationship for S. *mucronatus* and for *R. rotundifolia* with the exposure time period (2–10 d). Pb accumulation in the plant parts was higher in the roots for *S. mucronatus* but reverse in the case of *R. rotundifolia* and *M. intermedium*. The maximum bioconcentration factor (BCF) values were found at the 8th day in all the three aquatic macrophytes and translocation factor (TF) was at the 2nd day for S. *mucronatus* and *R. rotundifolia* and at the 10th day for *M. intermedium* respectively. The experimental results demonstrated that these three aquatic macrophytes have a phytoremediation potential for removing Pb from Pb - contaminated water.

Index Terms- *Scripus mucronatus*, *Rotala rotundifolia*, *Myriophyllum intermedium*, Lead uptake, Bioconcentration (BCF), Translocation Factor (TF).

I. INTRODUCTION

Water though an indispensable resource for human life is yet one of the most badly abused resources. For centuries, especially in urban areas, water has been polluted and used as dumping places for all sorts of domestic and industrial waste as well as sewage. Over 75 to 90 percent of people in developing countries are exposed to unsafe drinking water (Kaplan, 1972), hence proper water treatment is inevitable in order to ensure healthy life. Nowadays, apart from other common pollutants, heavy metals are considered as one of the most important water pollutants which may have a severe health problem. Lead is a silvery-white highly malleable metal that occurs naturally in minute amounts within the Earth's crust. Naturally lead is release to the environment from the Earth's crust and mantle through volcanic activity and the weathering of rocks. However, these releases are very rare and the most significant sources of Pb discharge are those originated by anthropogenic activities such as mining, smelting, manufacture of pesticides and fertilizers, dumping of municipal sewage and the burning of fossil fuels that contain a lead additive and commercial products and materials like in paints, ceramic glazes, television glass, ammunition, batteries, medical equipment, electrical equipment (UNEP, 2010).

A variety of techniques which includes chemical, physical and biological technology have been used to remediate heavy metal contamination from soil or water. Toxic metals from industrial effluents have been remove by various other techniques such as precipitation, reduction, artificial membranes, and ion exchange, but however these techniques generate a huge amount of waste e.g., sludge, metal rich waste, etc which is difficult to dispose of and therefore, dangerous to the environment and they are also generally expensive, relatively inefficient (Rebhun and Galil, 1990). Phytoaccumulation, one of the biological indicators which indicate the degree of absorption of heavy metals in plants has lately gained its applicability because its cost-effectiveness, long-term and ecological aspect (Weiss *et al*., 2006). Aquatic macrophytes have received great attention and have shown to be one of the candidates in the aquatic system for pollutant uptake and biological indicators of heavy metal (Maine *et al*., 2001).

The objective of the present study was to assess the uptake of Pb and phytoremediation potential of *S. mucronatus R. rotundifolia* and *M. intermedium* for Pb under laboratory conditions. The experiments were performed in a contained environmental set up inorder to eliminate all external environmental factors.

II. MATERIALS AND METHODS

S. mucronatus an emergent and *R. rotundifolia* and *M. intermedium* are submerged macrophytes and they are one of the major natural constituent of wetland and riverside vegetation. They are sampled as shown in figure 1 from water body of Mawlai Umshing, (Lat $25^0 36'36.76N$ Long $91^0 54'05.11E$), Cherrapunjee (Lat $25^0 19'01.38''N$ Long $91^0 48'36.51''E$) and Pongkung ($25°21'47.69'' N$ $91°40'03.34'' E$), Meghalaya, India in the month of April 2012 and collected in polyethylene bags and transferred to the laboratory. Plants were washed several times with tap and distilled water in order to remove any adhering soils and plants of similar size, shape and height were selected and kept separately in a 40L capacity tank which contained half strength Hoagland's solution of pH = 7 (Hoagland and Arnon, 1950) and kept for 15 days prior to experimentation for. After 15 days the acclimatized plants were transferred and maintained in 5% Hoagland's solution containing working Pb standard solutions of different concentrations 1.0, 2.0, 4.0, 8.0 and 16.0 mg L^{-1} and then they were exposed to Pb concentrations at a time interval of 2, 4, 6, 8 and 10 days. Pb of analytical grade, were supplied as $Pb(NO_3)_2$ (Himedia) were used as the source of Pb. Experiments were carried out separately for the three aquatic macrophytes under controlled temperature (24 ± 1^0C) and light (3500 Lux) conditions. After each time

interval the plants were collected and washed with deionised water to remove any metal adhering to its surface. The washed plant samples were carefully dried the adherent water using absorbent paper and then they are separated to roots and shoots. Samples were dried for 48h in an oven at 70 ± 5^0C. The dried oven plant root and shoot was then chopped and finally powdered using a mortar and pestle to ensure homogeneity for facilitating organic matter digestion. One control plant groups were also set up where no Pb was added into the medium.

For digestion, the plant samples were carried out according to Kara and Zeytunluoglu (2007). Atomic Absorption Spectrophotometer (AAS 3110, Perkin-Elmer) was used to determine the Pb contents in plant root and shoot parts. The bioconcentration factor (BCF) is a useful parameter and it provides the ability index of a plant to accumulate metals with respect to metal concentration in the medium and it was calculated on a dry weight basis (Zayed et al., 1998)

$$BCF = \frac{\text{Trace elemements concentration in plant tissue } (\mu g g^{-1})}{\text{Initial concentration of the element in the external nutrient solution } (mg L^{-1})}$$

Translocation Factor (TF) is generally the translocation of heavy metal from roots to aerial part and indicates the internal metal transportation of the plant. The translocation factor is determined as a ratio of metal accumulated in the shoot to metal accumulated in the root (Deng et al., 2004)

$$TF = \frac{[Metal] Shoot}{[Metal] root}$$

Wherein, TF>1 indicates that the plant translocate metals effectively from the root to the shoot.

Statistics analyses

ANOVA and multiple linear regressions were performed for all the data to confirm their validity using SPSS 17.0. The data were all presented as mean ± standard error of three replicates. Fisher least significant difference (LSD) test was performed at p < 0.05 to check the significant difference between the means for different uptake at different Pb concentrations.

III. RESULT AND DISCUSSION

Accumulation of lead

Lead content in the roots and shoots of *S. mucronatus*, *R. rotundifolia* and *M. intermedium* showed increases in metal accumulation in the roots and shoots if metal concentrations and time period are enhanced. At lead concentration of 1, 2, 4, 8 and 16mg/L, the lead content (Figure-2) in *S. mucronatus* roots increased to the maximum of 2156, 2239, 2541, 3222 and 3765 µg/g dry weight in roots and in case of shoots it was 312, 753, 911, 1335 and 1781 µg/g dry weight at 2nd, 4th, 6th, 8th and 10th day of harvesting and accumulation ranges from 553-3765 µg/g dry weight in roots and 150-1781 µg/g dry weight in shoots. The maximum accumulation was found on the 10th day at 4mg/L in both the roots and shoots and minimum was on the 2nd day (1mg/L). In *S. mucronatus*, the accumulation of lead accumulation in the root increased significantly (p<0.05) upto the

8th day of exposure but when exposure time (8th to 10th days) from 2 to 8 days however, there is no significant increase (p<0.05) of metal accumulation, which may suggest that accumulation in the roots reached a maximum at 8th day. The lead accumulation in shoots increased significantly (p<0.05) upto the 4th day and there after it showed no significant increased (p<0.05) in accumulation with further increased of exposure time from 6th to 10th day.

Lead content in the roots and shoots of *R. rotundifolia* (Figure-3) was 459, 517, 522, 637 and 546 µg/g dry weight and 488, 548, 568, 681 and 683 µg/g dry weight respectively at 2th, 4th, 6th, 8th and 10th day of harvesting. Lead accumulation ranges from 208-637 and 346-683 µg/g dry weight in root and shoot. The maximum accumulation was on the 8th day (16mg/L) in roots and on the 10th day (4mg/L) in shoots while minimum accumulation was found on the 10th day (1mg/L) for both roots and shoots. In *R. rotundifolia*, lead accumulation in roots and shoots increased significantly (p<0.05) upto 2nd day, but with further increase in exposure time and concentration it showed no significant increased (p>0.05) in accumulation.

Lead content in *M. intermedium* roots and shoots (Figure-4) was 462, 511, 495, 528 and 455 µg/g dry weight and 481, 496, 511, 469 and 457µg/g dry weight at 2th, 4th, 6th, 8th and 10th day of harvesting. Lead accumulation ranges from 244-528 and 358-511 µg/g dry weight in root and shoot. The maximum accumulation was on the 8th day (16mg/L) in the roots and on the 6th day (8mg/L) in shoots, whereas, minimum accumulation in the roots was on the 10th day (8mg/L) and on the 6th day (8mg/L) in shoots. Lead accumulation in roots increased significantly (p<0.05) in accumulation, however in shoots showed no significant increase (p<0.05) in accumulation. In control plants, lead accumulation was below detection limit in all the three experimental plants.

The major factor influencing in metal uptake efficiency of plants depends on the metal concentration in the medium (Rai and Chandra, 1992). The accumulation of lead observed in the roots of *S. mucronatus*, is much higher as compared than *R. rotundifolia* and *M. intermedium*. It was found out that the roots of *S. mucronatus* accumulate higher Pb concentrations as compared to the shoots part. The accumulation of Pb in the shoots of an emergent plant is generally dependent on the roots as its primary source (John et al., 2008,). Root morphology plays an important role in the ability of plants to accumulate heavy metals, generally plants with long, fine roots formed a larger root system which in turn helps in efficient acquisition of nutrients or metal than those plants which have a short and thick roots (Xie and Yu, 2003) which is observed also in *S. mucronatus* with a long fine roots system and have a higher Pb concentration in the roots by increasing root water contact. Thus, higher concentration of Pb in the roots of *S. mucronatus* corroborates with earlier studies of Stoltz and Greger, (2002); Deng et al., (2004); Phetsombat et al., (2006).

It has been reported that metal accumulate in a relatively higher amount in submerged species as compared to emergent species (Rai et al., 1995; Noller and Parker, 1996). Hadad et al., (2010) reported that submerged plants have a greater surface area as compared to non-submerged species and their shoots are in constant contact with the water medium which may help them to bioconcentrate more nutrients and metals. Welsh & Denny,

(1979) accounted that high Pb accumulation in the shoots is by absorption of Pb from the medium, which may be the probably reasons for high Pb accumulation in the shoots of *R. rotundifolia* and *M. intermedium*. Adsorption may also contribute to high Pb accumulation in the shoots of submerged species from the surrounding medium. Pb accumulation in the shoots of *R. rotundifolia* and *M. intermedium* may also occur probably via root-mediated precipitation and intracellular uptake, apoplast and symplast transport which also contribute to the high Pb accumulation. Thus the present study corroborates with earlier findings of Welsh and Denny, (1979); Wolterbeek and van der Meer, (2002), Fritioff and Greger, (2006).

Correlation and multiple regression analyses were conducted to examine the relationship between lead uptake by *S. mucronatus*, *R. rotundifolia*, *M. intermedium* and potential predictors (concentrations of lead in the medium and time). Table 1, 2 and 3 summarizes the descriptive statistics and analysis results for *S. mucronatus*, *R. rotundifolia*, and *M. intermedium*. As can be seen each of the uptake is positively and significantly correlated with the lead concentration in the medium for *S. mucronatus* and *R. rotundifolia*, indicating that with the increase in cadmium concentration in the medium tend to have a significant uptake of lead into the plant tissues but uptake is not significantly correlated with the lead concentration in the medium in the case for *M. intermedium*. However, in case of *S.mucronatus* the lead uptake is significantly correlated with time i.e., the no of days have a significant outcome on the uptake of lead, but time is not significantly correlated with lead uptake in *R. rotundifolia*, and *M. intermedium*.

The multiple regression model with all two predictors produced R^2 = .564, $F_{(2, 27)}$ = 17.49, $p < .001$, R^2 = .282, $F_{(2, 27)}$ = 5.294, $p < .05$ and R^2 = .093, $F_{(2, 27)}$ = 1.389, $p > .05$ for *S. mucronatus*, *R. rotundifolia*, and *M. intermedium* respectively. As can be seen in Table 1 and 2, the concentration of lead in the medium had significant positive regression weights, indicating with higher lead concentration in the medium were expected to have higher lead uptake in *S. mucronatus* and *R. rotundifolia* but not in the case for *M. intermedium* (Table-3). Time i.e., number of days also contribute to the multiple regression model in case of *S. mucronatus* and have a significant regression weights, indicating that the uptake of lead in *S. mucronatus* also depends on time period, whereas in *R. rotundifolia* and *M. intermedium* time did not contribute to the multiple regression model and it is does not have a significant regression weights, indicating that uptake of lead in these two aquatic macrophytes does not fully depend on time period.

Bioconcentration factor (BCF) of lead

Bioconcentration factor (BCF) value indicates the ability of the plant to accumulate metal in their tissue parts. The BCF values at different cadmium concentrations (1, 2, 4, 8 and 16mg/L) were evaluated at 2, 4, 6 8 and 10 day. The BCF value was 1271, 1007, 1387, 599 and 270 (Table-4) in *S. mucronatus* 529, 446, 300, 108 and 61 in *R. rotundifolia* (Table-5) and 813, 373, 200, 83 and 52 in *M. intermedium* (Table-6) respectively after 10th day harvesting. The maximum (1387) BCF value was obtained in *S. mucronatus* treated with 4mg/L of cadmium at 10th day, while in *R. rotundifolia* the maximum BCF value of 879 was obtained on the 2nd day (1mg/L). In *M. intermedium* also the

maximum BCF value of 962 was obtain at 8th day at 1mg/L of concentration.

Plants which have the ability to accumulate heavy metal in the tissues are generally classified as a good accumulator. Generally it is considered that a plant useful for phytoremediation should have a BCF value greater then 1000 (Zayed *et al*., 1998). In the present study, the highest BCF of Pb was 1387 in *S. mucronatus*, 879 in *R. rotundifolia* and 909 in *M. intermedium* which indicates that *S. mucronatus* was a good accumulator of Pb while *R. rotundifolia* and *M. intermedium* maybe considered as a moderate accumulator of Pb. High BCF values also reflects the high accumulation potential of the plants which is an essential factor for phytoremediation (Andra *et al*., 2010).

Translocation factor (TF) of lead

Translocation Factor (TF) in plants is the ratio of heavy metal accumulation in the shoots parts to the roots. Translocation of heavy metal in plants are generally dependent on plant species, type of heavy metals and various environmental factors like pH, redox potential (Eh), temperature, salinity (Fritioff *et al*., 2005). Yanqun *et al*., (2005) reported that a TF value greater than 1, the plants are considered as an accumulator species, whereas TF lesser than 1 is an excluder species. The TF>1 indicated that there is a transport of metal from root to leaf probably through an efficient metal transporter system (Zhao *et al*., 2002), metals sequestration in the leaf vacuoles and apoplast (Lasat *et al*., 2000). According to Yoon e*t al*., (2006) TF value more than 1 of plant species indicates their hyperacumulation potential and is known as hyperaccumulator plants.

In the present study, the TF values in *R. rotundifolia* and *M. intermedium* (Table-8 and 9) were greater than one indicating better translocation of lead from roots to shoots parts, whereas in *S. mucronatus* (Table-7) the TF values were less than one indicating less Pb translocation from roots to shoots parts.

Deng *et al*., (2004) reported that emergent species accumulated high concentrations of metals in their roots but much less in their shoots, and the accumulation increased further with increased external concentration which is in accordance with the present study for *S. mucronatus*. The lack of toxic effects of lead on plants may be due to that Pb is being bound to the cell wall, thus rendering its ineffective in acting as a strong metabolic inhibitor (Buddhari *et al*., 1983). The higher accumulation of lead in *S. mucronatus* maybe due to a relatively low mobility of Pb to the shoots which is indicated by the increased lead accumulation in roots with increased of lead concentration in the medium which is in accordance with the findings of Sharpe and Denny, (1976) and Buddhari *et al*., (1983).

Our findings showed that a significant amount of Pb is accumulate in shoots of *R. rotundifolia* and *M. intermedium* possibly due to a constant contact of shoots with the medium and the shoots may directly uptake Pb from the medium in addition to translocation from roots. Nonetheless, accumulation of Pb in submerged plant shoots may be also due to transient releases or diffusion of metal in the water followed by rapid adsorption to shoot tissues.

IV. CONCLUSION

In the present study, a laboratory experiment was carried out where all the external factors are controlled against Pb contamination in water. The present study indicates that all the three experimental plants were suitable for the phytoremediation of Pb contamination from water. Therefore, *S.mucronatus*, *R. rotundifolia* and *M. intermedium* could be useful for phytoremediation of Pb from contaminated water. Furthermore, field experiments are needed to carry out their phytoremediation potentials of these plants for phytoremediation technique.

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Table-1: Summary statistics, correlations and results from the regression analysis in *S. mucronatus*

Variable	mean	std error	correlation with uptake	multiple regression weights	
				B	β
Uptake	1875.16	482.788			
Time (in days	6.00	67.547	.348*	185.058*	.348
Concentrations (mg/L)	5.17	34.801	.666***	182.413***	.666

* p < .05 ** p < .01 ***p<.001

Table-2: Summary statistics, correlations and results from the regression analysis in *R. rotundifolia*

Variable	mean	std error	correlation with uptake	multiple regression weights	
				B	β
Uptake	793.33	157.394			
Time (in days	6.00	22.021	.080	10.776	.080
Concentrations (mg/L)	5.17	11.345	.525**	36.497**	.525

* p < .05 ** p < .01 ***p<.001

Table-3: Summary statistics, correlations and results from the regression analysis in *M. intermedium*

Variable	mean	std error	correlation with uptake	multiple regression weights	
				B	β
Uptake	736.57	156.244			
Time (in days	6.00	21.860	.029	3.422	.029
Concentrations (mg/L)	5.17	11.263	.304	18.686	.304

* p < .05 ** p < .01 ***p<.001

Table-4: Bioconcentration Factor for lead in *S. mucronatus*

Pb concentration (mg/L)	Bioconcentration Factor				
	2d	4d	6d	8d	10d
1	703	961	1142	967	1271
2	422	505	611	630	1007
4	617	748	863	1140	1387
8	154	203	312	363	599
16	74	99	168	189	270

Table-5: Bioconcentration Factor for lead in *R. rotundifolia*

Pb concentration (mg/L)	Bioconcentration Factor				
	2d	4d	6d	8d	10d
1	879	836	794	782	529

2	424	467	501	508	446
4	218	234	262	289	300
8	100	119	120	152	108
16	55	66	62	82	61

Table-6: Bioconcentration Factor for lead in *M. intermedium*

Pb concentration (mg/L)	Bioconcentration Factor				
	2d	4d	6d	8d	10d
1	909	848	917	962	813
2	398	471	440	419	373
4	222	235	227	231	200
8	107	124	126	119	83
16	53	57	58	62	52

Table-7: Translocation Factor for lead in *S. mucronatus*

Pb concentration (mg/L)	TF values				
	2d	4d	6d	8d	10d
1	0.27	0.21	0.25	0.41	0.33
2	0.27	0.22	0.28	0.29	0.95
4	0.14	0.34	0.36	0.41	0.47
8	0.18	0.40	0.36	0.57	0.53
16	0.16	0.20	0.39	0.54	0.58

Table-8: Translocation Factor for lead in *R. rotundifolia*

Pb concentration (mg/L)	TF values				
	2d	4d	6d	8d	10d
1	0.98	1.07	1.03	1.41	1.84
2	0.84	0.96	1.00	0.95	0.3
4	1.02	1.03	1.00	1.03	1.37
8	1.57	1.36	1.04	1.02	1.21
16	1.07	1.05	1.34	1.07	1.01

Table-9: Translocation Factor for lead in *M. intermedium*

Pb concentration (mg/L)	TF values				
	2d	4d	6d	8d	10d
1	0.97	0.91	1.00	1.04	0.79
2	0.85	0.84	0.82	0.74	0.99
4	1.12	0.98	0.93	0.87	1.03
8	1.28	1.01	1.03	0.89	1.71
16	0.99	0.97	0.98	0.89	1.24

Figure- 1
Map showing location and collection sites of aquatic macrophytes

Figure-2
Lead accumulation in roots and shoots of *S. mucronatus*

Figure- 3
Lead accumulation in roots and shoots of _R. rotundifolia_

Figure- 4
Lead accumulation in roots and shoots of _M. intermedium_

Data Warehouse Security through Conceptual Models

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Abstract- A key challenge for data warehouse security is how to manage the entire system coherently – from sources and their export tables, to warehouse stored tables (conventional and cubes) and views defined over the warehouse. Permissions on the warehouse must satisfy the restrictions of the data owners, and be updated quickly as those local concerns evolve. Yet the system cannot demand extensive administrator time, since there are too few people with both technical skills to understand derivation logic, and business skills to balance security versus accessibility. Security aspects should be considered in the design phase of the data warehouse to better match the security requirements and to avoid later fundamental,cost-intensive adaptations. For the identification of security requirements legal, audit, network and other issues have to be considered

Index Terms- Conceptual models, Data warehouse, Metadata,Multidimensional data model, OLAP

I. INTRRODUCTION

Traditionally, Data warehouse were queried by high level users (executive management , business analyst only). Data warehousing systems enable enterprise managers to acquire and integrate information from heterogeneous sources and to query very large databases efficiently. Data warehousing systems enable enterprise managers to acquire and integrate information from heterogeneous sources and to query very large databases efficiently. Building a data warehouse requires adopting design and implementation techniques completely different from those underlying operational information systems.

Fig 1 . Early phases of DW design [19]

The complexity of data warehouse environments is rising every day and data volumes are growing at a significant pace. The data warehouse administration and design group should manage enterprise information efficiently, and with high quality results. Approximately 30–50% of the data warehouse design process is spent on analysis, to ensure that source systems are understood and that there is alignment between the involved parties: business and administrators. Usually, such design process involves the representation of the business requirements into a conceptual design (Fig. 1-I) and it is continuously refined through a feedback process (Fig. 1-II). An integrated metadata strategy may reduce the time needed, lower risk, and produce an ongoing record of understanding, useful in the whole data warehouse lifecycle. Hence, it is of great importance to provide a formal, explicit, and well-defined way to represent all the parameters and properties guiding this early stage. Moreover, the proposed solution should be simple and comprehensive enough to be used by all the parties involved, which usually have different technical skills, knowledge background, and communication codes. Data warehouse often store historical information which is extracted from multiple, heterogeneous, autonomous and distributed data sources, thereby; the survival of the organizations depends on the correct management, security and confidentiality of the information. The application of the Model Driven Architecture (MDA) [1] in the secure modeling of DWs allows obtaining the secure logical scheme from the conceptual model.Confidentiality is defined as the absence of unauthorized disclosure of information, integrity as the absence of improper system alterations and availability as readiness for correct service [5] and Dependability is a broader concept that encompasses all primary aspects of security save confidentiality.

MULTIDIMENSIONAL DATA MODELLING

Multidimensional data modeling is an integrated aspect of OLAP . . It involves the analysis of selected facts or measures of the business area. Multidimensional modeling is a prominent factor in interactive analysis of large amount of data for decision making purpose. Basically multidimensional modeling is the foundation of the data warehouses[20].The multidimensional data model is composed of logical cubes, measures, dimensions, hierarchies, levels and attributes. The simplicity of the model is inherent because it defines objects that represent real-world business entities. Analysts know which business measures they are interested in examining, which dimensions and attributes make the data meaningful, and how the dimensions of their business are organized into levels and hierarchies. Multidimensional data cubes, are the basic logical model for OLAP application is shown in fig 2.

Fig 2 Multidimensional model of Data Warehouse

To define the data warehousing security and audit requirements. [11]

DEFINE ACCESS REQUIREMENTS

We should classify the data and users in the data warehouse. The data can be classified by its sensitivity (e.g., restricted, confidential) or by user role. Users can be classified by organizational unit, by user role, or by individual. Identify restrictions by data and user classification. Define time frames when secure data cannot be published to non-secure staff.

DEFINE AUDIT REQUIREMENTS

Define audit requirements. Consider gathering information on connections, disconnections, data accesses, and data changes.

DEFINE NETWORK REQUIREMENTS

Identify network requirements, such as data encryption/decryption and routing restrictions.

DEFINE DATA REQUIREMENTS

Identify any legal restrictions that apply to data kept on customers, employees, etc. To meet legal restrictions it may be necessary to store summarized data so that individual entities (e.g., employees, companies) cannot be identified.

Identify data privacy laws that must be adhered to (e.g., most countries require that companies that hold data on customers must make this data available to the customer on demand).

While defining data movement security requirements. The following points should be considered:
· Can data be transferred to a diskette?
· Can data be stored on a PC?
· Who might have access to data transferred to a diskette or a PC?
· Do back-ups have to be encrypted?
· Where should back-ups be kept?
· Who might have access to the back-ups?

DEFINE HIGH SECURITY REQUIREMENTS

If high levels of security are required, define the requirements, such as "trusted" versions of database management systems, "trusted" versions of operating systems, and secure facilities.

II.   BACKGROUND

Database security was addressed in the 1960s by introducing mandatory access control (MAC), driven mainly by military requirements. Today, role-based access control (RBAC) [6] is the commonly used access control model in commercial databases. RBAC does not define the degree of scalability implemented in a system with respect to the number of roles, number of permissions, size of role hierarchy, or limits on user-role assignments, etc.The security model in the data warehouse restricts the viewership of users to data for only those projects that they have access to. By default, the security is disabled, giving all users the ability to see all data in all projects. [11]

When users have permission to a project, they have permission to access all the data within the project, both in the data mart and the operational data store. Data that does not belong to a specific project can be seen by all users. The relationship of users to projects is defined in a lookup table in the data warehouse. The switching of security is handled through a parameter in the Framework Manager data warehouse model. Security is disabled by default and all users can see all data regardless of the user-to-project mapping in the lookup table, if loaded. If security needs to be switched on, you must load the RESOURCE and PROJECT_RESOURCE_LOOKUP tables to the data warehouse and republish the reporting package. All the tables that have project IDs in data warehouse have a security filter that is controlled by the VW_PROJECT_RESOURCE_LOOKUP table.   The switching of security is handled through a parameter in the Framework Manager data warehouse model, and data permission is achieved through query subject filters.

III.   RELATED WORK

This section divides the related work according to two main research topics covered by this paper: ETL modeling, and data warehouse modeling. The paper focuses on the logical modeling specifications in these topics. Many data structures in the data warehouse are completely devoid of sensitive individual identities by design and, therefore, do not require protection appropriate for the most private and sensitive data. For example, when data has been aggregated into summaries by brand or region, as is often the case with data warehousing, the data no longer presents the risk of compromising the private identities of individuals. However, the data can still have value as competitive intelligence of market trends, and thus requires careful handling to keep it out of the hands of rival firms. Relaxed security does not mean a lack of commitment to security. The point is that differing levels of security requirements ought to remind us that one-size-fits-all solutions are likely to create trouble [12]. Moreover, a number of security models have been proposed for data warehouse and OLAP. For example, [14] propose a security model based on mandatory access control for OLAP cubes. Another model for data warehouse security based on metadata is presented in [15]. The authors elaborate on requirements of and impacts on the selection of an adequate security model for a data warehouse environment.

Building upon on a similar mindset [16] focuses on ideas that can contribute to warehouse security. The concepts take common operations in to account such as replication control, aggregation and generalization, ex-aggregation and misleading, anonymity, and user profile based security.

 [17] suggest to base data warehouse security on view security. This paper aims to provide a theory that permits automated inference of many permissions for the warehouse, in a way that minimize both the learning curve for administrators and the amount of new software that vendors would need to implement. Moving from theory to practical challenges [18] focus mainly on the technical issues such as authorization and access control.

IV.   DATA WAREHOUSE AND SECURITY

It empowers end-users to perform data access and analysis. It also gives an organisation certain competitive advantages, such as fostering a culture of information sharing, enabling employees to effectively and efficiently solve dynamic organisational problems, minimizing operating costs and maximising revenue, attracting and maintaining market shares, and minimizing the impact of employee turnovers. The security requirements of the data warehouse environment are similar to those of other distributed computing systems [2]

4.1 SECURITY RESTRICTIONS

 A data warehouse is an open, accessible system. The aim of a data warehouse generally is to make large amounts of data easily accessible to users, thereby enabling them to extract information about the business as a whole. Any security restrictions can be seen as obstacles to that goal, and they become constraints on the design of the warehouse. The main problem with data collection is that people might allow companies to use data for specific reasons (such as recommending related products) but do not consent to other uses of the same data. Usage control [4] is a concept that makes it possible to enforce pre- and postconditions when using data. It is similar to a traditional reference monitor, only that the restrictions are enforced during the entire access [7]

Fig 3 The UCONABC usage control model [4]

4.2 SECURITY REQUIREMENTS

 Security requirements describe all security conditions that have to be considered in the data warehouse environment. It is important to determine in an early stage any   security requirements that will be enforced in the data warehouse, because they can seriously impair the organisation and design of the warehouse. It is very much important to freeze the security at the beginning of requirement phase. This helps in system design.

4.3 METADATA AND SECURITY MODEL

 Data about data is called metadata, Metadata not only describe   the contents of the data warehouse but also provide the user with information useful in judging the quality of the content [3].

   The role of metadata is rapidly expanding as organisations develop a data warehouse strategy that may result in the creation   of operational data stores, integrated data warehouses and multiple data marts. Metadata, which are used by developers in order to manage and control the creation and maintenance of the data warehouse, are kept outside of the data warehouse. The metadata concerning data warehouse users are on the contrary a part of data warehouse. This data are used to control access to and analysis of data. Figure shows a simplified diagram of how a metadata points to all information in a data warehouse.

Figure 4: Metadata in the data warehouse [21]

Consequently there are two types of metadata [8]:
• Structural metadata
• Access metadata

4.2.1. STRUCTURAL METADATA

   Structural metadata are used for the creation and maintenance of the data warehouse. They completely describe the data warehouse - its structure and its content. The basic element of structural metadata is a model which describes their data subjects, their features and their intermediate relationships. [9]

4.2.2. ACCESS METADATA

   Access metadata represent a dynamic relationship between the data warehouse and the end-user applications. They contain the measured values of the enterprise, user-defined names and aliases. These data hold the description of the data warehouse server, databases, tables, detailed data and summed up data with a description of the initial data sources and of the transformations being carried out. Access metadata set up "drill-down" and "roll-up" rules as well as the views over dimensions and available   hierarchies (such as products, markets and customers). This data can also contain the rules for user-defined calculations and queries. Such metadata allow the security implementation for an individual user, user groups or the whole

enterprise, relating reading, modifying etc. of calculations, summed up data or analyses. [9]

V.   CONCLUSION AND FUTUREWORK

In this paper we focus on a basic authorization model for data warehouses and OLAP offering greater expressiveness and highly increased usability with respect to security. Future work will also have to deal with special security requirements [13] with respect to aggregation functions different to SUM, like variance or average, for instance. Likewise the issue of derived authorizations has to be addressed   in the context of data warehouses especially while serving a drill-through operation that directly forwards access to the OLTP data sources.

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Study of Security Algorithm to Provide Triple Security in Cloud Computing

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Abstract- Among the various technologies of web Cloud Computing is one of the recent internet based computing technology. It provide us a virtual server and a huge size of database to store our data over the internet. Since it is easy to store and manage the data many organizations moving their confidential data into the cloud. But as it is an internet based technology we are concerning about the security related issues like hacking, stealing, misusing etc. These security related issues are the greatest obstacle in the popularity of cloud. Therefore we are going to use the combinations of three different algorithms-DSA, DES and Steganograohy. These algorithms help to reduce the problems of security on cloud.

Index Terms- DES, DSA, Security issues in cloud, and Stagenography.

I. INTRODUCTION

Cloud computing is a modern technology offered through the Internet. Cloud computing is an Internet based computing which provide servers, storage applications and resources to many organizations. There are virtual servers hosting to customers on a pay – as – you – use basis. Cloud computing have aimed to allow access to large amounts of computing power in a fully virtualized manner.[1] This provide an easy and fast access to applications and is also useful to reduce the infrastructure costs. Many companies using cloud computing for their business processes as they only need to pay only for those resources that the use, they do not need their own physical infrastructure. As this new world is totally dependent on internet, people shares, sends and receives their data, information, messages etc. so there is a great need of security for the massive amount of data. Security is needed against unauthorized access and to reduce risks of data stealing. Cloud provider hosting a large set of databases to their customer and by securing cloud means that storage should be protected and secured for the privacy purpose. In this paper we will focus the security in cloud computing – how can data be secure on cloud.

II. SECURITY ISSUES IN CLOUD COMPUTING

The tremendous growth of cloud computing in the variety of organizations may leads to criminal offences, it is important that cloud should also provide security to them. Security in cloud computing is very necessary so that it would be more effective and useful. The users do not have any idea where their data is placed. Since user's data is placed somewhere on the cloud so there might be possibility that a third party who is looking after that stored data. Some illegal activities can harm the data and this is called 'cyber crime'. The next security issue in cloud is that it has a single point of failure. Since cloud is a name given to a group and this is not only for single user but it is for the many users so one mistake or failure can impact the whole group. The other issue related to its security is that the hacker not only hack the cloud data but can also hack the user account. The main aim of security is to provide availability, confidentiality, integrity to the data. [3] In this paper we will use 'Triple Security in Cloud Computing' by using three different security algorithms such as-

1) DSA (Digital signature algorithm)
2) DES (Data Encryption Standard)
3) Steganography – hiding data behind an audio file.

III. ALGORITHMS USED IN SECURITY OF CLOUD COMPUTING

A. DSA(Digital Signature Algorithm):

the digital signature is analogous to the hand written signature. It is used for the authenticity of the document. Similarly, digital signature makes receiver belief that the sender is genuine and the receiving document is authentic. It must verify the author, date and time of the signature. After signing a message, the person cannot deny it. For signing a document 'private key' is used and 'public key' is generated for the signature verification. These keys- private and public are used for confidentiality.

The process of signature algorithm could be understood by the given figure. It shows how DSA works to generate and verified the signature.

Figure -1 Digital Signature Scheme

In digital signature, the private and public keys of sender are used. The sender uses their private key and the receiver uses the private key of the sender. For encryption receiver's public key is used by sender and receiver uses his own private key to decrypt. Since the message are very long, it is not easy to sign a whole document itself in this case we sign a digest of the message. A secure hash function is used to create message digest- a condensed version of data. Now the signature got verified by the receiver.

B. DES(Digital Encryption Standard)

In cryptography DES is a symmetric key algorithm which have the same key for encryption as well as for decryption. In this technique the users shared a single key. The key is kept secret and therefore it is also called as secret key algorithm. The DES is a block cipher that uses shared secret encryption. The DES can also be used for single – user encryption, such as to store files on a hard disk in encrypted form.[5]

The two main techniques used in DES are XOR operations and numerous permutations. It consists of 64 bit plaintext and 64 bit key but uses 56 bit key during execution. During DES encryption following processes is done

- Initial permutation(IP)
- Key dependence Computation
- Inverse initial permutation

The encryption process is made of two permutations (P- boxes) which we call initial and final permutations and sixteen Fiestel round. Each round uses a different 48 bit round key generated from cipher key according to a predefined algorithm. Decryption is the inverse of DES encryption.[15]

Figure –2 DES algorithm Structure

IV.   STEGANOGRAPHY

Steganography is defined as the art and science of writing hidden messages in such a way that no one else apart from the intended recipient knows the existence of the message.[7] It is a

technology in network security to hide the message behind an audio, text, object and image. The message could only be read by sender and receiver. It **protects** the message from the third person (hacker) or from unauthorized access. Steaganography term is dissimilar to the cryptography. In cryptography the hacker could recognize the encrypted data by decrypting it using different decrypting methods but this could not be

happen in steganography where data is hidden behind a file. The hacker find it a useless data for himself. Fragile and robust are two types of steganography.

There are different methods used in steganography are such as:
  i.   Hiding messages behind text file.
  ii.   Hiding messages behind an image.
  iii.   Hiding messages behind an audio file.
          Hiding messages behind video file.

In this paper we are using the method iii. With the tremendous advancement in digital signal processing use of internet computing power, steganography has gone digital.[9]

V.   PROPOSED WORK

In our proposed work we are going to reduce the security threats on cloud. In this the three algorithms DSA, DES and staeganography(hiding data behind an audio file) is used together. To implement these algorithms we use .net framework as a platform. The software requirements for the implementation are:
- Microsoft Visual studio 2008
- Windows XP operating System
- MS- Office

The hardware requirements are:
- One computer with 2 GB of memory
- 80 GB hard disk space
- An Intel Premium Core 2 Duo based computer

Figure- 3 Proposed Work Design

Figure 4- sending routing information

Figure 5- Creating Signed Document

Figure 6- Encryption of signed document

Figure 6- Hiding data behind an audio and image

VI. CONCLUSION AND FUTURE SCOPE

In this paper we implements Digital signature Algorithm, Data Encryption Standard and Steganography to improve the security in cloud computing. We find that the Time complexity is high because it is a one by one process but in future this time complexity could be reduced. We try to improve the time complexity by using other security algorithms.

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Phytochemical Screening of Selected Medicinal Plant *Cinnamon Zeylanicum* bark extract, Area of research; Uttarakhand, India

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Abstract- Medicinal plant of Cinnamon zeylanicum pertaining Region in the Uttarakhand were subjected to phytochemical screening to determine the presence of natural products (secondary metabolites) i.e., alkaloids, steroids, flavonoids, saponins, protein, tannins and polyphenols, and glycosides which may be responsible for their therapeutic effects. Extracts of this medicinal plant was utilized the standard screening method (Guevarra, et al, 2005) for the detection of secondary metabolites. The phytochemicals are important in human health this is because they display different biological activities such as antifungal, antibacterial activities. Quantitative phytochemical analysis of this plant confirms the presence of various phytochemicals like alkaloids. Flavonoids, tannins, saponins, steroid and glycosides in their six solvents cold, hot, warm water, acetone, ethanolic and methanolic bark extracts. The present study dealt with highlighting, of the phytochemicals with respect to the role of these plants in traditional system.

Index Terms- medicinal plants; phytochemicals; Soxlet extraction

I.   INTRODUCTION

Cinnamon (*Cinnamomum zylenicum*) is commonly used in the food industry because of its special aroma. Additionally, it has strong antibacterial properties, anticandidial, antiulcer, analgesic, antioxidant and hypocholesterolaemic activities (Mastura et al. 1999; Lin et al. 2003). It is an ever green tropical tree, belonging to the Lauraceae family. Different parts of the plant (bark, roots and leaves) essential oils are used as a medicine. Due to its distinct odour, it is widely used as an important ingredient of many mouth watering dishes of the world. Cinnamon has been reported to have remarkable pharmacological effects in the treatment of type II diabetes and insulin resistance (Hassan et al. 2012). Cinnamon is indicated as an analgesic and antipyretic agent against cold, fever, headache, myalgia (mascular pain), arthralgia (arthritic pain) and amenorrhea (failure of menstruation). In Indian traditional literature including Ayurveda, many other valuable actions are attributed to cinnamon bark (R.N. Khory, N.N. Katrak, 1903).

Many scientific pharmacological investigations are also reported on anti-inflammatory potential of the bark of many species of cinnamon. The anti-inflammatory action has been attributed to a series of tannins. The antinociceptive (analgesic) and antipyretic (fever reducing) activity were also been reported (Sachin vetal, 2013).

In this context, the aim of the present study was the screening of phytochemicals present in *Cinnamomum zeylanicum* aqueous bark extract.

II.   MATERIALS AND METHODS

Collection and identification of plant materials
The barks of healthy plant *Cinnamomum zeylanicum* were collected from local areas of patwadangar near nainital, uttarakhand between April to May 2012 for phytochemical screening.

Preparation of plant extracts
These barks were washed with distilled water to remove the adhering dust particles. They were dried in the shaded place. The dried barks were powdered, weighed and stored in clean containers.

Aqueous Extraction (*Maceration method)*

Powdered material of cinnamon zylenicum bark (5gm) is taken for maceration with 150 ml of distilled water for 1 hr on rotary shaker. The extract **is filtered** by using **muslin cloth and** Whatman **no.1 filter paper** and concentrated by evaporation on water bath. The extract was dried and used as a powder. There are various types of maceration method used –

Cold Water maceration-
5g of dried plant powder was added to 150ml of distilled water (15°C) and was mixed thoroughly and kept it on rotary shaker for 1 h on 100 r.p.m. It was then filtered through muslin cloth or whatman no.1 filter paper. Filtrate was taken and concentrated through evaporation on water bath at 70-80 c. The extract was weighted (0.27gm) and stored in vial and kept in dessicator.

Hot Water maceration-
5g of dried plant powder was added to 150ml of distilled water (70°C) and kept on rotary shaker for 1 hour. It was then filtered through muslin cloth or whatman no.1 filter paper. Filtrate was taken and concentrated through evaporation on water bath at 100 °c. The extract was weighed (1.12 gm) and stored in vial and kept in dessicator.

Warm water maceration-
 5g of dried plant powder was added to 150ml of distilled water (45°C) and kept on rotary shaker for 1 hour .It was then filtered through muslin cloth or What man no.1 filter paper. Filtrate was taken and concentrated through evaporation on water bath at 100 c. The extract was weighted (.21 gm) and stored in vial and kept in dessicator.

Soxhlet extraction
5g of dried plant powder was extracted for 4-5 hrs with (150ml) organic solvent (ethanol, methanol, acetone, ether, chloroform etc.) by hot continous perlocation method in Soxhlet apparatus. After the effective extraction ,solvent were concentrated using rotary flash evaporator and water was removed by evaporated to dryness on a hot water bath to yield a soxhlet crude extract.

Qualitative analysis for phytochemical components
Collected plant samples that were identified to have medicinal properties were subjected to phytochemical screening. Five hundred milligrams of the dried methanolic extract was reconstituted in 10ml of methanol and it was subjected to preliminary phytochemical testing for the presence of different chemicals groups of compounds using standard methods.

All plant parts were extracted on the day of collection. The screening procedures were adapted from Guevara (2005). An extraction of each plant was prepared by macerating a known weight of the fresh plant material in an electric blender. Each extract was suction-filtered and the process repeated until all soluble compounds had been extracted, as judged by loss of color of the filtrate. Extract from each plant part was evaporated to dryness in *vacuo* at about 45°C and further dried to a constant weight at the same temperature in a hot-air oven. A portion of the residue was used to test for plant constituents.

The test for alkaloids was carried out by subjecting 20g plant material in 5 ml 2M HCl, heated, filtered and 2 to 3 drops Dragendorff's reagent was added. In the test for steroids, Salkowski test (To 2 ml of extract, 2 ml chloroform and 2 ml concentrated H_2SO_4 was added. Shack well, whether chloroform layer appeared red and acid layer showed greenish yellow fluorescence was observed). The presence of flavanoids was determined employing Shinoda test (added 5 ml 95% ethanol, few drops concentrated HCl and 0.5 g magnesium turnings. Pink colour was observed.).

The extract was subjected to Froth test for the identification of saponin. The tests for tannins and polyphenols were carried out by subjecting the plant extracts in Ferric chloride test. Glycosides were identified by Legal's test For cardenoloids by subjecting 1ml pyridine and 1 ml sodium nitroprusside observed for pink to red colour and Kellar Killani test (To 2 ml extract added glacial acetic acid, one drop of 5% $FeCl_3$ and concentrated H_2SO_4 observed for reddish brown colour at junction of the two liquid and upper layers bluish green).

III.   RESULTS AND DISCUSSION

Table 1 presents the results of the phytochemical screening of the Cold water, hot water, warm water, ethanolic, acetone and methanolic extracts of the *Cinnamon* plant's bark. In the preliminary test (test for primary metabolites), steroid alkaloid and saponin were detected in all plant extracts. Flavanoide was detected only in aceton ethanol and cold water extract. Carbohydrates present only in cold, hot and warm water extract. Ethanol, methano and acetone plant extracts were found to have tannin and phenol. Notably, protein and Glycosides were not detected in all plant extracts tested.

Table 1: Phytochemical screening of secondary metabolites of plant extracts.

phytoconstituents	Cold water extract	Hot water extract	Warm water ext	Ethanol extract	Methanol	Acetone
Carbohydrates	+	+	+	_	_	_
Steroids	+	+	+	+	+	+
Protiens	_	_	_	_	_	_
Glycosides	_	_	_	_	_	_
alkaloids	+	+	+	+	+	+
Flavanoids	+	_	_	+	_	+
Saponins	+	+	+	+	+	+
Tannins & phenol	_	_	_	+	+	+

Table 2. Chemical basis

Tests	Reagents	Positive result
Carbohydrates 1.Molish test 2.Fehling test	Conc. HCl Conc. HCl & Mg turnings	Violet ring. Yellow and brick red precipitate
Proteins 1.Biuret test	4%NaOH, 1% CuSO4	Violet or pink color
Steroids 1. Salkowski test	Chloroform and conc. H2SO4	Chloroform layer appeared red and acid layer show greenish yellow inflorescence
Alkaloids 1. Dragendorff's	Dragendorff's rgt.	Orange ppt.
Saponin test 1. Froth test	H2O, gogo	Honeycomb froth
Glycosides test 1.Legal's test (for cardenoloids) 2.Kellar killani test	Pyridine, Sodium-nitroprusside. Glacial acetic acid, 5% FeCl3.	Pink to red color. Reddish brown color &bluish green color
Starch 1.Tannic acid test	20% Tannic acid	White ppt
Flavanoids 1.Shinoda test	95% ethanol, HCl, Magnesium	Pink color
Tannins & Phenols 2. FeCl3 test	FeCl3	Intense green colore

IV. CONCLUSION

In this study, although there are variations in the chemical constituents, the six different plant bark extract of *Cinnamon* tested are potential antimicrobial agents. Characterization and isolation of the active chemical components possessed by this trditional plants for further study may lead to the development of a potential drug that may treat various kinds of infections and may lead to full utilization by the local community. The results of this study may also be of commercial interest to research institutes and pharmaceutical industries in the development of new dugs.

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Correlation Coefficient and Path Analysis in Coriander

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Abstract- The field experiment was carried out during *Rabi* season of the year 2011-2012 on the experimental field of Department of Horticulture, Dr. PDKV, Akola, Maharashtra (India). The study was undertaken on twenty four genotypes of coriander using Randomized Block Design with three replications. This study revealed that number of umbels per plant (0.25) and test weight (0.31) was associated significantly and positively with seed yield per plant. The perusal of path coefficient analysis shown days to 50% flowering (2.08) had highest direct effect on seed yield followed by number of seed per umbel (1.01), number of secondary branches (0.52), number of umbel per plant (0.49), test weight (0.28), plant height (0.23), leaf area (0.11) and chlorophyll content (0.11). Therefore, greater emphasis should be given on these characters while selecting for higher yield and related traits.

Index Terms- Coriander, correlation coefficient, path analysis and yield.

I. INTRODUCTION

Coriander (*Coriandrum sativum* L.) is an important seed spices crop of family Apiaceae (Umbelliferae) and possess 2n=22 chromosomes with cross-pollination as mode of reproduction. Western Europe and Asia are considered to be the centre of origin of this crop (Gal, *et al.,* 2010). In India it is mainly grown in Rajasthan, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. In India coriander is cultivated in an area of about 107.54 thousand ha. with a production of about 385.33 thousand million tonnes (Anonyms, 2010).

Coriander is an annual herbaceous plant extensively grown in India. Its name has been derived from Greek world "Koris" means bed-bug, because of unpleasant, fetid bug like odour of the green unripened fruits (Meena *et. al.* 2010).

When initiating a breeding programme with any crop having genetic variation, it is important to gather information on the traits of agronomic importance in order to select and breed better varieties (Dubley and Moll, 1969). Relationships of different traits with yield, among different traits and their direct and indirect effects on one another provides basis for a successful breeding programme (Ali *et al*., 2003). Yield being a quantitative trait has complex inheritance, which is subjected to environmental fluctuations, requiring indirect selection of simply highly heritable traits for its improvement (Thakur and Saini, 1995). Deb and Khaleque (2009) stated that knowledge about the association and interaction of different traits with yield greatly helps the breeder in selection work with more precession and accuracy. The intensity and direction of association of the different traits with yield were estimated with genotypic and phenotypic coefficient of correlation (Mode and Robinson, 1959). The exact picture of the relative importance of direct and indirect influences of the component characters towards seed yield is determined by path analysis (Bhatt, 1973).

Correlation and path analysis have been used in breeding studies in different aromatic plants (Gurubuz, 2001). Hence, correlation studies and path analysis provide detailed information to identify important characters to be considered in improvement programme through selection.

The present research work was undertaken to investigate the relative importance of direct and indirect influences of the component traits toward seed yield; and identify the important traits to be considered in coriander improvement programmes.

II. MATERIALS AND METHODS

The present investigation was conducted at Main Garden, Department of Horticulture, Dr . Panjabrao Deshmukh Krishi Vidyapeeth. Akola during rabi 2011-2012. The experimental material comprised of twenty four diverse genotypes (RCr-20, RCr-41, RCr-435, RCr-436, RCr-684, GCr-1, GCr-2, Co-1, Co-2, Co-3, Co-4, JD-1, NRCSS-ACr-1, Azad Dhania-1, Rajendra Swathi, Swathi, Sudha, Sindhu, Sadhana, Pant Haritma, Hissar Sugandh, Hissar Anand, Hissar Surbhi and Akola Local) collected from the National Research Center of Seed spices Ajmer, Rajasthan and Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth. Akola, Maharashtra. The experiment was laid out in a randomized block design with three replications. The seeds of different genotypes were sown on 24 October at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The recommended dose of manures and fertilizer were applied at the time of field preparation. Akola is situated in subtropical region between 22° 42' N latitude and 77° 02' longitudes at an altitude of 307.42' above the mean sea level. Row to row and plant to plant spacing were maintained at 30 cm and 10 cm respectively. All the agronomic package of practices was adapted to grow a healthy crop. In each replication five plants randomly selected were marked for observation. Observations were recorded for twelve characters viz., plant height (cm), number of primary branches per plant, number of secondary branches per plant, leaf area (cm^2), days to 50 percent flowering, days to harvesting, number of umbels per plant, number of umbellets per umbel, number of seeds per umbel, test weight (g), chlorophyll content (mg/g) and seed yield per plant (g).

The analysis of variance for testing the variation among treatments was carried out as per the method suggested by Panse and Sukhatm, (1989). The genotypic and phenotypic correlation coefficients were calculated as per methods given by Al-Jibouri *et al.* (1958). Path analysis based on genotypic correlations was performed according to Dewey & Lu (1959).

III.   RESULTS AND DISCUSSION

Analysis of variance revealed significant differences among genotypes for all traits studied indicating presence of significant variability in the materials

Yield of a crop is the result of interaction of a number of inter-related characters. Therefore, selection should be based on these component characters after assessing their correlation with seed yield per plot. Character association revealed the mutual relationship between two characters, and it is important parameters for taking a decision regarding the nature of selection to be followed for improvement in the crop under study. The phenotypic and genotypic correlation among the yield and yield components in coriander are presented in Table 1. Significant correlation of character suggested that these are much scope for direct and indirect selection for further improvement. In general, the estimate of genotypic correlation coefficient was higher than corresponding phenotypic ones, thereby, suggesting strong inherent association among the characters studied. In the present investigation, seed yield per plant was positively significant correlated with number of umbel per plant (0.25) and test weight (0.311) at genotypic and phenotypic level. Therefore, these characters should be considered while making selection for yield improvement in coriander. There finding are in line with Sanker and Khader (1991).

Plant height showed positive and significant correlations with number of primary branches, number of secondary branches, leaf area, days to 50% flowering, number of umbel per plant, number of umbllete per umbel, number of seed per umbel, days to harvesting and chlorophyll content at both genotypic and phenotypic content. These findings are in agreement with Bhandari and Gupta (1993). Number of umbels per plant showed positive and significant correlations with plant height, number of primary branches, number of secondary branches, leaf area, days to 50% flowering, number of umbllete per umbel, number of seed per umbel, days to harvesting and chlorophyll content at both genotypic and phenotypic content. Similar findings were also noted by Meena *et. al.* (2010), Singh *et. al.* (2006), Agrihotri *et. al.* (1997) and Vedamuthu *et. al.* (1989).

Test weight showed positive and significant correlation with seed yield per plant. Similar result also reported by Sanjeev *et. al.* (1990)

Yield is the sum total of the several component characters which directly or indirectly contributed to it. The information derived from the correlation studies indicated only mutual association among the characters. Whereas, path coefficient analysis helps in understanding the magnitude of direct and indirect contribution of each character on the dependent characters like seed yield. Partitioning of correlation coefficient into direct and indirect effects provide information about the nature and magnitude of effects of other characters on seed yield. The result of the present investigation on path coefficient analysis as presented in Table 2 revealed that days to 50% flowering (2.08) had highest direct effect on seed yield followed by number of seed per umbel (1.01), number of secondary branches (0.52), number of umbel per plant (0.49), test weight (0.28), plant height (0.23), leaf area (0.11) and chlorophyll content (0.11). These indicate that seed yield could be improved by making selection on the basis these characters. These findings are in agreement with that Datta *et.al. (*2006), Kumar (1997),

Vedamuthu *et. al.* (1989) and Choudhary (1987) for secondary branches per plant; Jain *et. al.* (2003), Srivastava *et. al.* (2000) and Kumar (1997) for number of umbel per plant and Srivastava *et. al.* (2000) for number of seed per umbel.

Path coefficient analysis indicated that utility of the character like days to 50% flowering which showed highest positive direct effects on seed yield per plot. These are major yield contributing traits for enhancing the yield of coriander.

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Table 1. The genotypic and phenotypic (in parenthesis) correlation coefficient among 12 quantitative traits in coriander.

Characters		Plant height (cm)	Primary branches/ plant	Secondary Branches/ plant	Leaf area	Days to 50% flowering	No. of umbels/ plant	No. of umballete/ umbel	No. of seed/ umbel	Test weight (g)	Days to harvesting	Chlorophyll content	Correlation with seed yield/ plant (g)
Plant height (cm)	rg	1.00	0.67	0.51	0.70	0.64	0.25	0.49	0.48	-0.42	0.66	0.56	-0.33
	rp	(1.00)	0.60**	0.50**	0.69**	0.62**	0.25 *	0.47**	0.47 **	-0.42 **	0.65 **	0.55 **	-0.33**
Primary branches/ plant	rg		1.00	0.91	0.78	0.62	0.48	0.51	0.69	-0.56	0.63	0.47	-0.22
	rp		(1.00)	0.83 **	0.69 **	0.54**	0.41**	0.46**	0.60 **	-0.50**	0.56 **	0.41 **	-0.20
Secondary branches/ plant	rg			1.00	0.65	0.70	0.49	0.62	0.65	-0.55	0.67	0.41	-0.21
	rp			(1.00)	0.63 **	0.67**	0.48**	0.60**	0.63**	-0.54**	0.66 **	0.40 **	-0.21
Leaf area (cm²)	rg				1.00	0.69	0.59	0.50	0.53	-0.36	0.68	0.56	-0.08
	rp				(1.00)	0.66 **	0.58**	0.48**	0.51 **	-0.36 **	0.66 **	0.55 **	-0.08
Days to 50% flowering	rg					1.00	0.55	0.65	0.45	-0.57	0.96	0.60	-0.27
	rp					(1.00)	0.53**	0.58**	0.43 **	-0.55 **	0.92 **	0.58 **	-0.24 *
No of umbels per plant	rg						1.00	0.52	0.61	-0.36	0.53	0.43	0.25
	rp						(1.00)	0.50**	0.60**	-0.35 **	0.52 **	0.42 **	0.25 *
No. of umballate/umbel	rg							1.00	0.68	-0.45	0.53	0.31	-0.10
	rp							(1.00)	0.64 **	-0.43**	0.50 **	0.31 **	-0.10
No. of seed per umbel	rg								1.00	-0.61	0.44	0.43	0.11
	rp								(1.00)	-0.61 **	0.44 **	0.43**	0.12
Test weight (g)	rg									1.00	-0.60	-0.35	0.31
	rp									(1.00)	-0.59**	-0.35**	0.311**
Days to harvesting	rg										1.00	0.65	-0.40
	rp										(1.00)	0.64 **	-0.39**
Chlorophyll content	rg											1.00	-0.05
	rp											(1.00)	-0.05
Seed yield per plant (g)	rg												1.00
	rp												(1.00)

*, **Significant at 5 and 1 % levels, rg= genotypic correlation; rp = phenotypic correlation

Table 2. Direct (diagonal) and indirect effect of different traits contributing to yield in coriander

Characters	Plant height (cm)	Primary branches/ plant	Secondary Branches/ plant	Leaf area (cm²)	Days to 50 % flowe	No of umbels / plant	No. of umballete /umbel	No. of seed/um bel	Test weight (g)	Days to harves ting	Chlorop hyll	Correlation seed yield/ plant
Plant height (cm)	0.233	0.158	0.121	0.164	0.150	0.059	0.115	0.112	-0.099	0.155	0.131	-0.337
Primary branches/ plant	-0.668	-0.988	-0.901	-0.772	-0.614	-0.477	-0.506	-0.685	0.556	-0.629	-0.466	-0.228
Secondary branches/ plant	0.271	0.477	0.523	0.344	0.368	0.260	0.329	0.342	-0.292	0.354	0.215	-0.217

Leaf area (cm^2)	0.083	0.093	0.078	0.119	0.083	0.071	0.060	0.063	-0.043	0.081	0.066	-0.087
Days to 50 % flower	1.808	1.744	1.975	1.959	2.804	1.552	1.829	1.275	-1.607	2.692	1.707	-0.271
No of umbels/ plant	0.124	0.236	0.244	0.293	0.271	0.490	0.258	0.300	-0.178	0.264	0.211	0.255
No. of umballate/umbel	-0.584	-0.604	-0.743	-0.601	-0.770	-0.622	-1.180	-0.809	0.531	-0.626	-0.375	-0.107
No. of seed/ umbel	0.490	0.706	0.666	0.540	0.463	0.625	0.699	1.019	-0.628	0.458	0.443	0.119
Test weight (g)	-0.119	-0.158	-0.157	-0.103	-0.160	-0.102	-0.126	-0.172	0.280	-0.168	-0.099	0.316
Days to harvesting	-2.039	-1.945	-2.069	-2.093	-2.935	-1.650	-1.622	-1.373	1.836	-3.056	-2.002	-0.401
Chlorophyll	0.061	0.051	0.045	0.061	0.067	0.047	0.035	0.047	-0.039	0.07	0.110	-0.057

Residual effect =   0.236; Bold figures in main diagonal indicate direct effect

A Study of Primary Productivity on Grassland of Bilaspur District (Chhattisgarh) India

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Abstract- The Primary productivity of a grassland commune located at Kota of Bilaspur district, Chhattisgarh lies between $21°$–47' to $23°$_8' North latitude and $81°$_14' to $83°$_15' East longitude. A circular quadrate of $0.35 \, m^{-2}$ was used for sampling the above ground plant parts. The size of quadrate was determined by Species Area Curve Method. The grassland community comprised of 17 species (8 were grasses and 9 were non-grasses). *Bothriochloa Pertusa,Cynodon dactylon, Digitaria longiflora,* among the grasses and *Desmodium Triflorum, Parthenium* and *Sida cordifolia* among the non-grasses were found dominant during the study period. The annual grass production was found to be 3502.67 gm^{-2} /year. The non-grass production showed maximum in the month of January (128.20 gm^{-2}) and minimum in the month of June (1.95 gm^{-2}). The annual non-grass production was found to be 782.87 gm^{-2} /year. The study of primary productivity helps to recovery of the natural ecosystems to the earlier balanced state and continuation the biodiversity of grassland community in world.

Index Terms- Biomass, Live green, standing dead, litter, below ground

I. INTRODUCTION

The Indian grassland commune are totally depending upon the climatologically factors and various biotic interferences. Grassland were are important segment in the worlds productivity long before the advent of man and perhaps the extent of grassland will control man's diet population & habits in the future as it was for many other animals' (vandyneal alal 1978). Human activities have mainly affects the grassland all over the world and much of the area has been converted in to agricultural land. As a result of excessive human interference it is difficult to locate virgin grassland in our country. The grassland vegetation mainly consist of a number of perennial grasses mixed with legumes & fob's with the advent of the mansoon in June & fairly good number of special start their growth either through seeds or sporting rhizomes.

The rate of organic matter accumulation in plant tissue in excess of respiratory utilization refers to net primary production while the total weight of the living component present at any given time in the ecosystem accounts for the biomass. The customary approach in ecologically works is to evaluate production as a parameter of productivity as a functional aspect of the ecosystem has attracted much attention during recent year's and much information is available now on primary production & turnover parameters for grassland of tropical & temperate regions. The important contributions to the production relation of grassland communities of India have been revised by sing (1976) pandey (1977) Tiwary & sing (1981).

Litter decomposition is also important in terrestrial ecosystem for maintaining productivity because it regulates the availability of nutrients needed for plant growth. Mson (1977), distinguished there basic process of decomposition namely biological action withering and leaching, key factor affecting decomposition are the decomposer community and its complex nature swift et al 1979, litter quality Berg and Mc Claugherty 1989, Hooper and Vitousek 1998, Kalburtsi et al 1999, Moretto et al 2001, Ross et al 2002 and the physical and chemical characteristics of the environment vitousek et al 1994, Kalburtil et al 1997, 1998, Kaukoura 1998, 1999, Chen and stark 2000.

II. MATERIALS AND METHODS

CLIMATE CONDITION

Bilaspur was Sub tropical temperature remains moderate for most of the year a part from the summer from March to June which can be externally not approx. $45 °C$. The city receives about 1300 mm of rain mostly in the monsoon season from late to June early October winter last from November to January and are mild although low scan fall to $5 °C$ ($42 °F$).

The soil of the experimental site was found to be moderately acidic (pH = 6.1). The percentage of soil phosphorus at the protected site remained more or less constant through the year. It ranged from 0.02 to 00.03 percent. The overall organic carbon (0.60%), the percentage of nitrogen in the soil ranged between 0.10 to 0.42% and available potassium (57 to 93 ppm).

Table-1: the pH, conductivity, organic carbon (%), available phosphorus and potassium content of the soil content of the study site (values are in mean ± SD, n = 5 each

depth in cm	pH	Conductivity	Organic carbon (C) (%)	Available phosphorus (P) (ppm)	Available potassium (K) (ppm)
0 to 10	5.15	0.41	0.56	0.65	92.53
10 to 20	6.20	0.32	0.64	0.48	85.47
20 to 30	6.95	0.32	0.60	1.11	57.54

III. SAMPLE COLLECTION AND IDENTIFICATION

PLANT SAMPLING-
- The monthly sampling for above ground biomass will be done in a random way in all the 3 parts of the grassland area by harvest method 3 Quadrates will be taken at each sampling site on each sampling date. The clipping of above ground parts will be done closed to the ground with the help of a scissor. The material will be separated species wise.
- The below ground plant parts will be collected, by monolith method (weaver and darland 1949) 3 Monolith of 25 x 25 x 30cm., will be taken at each site on each sampling time.

SOIL SAMPLE:
Composite soil samples will be collected every month.

PRODUCTIVITY STUDY:
The various parameters of biomass structure and function will be calculated from the sampled plant materials.

BIOMASS AND PRIMARY PRODUCTIVITY
The productivity for each category of plant materials i.e. live green, standing dead, litter and below ground parts was calculated by summing up of the positive increments of concerned biomass during the study period and was expressed as $gm^{-2}/year$.

Litter disappearance (LD) was calculated by subtracting the total net productivity of litter during the year from the difference between final and initial litter biomass (Golley, 1965).Below ground disappearance (BGD) was calculated from the difference between peak below ground biomass and succeeding minimum below ground biomass (Sims & Singh, 1971).Total disappearance was obtained by adding litter disappearance and below ground disappearance.

IV. RESULTS

The green biomass of grasses sedges increased continuously from 0.86 gm^{-2} may to a peak value of 258.31 gm^{-2} in October. The total above ground standing dead biomass in site was minimum 7.60 gm^{-2} in June & maximum 136.08 gm^{-2} in October. The total above ground biomass (green dead) in site increased from a minimum of 23.85 gm^{-2} in June to 422.71 gm^{-2} in October .The litter in site increased from January & reached its peak of 76.43 gm^{-2} in October the belowground biomass of both the sites decreased initially in the rainy season & than increased in site the peak value was 260.30 gm^{-2} in January

The total biomass of site increased from 45.50 gm^{-2} in June to 678.39 gm^{-2} in January where as it fluctuated throughout the year. The below ground/ above ground ratio in site ranged between 0.42 to 0.90.

Live green biomass (grasses, non grasses and total live green) of the study site. The green biomass did not show any trend. It attained a peak during October and minimum in month of May. The standing dead biomass also did not show any trend and the peak in the month of October (133.69 gm^{-2}). Minimum standing dead biomass was recorded in the month of May (4.36 gm^{-2}).Total above ground biomass is the sum total of live green biomass and standing dead biomass. It was found to be minimum in the month of May (5.12 gm^{-2}) and maximum during Oct0ber (406.97 gm^{-2}).

The litter biomass of the community exhibited an decreasing trend from January to May and increasing in June, September and October. There is no litter found in month of July and August. Thereafter the value showed a declined trend till May (18.09 gm^{-2}). The litter biomass again showed an increasing trend showing a maximum of (76.43 gm^{-2}) during the last sampling period i.e. in the month of October.

The sequence of monthly above ground biomass values showed similar trend to that observed in case of live green biomass values. The below ground biomass values decreased from January (260.3 gm^{-2}) to June (45.61 gm^{-2}) and onwards

the values showed gradual increased from July (58.64 gm^{-2}) to October (251.324). The total biomass of the community ranges from 54.34 gm^{-2} to 734.724 gm^{-2}. The maximum biomass was observed in October and minimum in the month of May.

The non-grass production showed maximum in the month of January (36.54 gm^{-2}) and minimum in the month of May (0.36 gm^{-2}). The annual non-grass production was found to be 134.01 ($gm^{-2}/year$). The total live green production showed their minimum and maximum value during May ($1.22 gm^{-2}$) and October (273.28 gm^{-2}). Out of the annual net live green production (1326.13 $gm^{-2}/year$) 89.89% was contributed by grasses and 10.11% by non-grasses. The standing dead production was found to be 659.29 ($gm^{-2}/year$)

Table- 2: Biomass (gm^{-2}) of different species during the study period.

Month	Live green			Standing dead	Litter	Above ground		Below ground	Total Biomass
	Grasses	Non grasses	Total			Lg + Sd	Lg + Sd + L		
Oct.	189.3	14.77	204.07	73.44	70.12	277.51	347.63	158.30	505.93
Nov.	143.79	14.93	158.72	109.52	72.30	268.24	340.54	168.5	509.04
Dec.	76.49	17.51	94	52.65	56.64	146.65	203.29	130.72	334.01
Jan.	144.18	36.54	180.72	105.42	64.34	286.14	350.48	260.3	610.78
Feb.	25.2 7	2.4	2.4	14.93	41.50	17.33	58.83	82.67	141.5
Mar.	7.10	1.39	8.49	4.40	36.30	12.89	49.19	57.26	106.45
Apl.	8.95	1.2	10.15	17.03	21.06	27.18	48.24	28.20	76.44
May.	0.86	0.36	1.22	4.36	18.09	5.58	23.67	30.67	54.34
Jun.	14.30	1.95	16.25	10.60	18.76	26.85	45.61	21.65	67.26
Jul.	38.43	4.21	42.64	19.26	--	61.9	61.9	58.64	120.54
Aug.	119.45	7.89	127.34	47.39	--	174.73	174.73	98.67	273.4
Sep.	195.14	11.71	206.85	66.60	45.32	273.45	318.77	197.34	516.11
Oct.	254.13	19.15	273.28	133.69	76.43	406.97	483.4	251.324	734.724
Total	**1192.12**	**134.01**	**1326.13**	**659.29**	**520.86**	**1985.42**	**2506.28**	**1544.24**	**4050.524**

Table- 3: Total annual net primary production $gm^{-2}/year$ of different grassland community

Author(s)	Year	Location	Type of community(Dominance)	NPP ($gm^{-2}/year$)
Ambasht *et al.*	1972	Varanasi	Dichanthium	1420
Varshne	1972	New Delhi	Heteropogon	1330
Singh & Yadav	1972	Kurukhetra	Panicum	2980
Mishra	1973	Ujjain	Dichanthium	989
Billore & Mall	1977	Ratlam	Sehima	846
Misha	1978	Berhampur	Aristida	1447
Malana	1981	Berhampur	Aristida	1180
Pradhan	1994	Bhubaneswar	Aristida	1474
Behera	1994	Phulbani	Heteropogon	809
Barik	2006	Berhampur	Aristida	929
Pramod ku. kar	2013	Rangamatia	Mixed Type	6403
Present study		Bilaspur	Mixed Type	989

V. GENRAL DISCUSSION

The annual net above ground production of this grassland, it was observed that the present value showed $989 gm^{-2}/year$. The litter production of the community was evident from January to May and from September to December. No litter production was observed during June, July and August. This may perhaps be due to rapid decomposition of litter.

The rain fall, atmospheric temperature and soil condition were found to be suitable for the growth and development of all species so that September exhibited peak value. Onwards the amount of rain fall, atmospheric temperature along with the soil condition might not be favourable for the growth of vegetation as a result of which a gradual declined in green biomass was observed till to the end of the sampling period.

VI. NET PRIMARY PRODUCTION

Table-3 gives the annual, net primary production of some Indian grassland. It indicates that the net production in this study was no way similar to the findings of other workers as reported earlier. It showed marked higher value compared to the findings of Ambasht *et al.* (1972), Varshney (1972), Singh & Yadava (1972), Misra (1973), Billore & Mall (1977), & Misra (1978), Malana (1981), Pradhan (1994), Behera (1994), Barik (2006) and Pramod kumar kar(2013). It was observed that rain fall was not a single factor responsible for this variation. There were some other factors including rain fall that influenced the net production in the community. It might be due to phenology of the species, rate of evaporation, temperature variability, fertility of soil etc.

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Intrusion and Fault Tolerance in Heterogeneous Wireless Sensor Networks Using Weighted voting Method

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*Abstract-*A wireless sensor network (WSN) is a large collection sensor node with limited memory, battery and processing capacity. Due to this limited resources the energy conservation plays important role in wireless sensor networks. We formulate optimization problem for dynamically determining the best redundancy level to apply to multipath routing for intrusion tolerance so that query success probability maximized while prolonging system useful lifetime. In redundancy management "packet dropping" and "Bad mouthing" are the major problems in managing the redundancy. In order sort out these problems we plan to propose "weighted voting" based trust management method is used to achieve best energy efficiency. The main function of weighted voting method is to find the trust/reputation of neighbor nodes.

Index Terms- Multipath routing, Wireless Sensor Networks, Bad mouthing, security, energy conservation.

I. INTRODUCTION

T HE Wireless Sensor Network provides a new prototype for sensing and disseminating information from various Environments, with the potential to serve many and diverse applications. WSN consists of a huge number of small sensor nodes that are grouped with analyzing, processing and communicating components and base station. The WSN authority can send queries to the base station and spread those queries to network. Hence base station act as a gateway between the WSN and external world. The applications of the WSN include Earth monitoring, health care monitoring, industrial monitoring etc., This feature of sensor networks makes them more susceptible to various attacks. So Wireless Sensor Networks need more security to withstand in critical areas. Cryptography and authentication approach provides security to WSN. But these approaches do not provide sufficient security in autonomous network. So a trust based methods are used for providing security to the network. For security enhancement and successful collaboration of sensor networks, trust based approach is essential.

In most wireless sensor networks (WSNs) are organized in an unrelated environment in which energy replacement is difficult if not impossible. WSN must not only satisfy the application specific QoS requirements such as timeliness, security and reliability but also minimize energy consumption to prolong the useful system lifetime. The tradeoff between consistency gain vs energy consumption with the goal to maximize the WSN system lifetime has been well explored in the literature

No prior work exists to consider the tradeoff in the presence of malicious nodes. Routing among multiple positions is to consider an good mechanism for fault and intrusion tolerance to improve data delivery in Wireless Sensor Networks. The idea for the probability of that least one path reaching the sink node or base station increases as we have more paths during delivery of the data The most prior request focused on using multiple routing to improve efficiency, some attention has been paid to using among the routing to tolerate insider attacks however, largely ignored the tradeoff between gain and QOS. Energy consumption is very short in the system lifetime. The research problem we are addressing in this paper is effective redundancy management of a clustered HWSN to prolong its lifetime operation in the presence of unreliable and malicious nodes. We address the tradeoff between consumption of the energy and QoS gain in timeliness, reliability and security with the goal to maximize the lifetime of a clustered HWSN while satisfying application QoS requirements in the context of multipath routing. Most specifically, we analyze the optimal amount of redundancy that through which data are routed to a remote sink in the presence of unreliable and malicious nodes with attackers, so that the query success ratio of the probability is maximized while maximizing the HWSN lifetime. We consider this optimization problem for the case in which a voting-based distributed intrusion detection algorithm is applied to remove malicious nodes from the HWSN. The contribution is a modeling based analysis methodology by which the optimal with multipath redundancy levels and intrusion detection settings may be identified for satisfying application QoS requirements while maximizing the lifetime of HWSNs.

In paper [1] the author has proposed based on weighted voting that allows for each local window to cast not just a single vote, but a set of weighted votes. In [2] the paper has a proposed algorithm called greedy weighted region routing (GWRR) algorithm that addresses message loss tolerability in harsh and hostile environments by assigning higher weights to harsher regions and then we present a nearly-optimal routing in dense WSNs. In another paper [3] propose to use the key techniques and probabilistic multi-path redundancy transmission (PMRT) to find out the wormhole attacks. Identification based key management scheme is used for wireless sensor networks to build security link and detect wormhole attack.

Heterogeneous wireless sensor network (HWSN) consists of sensor nodes with different ability, such as different computing power and sensing range. Compared with homogeneous WSN, the heterogeneous WSN consists of sensor nodes with different abilities, such as various sensor types and communication and sensing range, thus provides more flexibility in deployment.

For example, WSN can construct in which nodes are equipped with different kinds of sensors to provide various sensing services.

The tradeoff Performance of both energy consumption and QoS gain in both security and reliability to maximize the system lifetime and also uses the multipath routing to tolerate intrusion detection process where decision is based on a majority voting of monitoring nodes and considering energy being consumed for intrusion detection. Both cluster head (CHs) and sensor nodes (SNs) can be compromised for lifetime maximization. The basic idea is that heterogeneous wireless sensor network (HWSNs) nodes having wireless link with dissimilar communication range, sensing range, densities and capabilities. It Increases the network lifetime and reliability and energy also achieved.

Intrusion detection system (IDS) is used to detect malicious nodes. Two problems will arise:1)what paths to use and 2) how many paths to use and to overcome this problem multipath routing is used, is a routing technique of using multiple alternative paths through a network. Trust based systems are used to tackle the "what path to use" problem and here trust based intrusion detection observe the existence of optimal trust threshold for minimizing both false positive and false negative. and is used to identify the best trust formation model as well as drop dead trust is the best application level threshold under which anode is considered misbehaving to optimize the application performance in false alarm probability.

When data need to be sent from a sender to a receiver, then the data will go to the processing center. In fig: 1 which consists of cluster head which will be a random based on the success ratio with in a particular cluster. For each and every group of cluster a cluster head will be selected based on the success ratio. Then the router will maintain the multiple sensor nodes which are under them. If a sensor node is need to send some data to other sensor node. The sensor node will transmit the data to the cluster head. The router will start its work of finding the path way to the destination node. The path for the destination node is obtained by shortest distance. The path of the destination node have been found the data will be transmitted from one cluster head to another cluster head by using the nodes nearby the cluster head. Then data will be reaching the processing center where the destination point will be shown along with the data. Now processing data takes the whole responsibility of the data which has been got from the cluster head's. The data will be containing the information that is needed to be sent to a particular user and also the destination id/address. The processing center can only be able to open the destination id/address information and not the information that is to be shared with the destination.

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When data need to be sent from a sender to a receiver, then the data will go to the processing center. In fig: 1 which consists of cluster head which will be a random based on the success ratio with in a particular cluster. For each and every group of cluster a cluster head will be selected based on the success ratio. Then the router will maintain the multiple sensor nodes which are under them. If a sensor node is need to send some data to other sensor node. The sensor node will transmit the data to the cluster head. The router will start its work of finding the path way to the destination node. The path for the destination node is obtained by shortest distance. The path of the destination node have been found the data will be transmitted from one cluster head to another cluster head by using the nodes nearby the cluster head. Then data will be reaching the processing center where the destination point will be shown along with the data. Now processing data takes the whole responsibility of the data which has been got from the cluster head's. The data will be containing the information that is needed to be sent to a particular user and also the destination id/address. The processing center can only be able to open the destination id/address information and not the information that is to be shared with the destination.

● - Cluster head
○ - Sensor nodes

Fig 1: Packet Delivery

Now the processing data will find the destination address, and will find under which cluster head the node lies r the node itself a cluster head. After know the information about the destination point the data will be forwarded to the destination point. In the above fig:4.1 the packet delivery has been done successively, the cluster head which got the data from the nodes under. Then the cluster head which got the data, forward to the other cluster head to its way to the processing center. There the data will be forwarded to the particular node, from the processing center. When the process executes without error then nothing to be worried, but we know that the sensor nodes are wireless and will be movement, no nodes will be with stand in the same place for a long time so the data which has to be sent may sent twice as because the node moves from one cluster group to another cluster group. The PS will check the data and result that the data has been already sent and the data will be sent again to the cluster group nodes, which forwarded to the PS. There a process called

Packet drop must be done. If the process of packet drop has been done then the node is not a malicious or an intruder.

Fig 2: Packet Drop

In fig 2 packet Drop we can see that the data has been sent twice and the processing center has again sent the data to the cluster which has forwarded the packet to processing center. There the packet drop process has been done successively. And know that the information has not be stolen and seen by other node.

The packet will be dropped by the cluster head, when the data has been already sent. If the packet has not been dropped then the cluster head or the node which did not drop the packet behaves as a malicious node. The function of no dropping the packet is called as Bad Mouthing. This becomes the main problem when in the redundancy, wireless sensor networks. When some nodes in a cluster group need to send some data to other cluster node. The nodes which need to send information will approach the cluster head of its group, and then the data will be sent to the cluster head. Each and every cluster will have direct connection or an indirect connection to processing head. Now the cluster head will get the data and send the data to the processing head. As the cluster nodes and head will be in movement the data can be sent more than one time. When the data reaches the processing head the information will be checked and will be sent to the particular node destination.

As like the before process the data will be reaching the processing head, the PC (processing center) will analyze the data, and identifies the data has been sent already to the respective destination node. So the PH will send the data again to a cluster head with the information that the data has been already sent. Now the data must reach the original sender node as the data has been already sent, so the processing Center will forward the data to the cluster heads, and from the cluster head the data will be forwarded to the respective cluster node. Suppose the data did not reach the source then the data must be dropped by some cluster head. If did not then "Bad Mouthing" affects. This problem can be overcomes by using the proposed technique called "weighted based voting'.

Fig 3: Bad mouthing

In the above diagram we can view the occurrence of the "Bad mouthing" attack, and also no packet drop by the cluster head After getting the data from the processing center. This attack only occurs due to the movement of the cluster nodes. The movement of the cluster nodes cannot be stopped and should not be done. So the problem of 'bad mouthing' can be stopped by using the weighted based voting.

As discussed before the problem of "bad mouthing became an issue in wireless sensor network, this attack occurs mainly in cluster based routing and uses takes the data or information of other node, when packet drop need to be done. To remove malicious nodes from the system, a voting based distributed IDS is applied periodically in every time interval. A CH is being assessed by its neighbor CHs, and a SN is being assessed by its neighbor SNs. In each interval, m neighbor nodes (at the CH or SN level) around a target node will be chosen randomly as voters and each cast their votes based on their host IDS results to collectively decide if the target node is still a good node. The m voters share their votes through secure transmission using their pair wise keys.

When the majority of voters come to the conclusion that a target node is bad, then the target node is evicted. For both CHs and SNs, there is a system-level false positive probability that the voters can incorrectly identify a good node as a bad node. There is also a system-level false negative probability that the voters can incorrectly misidentify a bad node as a good node. These two system-level IDS probabilities will be derived based on the bad-mouthing attack model in the paper. Assume that the capture time of a SN follows a distribution function Fc(t) which can be determined based on historical data and knowledge about the target application environment.

Fig 4: Weighted Based Voting

In the above diagram, the nodes in a particular cluster are in need to send some data or information to a destination. Then now by using the proposed scheme of Weighted based voting, the process begins with the weighting of cluster heads. The head which has a highest weight will be having high successive rate. So the data will be sent to the particular cluster head to processing center. While the cluster head get the same data twice the packet drop will be as a redundancy data. Here a cluster head sends a data and using weighted voting it selects the cluster head which has a weight "10", and from there again the process of weighted voting begins of selecting the cluster head now heads has the values "7", "20". So by selecting highest weight the data travels through weight "20". And then "14" then to the processing head.

Then, the probability that a SN is compromised at time t, given that it was a good node at time t, denoted by 1, is given by: We note that _1 is time dependent. For the special case in which the capture time is exponential distributed with rate $\lambda c, \_1 = 1 - 2345 \times 789$:.Recallthat the voting-based distributed IDS executes periodically with being the interval. At the ith IDS execution time (denoted by), a good node may have been compromised with probability1 since the previous IDS Execution time.

III   CONCLUSION

As many attacks like the "bad mouthing" are approaching to attack the wireless sensor network. We are in need to get prepare For the attacks to be rectified. As like as the same in this paper the Bad mouthing attack has been controlled by using weighted based voting method which has been proposed in this paper. In future this bad mouthing will itself attack in different form or will get newer version, so the rectification is also needed to be updated "higher weight based voting.

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Enhancement of Secure and Efficient Data Transmission in cluster based Wireless Sensor Networks

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Abstract- Wireless Sensor Networks (WSN) plays vital role in research field. Due to its rapidly increasing application in monitoring various kinds of environment by sensing physical phenomenon. Clustering is an efficient and effective method to enhance performance of the WSNs system. In this project work, we study a secure transmission of data for cluster-based WSNs (CWSNs), where the clusters are formed dynamically and randomly. We propose two Secure and Efficient data Transmission (SET) protocols for CWSNs, called SET-IBS and SET-IBOOS, by using the Identity-Based digital Signature (IBS) scheme and the Identity-Based Online/Offline digital Signature (IBOOS) scheme, respectively. The cluster routing protocol LEACH (Low-Energy Adaptive Clustering Hierarchy) is considered and improved. In SET-IBS, security relies on the hardness of the Diffie-Hellman problem in the pairing area. SET-IBOOS additionally decreases the computational operating cost for protocol security, which is critical for WSNs, while its defense depends on the stability of the problem of discrete logarithm. We propose a clustering routing protocol named Enhanced LEACH, which extends LEACH protocol by balancing the energy consumption in the network. The simulation results show that Enhanced LEACH outperforms LEACH in terms of network system lifetime and reduce the energy consumption.

Index Terms- CWSN, LEACH, SET-IBS, SET-IBOOS

I. INTRODUCTION

Wireless sensor network (WSN) is a system of network comprised of spatially distributed devices using wireless sensor nodes to examine environmental or physical conditions, such as temperature, sound and movement. The individual nodes are competent of sensing their environments, processing the information statistics in the vicinity, and sending data to one or more compilation points in a WSN. Efficient transmission of data is one of the most significant issues for WSNs. Usually many WSNs are installed in unobserved, harsh and often adversarial physical environments for specific applications, such as armed forces domains and sensing tasks with unreliable surroundings. Efficient and secure transmission of data is thus very essential and is required in many such realistic WSNs. Cluster-based transmissions of data in WSNs, has been examined by researchers in order to accomplish the network scalability and supervision, which maximizes node life span and reduces bandwidth utilization by using local cooperation between sensor nodes. In a cluster-based WSN (CWSN), each cluster has a leader sensor node, known as cluster-head (CH). A CH collects the data gathered by the leaf nodes (non- CH sensor nodes) in its cluster, and sends the pooled data to the base station (BS).The probability of the asymmetric key management has been revealed in WSNs in recent times, which compensates the deficiency from relating the symmetric key management for security. Digital signature is one of the most significant security services presented by cryptography in asymmetric key management systems, where the binding between the public key and the recognition of the signer is acquired via a digital certificate. The Identity-Based digital Signature (IBS) scheme, based on the complexity of factoring integers from Identity- Based Cryptography (IBC), is to develop an entity's public key from its character information, e.g., from its identification number or its name. This states that security must encompass every phase of the design of a wireless sensor network application that will require a high intensity of security. Probable applications comprise monitoring isolated or hostile locations, objective tracking in combat zone, catastrophe liberation networks, premature fire recognition, and environmental supervision. A primary topic that must be addressed when using cluster-based security protocols based on symmetric session keys is the means used for ascertaining the session keys in the primary place. A vital design concern for security protocols based onsymmetric keys is the degree of session key among the nodes in the system. On the other hand, it has the clear securitydrawback that the negotiation of a single node will disclose the global key.

A wireless sensor network (WSN) generally consists of a base station (or "gateway") that can communicate with a number of wireless sensors via a radio link. Data is collected at the wireless sensor node, compressed, and transmitted to the gateway directly or, if required, uses other wireless sensor nodes to forward data to the gateway. The transmitted data is then presented to the system by the gateway connection. The purpose of this chapter is to provide a brief technical introduction to wireless sensor networks and present a few applications in which wireless sensor networks are enabling. A WSN usually consists of tens to thousands of such nodes that communicate through wireless channels for information sharing and cooperative processing. WSNs can be deployed on a global scale for environmental monitoringand habitat study, over a battle field for military surveillance and reconnaissance, in emergent environments for search and rescue, in factories for condition based maintenance, in buildings for infrastructure health monitoring, in homes to realize smart homes, or even in bodies for patient monitoring. After the initial deployment (typically ad hoc), sensor nodes are

responsible for self-organizing an appropriate network infrastructure, often with multi-hop

Connection between sensor nodes. The onboard sensors then start collecting acoustic, seismic, infrared or magnetic Information about the environment, using either continuous or event driven working modes.

Fig 1: Architecture of WSN

II.   IRESEARCH ELABORATIONS

L. B. Jivanadham*et al.* proposed creation of a Secured Cluster-based architecture for a Dynamic Wireless SensorNetwork that applies two topology management procedures: node-move-in and node-move-out. The planned securityprotocol incorporate one round Zero Knowledge Proof and AES algorithm to relate for node authentication, whereveronly authenticated nodes will be acknowledged through node-move-in operation. In addition they explained that, itneeds $O(h+q)$ rounds for a node to connect into a network securely, where h is the height of the dynamic cluster-basedwireless sensor network and q is the number of adjacent nodes of a joining node. After the $O(h+q)$ attempts to join thenetwork, the node is considered as insecure and is eventually discarded from joining the network as in [1].

HichemSedjelmaci*et.al* proposed an intrusion detection framework for a cluster-based WSN (CWSN) that intend to

merge the advantage of anomaly and signature detection which are high discovery rate and low false positive,correspondingly. Wireless sensor networks (WSNs) have a enormous potential to be used in vital circumstances likearmed forces and commercial applications. On the other hand, these applications are mostly frequently to be deployedin hostile surroundings, where nodes and communication are smart targets to intruders. This makes WSNs susceptibleto a range of possible attacks. Because of their characteristics, conservative security methods are not appropriate. Sohere the authors have proposed an intrusion detection framework for a cluster-based WSN (CWSN) that aims to mergethe advantage of signature detection and anomaly which are high detection rate and low false positive, correspondinglyas in [2].

MaanYounis Abdullah *et al* in inspected the problem of security addition to cluster based communication protocols forhomogeneous wireless sensor networks containing sensor nodes with very limited resources, and proposed a securityresolution where clusters are created periodically and dynamically. Their explanation depicts re-keying functionprotocol for wireless sensor networks security. They have projected the local administrative functions as masterfunction, derivation function and rekeying function is imprinted with sensor node. A security and performance studyproved that it is very proficient in communication, storage, computation and this technique is very successful indefending against a lot of complicated attacks   [3]

Tingyao Jiang *et.al* presented a new dynamic intrusion detection method for cluster-based wireless sensor networks(CWSN). The nodes in a wireless sensor network are assembled into clusters depending on the particular relationshipswith a cluster head (CH) in every cluster. The projected scheme initially makes use of a clustering algorithm toconstruct a model of standard traffic behavior, and then uses this model of standard traffic to detect anomalous trafficpatterns. Along with the diverse network conditions of clusters, this method might also dynamically set differentdetection factors for different clusters to accomplish a more proper detection algorithm. The performance study showedthat the projected intrusion detection method can progress the detection accuracy and decrease the false positive rate, and is extremely efficient of the energy preservation as in [4].

Nikolaos A. Pantazis*et.al* presented a classification of energy efficient routing protocols and expanded theclassification initially done by Al-Kariki to better describe which issues/operations in each protocol illustrate/enhancethe energy efficiency issues. The distributed behavior and dynamic topology of Wireless Sensor Networks (WSNs)brings in many unusual requirements in routing protocols that should be fulfilled. The main important aspect of arouting protocol, so as to be efficient for WSNs, is the energy usage and the extension of the network's life span.During the past few years, a lot of energy efficient routing protocols have been projected for WSNs. The authors herepresented the four types of schemes of energy efficient routing protocols: Network Structure, Communication Model,Topology Based and Reliable Routing. The routing protocols which belong to the first type can be additionallyclassified as hierarchical or flat. The routing protocols belonging to the second type can be additionally classified asQuery-based or Coherent and non-coherent based or Negotiation-based. The routing protocols belonging to the thirdtype can be additionally classified as Location-based or Mobile Agent-based. The routing protocols belonging to thefourth type can be additionally classified as QoS-based or Multipath based. Lastly, a systematic review on energyefficient routing protocols for WSNs is provided as in [5].

Key management methods, except many of them were planned for flat wireless sensor networks, which are not suitablefor cluster-based wireless sensor networks (like LEACH). Here Kun Zhang *et.al* investigated adding security to clusterbased routing protocols for wireless sensor networks which consist of sensor

nodes with very inadequate resources, and have proposed a security solution for LEACH which is a protocol in which the clusters are created periodically anddynamically. The solution proposed by authors makes use of enhanced Random Pair-wise Keys (RPK) method, anoptimized security method that depends on symmetric key methods and is a lightweight and conserves the heart of theoriginal LEACH protocol. Simulations demonstrate that security of RLEACH has been enhanced, with reduction inenergy utilization and very less operating cost as in [6].

In Wireless Sensor Networks (WSNs), a crucial security necessity is authentication to evade attacks against secure Communication, and to diminish DoS attacks utilize the limited resources of sensor nodes. Resource restraint of sensornodes are major difficulty in applying strong public key cryptographic based mechanisms in WSNs. To deal with theproblem of authentication in WSNs, Yasmin, R *et.al* have proposed secure and efficient framework for authenticatedbroadcast/multicast by sensor nodes and for outside user authentication, which uses identity based cryptography andonline/offline signature schemes. The most important objectives of this framework are to allow all sensor nodes in thenetwork, initially, to broadcast and/or multicast an authenticated message rapidly; secondly, to confirm thebroadcast/multicast message sender and the message contents; and lastly, to confirm the authenticity of an outside user.The projected framework is also evaluated by means of the most secure and efficient identity-based signature (IBS)schemes as in [7].

A secure routing for cluster-based sensor networks is where clusters are formed periodically and dynamically. Togetherwith the investigation of ID-based cryptography for security in WSNs, Huang Lu *et.al* proposed anew secure routing protocol with ID-based signature scheme for cluster-based WSNs within which the security isdependent on the hardness of the Diffie-Hellman problem in the random oracle model. Here the deficiency inthe secure routing protocols with symmetric key pairing is pointed out by authors. Because of the communicationoperating cost for security, authors provide simulation investigation results in details to demonstrate how variousparameters act among energy efficiency and security as in [8].

A process by which data is collected and sent from sensor nodes to the base station is known as data aggregation. It iscompleted via some sensor nodes called aggregators. A key role is played by security in data aggregation procedure tomake sure confidentiality and privacy of aggregated data., In [9] Nguyen Xuan Quy et.al proposed a data aggregationmethod for cluster-based WSN that improves the security against attackers. This method was based on acceleratedhomomorphism public key encryption which presents continuous suppression of and supports hop-to-hop verification.The logical investigation and association demonstrate that this approach has both lower computational and bettersecurity performance as compared to other approaches as in [9].

In this paper, we do not assume any prior knowledge about the data indeed in many applications; raw data may not be easily categorized into different types. To transmit the collected data to

a remote location is also considered Expensive because the total collected data may be in a very large quantity. To facilitate data query. The operation of LEACH is divided into rounds. Each round begins with a setup phase when the clusters are organized, followed by a Steady-state phase when data are transferred from the nodes to the cluster head and on to the Base Station (BS).

The LEACH network has two phases: 1)set-up phase

$$T(n) = \{ \begin{array}{cc} \frac{p}{1-p(r\,mode\frac{1}{p})} & n \in G \\ 0 & otherwise \end{array}$$

The selected CH informs about its selections as CH among the group. Non cluster-head nodes decide their cluster for current round by choosing the CH that requires minimum communication energy, based on the received signal strength of the advertisement from each CH. After the selection each non-CH informs the CH by transmitting a join requestmessage (Join-REQ) back to the CH. Then the CH node sets up and broadcast a TDMA schedule to all member non-CH nodes.
2) Steady state phase:The Steady Sate Phase is broken into many frames, in which nodes can send their data to the CH at most once per time slot. CH sends the aggregated data to BS in single hop manner. The LEACH provides better results compared to earlier existing protocols e.g. direct communication protocol, minimum- transmission-energy protocol and static Clustering protocol in Wireless Sensor Network. The available redundant information is subsequently cancelled during aggregation process performed by CH.

Then the CH will broadcast an advertisement message to inform all others that it is the new cluster-head. The nodes send the join-request message containing their IDs by using CSMA (carrier sensing multiple access) to join a cluster. The node joins that cluster from which they received strongest strength signal. After that, each CH knows its own cluster members information. Based on the message, the CH creates TDMA schedule table and broadcasts it to the cluster members. So all the member nodes know their idle slots, and then the steady-state phase begins.

The cluster based protocols (like LEACH) which are the data transmission protocols for WSNs, are susceptible to many security attacks. In general, the attacks to Cluster Heads in CWSNs can produce serious damage to the network, since security attacks. data aggregation and data transmission rely on the CHs primarily. If an invader manages to act as if it's a CH or negotiate the CH, it can incite attacks such as selective forwarding attacks and sinkhole, thus upsetting the network. Alternatively an attacker may mean to insert false sensing data into the WSN, like pretending as a leaf node transferring false information to the CHs. However, LEACH like protocols are extra tough against insider attacks rather than other types of protocols in WSNs. Since CHs are rotating from nodes to nodes in the network by rounds making it harder for types of protocols in WSNs.

Fig 2: Example of LEACH Network

The goal of the proposed secure data transmission for CWSNs is to guarantee a secure and efficient data transmission between leaf nodes and CHs, as well as transmission between CHs and the BS. Meanwhile, most of existing secure transmission protocols for CWSNs in the literature, however, apply the symmetric key management for security, which suffers from the orphan node problem that is introduced, In this paper, we aim to solve this orphan node problem by using the ID-based crypto-system that guarantees security requirements, and propose SET-IBS by using the IBS scheme. Furthermore, SET-IBOOS is proposed to reduce the computational overhead in SET-IBS with the IBOOS scheme. The propose two novel Secure and Efficient data Transmission (SET) protocols for CWSNs, called SET-IBS and SET-IBOOS, by using the IBS scheme and the IBOOS scheme, respectively. We first present SET-IBS in this section. The proposed SET-IBS has a protocol initialization prior to the network deployment and operates in rounds during communication, which consists of a Setup phase and a Steady-state phase in each round. We introduce the protocol initialization; describe the key management of the protocol by using the IBS scheme, and the protocol operations afterwards.

After the protocol initialization, SET-IBS operates in rounds during communication. Each round consists of a setup phase and a steady-state phase. We suppose that, all sensor nodes know the starting and ending time of each round, because of the time synchronization.

The operation of SET-IBS is divided by rounds as shown in Figure, which is similar to other LEACH-like protocols. Each round includes a setup phase for constructing clusters from CHs, and a steady-state phase for transmitting data from sensor nodes to the BS. In each round, the timeline is divided into consecutive time slots by the TDMA (time Division multiple access) control. Sensor nodes transmit the sensed data to the CHs in each frame of the steady state phase. For fair energy consumption, nodes are

randomly selected as CHs in each round, and other non-CH sensor nodes join clusters using one-hop transmission, depending on the highest received signal strength of CHs. In order to elect CHs in a new round, each sensor node determines a random number and compares it with a threshold. If the value is less than the threshold, the sensor node becomes a CH for the current round. In this way, the new CHs are self-elected based by the sensor nodes themselves only on their local decisions, therefore, SETIBS functions without data transmission with each other in the CH rotations. The steady-state phase consists of the latter two Steps. In the setup phase, the time-stamp T_s and node IDs are used for the signature generation. Whereas, in the Steady-state phase, the time-stamp ti is used for the signature generation securing the inner cluster communications, and T_s is used for the signature generation securing the CHs-to-BS data transmission. The proposed SET-IBOOS operates similarly to that of SETIBS. SET-IBOOS works in rounds duringcommunication, and the self-elected CHs are decided based on their local decisions, thus it functions without data transmission in the CH rotations. For the IBOOS key management in SET-IBOOS, the offline signatures are generated by the CHs, which are used for the online signing at the leaf nodes.

Fig 3:LEACH Protocol operation

Operations of SET IBS and SET IBOOS Protocols

Setup phase			
Step 1.	$BS \Rightarrow G_s$	:	$\langle ID_{bs}, T_s, nonce \rangle$
Step 2.	$CH_i \Rightarrow G_s$	:	$\langle ID_i, T_s, adv, \sigma_i, c_i \rangle$
Step 3.	$L_j \rightarrow CH_i$	:	$\langle ID_i, ID_j, T_s, join, \sigma_j, c_j \rangle$
Step 4.	$CH_i \Rightarrow G_s$	:	$\langle ID_i, T_s, sched(\ldots, ID_j/t_j, \ldots), \sigma_i, c_i \rangle$
Steady-state phase			
Step 5.	$L_j \rightarrow CH_i$	:	$\langle ID_i, ID_j, t_j, C, \sigma_j, c_j \rangle$
Step 6.	$CH_i \rightarrow BS$	:	$\langle ID_{bs}, ID_i, T_s, F, \sigma_i, c_i \rangle$

Setup phase

Step 1.	$BS \Rightarrow G_s$	:	$\langle ID_{bs}, T_s, nonce \rangle$
Step 2.	$CH_i \Rightarrow G_s$	:	$\langle ID_i, T_s, adv, \sigma_i, z_i \rangle$
Step 3.	$L_j \rightarrow CH_i$	:	$\langle ID_i, ID_j, T_s, join, \sigma_j, z_j \rangle$
Step 4.	$CH_i \Rightarrow G_s$	:	$\langle ID_i, T_s, alloc(\ldots, ID_j/t_j/\widehat{\sigma}_j,\ldots), \sigma_i, z_i \rangle$

Steady-state phase

| Step 5. | $L_j \rightarrow CH_i$ | : | $\langle ID_i, ID_j, t_j, C, \sigma_j, z_j \rangle$ |
| Step 6. | $CH_i \rightarrow BS$ | : | $\langle ID_{bs}, ID_i, T_s, F, \sigma_i, z_i \rangle$ |

/* The BS broadcasts its information to all nodes. */
/* The elected CHs broadcast their information. */
/* A leaf node joins a cluster of CH_i. */
/* A CH i broadcasts the allocation message. */

/* A leaf node j transmits the sensed data to its CH i. */
/* A CH i transmits the aggregated data to the BS. */

Enhanced leach is a T-LEACH stands for threshold-based LEACH because it replaces cluster heads based on the threshold value of residual energy on the sensor nodes. In traditional protocols relating to cluster optimization, the authors proposed that the number of cluster heads be reduced to decrease energy consumption or that energy efficiency-based optimal cluster sizes be constructed to extend the survival time of the network. LEACH algorithm has a structure where cluster heads are selected according to probabilistic values and the collection and transmission of messages occur during each round. Consequently, the number of cluster heads and rounding periods come to be closely related to energy consumption. In these algorithms, nodes play the roles of cluster heads periodically, and these are not considering energy cost of that time. When arbitrary sensor nodes become cluster heads through the performance of rounds, nodes selected as cluster heads must broadcast to member nodes of the clusters to which they belong that they have become cluster heads. Consequently, as the frequency of rounding and of cluster head replacement increases, energy consumption increases due to message transmission for broadcasting. All the nodes start with initial power. It's impossible that sensor nodes recharge energy and replace battery in ubiquitous sensor networks. Thus, it's very important that sensor nodes expense energy efficiently. To calculate the whole energy consumption of the networks, we have to consider two parts. One is quantity of energy as roles of sensor nodes. Another is a volume of energy when role of sensor nodes is exchange. There is a significant disparity of energy consumption between cluster heads and member nodes. All member nodes are transmitting perceived data to cluster head on allocated time slot periodically. And then cluster head transmit data aggregated in the cluster.

Fig: One round of Enhanced LEACH operation

Enhanced LEACH which improves the energy distribution between sensor nodes in each round and prolongthe network lifetime. The implementation process of Enhanced LEACH is divided into rounds and each round is divided into three phases,1) Setup phase, 2)Pre-Steady phase and 3) Steady State phase; each sensor knows when each round starts using a synchronized clock.

1) *Setup –Phase:*In cluster each node creates a random number with the probability p, each node has the random probability (p) at the each round, and the next round it will creates another probability. Each node generates a random probability (p) at the beginning of a new round and computes the threshold value (T(n)) with the use of equation (1). If r=1 (i.e. the first round), let *EMAX* of all nodes be 1. In case of P < PT, the node is selected as a cluster head. A selected cluster head broadcasts an advertisement message over neighbor nodes. The neighbor nodes collect advertised message during a given time interval and then send a "join REQ" message to the nearest cluster head. The cluster head receives the "join-REQ" message and builds a cluster member list schedule. The member node receives and save the message for data transfer

2) *Pre-State phase:*The main idea of this phase is to calculate the cluster Workload (which include aggregates the sensed data from cluster members and send the aggregated data to the base station) in one frame, then try to elect cluster member node that can handle the aggregation processes through all frames in the round. If not exist such a node, try to elect cluster member nodes that can handle the aggregation processes for each one frame in the round and the cluster head will handle the aggregation process for frames that there are no aggregator nodes for them.

3) *Steady State Phase:*In Steady State phase, the operation is divided into frames, in each frame; cluster member nodes send their data to the aggregation node NAggregator according to their time slots. The aggregation node must keep its receiver on to receive all the data from the nodes in the cluster. When all the data has been received, the aggregation node sends it to the base station after performs data aggregation.Cluster head maintains the received information of member nodes. The member nodes will have all the data in the form of TDMA table sent by sink node.

Algorithm 1 Steady phase

```
1: for each frame f in round r do
2:    for each cluster member cm_i do
3:        if cm_i.Timeslot = TRUE then
4:            Transmit data to aggregator node cm_aggregator
5:        else
6:            cm_i.SleepMode = TRUE;
7:        end if
8:    end for
9:    if cm_aggregator.Timeslot = TRUE then
10:       Transmit aggregated data to base station
11:   end if
12: end for
```

III. CONCLUSION

In this paper, the data transmission issues and the security issues in CWSNs. We then presented two secure and efficient data transmission protocols respectively for CWSNs, SET-IBS and SET-IBOOS. In the evaluation section, we provided feasibility of the proposed SET-IBS and SET-IBOOS with respect to the security requirements and analysis against routing attacks. SET-IBS and SET-IBOOS are efficient in communication and applying the ID-based crypto-system, which achieves security requirements in CWSNs, as well as solved the orphan node problem in the secure transmission protocols with the symmetric key management. Lastly, the comparison in the calculation and simulation results show that, the proposed SET-IBS and SET-IBOOS protocols have better performance than existing secure protocols for CWSNs. With respect to both computation and communication costs, we pointed out the merits that, using SET-IBOOS with less auxiliary security overhead is preferred for secure data transmission in CWSNs.

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Effect of Gamma Radiation on the Structure of Neodymium: Chromium Doped Silicate Glasses

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Abstract- The paper deals with the spectroscopic studies of sol-gel systems doped with rare-earth ions and co-doped with chromium. Doped samples of Nd^{3+}: Cr^{3+} silica zero gels and silica glasses were prepared from hydrolysis and poly-condensation of precursor solution Tetra Ethyl Ortho Silicate (TEOS), which allows incorporation of specifications by sol-gel method. The xero gels were characterized by XRD, TGA, FTIR & UV/VIS absorption spectra. The intensity and the behavior of the radiation-induced bands are seen to depend on the type of the 3d- transition metal in presence of Neodymium. The host silicate glass shows the stabilizing effect due to increase of more color centers on Gamma Radiation. Reduction in spectroscopic parameters (Racaah and naphelauxetic ratio) confirmed the increase in covalent character of the transition metal ion in the silica matrix due to irradiation.

Index Terms- Sol-Gel, XRD, TGA, FTIR, UV/VIS Absorption Spectra

I. INTRODUCTION

Sol gel method is one of the promising technologies for the production of amorphous materials. Amorphous materials doped with lanthanide ions and small metallic particles may be useful for the study of linear as well as non-linear processes. Glasses containing transition metal ions have been studied owing to their potential applications including radiation sensitive materials in addition to coloring agents in glasses [1-4]. Each 3d transition metal can exist in two or more oxidation or coordination states within the glass matrix depending on composition of the glass type. It is possible to dope the glass with a second ion that would absorb the pump radiation not absorbed by the primary activator, and then transfer the energy to the primary activator. Chromium absorbs spectral energy of 450 and 650 nm, which is not absorbed by Nd^{3+}. The Cr^{3+} ions subsequently transfer their energy to the Nd^{3+} with an efficiency of 45%. Likewise, efficient transfer of energy from Nd^{3+} to Yb^{3+} and from Yb^{3+} to Er^{3+} has been observed [5]. The most widely known glass of all, silica has some ionic contribution to the predominant covalent bonding [6]. Fused silica is useful as an optical material because of its high transmission of visible and ultraviolet light. When silicates are irradiated with ultraviolet light, X-rays, or Gamma rays (ionizing radiation) or atomic particles, defects are formed that absorb light in the ultraviolet

light and visible parts of the electromagnetic spectrum. These irradiation effects in glasses, especially silica, are reviewed by several authors [7-9]. Each state normally gives rise to specific absorption spectra, which have been measured and explained by the application of ligand field and molecular orbital theories [10]. Silica Zero gels has a wide range of applications [11-14], which depend on their structural properties and on the variety of nano structures [15]. These materials have three dimensional SiO2 network prepared by sol gel process [16-17]. Irradiation can further make the coloring components undergo reduction changes and some of these components can even act as stabilizers countering the effects of radiation. Hence we could explain only the aggregate effects of the complex. Irradiation by 0.258-to 2.58 Gy of radiation will give rise to colour centers, and glasses must be stabilized [18]. Neodymium – Chromium doped Phosphate glasses as luminescent solar concentrators have been designed by B. Jezowska and coworkers [19]. Energy transfer in Cr^{3+} : Nd^{3+} co doped borate glass was studied by several authors [20].

The first objective is to investigate the UV-Vis absorption of the host silicate glass co-doped with 3d transition element and the lanthanides and to find out response of Gamma Irradiation on such spectral measurements. The change in Band Gap energy is also calculated from the above spectra. The second objective is to characterize the induced colour centers either intrinsic or extrinsic due to co-dopants in the prepared glasses by analyzing the FTIR Spectrum, which will correspond to the characteristic functional groups and bonds present. In this paper we report the silicate glasses co-doped with Nd^{3+}: Cr^{3+}, and their optical as well as structural properties were analyzed.

II. EXPERIMENTAL DETAILS

The silica gels were synthesized from Tetra ethoxy – silane (CH3CH2O)4 Si [TEOS], of density 93 Kg/l, water, ethanol and the nitrates of the dopants [21]. The molar ratio of ethanol to TEOS and water to TEOS were made 2:1 and 14:1 respectively. The dopants were added in the form of their nitrates. The preparation method is found elsewhere [22]. Samples co-doped with Nd^{3+}: Cr^{3+} were prepared in the different weight %. Sample list is shown in Table.1. The glass structure was characterized by XRD spectra and Fourier transforms infra red (FTIR) spectroscopy. XRD was recorded by D8 Advance X-ray Diffractometer with X- ray source Cu, wavelength 1.5406 A°.

The Thermo gravimetric analysis (TGA) of the dried samples were carried out at a heating rate of $20.000 C/min$ from room temperature (28^0C) to 1010^0C, using Shimadzu thermal analyzer DT40 under N2 atmosphere at 100.0ml/min. The FTIR spectra were recorded   over the frequency range 4000 – 500 cm-1 using Thermo Nicolet, avatar 370 FTIR Spectrometer with a resolution of 0.9 cm-1. The absorption spectra were recorded in a Shimadzu spectrophotometer (UVPC 2450) in the wavelength range 200-900 nm. All measurements were done at room temperature and for the same instrument parameters. An Indian 60Co gamma cell (5000 cc) was used as a gamma ray source with a dose rate of 2.5 Gy /sec.

Table 1. Sample List

Serial Number	Sample	Conc: Nd. ion	Conc: Cr.ion
1	A	1%	1%
2	B	2%	1%
3	C	3%	1%
4	D	4%	1%
5	E	1%	0%
6	F	0%	1%

III.   RESULTS AND DISCUSSIONS

1.1. X-ray Diffraction Analysis.

Figure.1: represents X ray Diffraction Pattern (XRD)   of the sample D at room temperature. It shows irregular peaks, which is indicative of an amorphous structure free from any sharp peaks. The typical harrow-like pattern obtained at $20\sim30^0$ is attributed to amorphous silica gel [23].

1   Figure 1. XRD Spectra of Sample D

Fig.1. XRD of Sample D

1.2. Thermo Gravimetric Analysis (TGA)

Figure. 2: shows the TGA curve of gel sample D from room temperature to 1010^0C. Major part of the weight loss occurs between room temperature and 200^0C owing to the vaporization of the absorbed water and residual organic molecules. A substantial amount of water and other organics present in the dried gel are removed below 600^0C. Beyond 600^0C the weight loss is small with further heat treatment. The small weight loss at high temperature can be attributed to the removal of trapped residual hydroxyls.

Fig:2.TGA of Sample D

The gels are micro porous in nature and contain a large number of internal silanol groups. On heating the gel, the pores collapse gradually with increasing temperature and the gels are converted to pore-free materials similar to silica glass.

1.3. FTIR Studies

1.3.1. Before Gamma Irradiation

The purpose of the present work is to use FTIR spectroscopy to investigate the effects of doping with Chromium ions on the structure of the silica gels and the gel derived glasses. The FTIR transmittance curves of sample D extending from 500-4000 cm -1 region has been studied and shown in figure.3. Transition metal ions have been used in glasses for their luminescence properties or as probes to follow the structural evolution of the host matrix [24, 25]. Table 2 shows positions and assignments of the observed FTIR spectrum. The band at 3472.48cm-1 corresponds to the fundamental vibrations of different hydroxyl groups. The presence of adsorbed water is indicated by the absorption band at 1642.73cm-1, which is assigned as bending mode of water molecules. The characteristic bands at 1085.95 cm-1 are due to asymmetric stretching vibrations peaks of Si-O-Si. The bending mode is at 465.74 cm-1. The 796.76 cm-1 vibration peak is associated with symmetric stretching or vibrational modes of ring structures [26, 27]. Thus the results of IR spectral Studies point out that there is an increasing degree of disorder in the glass network when Cr2O3 is present in higher concentration.

Table :2. FTIR Peaks of Sample D (Fig 3 &4) Before and After Irradiation

No	Before Irradiation cm^{-1}	Assignment	After Irradiation cm^{-1}	Assignment
1	3472.48	-OH group vibrations	3452.47	-OH group vibrations
2	1642.73	Bending mode of H$_2$O	2934.72	CH stretching vibrations.
3	1085.95	Asymmetric stretching of vibration of Si-O-Si	1655.21	Bending mode of H$_2$O
4	796.76	Symmetric stretching of ring structure	1384.31	vibrations of [TEOS and Ethoxy groups]
5	465.74	Bending mode of SiO$_2$	1074.4	Asymmetric stretching of vibration of Si-O-Si
6	-----	---	964.66	C=C-H bands of substituted ethylene system
7	------	----	791.49	Symmetric stretching of ring structure
8	------	-----	462.59	Bending of Si-O-Si bond

Fig.3.FTIR Sp.of Sample D before Irradiation

Fig.4.FTIR Sp.of Sample D after Irradiation

1.3.2. Effect of Gamma Irradiation.

High energy radiations like gamma rays change the spectral as well as structural defects called colour centers of the materials. Figure. 4: shows the FTIR spectra of sample D after Gama ray irradiation. A number of structural changes could be observed in the network as a result of irradiation. It is due to the bonding mechanisms of the formation of non bridging oxygens. Moreover silicon – oxygen bond is strongly affected by irradiation. As a result of gamma ray irradiation the vibrational modes H2O and H OH bending mode are extended. It is observed that on irradiation more stability is obtained due to the increase in number of oxygen ions available in the glass network. Hence more stable glasses with compact tetrahedral structure are formed. The positions and assignments of the observed FTIR spectrum after Gama radiation are also included in Table 2.

1.4. Absorption Spectra

1.4.1. Before Gamma Irradiation

Optical absorption due to transitions within the d shell of Cr as an impurity in silicate glasses has been observed and interpreted. The intense bands centered on 409 and 578 corresponds to 4A2→4T1 and the latter to the 4A2→4T2 due to Cr3+ in octahedral co-ordination [28]. Absorption in Neodymium arises due to transition from the ground $^4I_{9/2}$ state to other excited states and are predominantly due to 4f–4f electric dipole induced in nature. The Absorption spectra of Nd-Cr-SiO2 are shown in figure.5: before Gamma radiation. The observed spectrum corresponds to collective absorption bands due to $^4I_{9/2} \rightarrow$ $^2D_{3/2}$ (300nm), $^4D_{3/2}$ (353 nm), $^2D_{5/2}$ (409 nm), $^4G_{7/2}$ (525 nm), $^4G_{5/2}$ (578 nm), $^4S_{3/2}$ (742 nm), $^2H_{9/2}$ (797 nm), $^4F_{3/2}$

(868 nm), and $^4I_{15/2}$ (887 nm) in accordance to several authors [29-33].

Fig.5. Ab. Sp.of Sample D before Irradiation

1.4.2. Effect of Gamma Irradiation

Fig : 6. Ab. Sp. of Sample D After Irradiation

Figure. 6: represents the absorption spectrum of same sample after Gamma ray irradiation. It is observed that the visible bands become more identified with Gamma radiation, and absorption bands increases in intensity. The band at 409 shifts to 420 nm. The hexavalent Chromium has a 3d0 configuration and therefore exhibits only sharp charge transfer band giving rise to strong absorption band around 380 nm because of its large intensity [34]. It can be assumed that some of the Cr^{6+} ions capture liberated electrons during Gamma radiation and are converted to induced Cr^{3+} ions producing absorption in the same position of the trivalent Chromium having the photochemical reaction as $Cr^{6+} + 3e- \rightarrow Cr^{3+}$.

It is reported that the colour of the Cr-SiO2 made by the Sol-gel method [35] and by the fused method are due to Cr^{6+} ions present in the matrix [36]. Building metallic ions into the structure of the glass will extend the structure owing to the formation of non bridging oxygen's. The electron transitions from the non bridging oxygen's into the conductance band then require far less energy than the bridging oxygens so that the absorption is shifted towards the longer wavelength [18]. Since the concentration of dopants is small, the respective absorption bands show an increase in intensity with increase of doped ions
.

1.5. Crystal field parameters

1.5.1. Before Gamma Irradiation

The Racaah parameter B and nephelauxetic ratio (β) can be used to find the degree of covalence of the transition metal ion in the present matrix. From the absorption measurements, using the Tanabe-Sugano model a complete level scheme of chromium in the gel host was obtained. A direct indication of the value of the local field Dq can be derived from the average peak energy of the 4A2→4T2 transition [37].

$$Dq = \frac{E_a\left(^4T_2\right) - E_b\left(^4A_2\right)}{10} = 214.1 \text{ meV}$$

More over from the average peak energies of the 4A2→4T2 and 4A2→4T1 transitions the Racaah parameter B can be evaluated. Indeed B and Dq are related through the equation

$$\frac{Dq}{B} = \frac{15(x-8)}{x^2 - 10x}$$

Where the parameter x is defined by the following equation

$$x = \frac{E_a(^4T_1) - E_a(^4T_2)}{Dq}$$

from the experimental results one obtains
x = 4.12
B= 89.2 meV (720.8cm^{-1})

The naphelauxetic parameter is readily obtained by using the relation
β= B $_{(matrix)}$/B$_{(free ion)}$. In sol-gel silica β= 0.782.

The Cr^{3+} ion have a low value of Racaah parameter i.e. 720.8cm-1 , which is 22% less from that of the free ion value(918 cm-1) [38] and indicates a greater degree of covalence. The Tanabe –Sugano diagram of Cr^{3+} in the octahedral symmetry is shown in figure 7. Furthermore the naphelauxetic parameter indicates that the chromium ion have appreciable covalent character in metal ligand bond.

1.5.2. Effect of Gamma Irradiation

Irradiation with gamma rays lead to significant modification of the glassy system. The effect of gamma radiation was manifested in change in the Racaah parameter and naphelauxetic ratio. After irradiation the Racaah parameter and naphelauxetic ratio became B = 85.002 meV(618cm-1) and 0.673 respectively. A significant reduction in Racaah parameter and nephelauxetic ratio are associated with a reduction in nuclear charge on the cation and the smaller effective charge experienced by the d electrons [39].

Figure. 7 Cr^{3+} levels in octahedral symmetry

1.6. Optical Band-gap

1.6.1. Before Gamma Irradiation

Tauc [40] showed that the shape and position of the absorption edge for high absorption region could be represented by an equation of the form,

$\alpha(\omega) = A(\hbar\omega - E_{opt})^2 / \hbar\omega$

Two fundamental equations are used for the analysis

$(\alpha h\nu)2 = A(h\nu - Eopt)$, for direct electron transition from valence band to conduction band and $(\alpha h\nu)1/2 = A1(h\nu - Eopt)$, for indirect electron transition from valence to conduction band where , α is the absorption co-efficient, ω is angular frequency, A is a constant and Eopt is the optical energy gap Here we applied the Mott and Davis theory [41] to evaluate the optical band gap of Neodymium doped and Neodymium: Chromium co doped samples. Direct and Indirect band gaps are determined from the linear regions of the plots. The results show that direct band gap values are larger than that of the indirect band gap and both are decreasing with increasing concentration of the Cr3+ions.

1.6.2. Effect of Gamma Irradiation

With Gamma radiation a decrease in band gap is observed in all the prepared samples, which may be due to the displacement of the ions and breaking of bonds. The decrease in E-opt is related to the increase in the Nd^{3+}ions; content. It may be caused by the tendency of the transition atoms to form chemical disordering and to create localized centers in band gap. Table 3 shows the values of band gap energy before and after Irradiation.

Table :3. Direct and Indirect Band gaps of the samples before and after Gamma Irradiation

Sl.No	Sample	Before	Gamma	After	Gamma
		Direct Band Gap (eV)	Indirect Band Gap (eV)	Direct Band Gap (eV)	Indirect Band Gap (eV)
1	A	3.90	3.45	3.8	3.40
2	B	3.80	3.40	3.75	3.35
3	C	3.75	3.30	3.70	3.25
4	D	3.70	3.25	3.65	3.20

IV. CONCLUSIONS

Sol gel method was successfully used for the preparation of pure silica gel derived glasses doped with Nd^{3+}: Cr^{3+}. The amorphous nature of gel glasses have been confirmed by XRD spectra at room temperature. The FTIR spectra elucidate the bonding system of the constituent atoms and groups such as Si-O, and OH that throw light to the expected structure. The UV/VIS absorption spectra lead to the study of the structure of the samples. Hence the absorption and structural properties could be enhanced by co doping with transition metal. The d- orbital of transition metal ions or atoms is very sensitive to the surroundings and hence they influence the neighboring atoms and ions. Conversely, 4f – electrons are located deep inside the shell of the rare earth atoms or ions are strongly shielded by the 5s and 5p – electrons. In many applications, interactions between the rare earth ion and the electronic states of the host material can enhance or inhibit performance and provide mechanisms for manipulating the material's optical properties [42]. The substitution of Nd^{3+}: Cr^{3+} ion in the samples influences the structural, infrared properties and optical band gap values of neodymium doped silicate glasses.

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Solid State Fermentation of Aspergillus niger MENA1E and Rhizopus MENACO11A for Glucoamylase Production on Agricultural residues.

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Abstract- Glucoamylases are important enzymes that allow the hydrolysis of starch and related polymers to glucose. They can be obtained from microbial as well as other sources. Studies were conducted with two fungal isolates, *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A obtained locally from infected plant materials to assess their potential in producing glucoamylase. The organisms were grown on four substrates: wheat bran, rice bran, groundnut pod and maize bran. Glucoamylase was produced by both organisms on all four substrates. The highest glucoamylase activities of 2.0 U and 1.99 U respectively for *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A were recorded after 48 hours on wheat bran. Significant activities of the enzyme were also produced on the other wastes studied in this report.

Index Terms- Agricultural residues, *Aspergillus,* Glucoamylase, *Rhizopus,* Solid state fermentation.

I.   INTRODUCTION

The amylase family of enzymes have been well characterized through the study of various microorganisms (Ellaiah *et al*., 2002). Two major groups, endo- and exo-amylases, have been identified and are among the enzymes most studied (Horvathva *et al*., 2001; Aiyer, 2005; Anto *et al*., 2006). These enzymes represent about 25-33% of the world enzyme market, second after proteases (Cereia *et al*., 2006). Amylases are important enzymes employed in starch processing industries for hydrolysis of polysaccharides into simple sugars (Suganthi *et al*., 2011; Pandey *et al*., 1996).

Glucoamylase is an economically important enzyme because of its capacity to hydrolyse starch and related polymers into β-D-glucose as the sole end product (Valent *et al*., 1992). The principal industrial use of glucoamylase is therefore, the production of glucose, which in turn serves as a feedstock for biological fermentations in the production of ethanol or high fructose syrups (Saha and Zeikus, 1989; Pavezzi *et al*., 2008; Zambare, 2010). Glucoamylase is also used to improve barley mash for beer production (Pavezzi *et al*., 2008). It is a key enzyme in the production of sake and soy sauce (Zambare, 2010). Glucoamylase also has applications in confectionery, baking and pharmaceutical industries (Rose, 1980; Pandey *et al*., 2000). The enzyme has applications in the textile and paper industries (Pandey *et al*., 1996).

Readily available sources of glucoamylase are required for the development of economically sound fermentation industries that utilize starch as a raw material. Imported glucoamylase is the main source of this enzyme for several small scale fermentation industries in developing countries. Sustaining or increasing production levels of these small scale industries depend on improving the availability of important enzymes, principally glucoamylase, produced locally at affordable prices. Microorganisms are used to produce large quantities of industrially important enzymes including glucoamylase using cheap agricultural residues (Zambare, 2010).

Aspergillus niger and *Rhizopus sp.* have been used to produce glucoamylase for industrial activities (Hata *et al*., 1997; Fujio and Morita, 1996; Fogarty and Kelly, 1980; Selvakumar *et al*., 1994; Pandey *et al*., 1993; Pandey and Ashok, 1991; Bhatti *et al.,* 2007).

Local small and medium scale fermentation industries depend on starch-rich staple foods such as maize, rice, millet and sorghum as sources of amylases for starch hydrolysis (Ocloo and Ayernor, 2010). The use of staple food for enzyme production on large scale has the potential of increasing prices of staple foods and negatively impacting food security. A number of locally available agricultural wastes or residues could be exploited as substrates for the production of glucoamylase by microorganisms.

This study reports on the production of glucoamylase using locally isolated fungal species, *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A on agro-residues using solid-state fermentation.

II.   METHODOLOGY

Sources of Fungal Isolates for the Studies

Two fungal species, *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A were isolated from infected plant materials and maintained pure on potato dextrose agar (PDA). The fungal isolates were stored at 4°C in a refrigerator and regenerated on freshly prepared PDA medium whenever required for experiments.

Preparation of substrates for inoculation

Wheat bran, rice bran, groundnut pods and maize bran were purchased or obtained from agro-processing mills for this study. The five substrates were separately dried and milled using a Wiley mill to 0.5 mm particle sizes (Paulchamy, 2008). Ten (10) grams of each substrate were mixed with 10 ml of Aspergillus

Complete Medium (ACM) in a 250 mL Erlenmeyer flask. ACM comprises: $(NH_4)_2SO_4$: 5.0; $Na_2HPO_4 \cdot 12H_2O$: 3.8; KH_2PO_4 3.5; $MgSO_4$ 0.5 and yeast extract 0.1 at pH 5.0 (Zaldivar-Aguero *et al*., 1997). The ACM provided the needed mineral salts required for effective growth of *Aspergillus niger* MENA1E. Similarly, ten (10) grams of each substrate for growing the *Rhizopus* MENACO11A were mixed with a mineral solution containing (g/L): $(NH_4)_2SO_4$ 20.0; K_2HPO_4 3.0; NaCl 5.0; $MgSO_4$ 5.0; Na_2HPO_4 2.0 and $CaCl_2$ 1.0 at pH 4.5 (Rauf *et al*., 2010). The mixtures of substrates and mineral solutions were autoclaved at a temperature of 121°C for 25 minutes before they were inoculated with the appropriate organism.

Inoculation of Substrate

Spore suspensions of each of the two fungal species were produced from six day old cultures grown on PDA. The spore suspension was produced by adding 12 ml of sterile distilled water (SDW) to actively growing six-day old cultures of the appropriate fungal organism. The resulting spore suspension was filtered through four layers of sterilized cheese cloth. The concentration of spore suspension was adjusted to 1×10^7 using a haemocytometer. 10 g of each substrate mixture was inoculated with 3 mL of the adjusted spore suspension in a 250 ml Erlenmeyer flask. The cultures were incubated and maintained at 30°C.

Assaying for Glucoamylase Activity

Inoculated substrate-mineral solution mixtures of the two fungal species were harvested at 24 hour intervals over five days (120 hours). At harvest, 10 ml of 0.021M citric acid buffer (pH, 4.6) was added to the contents of each flask. The flask was then actively shaken to ensure proper mixing of the culture mixture and the buffer. The resultant mixture from each flask was squeezed through four layers of cheese cloth. The culture filtrate from each flask was centrifuged at 7000 rpm for 15 minutes. The collected supernatant (crude enzyme) was assayed for glucoamylase activity following methods described by (Zambare, 2010 and Miller *et al*., 1959). Glucoamylase activity in each supernatant (crude enzyme) was determined by incubating at 28 °C for 10 min, a reaction mixture containing 1.0 ml of 50 mM citrate buffer (pH 4.6), 1.0 ml starch solution (1 %, w/v) and 1.0 ml of the crude enzyme. The released reducing sugar in the reactive mixture was measured using 3, 5-dinitrosalicyclic acid (DNSA) reagent (Miller *et al*. 1959) using glucose as a standard. Glucoamylase activity unit (U) was expressed as the amount of enzyme releasing one µmole of glucose equivalent per minute under assay condition.

III. RESULTS AND DISCUSSION

The two fungal species, *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A investigated in this study produced glucoamylase on all four agro residues tested. Using glucoamylase produced from *Aspergillus niger* MENA1E, wheat bran gave the highest glucoamylase activity (2 U) at 48 hours of incubation followed by rice bran (1.58 U) at 96 hours of incubation in Table 1.

Table 1: Glucoamylase production from *Aspergillus niger* MENA1E

| Time (Hours) | Substrate | | | |
	Wheat bran	Rice bran	Groundnut pod	Maize bran
	Glucoamylase enzyme production(U)			
24	1.50±0.1	1.01 ±0.2	0.44±0.1	0.14±0.1
48	2.00±0.1	1.21 ±0.1	0.83 ±0.1	0.28±0.1
72	1.56 ±0.1	1.52 ±0.1	1.11±0.2	0.38±0.2
96	1.66±0.1	1.58 ±0.1	1.39±0.1	0.22±0.1
120	1.79±0.2	0.92 ±0.1	1.17±0.2	0.17±0.2

For glucoamylase produced from *Rhizopus* MENACO11A, wheat bran also gave the highest glucoamylase activity (1.99 U) at 48 hours of incubation followed by rice bran (1.55 U) at 72 hours of incubation in Table 2.

Table 2: Glucoamylase production from *Rhizopus* MENACO11A

| Time (Hours) | Substrate | | | |
	Wheat bran	Rice bran	Groundnut pod	Maize bran
	Glucoamylase enzyme production(U)			
24	1.47±0.1	0.89 ±0.1	0.42±0.2	0.13±0.1
48	1.99±0.1	1.11 ±0.1	0.8 ±0.1	0.17±0.1
72	1.5 ±0.1	1.55 ±0.1	1.33±0.1	0.15±0.2
96	1.55±0.1	1.5 ±0.1	1.11±0.1	0.21±0.1
120	1.55±0.1	0.94 ±0.1	0.83±0.2	0.11±0.1

Wheat bran has been reported by several workers as a very suitable substrate for the production of glucoamylase (Pandey *et al*., 1999; Anto *et al.,* 2006; Kaur *et al.,* 2003). The current results suggest rice bran as a possible substitute for wheat bran among the substrates considered. Similar results were obtained by Zambare (2010).

In Table 1, the activity of glucoamylase from *Aspergillus niger* MENA1E on each substrate increased to a maximum and then declined with time. This observation may be ascribed to utilisation of minerals in the fungal culture by the fungal species (Hema Anto *et al*., 2006). A similar trend was observed for *Rhizopus sp*. MENACO11A (Table 2) except on maize bran where activities of glucoamylase remained fairly constant. Glucoamylase from *Aspergillus niger* and *Rhizopus sp*. are reported to be structurally different and this may be responsible for the different activities observed. The carbohydrate chains (containing mannose and glucosamine in the N-acetyl form) of

the *Rhizopus sp.* enzyme are linked by O-glycosidic and N-glycosidic linkages to the protein, while carbohydrate chains (containing mannose, glucose, and galactose) of the *Aspergillus niger* enzyme are linked by O-glycosidic linkages only to the protein (Pazur *et al*., 2010).

During solid-state fermentation, higher moisture level decreases porosity, changes substrate particle structure, promotes development of stickiness and lowers oxygen transfer, whereas lower moisture content causes reduction in the solubility of nutrients of the solid substrate, lower degree of swelling and higher water tension (Hema Anto *et al*., 2006). The moisture content was maintained at a fixed value in this study, which might not necessarily be optimal for the two fungal species. Analysis of variance conducted on the data using Statistix 9 statistical software showed *Aspergillus niger* MENA1E, wheat bran and 48 hours of incubation as the best combination for maximum glucoamylase production (Tables 3.1, 3.2 and 3.3).

Table 3 Main effect for organisms

Organism	GA
Rhizopus sp.	0.797b
Aspergillus niger	0.859a
F.Pr	**<0.001**
LSD(0.05)	**0.022**
%CV	**10.2**

Table 3.1 Main effect for media

Medium	GA
Wheat bran	1.315a
Rice bran	0.972b
Groundnut pod	0.774c
Maize bran	0.179d
F.Pr	**<0.001**
LSD(0.05)	**0.025**
%CV	**10.2**

Table 3.2 Main effect for incubation period

Time (hours)	GA
24	0.499d
48	0.752a
72	0.757a
96	0.703b
120	0.630c
F.Pr	**<0.001**
LSD(0.05)	**0.024**
%CV	**10.2**

The mean values in each column followed by the same letter are not significantly different

Enzyme production by microorganisms is affected by a number of factors including temperature, substrate particle size, pH and nitrogen concentration (Pandey *et al*., 1994). Improving glucoamylase production by microbial organisms through exploitation of these factors has been reported by several workers (Irfan *et al*., 2012). The optimization of these factors is suggested by these initial results for maximum production of glucoamylase on readily available substrates by *Aspergillus niger* MENA1E and *Rhizopus sp.* MENACO11A.

IV.   CONCLUSIONS

The two fungal isolates, *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A isolated locally from infected plant materials were capable of producing the enzyme glucoamylase on four substrates, wheat bran, rice bran, groundnut pod and maize bran. Individually, *Aspergillus niger* MENA1E was found to produce higher glucoamylase activity than *Rhizopus* MENACO11A. With respect to media, wheat bran was most suitable for producing maximum glucoamylase activity. Generally, the most favourable period of incubation was 48 hours. The study suggests that native *Aspergillus niger* MENA1E and *Rhizopus* MENACO11A could be used to produce high

glucoamylase activity at optimized conditions for industrial purposes.

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Study on Health Social Determinants as Cause of Maternal Mortality in Gowa District South Sulawesi, 2013

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Abstract- The maternal mortality rate in Indonesia based on the demographic and health survey of Indonesia (IDHS) consecutively since 1994 was 390 per 100,000 KH, in 1997 was 334 per 100,000 KH, then in 2003 showed the number of live births 307/100.000 and later be 228/100.000 in 2007. In Gowa, the number of maternal deaths in 2010 was 12 or 93.4 per 100,000 and in 2011 KH, 12 or 92.7 per 100,000 KH and in 2012, there were 11 deaths. One of the important issues in maternal mortality is the presence or involvement of factors influence social determinants of health in cases of maternal death. This study used a case-control study design by comparing the case group and the control group based on the status of his presentation. This study was conducted to identify clusters of cases (maternal deaths) and control group (post-partum mothers life), which then retrospectively examined factors that can explain the determinants whether cases and controls exposed or not. The population consisted of a population case and control. For the entire population is a case of a mother who death in Gowa in the last 3 years, recorded in the maternal mortality data in Gowa District Health Office. While population control is all postpartum mothers who did not experience death over the last 3 years and meet the inclusion and exclusion criteria. The majority of both groups of respondents in the control proved first married before age < 19 years of age is an age in which high -risk pregnancies and deliveries reached 109 respondents out of 175 respondents, or 62.3 %. Furthermore, the productive age between 19-35 years is the ideal age to 57 (32.6 %) respondents and for age > 35 years there were 9 (5.1 %) respondents. The highest percentage for the education of both groups is the primary control that is 48.6 % in the case group and 34.3 % in the control group. While the lowest percentage for education in the case group was college by 2.9 % and in the control group is Diploma / Academy namely 1.4 %. Variable work group 65.7 % of cases were working mothers during pregnancy and in the control group, there were 37.1 % of mothers who worked during pregnancy, whereas 34.3 % of the mothers in the group of cases do not work and 62.9 % of mothers in the control group that did not work. For decision-making in the family was found in the case group, 65.7 % of women are not involved, and 37.1 % are not involved in the control group. In addition, there is also 34.3 % of the mothers involved in the case group and 62.9 % of women were included in the control group. Variables determining the place of delivery is found in the case group, 65.7 % of women are not involved and 37.1 % in the control group.

Then there is also 34.3 % of the mothers involved in the case group and 62.9 % in the control group. Furthermore, there were 25.7 % in the group of cases that have abstinence behavior during pregnancy and 45.7 % of respondents in the control group. Furthermore, there were 74.3 % in the group of cases that do not have restrictions on the behavior during pregnancy and 54.3 % of respondents in the control group. For abstinence of food consumed during pregnancy, there are 22.9 % in the group of cases that have dietary restrictions during pregnancy and 35.0 % of respondents in the control group. Furthermore, there were 77.1 % in the group of cases that do not have food taboos during pregnancy and 65.0 % of respondents in the control group. The study also found 20.0 % of those cases have restrictions on the behavior and the puerperium around 17.1 % of respondents in the control group. Then 80.0 % of the respondents in the case group does not have restrictions on the behavior during childbirth, and 82.9 % of respondents in the control group who did not have restrictions on the behavior during childbirth. Food taboos during parturition are 5.7 % in the case group and 13.6 % of respondents in the control group who had food taboos during parturition. Meanwhile, there were 94.3 % in the case group and 86.4 % of respondents in the control group who did not have food taboos during parturition. The results of the bivariate analysis showed significant results because the value of OR = 3.244. This means that the social determinants of health 3.244 times the risk of causing maternal death / birth than if the social determinants of health play a role, because the value of OR > 1, shows the social determinants of health factor is a risk factor to maternal mortality. Health social determinants is an important variable against maternal mortality with OR values were found at 3.244 which means the social determinants of health is a risk factor for the occurrence of maternal deaths in the district of Gowa in South Sulawesi. Cultural communication approach is needed so that community health workers can accept the changes offered by the relevant government social determinants of health.

Index Terms- Social determinants, health and maternal mortality

I. INTRODUCTION

Women play a very important and strategic role as a driving force in creating quality family. One important aspect is the quality that support family health. Maternal health is one aspect of women's reproductive health related morbidity and

mortality in pregnant women and maternity. Maternal death is a phenomenon tip of the iceberg because the case is quite much visible on the surface but only a limited number only (Hasnah, 2003). Maternal deaths according to ICD - 10 (The Tenth Revision of the International Classification of Disease) is a death that occurs in women during pregnancy or within 42 days after the end of pregnancy, irrespective of time and location of pregnancy, caused by anything related to pregnancy or aggravated by the pregnancy or its management, but not deaths caused by accident or chance (WHO, 2008). Maternal mortality in developing countries is estimated at 100 to 1,000 or more per 100,000 live births , while in developed countries range from 7 to 15 per 100,000 live births, (Hasnah, 2003, Surekha, 2012). The same study was also conducted Kabali (2011) who found maternal deaths in the Congo region, reaching 740 per 100,000 KH. The maternal mortality rate in Indonesia based on the demographic and health survey of Indonesia (IDHS) consecutively since 1994, was 390 per 100,000 KH, then in 1997, to 334 per 100,000 KH, then in 2003 showed the number of live births 307/100.000 later be 228/100.000 in 2007. Fibriana research results (2007) revealed the most maternal deaths occur during delivery is 61.5 %, and 26.9 % in the puerperium. Still on the study, 73.1 % of women died in the hospital, and 13.5 % died at home, and 7.7% died and 5.7% in health centers died on the way. Riskesdas data in 2010 showed that deliveries in health facilities reached 55.4 % and the high rate of home deliveries is 43.2 %. In the group of mothers who gave birth at home, was just 51.9 % of births are attended by midwives, herbalists whereas by 40.2%.

One of the important issues in maternal mortality is the presence or involvement of factors influence social determinants of health in cases of maternal death. One important part of that is the inclusion of a shaman in the delivery process. Emotional closeness traditionally, pregnant women contributes to harness a shaman as birth attendants. This gave birth to the proximity of public trust for generations on the quality of work of a shaman. The issue then arises, when the birth process encountered a problem, where the shaman with all its limitations, was not able to perform the treatment to prevent more serious complications. Yenita (2011) revealed that the lack of knowledge of TBAs in recognizing complications that may arise in the delivery and improper handling of complications will increase the risk of maternal mortality. Another part of the social determinants of health are factors of poverty where it is associated with income and economic status of the family. Families with poor economic and educational levels have a tendency to take advantage of low quack as birth attendants (Rajab, 2009). Further understand the issue of maternal mortality, the study is expected to approach the social determinants of health factors may be a reference to map of maternal mortality has not been clearly illustrated and detailed. Especially for Gowa district, as one of the four counties with the maternal mortality rate is still relatively high in South Sulawesi. For Gowa, the number of maternal deaths in 2010, 12 or 93.4 per 100,000 and for 2011 KH, 12 or 92.7 per 100,000 KH and for 2012, there were 11 deaths. The description of the background then examines the determinant factors of maternal death with the social determinants of health approach becomes important and strategic to be researched more in an effort to get

an overview of maternal mortality in Indonesia, particularly in Gowa.

II. MATERIALS AND METHODS

This study used a case-control study design (case control study) is a research that studied the relationship between exposure factors and disease by comparing the case group and the control group based on the status of his presentation. Subjects were selected based on the status of the disease / outcome, then observed whether the subjects had a history of exposure to factors research or not. This study was conducted to identify clusters of cases (maternal deaths) and control group (post-partum mothers life), which then retrospectively (search backward) examined factors that can explain the determinants whether cases and controls exposed or not. This study conducted in the area of Gowa in South Sulawesi, which is one that has the highest maternal mortality rate in South Sulawesi according to the health ministry study results through Expanding Maternal and Neonatal Survival (EMAS). When the study was planned in April 2013 to April 2014. The population in this study consisted of a population case and control populations. For the entire population is a case of a mother who suffered death in Gowa in the last 3 years are recorded in the maternal mortality data in Gowa District Health Office. While population control is all postpartum mothers who did not experience death over the last 3 years and meet the inclusion and exclusion criteria from the calculation of the minimum sample size, the number of samples obtained were 74. Due to the number of cases are only 35, then to meet analysis requirement, this study will use a comparison between the case group and the control group was 1 : 4, in which case the sample is 35 and for control sample of 140 persons bringing the total number of samples of cases and controls in this study was 175. To determine the control sample used simple random sampling method which is derived from the number of mothers who gave birth to survive during the last 3 years of data recorded in Gowa district health offices. Tor the matching in this study is the geographical position adjacent house between cases and controls. For primary data, the data collected through interviews with a structured questionnaire and a guide for secondary data obtained through the records of maternal deaths, maternal KMS, registers cohort of pregnant women, birth records and documents verbal autopsy. Data analysis was performed using univariate analysis are described in the form of tables and narrative, to evaluate the magnitude of the proportion found in the case and control groups for each - each variable under study, and to see whether there is any difference between the two groups performed bivariate analysis and to determine the relative risk estimates calculated odds ratios (OR) with 2 x 2 tables and formulas;

$$(OR) = \{A/(A+B): B/(A+B)\} / \{C/(C+D) : D/(C+D)\}$$
$$= A/B : C/D = AD/BC$$

III. RESULTS

Characteristics of the respondents in this study include age at the time of marriage. Overview of research results in Table 1 show that the majority of respondents of both groups on the

proven control was first married before age < 19 years of age is an age in which high -risk pregnancies and deliveries reached 109 respondents of 175 respondents, or 62.3 %. Furthermore, the productive age between 19-35 years is the ideal age to 57 (32.6 %) respondents and for age > 35 years there were 9 (5.1 %) respondents. In detail is presented in Table 1 below:

Table 1. Distribution of respondents base on the mothers age when married in Gowa, South Sulawesi, 2013

Age when marriage (year)	Respondent group				Total	
	Cases		Controls			
	n	%	n	%	n	%
< 19	23	65,7	86	61,4	109	62,3
19 – 35	8	22,8	49	35,0	57	32,6
> 35	4	11,4	5	3,6	9	5,1
Number	35	100,0	140	100,0	175	100,0

Source: Primary Data, 2013

Social determinants of health is an important variable that is currently studied in depth as a variable occurrence of maternal deaths. In this study, education, occupation, gender and culture put into the study of the social determinants of health. Determinants of education referred to the last of mother's education level is reached. The results of this study showed that the highest percentage for the education of both groups is the primary control that is 48.6 % in the case group and 34.3 % in the control group. While the lowest percentage for education in the case group was college by 2.9 % and in the control group is Diploma / Academy with 1.4 %. For the determinants of work referred to in this research is the activity performed by the mother during pregnancy and in the postpartum period. The work is related to the activity of either their own mother and helping her husband work. Results of this study found that, in the case group was 65.7 % of working mothers during pregnancy and in the control group, there were 37.1 % of mothers who worked during pregnancy. Then there were 34.3 % of the mothers in the group of cases that do not work and 62.9 % of mothers in the control group that did not work. Data concerning the determinants of work, found the majority of women work as agricultural laborers either the control group or in the group of cases. Working during pregnancy, especially if the work is classified as heavy work is risky because it can have an effect on the condition of the mother's pregnancy.

Table 2. Distribution of respondents based on health social determinants in Gowa, South Sulawesi, , 2013

Health Social Determinant	Respondent group				Total	
	Cases		Controls			
	n	%	n	%	n	%
Mother education						
- < Junior High School (Risks)	20	57,2	53	37,9	73	41,7
- ≥ Junior High School (Not risks)	15	42,9	87	62,1	102	58,3
Mother activity:						
- Work	23	65,7	52	37,1	75	42,9
- Not work	12	34,3	88	62,9	100	57,1
Involved in the decision process						
- No	23	65,7	52	37,1	75	42,9
- Yes	12	34,3	88	62,9	100	57,1
Involved in determining delivery place:						
- Yes						
- No	23	65,7	52	37,1	75	42,9
	12	34,3	88	62,9	100	57,1
Behavior restriction during pregnancy:						
- Yes	9	25,7	64	45,7	73	41,7
- No	26	74,3	76	54,3	102	58,3
Food restriction during pregnancy						
- Yes	8	22,9	49	35,0	57	32,6
- No	27	77,1	91	65,0	118	67,4

Behavior restriction during postpartum:						
- Yes						
- No	7	20,0	24	17,1	31	17,7
	28	80,0	116	82,9	144	82,3
Food restriction during postpartum :						
- Yes	2	5,7	19	13,6	21	12,0
- No	33	94,3	121	86,4	154	88,0

Sources: Primary Data, 2013

Determinants of gender in this research is the view of the family of the mother's position and role in the family decision making related decisions related to pregnancy and birth place. The results show that decision-making in the family, was found in the case group, 65.7 % of women are not involved, and 37.1 % are not involved in the control group. Then there is also 34.3 % of the mothers involved in the case group and 62.9 % of women were included in the control group. The reasons respondents said that the decision was not involved in the husband's authority. This is also the dominating influence of community culture customs within the family. The results of this study also found that in order to determine the place of delivery, is found in the case group, 65.7 % of women are not involved and 37.1 % in the control group. Then there is also 34.3 % of the mothers involved in the case group and 62.9 % in the control group. Exclusion in determining where the birth mother is also influenced by the cultural authority of the decision in the hands of the husband. For cultural determinants in this study associated with taboos adopted by the family, either dietary restrictions or behavior that should not be consumed or carried by the mother during pregnancy and the postpartum period. The results of this study found that there were 25.7 % in the group of cases that have abstinence behavior during pregnancy and 45.7 % of respondents in the control group. Furthermore, there were 74.3 % in the group of cases that do not have restrictions on the behavior during pregnancy and 54.3 % of respondents in the control group. Abstinence -related behaviors during pregnancy, is an aspect of culture that is very thick in Gowa district, but with the transformation of information, the family began making were largely open to accept the changes that this behavior is related restrictions.

Picture of food taboos during pregnancy, more on the perception of society towards labor condition if the fetus and difficulty eating certain foods. The assumption is then embraced by the community and eventually became the adopted values are culturally become taboo. Results The study found that consumption of dietary restrictions during pregnancy, there were 22.9 % in the group of cases that have dietary restrictions during pregnancy and 35.0 % of respondents in the control group. Furthermore, there were 77.1 % in the group of cases that do not have food taboos during pregnancy and 65.0 % of respondents in the control group.

It is also an important part of the cultural determinants is related restrictions on during childbirth. Puerperium for some Gowa regencies society is a condition that is very risky for the mother. Keeping the mother 's behavior during this period is a serious thing for the family to be noticed by the mother. The results of this study found that there were 20.0 % in the case group had abstinence behavior during parturition and around. 17.1 % of respondents in the control group. Then 80.0 % of the respondents in the case group does not have restrictions on the behavior during childbirth, and 82.9 % of respondents in the control group who did not have restrictions on the behavior during childbirth.

This study also describes matters relating to food taboos during parturition and the results found that there were 5.7 % in the case group and 13.6 % of respondents in the control group who have dietary restrictions at the time of parturition. Meanwhile, there were 94.3 % in the case group and 86.4% of respondents in the control group who did not have food taboos during parturition.

Table 3. Social determinants of health risk factors against maternal mortality patterns in Gowa, 2013

Health social determinant	Respondent group				Total		CI 95% (LL – UL)
	Case		Control				
	n	%	n	%	n	%	
Not risk	23	65,7	52	37,1	75	42,9	OR = 3,244
Risk	12	34,3	88	62,9	100	57,1	(1,490 – 7,059)
Number	35	100.0	140	100.0	175	100.0	

Source: Primary Data, 2013

Based on the results of table 3, bivariate analysis showed significant results because the value of OR = 3.244. This means that the social determinants of health 3.244 times the risk of causing maternal death / birth than if the social determinants of health play a role, because the value of OR > 1, shows the social

determinants of health factor is a risk factor to maternal mortality.

IV.   DISCUSSION

Social determinants of health in the commission of social determinant of health (CSDH) by the WHO is associated with

socio-economic problems of society in the form of income, ethnicity / culture, education and gender, becoming one of the studies that supposedly has an important role to maternal mortality / birth. Factors social determinants of health are the manifestation of the basic rights of women to state their desire to obtain a quality life. If the problem is associated with pregnancy / childbirth, then this becomes a very important factor in achieving pregnancy / maternity is safe and healthy. The results of this study showed that 65.7 % of women experienced no deaths caused by variable involvement of the social determinants of health, which means that the social determinants of health factors become obstacles in achieving a pregnancy / childbirth are safe and healthy. The study also revealed that 42.9 % of women were still found to work when pregnant, then the highest level of education of respondents only graduate of basic school with o37.1 % and 42.9 % of women were not involved in the decision-making process related to pregnancy include the mother does not participate in determining a place where a mother would do the labor. Furthermore, 41.7 % of mothers also found that culture has taboos related behaviors during pregnancy and 32.6 % who have dietary restrictions during pregnancy. Similarly, in the puerperium, found 17.7 % of women having an abstinence - related behaviors and 12.0 % of mothers abstain from food during the postpartum.

It must be recognized that one of the important factors that are the root of the problem of maternal mortality is the factor of social determinants of health, where the family does not know even unresponsive to pregnant women at risk of the condition, the family attitude that tends to assume that birth is their responsibility alone, even maternal health budget pregnant and birthing mothers in the household is still considered important. Another important aspect of the social determinants of health is an aspect of culture, of which the family is applying too much taboo that implies a loss for pregnant women and mothers maternity postpartum period, both in eating and behavior, which in turn impacts on maternal nutrition. Likewise, the family's perception of pregnancy and childbirth are only considered as a regular event , then the attitude of the family who are not sensitive; household workload and responsibilities of pregnant women in making a living is still the same as ever, as well as the persistence of gender bias where decision-making process is still in the hands of men, be it husbands, fathers, in-laws, even for the purposes of prenatal care and childbirth, mothers sometimes helpless.

The results of this study , found the OR value was 3.244 which is a significant result, which means that when the social determinants of health factors become obstacles or not act, then the 3.244 times the maternal / birthing would be at risk for death. This suggests that the social determinants of health factors to maternal mortality / birth is a problem that global society must be the top priority to be addressed.

Aspects of cultural taboos associated with both abstinence behavior and dietary restrictions, the amount of income in the context of poverty and gender equality are represented in the decision-making patterns in the family, is a matter which should be addressed in a comprehensive manner. Several studies have been conducted region of Africa , showing the dominance of socio-economic factors and socio-cultural as a cause of maternal death . In Indonesia, NTT is a region that mother mortality rate is

still high and the research conducted by Musaddad (2002) gives the depiction of cultural factors as causes of maternal death plays an important role. Poverty can be a cause lack of community participation in health activities. Maternal mortality / maternity is still common in the group of poor, less educated, live in remote areas, and they do not have the ability to fight for her own life. Women from low-income families have less risk of over 300 times to suffer maternal mortality and morbidity when compared with those with better income (MOH, 2004). The results of the study by Fang Ye (2012) show that the low income of the poorest families have access to contribute greatly to the family in the utilization of health services, especially in the delivery and financing of transportation. It is also linked to the geographical area in which 80.17 % of Gowa district is a region of highlands and lowlands is only 19.83 %.

Reduce maternal mortality not only in the health sector, but of course it is also related to the understanding of power relations in the family will be the relationship of men and women. Socio-cultural constraints should be viewed within the framework society though, and not the government's viewpoint. deaths from childbirth are rare events, changes must be made to the mindset of society thinks that the death was an extraordinary event and it should be done continuously relentless in the wider community so that they know that an event can be an extraordinary event. Changes in society frameworks must be accompanied by an understanding in the form of counseling and accurate information so as not to lead society into a phobia against emergency conditions of pregnancy / childbirth but on the contrary increases are sure to join the community deal with the issue in a way that is both reasonable and according to rules.

Change the mindset of thinking in the form of counseling and provision of correct information must be done keeping in view the socio-cultural background of the people, so that they can make changes and implement them in accordance with the customs and capabilities available to it. Systematic and planned efforts in addressing the social determinants of health issues, will be a new way for the settlement of the problem of maternal mortality. Developed in close cooperation between health workers in their entirety by the public, is expected to open the bulkhead culture which has been a bottleneck in the implementation of programs in the field of primary health care related to pregnancy and childbirth. The various programs that have been initiated and implemented by the government, has actually meets optimism for reducing maternal mortality, only the model approach taken is always only oriented to the interests of achieving the government's targets / programs. In fact, there are things that apply in the community and has become one of the models of life and social systems that have been acted by the community for generations. When people see that what is planned by the government at odds with models of their lives, then that is where we will see the failure of the program to be implemented. Alignment of the system of a society that has been done culturally hereditary government program that tries to introduce "new models" in an attempt to find solutions to issues that arise during the life of the system has been run for generations, should be able to be created. This alignment can be seen from the partnership program between TBAs and midwives. TBAs which is one example of a system of community life for generations, and then trained to do the handling of a healthy and

safe delivery and immediately reported the case of complications. This program is one program that has been conducted in Gowa district. When this is done for all programs related to pregnancy or childbirth, the optimism of the role of health social determinants will be very large, and this will certainly be one of the strategic measures in order to reduce maternal mortality/birth.

V. CONCLUSION

Health social determinants is an important variable against maternal mortality with OR valueswere found at 3.244 which means the social determinants of health is a risk factor for the occurrence of maternal deaths in the district of Gowa in South Sulawesi. Cultural communication approach is needed so that community health workers can accept the changes offered by the relevant government social determinants of health.

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Potential Test of Papaya Leaf and Seed Extract (Carica Papaya) as Larvicides against Anopheles Mosquito Larvae Mortality. Sp in Jayapura, Papua Indonesia

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Abstract- Anopheles mosquitoes, sp is the main vector of malaria disease that is widespread in many parts of the world including in Papua Province. There are four speciesof Anopheles mosquitoes, sp, in Papua namely: *An.farauti, An.koliensis, An. subpictus, and An.punctulatus*. Larviciding synthetic cause resistance. This study aims to analyze the potential of papaya leaf and seeds extracts (Carica papaya) as larvicides against the mosquitoes *Anopheles* sp. The experiment was conducted at the Laboratory of Health Research and Development in Jayapura Papua province. The method used is an experimental post - only control group design. Sampling was done randomly on the larvae of Anopheles sp of breeding places in Kampung Kehiran Jayapura Sentani District, 1,500 larvae. Analysis of data using statistical analysis to test the log - probit mortality regression dosage, Kruskall - Wallis and Mann - Whitney. The results showed that papaya leaf extract effective in killing larvae of Anopheles sp, value Lethal Concentration (LC50) were 422.311 ppm, 1399.577 ppm LC90, Lethal Time (LT50) 13.579 hours, LT90 23.478 hours. Papaya seed extract is effective in killing mosquito larvae Anopheles sp, with 21.983 ppm LC50, LC90 ppm 137.862, 13.269 hours LT50, LT90 26.885 hours. Papaya seed extract is more effective in killing larvae of Anopheles sp. The mixture of papaya leaf extract and seeds are effective in killing mosquito larvae Anopheles sp, indicated by the percentage of larval mortality, the observation hours to 12, the highest larval mortality in comparison 0,05:0,1 extract, 52%, ratio 0.1 : 0.1 by 48 %, on a 24 hour observation, larval mortality in both groups reached 100 %.

Index Terms- Larvices, Carica papaya, Anopheles sp.

I. INTRODUCTION

Mosquitoes of the genus Anopheles, sp is a mosquito-borne diseases, particularly malaria. In Indonesia there are about 80 species of Anopheles sp while malaria is expressed as a vector with 22 species of different breeding places (Arsunan, AA, 2012). In the province of Papua, it was found four species of Anopheles sp namely: farauti Anopheles, Anopheles koliensis, subpictus Anopheles punctulatus and Anopheles (Elyazar, Iqbal.RF, et al., 2013). Malaria is naturally transmitted by the bite of Anopheles mosquitoes, sp females and become one of the public health problem because it can cause death, especially in high risk groups. World Health Organization (WHO) estimates

that in 2012 there were 207 million cases of malaria among 3.3 billion people, and leaded to death in about 627 thousand inhabitants. The highest malaria cases in the world occur in Africa and other poor countries. In Africa 90 % of malaria deaths occur in children under 5 years of age (WHO, 2013). One effort to reduce mosquito density is the use of larvicides. In Indonesia using temephos, use 1 % temephos (abate) established as part of an effort to eradicate mosquitoes in Indonesia (Daniel, 2008). The repeated use of temephos have been done since 36 years ago to increase the risk of water pollution, especially drinking water, (US. Environmental Protection Agency, 2001), and cause resistance to temephos. Resistance was reported to have occurred in several countries such as Brazil, Bolivia, Argentina, Cuba, France, Polynesia, the Caribbean and Thailand (Daniel, 2008), in Indonesia were reported in the area of Surabaya (Raharjo, B, 2006).

II. MATERIALS AND METHODS

2.1. Location and Design Research

This research was conducted at the Laboratory of Health Research and Development in Jayapura Papua Province. Experimental research design - post test only control group design.

2.2. Population and Sample

The population was all mosquito larvae in natural habitats in Sentani District, Jayapura Province. Sample was anopheles mosquito larvae, sp captured from the natural habitat adaptation is then performed for a minimum of 1x24 hours to reach Instar III / IV in Health Research and Development Laboratory of the Jayapura, Province of Papua. Larvae used 1,500 larvae.

2.3. Methods of data collection

Papaya leaves and seed varieties Bangkok obtained fresh from the garden community located in Sentani district, Jayapura Papua. In making leaf extract, fresh papaya leaves are washed, cut into pieces and dried at room temperature and then put in the oven until constant weight. Leaf maceration extraction method with 70 % ethanol solvent. In making seed extract, papaya seeds cleared of the husks, washed and then dried at room temperature and then put in the oven until constant weight. Soxhletasi seed extraction method with 70 % ethanol solvent.

Testing in accordance with the Guidelines Testing larvicidal mosquito larvicides in Laboratotium and Field by the WHO (2005). Tests carried out in four different concentrations, the larvae of Anopheles sp instar III / IV is placed in a plastic cup, each cup contains 25 larvae, 5-10 cm high water. In the control group was given 1 ml of 70 % ethanol solution. Replication is performed four times for each concentration. Larval death registration is done every 12 hours. Larval mortality observed data in the laboratory, then analyzed using a statistical test dosage log - probit mortality regression, Kruskall-Wallis and Mann-Whitney post hoc.

3. RESULTS

This study begins with a preliminary test to determine the dose of treatment, according to the WHO standard (2005), the group that used the extract concentration is 4 doses nearby

caused the death of 10 % - 90% of the larvae, and the concentration of so-called effective larvicides when ≤ 1 %, and time of < 48 hours. Larval mortality data cannot be used in the event of death of the larvae in the control group by 5-20 % and the larvae turn into pupae by 10 %. Observations were made during 48 hours, and larval death registration is done every 12 hours, so that the data obtained will be four time points measured of observation on water habitat, the average temperature of 26 °C, pH 8 and 0.04 ‰ salinity.

3.1. Papaya Leaf Extract Potential Test For larvicides against Anopheles larvae mortality, sp

Testing the potential of papaya leaf extract at a concentration of 125 ppm performed, 250 ppm, 500 ppm, and 1000 ppm, respectively.

Table 1. Observations Papaya Leaf Extract Treatment Group

Replication	Number Larva (n)	12 hours 0	125	250	500	1000	24 hours 0	125	250	500	1000	36 hours 0	125	250	500	1000	48 hours 0	125	250	500	1000
1	25	0	1	3	9	10	0	2	4	16	25	0	2	5	17	25	0	3	7	25	25
2	25	0	3	2	5	11	0	5	2	10	21	0	5	3	15	25	0	8	4	25	25
3	25	0	2	3	5	11	0	3	6	12	20	0	5	7	20	25	0	8	7	25	25
4	25	0	0	2	8	9	0	4	6	12	21	0	6	7	20	25	0	7	7	25	25
number	100	0	6	10	27	41	0	14	18	50	87	0	18	22	72	100	0	26	25	100	100
Average		0	2	3	7	10	0	4	5	13	22	0	5	6	18	25	0	7	6	25	25
Percentage		0	8	12	28	40	0	16	20	52	88	0	20	24	72	100	0	28	24	100	100

Table 1. Showed no larval mortality in the control group, so that the observed data can be used for calculations and Lethal Lethal Concentration Time as follows:

Table 2. Lethal Concentration Calculation Results of Papaya Leaf Extract against larvae of Anopheles sp

No	Period of *Bioassay* Test (hour)	Lethal Concentration (ppm) 50	90	Regression Equation	R Value
1	12	1,497,658	13,089,781	Y = -4,322 + 1,361X	0,974
2	24	422,311	1399,577	Y = -6,466 + 2,463X	0,917

Value of Lethal Concentration (LC50) of papaya extract on 12-hour test period is at 1497.658 ppm dose and value Lethal Concentration (LC90) at 13089.781 ppm, the regression equation was Y = -4.322 + 1.361 X with a value of R = 0.974. While the 24-hour test period, the value of Lethal Concentration (LC50) at 422.311 ppm, and the value of Lethal Concentration (LC90) at 1399.577 ppm, the regression equation was Y = -6.466 + 2.463 X, and the value of R = 0.917. R values indicate a very

strong correlation between the Anopheles sp mortality of larvae with papaya extract concentration.

Table 3. Value Lethal Time (LT) Papaya Leaf Extract Against Anopheles larvae, sp

No	Description	Value (hour)
1	Lethal Time (LT50)	13,579
2	Lethal Time (LT90)	23,468

Table 3, revealed that the value of Lethal Time (LT50) on the clock to 13.579 h, meaning that the time required to kill 50% of larvae of Anopheles sp is over 13.579 hours. Value Lethal Time (LT90) on the clock to 23.468 h, meaning that the time required to kill 90% of larvae of Anopheles sp is over 23.468 hours. Based on the probit regression, regression

equation $Y = -6.110 + 5.393 X$, and the value of R = 1. Rated R shows a very strong correlation between mortality of larvae of Anopheles sp and papaya extract exposure time.

3.2. Test of Potential Seed Extract Papaya As larvicides against Anopheles larvae mortality, sp

Testing the potential of papaya seed extract performed at four concentrations of the extract, the concentration of 10 ppm, 20 ppm, 40 ppm, and 80 ppm. The observation of mortality of larvae as follows:

Table 4. Observations Papaya Seed Extract Treatment Group

Replication	Number Larva (n)	12 hours					24 hours					36 hours					48 hours				
		0	10	20	40	80	0	10	20	40	80	0	10	20	40	80	0	10	20	40	80
1	25	0	2	2	5	12	0	7	10	15	25	0	8	12	25	25	0	9	19	25	25
2	25	0	2	6	4	8	0	8	11	15	18	0	10	15	20	22	0	15	18	23	24
3	25	0	3	3	7	13	0	10	10	18	22	0	11	12	22	25	0	12	18	23	25
4	25	0	2	5	4	12	0	8	12	15	20	0	9	13	22	25	0	15	20	24	25
Number	100	0	9	16	20	45	0	33	43	63	85	0	38	52	89	97	0	51	75	95	99
Average		0	2	4	5	11	0	8	11	16	21	0	10	13	22	24	0	13	19	24	25
Percentage		0	8	16	20	44	0	32	44	64	84	0	40	52	88	96	0	52	76	96	100

The data in Table 4 showed no larval mortality in the control group, so that the observed data can be used to then calculated values and Lethal Concentration Time as follows:

Table 5. Lethal Concentration Calculation Results of Papaya Seed Extracts Against Anopheles larvae, sp

No	Period of Bioassay test (Hour)	Lethal Concentration (ppm)		Regression Equation	R Value
		50	90		
1	12	120,987	1,080,689	$Y = -2,807 + 1,348X$	0,937
2	24	21,983	137,862	$Y = -2,157 + 1,607X$	0,979

The data in Table 5. Shows the Lethal Concentration value (LC50) 12 hour testing period is at 120.987 ppm concentration, the value of Lethal Concentration (LC90) at 1080.689 ppm concentration. Regression equation $Y = -2.807 + 1.348 X$, and the value of R = 0.937. Then the 24-hour test period, the value of the results obtained Lethal Concentration (LC50) at a concentration of 21.983 ppm, and the value of Lethal Concentration

(LC90) at a concentration of 137.862. Regression equation $Y = -2.157 + 1.607 X$, and the value of R = 0.979. Rated R shows a very strong correlation between mortality of larvae of Anopheles sp with papaya seed extract concentration.

Table 6. Value Lethal Time (LT) Papaya Seed Extract Against Anopheles larvae, sp

No	Description	Value (hour)
1	Lethal Time (LT50)	13,269
2	Lethal Time (LT90)	26,885

Table 6, indicated that the value of Lethal Time (LT50) on the clock to 13.269, meaning that the time required to kill 50% of larvae of Anopheles sp is over 13.269 hours. Value Lethal Time (LT90) on the clock to 26.885, meaning that the time required to kill 90% of larvae of Anopheles sp is over 26.885 hours.

Based on the probit regression, regression equation $Y = -4.692 + 4.179\ X$, and the value of $R = 0.999$. Rated R shows a very strong correlation between mortality of larvae of Anopheles sp and papaya seed extract exposure time.

3.3. Test Potential Mixed Leaf Extract and Papaya Seed Extract As larvicides against Anopheles larvae mortality, sp

Testing a mixture of papaya leaf and seed extracts were taken at four concentrations, ie the concentrations of 0,05:0,05, 0,1:0,1 concentration, 0,05:0,1 concentration, and the concentration 0,1:0,05. The data were as follows:

Table 7. Observations of Treatment Group and Mixed Leaf Extract Papaya Seed Extract

Replication	Number Larva (n)	12 hours K	A	B	C	D	24 hours K	A	B	C	D	36 hours K	A	B	C	D	48 hours K	A	B	C	D
		0	0,05:0,05	0,1:0,1	0,05:0,1	0,1:0,05	0	0,05:0,05	0,1:0,1	0,05:0,1	0,1:0,05	0	0,05:0,05	0,1:0,1	0,05:0,1	0,1:0,05	0	0,05:0,05	0,1:0,1	0,05:0,1	0,1:0,05
1	25	0	1	12	13	2	0	4	25	25	7	0	7	25	25	25	0	11	25	25	25
2	25	0	2	11	12	5	0	4	25	24	15	0	7	25	25	25	0	11	25	25	25
3	25	0	1	12	14	7	0	5	25	25	15	0	6	25	25	25	0	10	25	25	25
4	25	0	1	13	13	10	0	4	25	25	18	0	6	25	25	25	0	11	25	25	25
Number	100	0	5	48	52	24	0	17	100	99	55	0	26	100	100	100	0	43	100	100	100
Average		0	1	12	13	6	0	4	25	25	14	0	7	25	25	25	0	11	25	25	25
Percentage		0	4	48	52	24	0	16	100	100	56	0	28	100	100	100	0	44	100	100	100

Larval death based on dose (ppm) and the observation hour

Description:
Group K = control group
Group A = concentration of 0.05 leaves: concentration of 0.05 grains
Group B = concentration of leaf 0.1: seed concentration of 0.1
Group C = concentration of 0.05 leaves: concentration of 0.1 seeds
Group D = 0.1 leaf concentration: concentration of 0.05 grains

From Table 7, the number of larval mortality varied between one group with another group, the observation hours to 12, the highest larval mortality seen in group C (comparison extract 0,05:0,1), larval mortality by 52 %, then group B (0,1:0,1 ratio) by 48 %, group D (comparison 0,1:0,05) by 24 %, and the last in group A (comparison 0,05:0,05) by 4%.

At the 24th hour observation, larval mortality in group B (0,1:0,1) and group C (comparison 0,05:0,1) reached 100 %, while in group D (comparison 0,1:0,05) by 56 %, and group A (comparison 0,05:0,05) by 16 %. At the 36th hour observation, larvae in group D has died completely, whereas in group A has not reached 100 % even up to 48 hours of observation. To determine which groups are different. The available data were tested for normality and variance ANOVA test to qualify, but based on the Shapiro - Wilk test data distribution is not normal $p < 0.05$, and unequal variances $p < 0.05$, while the absolute requirement ANOVA test is homogeneous data distribution and variance the data must be the same. So it is necessary to transform the data, to achieve homogeneity of the distribution of the data after the data transformation, data distribution and variance of data still not homogeneous or $p < 0.05$.

Based on the data above, the data analysis is not possible using ANOVA test that is done with the Kruskal - Wallis test, $p = 0.03$ value obtained or $p < 0.05$ so that it can be concluded that at least there is no difference in mortality between the two groups of larvae. So as to know the difference between groups, post hoc test Mann – Whitney was applied.

Table 8. Results of Post Hoc Test Mann - Whitney Between Group and Mixed of papaya Leaf and seed Extracts.

Group Comparative	Papaya leaf and seed Extracts concentration		Value P
A : B	0,05 : 0,05	0,1 : 0,1	0,011
A : C	0,05 : 0,05	0,05 : 0,1	0,015
A : D	0,05 : 0,05	0,1 : 0,05	0,017
B : C	0,1 : 0,1	0,05 : 0,1	0,317
B : D	0,1 : 0,1	0,1 : 0,05	0,013
C : D	0,05 : 0,1	0,1 : 0,05	0,017

Based on Table 8, shows that there are differences in the number of deaths between groups A : B , A : C, A : D , B : C and group C : D p < 0.05 , whereas there was no difference in the number of deaths in group B : C , p ≥ 0.05.

III. DISCUSSION

This study was conducted to test the potential of the extracts from the leaves and seeds of papaya (Carica papaya) as a larvicides against Anopheles mosquito larvae mortality, sp. Testing was conducted larvicides against mosquito larvae instar III and IV according to the WHO guidelines in 2005. At the time of the test, the larvae are not fed, because using water habitat, it is estimated that there are still elements of the nutrients needed by the larvae to survive during the experiment. Water temperature and pH, and salinity were measured, and the results obtained average temperature of 26°C, pH 8 and salinity 0.04 ‰ . The results of water quality testing results obtained from the field, temperature 24.8 °C, pH 8.11, and salinity 4 ‰. In the study the effectiveness of the ethanol extract of papaya leaves that have been done by Oladimeji, Olawale.H, et al (2012), found that at a concentration of 5 % (5000 ppm), the extract killed 40 % of larvae of Anopheles gambiae in 12 hours, at 24 hours the larvae were death by 50 %. While at a concentration of 10 % (10000 ppm), larvae were dead by 70 % within 12 hours, and 80 % of larvae died within 24 hours. In another study conducted by Okolie, N.JC (2006), found 100 % mortality of larvae at a concentration of 0.6 mg / ml (600 ppm). Research Kalu, IG (2002) found the LC50 for larvae of Anopheles sp at 38.34 mg / ml (38 340 ppm or 3.834 %).

This study found the value Lethal Concentration (LC50) papaya leaf extract at a concentration of ppm 1497.658 and 13089.781 ppm LC90 values at 12 -hour test period. While the 24 -hour test period, found the value of Lethal Concentration (LC50) papaya leaf extract at a concentration of 422.311 ppm, and the LC90 value of 1399.577 ppm. The results of the regression test on both testing periods showed there results a very strong correlation between the concentration of papaya leaf extract with the death of the larvae of Anopheles sp. Based on the results of this test also seen that the most effective way to kill the larvae of Anopheles sp is by exposing the larvae within a longer period of time, because it takes a small extract concentration, the concentration needed only 422.311 ppm (0.04

%) to kill 50 % larvae, and it takes concentration 1399.577 ppm (0.13 %) to kill 90 % of larvae of Anopheles sp. However, when the larvae are contacted only in short periods of time, it takes great concentration of extract that is 1497.658 (0.14 %) to kill 50 % of larvae, and it takes 13089.781 extract concentration (1.3 %).

Based on the analysis results, it is seen that, the smaller the concentration of papaya extract then requires a longer contact time with the larvae can cause death to the larvae of Anopheles sp, the higher the concentration of papaya extract it requires a shorter contact time in killing the larvae of Anopheles, sp. Value Lethal Time (LT50) papaya extract LT90 value of 13.579 hours and 23.478 hours, meaning 13.579 within hours of papaya leaf extract is able to kill 50 % of larvae, and 23.478 within hours, papaya extract is able to kill 90 % of larvae of Anopheles sp. Based on WHO guidelines (2005), it can be said that papaya leaf extract effectively used as larvicides for Lethal Concentration values ≤ 1 % (10,000 ppm), and Lethal Time < 48 hours. Value or value Lethal Lethal Concentration Time is much different between this study with previous studies may be caused by the use of different raw materials, such as the level of maturity leaves, papaya varieties, method of extraction, which is a different type of *penyari* solution, also the concentration of the *penyari* solution used. As well as research conducted by Rawani (2012), she used the types of solutions of different solvents in the manufacture of papaya seed extract, namely petroleum ether / hexane, benzene, ethyl Cetate, chloroform, acetone, and alcohol, then find the value of different lethal different. Research on the effects of ethanol extract of papaya seeds larvicides ever undertaken by Rawani, et al (2012) against the Anopheles stephensi mosquito larvae, the value Lethal Concentration (LC50) 18.39 ppm and 250.76 ppm on the LC90 value.

In this study, Lethal Concentration values calculated at two time periods, the period of time of 12 hours LC50 values obtained at 120.987 ppm and LC90 values in ppm 1080.689. In the period of 24 hours LC50 values obtained 21.983 ppm and 137.862 ppm LC90 value. Based on both the results of these tests, it is seen that when the larvae are laid out in the interval of 12 hours then it will require the concentration of papaya seed extract greater is 120.987 ppm (0.012 %) to kill 50 % of larvae, and requires concentration 1080.689 ppm (0.1 %) to kill 90 % of larvae. However, when the larvae are contacted within a longer time then it just takes concentration 21.983 ppm (0.0002 %) to kill 50 % of larvae, and 137.862 ppm (0.01 %) to kill 90 % of larvae of Anopheles sp. Based on the test results is shown that, the smaller the concentration of papaya seed extract is used then need longer time in killing the larvae, and vice versa, the greater the concentration of papaya seed extract is used, it requires less time in the deadly Anopheles larvae, sp.

Lethal concentration values are different between this study with previous studies may be caused by different types of *penyari* solution, the use of hexane solution by Rawani (2012), found that the smaller the value of LC, it can be understood that hexane is a good solvent of fat, so that active compounds contained in the fat may be withdrawn by the solvent. Papaya seeds contain fat is evidenced at the time of the extraction process by researchers, looked oily liquid extract. The use of 70 % ethanol was chosen by the researchers because it has not been done in other studies, in addition to the price of hexane

economically more expensive than ethanol, and by using 70% ethanol proved still effective in killing larvae of Anopheles sp with a lethal concentration values are still far below WHO standard. Value Lethal time (LT50) of papaya seed extract on 13.269 hours, and LT90 at 26.885 hours, meaning that papaya seed extract is able to kill 50 % of larvae within 13.269 hours, and were able to kill 90 % of larvae within 26.885 hours. Based on the results of the analysis can be said that papaya seed extract is effective in killing larvae of Anopheles sp, due to the time required to kill the larvae of < 48 hours.

Based on data Lethal Concentration (LC) and Lethal Time (LT), it seems that the value of this research approach with the results of previous studies, that is based on values and value Lethal Concentration Lethal Time (LT) can be said that papaya seed extract is effective in killing larvae Anopheles sp, because the value of Lethal Concentration ≤ 1 % (10,000 ppm), and Lethal Time < 48 hours. So based on the data Lethal Concentration (LC) and Lethal Time (LT), it can be said that papaya seed extract is effective in killing larvae of Anopheles sp, because the value of Lethal Concentration ≤ 1 % (10,000 ppm), and Lethal Time < 48 hours.

Based on research conducted to papaya leaf and seed extract, it appears that the lethal concentration values between papaya seeds and leaf extracts of are much different, with the same exposure time against larvae of Anopheles sp. Papaya seeds are more toxic than the leaves of papaya, because the possibility of papaya seeds contain secondary metabolites that act as larvicides higher than the papaya leaves. According Sastrohamidjojo, Hardjono (1996), in the plant, the active substances dispersed in certain parts of plants, such as quinine alkaloid contained in the leaves of plants not bark Cinchona ledgeriana, then morphine in Papaver samniferum sap or latex. In certain parts of plants rich in alkaloids, but in other parts there is little or even not there at all, but it does not mean that these secondary metabolites such as alkaloids formed in parts of the plant, for example alkaloids found in Datura species and Nicotiana alkaloidnya produced in the roots but very quickly translocated to the leaves of the plant.

In tests using a mixture of leaf extracts and papaya seed extract, taken at four different concentrations, ie the concentrations 0,05:0,05, 0,1:0,1 concentration, 0,05:0,1 concentration, and the concentration of 0,1:0,5. Larval mortality varied, the larvae treated group at 24 hours 0,1:0,1 are 100 % larval mortality, and the 0,1:0,5 concentration, where the concentration of papaya seed extract is higher than the concentration of papaya extract, at 24 h larval mortality was 99 %, the reaction that occurs between the concentration of 0,1:0,1 with 0,1:0,05 can be said about the same.

Based on the results obtained by statistical tests there is a difference between the number of deaths in group A : group B, group A : group C, group A : group D, group B : Group C and Group C : Group D p < 0.05, whereas there was no difference in the amount of mortality in group B : group C, p ≥ 0.05. It can be understood that the highest larval mortality occurred in group B and group C, so that when the two groups are compared it is found there is no difference, whereas when compared with the other groups will find the difference. However, both groups that causes the highest larval mortality.

In the group in which the concentration of papaya seed extract more (group C) when compared with higher concentrations of the leaf extract (group D) of the obtained results there is a significant difference. This can be understood as based on previous testing, papaya seed extract is more toxic to the larvae of Anopheles, as evidenced by the value of sp Lethal Concentration (LC50) and Lethal Concentration (LC90).

The content of secondary metabolites in the leaves and seeds of papaya in the form in which the principle works Karpaina alkaloids inhibit the body's metabolic processes in larvae, interfere with growth hormones, and digest the protein in the larval body and turn it into peptone derivatives that will host larvae as food shortages and eventually die (Utomo, Margo, et al. 2010). Phenolic compounds work damage cell membranes causing lysis in the larval body (Rahman, 2008 in IPB Repository, 2011). This is demonstrated through experiments on concentration of papaya leaf extract as high as 4000 ppm, larval body destroyed until no trace. Flavonoids, works as a stomach poison that lowers appetite larvae because larvae fail to recognize food stimulus, so that over time the larvae will die of starvation (Cahyadi, Robby. 2009). Saponin is a toxin that is polar, soluble in water, and when it enters the body in larvae can result in hemolysis in the blood vessels. Organic fatty acids contained in papaya seed extract and inhibit the process of metamorphosis, inhibit the formation of the larval skin, thus resulting in the death of the larvae (Suirta, IWNM, et al., 2007).

The use of leaf extracts and papaya seed extract as larvicides relatively safer for the environment because it is a natural substance and its nature is not toxic to aquatic animals. This is evidenced by the use of papaya leaf by which the fish farmers who have mashed papaya propagated into catfish ponds as antimicrobial and fungi that can interfere with the growth of channel catfish (Marsul 2005, in media of fishery education.blogspot.com, accessed on February 8, 2014). Papaya leaf extract into a body of water will affect the color and flavor, but this should not be a problem, because the breeding places of Anopheles larvae, sp form puddles that are not used as a source of drinking water for humans. The use of papaya seed extract relatively no effect on the color, but it can change the taste of water, because papaya seed extract has a brighter color than the color of papaya extract but very bitter taste.

Papaya leaves are used in this study is an old papaya leaves, which are usually not used by most people, because it cannot be consumed as a vegetable as well as animal feed, thus making of larvicides based on the principle utilizes papaya leaf litter, as well as the manufacture of grain-based larvicides papaya, papaya seeds as currently untapped old, another case with young papaya seeds have been used in medicine since it has many benefits for health. Papaya fruit store huge potential, which can be used sap containing papain and papain are used in various industries are usually extracted from papaya fruit, and carried out by a special method, so that the papaya fruit can produce a lot of sap, and not leave the incision when The ripe fruit, but sometimes there is a failure in the process of tapping, so the incision scars on papaya fruit, papaya fruit becomes defective so as not marketable (Muhidin, Dudung, 2001). Opportunity is to be used, where the fruit is not sold in the market and become garbage, can be used as raw material for the manufacture of larvicides.

In this study, larvae used were Anopheles larvae, sp captured directly from its habitat in the wild. Trapping sites are in Kampung Kehiran II Jayapura Sentani District. The natural

habitat of the larval form of a puddle of water in the ditch between the beds of vegetables, with a little clear water conditions, not polluted by household waste and other waste, overgrown with water plants, somewhat shielded from direct sunlight. Larvae happy to be on the surface of the water at the edge of the gutter, and move actively when disturbed. Larvae were taken directly from the habitat are expected to have a higher resistance than larvae cultured (rearing) in the laboratory. The water used is water that comes from the natural habitat of the larvae, so expect the results of this research can be applied in the field. Limitations in this study is not to analyze the differences to variable pH, temperature, and salinity, as well as the study only uses the larvae of Anopheles sp thus necessary to investigate other mosquito larvae such as Culex sp. Based on the results of this study can be developed by examining the content of secondary metabolites in plant parts varieties of papaya on the same or different, comparing extraction methods different parts of the plant extracts in the manufacture of papaya, and can be tested larvicidal effects of isolation secondary metabolites in plant papaya.

IV. CONCLUSION

This study concluded that papaya leaf and seed extract effective as larvicides against Anopheles larvae mortality, sp captured from the natural habitat. We recommend further research to examine the isolation effectiveness secondary metabolites contained in the leaves and seeds of papaya extract on the larvae of the mosquito Anopheles sp and other mosquito larvae, such as Culex sp. This research can be developed by examining the content of secondary metabolites in plant parts varieties of papaya on the same or different, comparing extraction methods different parts of the plant extracts in the manufacture of papaya, and can be tested larvicidal effects of the isolation of secondary metabolites in papaya plants

CONFLICT OF INTEREST

The author declares no conflict of interest in this study.

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An Introduction to Compressive Sensing and its Applications

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Abstract- Compressed sensing or compressive sensing or CS is a new data acquisition protocol that has been an active research area for nearly a decade. It samples the signal of interest at a rate much below the Shannon nyquist rate and has led to better results in many cases as compared to the traditional Shannon – nyquist sampling theory. This paper surveys the theory of Compressive sensing and its applications in various fields of interest.

Index Terms- Compressive sensing, Compressive sampling, applications of CS, data acquisition

I. INTRODUCTION

Compressed sensing involves recovering the speech signal from far less samples than the nyquist rate. Also, as this is a sparse signal recovery algorithm, we can recover the signal which is sparse in nature in presence of noise which is non-sparse. Recently, compressive sensing or compressed sensing (will be referred as CS henceforth) has been an active research area in the field of signal processing and communication. It has been applied to Wireless sensor networks, video processing and image processing and up to some extent on speech signal processing also.

Conventionally, the signal of interest is sampled at nyquist rate and a large part of these samples is eliminated during the compression stage. This leads to unnecessary hardware and software load. Compressed sensing, as the name suggest, samples the signal in a compressed format i.e. it uses very less number of distinct samples of the target signal and is then recovered by using various recovery algorithms. As a result, less number of samples are handled, which leads to reduction in power consumption as well as a reduced load on hardware as well as software

The signal of interest is sampled by taking small number of linear random projections of the signal which contain most of the vital information about the signal. It basically relies on two major assumptions about the signal i.e. Sparsity and Incoherence[3]. Sparsity depends upon the signal of interest and incoherence depends upon the sensing modality. Sparsity means that the amount of information present in the signal is much less than the total bandwidth acquired by the signal. Most of the natural signals are sparse in nature. On the other hand, incoherence means that, signals that can be represented sparsely should be spread out in the domain in which they are acquired.

This paper is organized as follows. Section 2 provides an overview of CS, section 3 provides an idea on recovery algorithm implementation, section 4 describes varios applications of CS and section 5 summarizes the findings.

II. BACKGROUND

a. *Overview of Compressed Sensing*

The theory of CS was developed by Candes [1] and Donoho [2] in 2004. It involves taking random projections of the signal and recovering it from a small number of measurements using optimization techniques. In a traditional sampling theorem, the signal is sampled using Nyquist rate, whereas with the help of compressive sensing the signal is sampled below the Nyquist rate.

This is possible because the signal is transformed into a domain in which it has a sparse representation. Then the signal is reconstructed from the samples using one of the different optimization techniques available. Figure one shows a block diagram which illustrates the difference in the traditional method of signal acquisition and the CS approach.

It is clear from figure 1 that, traditionally, the signal is sensed, sampled at a nyquist criteria, then, the samples are saved and then compressed where a large amount of samples are discarded. In contrast to all these steps, CS senses the signal in an already compressed format. Hence, a lot of hardware as well as software load is reduced.

For understanding the concept of compressed sensing, we will go through following set of definitions and formulae:

i. **Sparse Signal:** A signal is called sparse in nature if it has only a few significant (large in magnitude) components and a greater number of insignificant (close to zero) components.

ii. **Compressible Signal:** A signal is said to be compressible if it is sparse in nature.

iii. $s = \Psi x$ where, s = Signal to be acquired
Ψ = Sparsifying matrix
x = Real valued Column vector

iv. $y = \Phi s = \Phi \Psi x$ where, y = Compressed Samples
$= Ax = A_k \cdot x_k$ Φ = Sensing Matrix

v. The Solution to above equations is:

$$X_k = (A_k{}^T A_k)^{-1} A_k{}^T y$$

vi. Above is an underdetermined problem i.e. projection of an n-dimensional vector into an M dimensional space i.e. Number of equations < Number of Unknowns

vii. To Solve this kind of problems, we use the concept of Norms. Norms are nothing but, they assign strictly positive length to vectors in a vector space. Norms are of following types:

    a. L_0 Norm: It simply counts the number of non-zero components in a vector

    b. L_1 Norm: It is given by the following equation:

$$\|\mathbf{x}\|_1 = \sum_{i=1}^{N} |x_i|$$

    c. L_2 Norm: It is given by following equation:

$$\|\mathbf{x}\|_2 = \left(\sum_{i=1}^{N} |x_i|^2 \right)^{\frac{1}{2}}$$

viii. **Designing a Sensing Matrix:** Following conditions need to be strictly satisfied while designing a sensing matrix so that, the signal is recovered faithfully:

    a. Universal Incoherence condition: It means, that, the value of cross correlation between two column vectors of a sensing matrix must be minimum.

    b. Data Independence: The construction of a random matrix does not depend upon any prior knowledge of data.

    c. Robustness: Transmission of randomly projected coefficients is robust to packet loss in the network.

ix. **Incoherence condition:** The sensing matrix should be as different from the sparsifying basis. Time and frequency basis are maximally incoherent. Following equation signifies the incoherence condition:

$\mu < 1/(2K-1)$

Fig. 1: Traditional sensing Vs. compressed sensing

III. RECOVERY ALGORITHMS

There are basic two types of approaches as follows:

1. Greedy Type – Orthogonal Matching Pursuit

OMP is a greedy-type algorithm because it selects the one index regarded as the optimal decision at each iteration. Thus, its performance is dominated by its ability to find the sparse set exactly. If the sparse set is not correctly reconstructed, OMP's solution could be wrong. It is mostly used when the number of common components is more.

2. Gradient Type – Primal Dual Interior Point

This algorithm is nothing but making some changes into the L_1 norm and is mainly used when the innovation components are more.

IV. APPLICATIONS OF CS

In this section, we see applications of CS to various areas of signal processing that have been done up till now. We will also see few results based on these applications.

1. Wireless Sensor Networks

Wireless sensor networks are usually placed in field e.g. seismic sensors, fire, temperature and humidity detectors in forest etc. These sensors are usually battery operated and cannot be easily replaced. Hence, an efficient data acquisition system is needed in order to optimize the data transferred from these sensors as well as minimize the computational complexity of these sensors in order to increase their battery life. Compressed sensing can very well fit into such situations as it samples the signal of interest at a very low rate than the nyquist criteria and as a result it has an effective computational capacity.

Wireless sensors collect their individual data and send this data from the sensor node to the collaboration location, from which they are transmitted through wireless channel to the fusion center. Conventionally, the intra-sensor correlation takes place at the sensor node and the inter sensor correlation takes place at the collaboration location. When we apply CS to WSN [14], the intra sensor correlation takes place at sensor node, the output is directly transmitted over wireless channel and the intersensor correlation takes place at the fusion center which is rich in resources. This is possible because, the data that is transmitted using CS is intelligent and can be sent using very less number of bits as compared to traditional method.

The advantages of applying CS to WSN are listed as follows.

    i. CS can be used to save transmittal and computational power significantly at the sensor node.

    ii. This CS based signal acquisition and compression scheme is very simple, so it is suitable for inexpensive sensors.

    iii. The number of compressed samples required for transmission from each sensor to the FC is significantly small, which makes it perfect for sensors whose operational power is drawn from onboard battery.

    iv. The joint CS recovery at the FC exploits signal correlation and enables Distributed Compressive Sensing.

2. Wireless video transmission

Recently there has been an alarming increase in demand for wireless video streaming in applications such as Home

entertainment, Home security, Mobile video etc. Hence, the need to provide the required quality of service (QoS) to support video applications is very crucial. This alarming increase in utilization and number of users with different QoS requirements increase the computational complexity and time.

Following are the main concerns for transmitting wireless video signal:

i. Wireless nodes need to send data out in a timely and energy efficient way.
ii. We need to jointly consider perceived video quality, quality variation, power consumption and Transmission delay requirements.

The following fig 2 gives us an idea about how CS can be applied to video signal:

Fig 2 : CS applied to layered architecture of video signal

Base layer – The Discrete cosine transform is used to encode the given video signal in the base layer. As the name suggests, it extracts the necessary information required to describe the given video signal. It consists mainly of the basic information which is required to describe a video signal. It is the necessary information that should be present to represent the video signal; irrespective of anything.

Enhanced layer – Compressed Sensing technology is used to encode the enhanced layer bit stream. It consists mainly of additive features used to enhance the video quality. These measurements can be transmitted depending upon the availability of channel and the required latency and QoS [13].

3. Speech Signal

The following figure 3 explains the basic block diagram of compressed sensing applied to speech signal.

Fig. 3: Block diagram of CS applied to speech signal

The recorded speech signal is first transformed into a domain in which it is sparse. Here, we have taken the transform domain as Discrete Cosine Transform (DCT). Once we find the DCT of the recorded speech signal, the next step is to design a window function. The function of the window function will be to multiply all the components in that window by zero. This will make the transformed signal sparser. The resulting signal is ready to be sensed compressively. For sensing the signal compressively, we multiply it with a random matrix of size K by N. here, K signifies the level of sparsity and N is the total number of samples in the transformed and windowed function.

By using random matrix, we make random linear projections on the sparse signal in order to take very few components of the sensed signal. Thus, the signal to be recovered becomes robust for any errors. Hence we now have the compressively sensed signal y.

Following figures explain the step by step results for obtaining the compressively sensed signal y:

DCT of recorded speech signal

Observation Vector

Threshold spectrum

Random Measurement matrix

The above results are by using values of k (sparse number) as 1000 out of total number of samples present i.e. 40000. Hence the degree of compression is huge. We can vary the sparse number and observe the results. The next step is to apply OMP and Basis pursuit algorithm and inverse DCT in order to recover original speech signal.

Compressed sensing can be applied to speech signal by using short time Fourier transform as the transform domain instead of discrete cosine transform [4].

V. CONCLUSION

CS can prove to be a revolutionary technique for signal acquisition and recovery. The key advantages are:

- Fast acquisition of data with fewer samples
- Decreased computational complexity
- Lower transmission power
- Small traffic volume
- Small time delay
- Sampling matrix need not be adaptive to signal
- The desired resolution for recovering the compressively sensed signal can be achieved by manipulating the sparse number K.

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"Probiotics – An Emerging Concept"

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Abstract- Probiotics are live microorganisms (e.g., bacteria) that are either the same as or similar to microorganisms found naturally in the human body and may be beneficial to health. Often referred to as "good bacteria" or "helpful bacteria," *probiotics* are available in various forms of suppliments or other delivery systems. There is a constantdebate regarding the effectiveness of probiotics in todays lifestyle. As the question arises whether the living & dietary habits of an individual can be altered and hence improved upon by the use of Probiotics.

Index Terms- Probiotics, Prebiotics ,Good Bacteria

I. INTRODUCTION

The term "Probiotics" comes from the Greek "for life". Probiotics are live microorganisms (in most cases, bacteria) that are similar to beneficial microorganisms found in the human gut. They are also called as "friendly bacteria" or "good bacteria." The first recorded probiotic was fermented milk for human consumption. After that, Probiotics became popular with animal nutrition. Probiotics have been used as growth promoters, for lactose intolerance[3], antitumour and anticholestrolaemic effects. When ingested, these living microorganisms replenish the microflora in the intestinal tract. This results in the promotion of a number of health-enhancing functions, including enhanced digestive function.[1]

Probiotics as defined by the World Health Organization (WHO) are live microorganisms which, when administered in adequate amounts, confer a health benefit on the host[2]. Probiotics have been extensively studied under *in vitro* and *in vivo* conditions. The main fields of research with respect to probiotics are heart diseases, allergic reaction, cancer, diarrhoea, etc. Intestinal infections caused by *Escherichia coli*, *Campylobacter fetus* subsp. *jejuni*, *Clostridium perfringens* and *C. botulinum* were reduced in the presence of *Lactobacillus* supplements. The *Lactobacillus* has shown promising results and *Bifidobacterium longum* has been successfully used to reduce the after-effects of antibiotic therapy.

II. HISTORY

Probiotic food such as fermented foods and cultured milk products has been used since the ancient times. Interest in probiotics in general has been growing. Over the last century, different micro organisms have been used for their ability to prevent and cure diseases leading to the coining of the term probiotics.In 1907 the Ukrainian born biologist & Nobel laureate Elie Metchnikoff stated that consumption of Bulgarian yogurt (which contains lactic acid bacteria) was good for health[3]. In the 1950s, probiotics product was tensed by the United States department of agriculture as a drug for the treatment of scour (E, coli infection) among pigs.

The term probiotics, as an antonym to the term antibiotic, was originally proposed in 1965 by Lilley and Stillwell [4]. Discovery of Mann and Spoerig in 1974 that people who drank yoghurt fermented with wild strains at lactobacillus specifically had low values for blood serum cholesterol, opened up a new area of study [5].The first probiotic species acidophilus was isolated by Hull et al in 1984 and Bifidobacterium bifidum by Holcombh et al in 1991(Tanboga et al; 2003)

In 1994, the World Health Organization deemed probiotics to be the next most important immune defence system when commonly prescribed antibiotics cohabited resistance (Kailasapathy and Chin 2000; Levy 2000).

III. COMPOSITION OF PROBIOTICS

Most probiotics are bacteria similar to those naturally found in people's guts, especially in those of breastfed infants (who have natural protection against many diseases). Most often, the bacteria come from two groups, *Lactobacillus* or *Bifidobacterium*.

Within each group, there are different species (for example, *Lactobacillus acidophilus* and *Bifidobacterium bifidus*), and within each species, different strains (or varieties). A few common probiotics, such as *Saccharomyces boulardii*, are yeasts, which are different from bacteria. Among bacteria, lactic acid bacteria are more popular. *Lactobacillus acidophilus*, *L. casei*, *L. lactis*,

L. helviticus, *L. salivarius*, *L. plantrum*, *L. bulgaricus*, *L.rhamnosus*, *L. johnsonii*, *L. reuteri*, *L. fermentum*, *L. del brueckii*, *Streptococcus thermophilus*, *Enterococcus faecium*, *E. faecalis*, *Bifidobacterium bifidum*, *B. breve*, *B. longum* and *Saccharomyces boulardii* are commonly used bacterial probiotics[5].

IV. MECHANISM OF ACTION

Probiotics can be in the form of powder, liquid, gel, paste, granules or available in the form of capsules, sachets, etc. Probiotics improve colonization resistance to gut pathogens by reinforcing the mucosal barrier and restoring normal gut micro ecology after diarrhea (Fig-1). If the intestinal micro flora is deficient, antigen transport is increased; probiotics have been shown to normalize an increased permeability Binding is considered to be the first step in pathogenesis, and binding of bacteria to the intestinal mucosa or mucus may allow the colonization". Probiotics compete with pathogens for binding

sites and available substrates. Probiotics can also activate and modulate the immune system, and reinforce gut defense by immune exclusion, immune elimination and immune regulation. The intestinal micro-flora is associated with the development of immune system in the gut during infancy and early child hood[6, 7].

V.   USES

Probiotics are recommended for people who take antibiotics, are under stress or are travelling. Stress can upset the stomach and alter the microflora in the gut. Probiotics can help in stabilizing the gut microflora. According to Farnworth, the probiotics in yogurt may also help in shortening the duration of diarrhea caused by some antibiotics less severe and because the active cultures help replenish beneficial bacteria, returning colon function to normal.Probiotics could halt the unfriendly microorganisms and/or suppress their growth and activity in conditions like:

- o Infectious diarrhea
- o Irritable bowel syndrome
- o Inflammatory bowel disease (e.g., ulcerative colitis and Crohn's disease)
- o Infection with *Helicobacter pylori* (*H. pylori*), a bacterium that causes most ulcers and many types of chronic stomach inflammation
- o Tooth decay and periodontal disease
- o Vaginal infections
- o Stomach and respiratory infections that children acquire in daycare
- o Skin infections.[6]

VI.   CLINICAL IMPLICATIONS OF PROBIOTICS

Anti-Cancer effects

There is a strong attestation to the importance of *Lactobacilli* in human nutrition and health, as well as the interrelationship between many dietary factors and cancer. There is some evidence that probiotics can interfere at various stages of the cancer process, such as prevention of DNA damage in the colon by live bacteria24, suppression of pre-neoplastic changes in the colon25 and suppression of colon tumours in animals.Animal and *in vitro* studies have indicated that probiotic bacteria may reduce colon cancer risk by reducing the incidence and number of tumours[3].

Lactose intolerance

Lactose intolerance is a physiological state in human beings where they lack the ability to produce an enzyme named lactase or B-galactosidase. This lactase is essential to assimilate the disaccharide in milk and needs to be split into glucose and galactose. Individuals lacking lactase will not be able to digest milk and it often poses a problem in newborn infants. People with lactose intolerance problem express abdominal discomfort, diarrhoea, cramps, flatulence, nausea, vomiting, etc. Another problem associated with lactose intolerance is calcium deficiency. A person suffering from lactose intolerance will be advised to take non-milk diet. The resident bacteria in the colon ferment undigested lactose, producing acid and gas, causing symptoms such as abdominal pain, bloating and diarrhoea.

Yogurt contains less lactose than milk and delays gastric emptying, which partly explains why lactose- intolerant individuals tolerate yogurt[3].

Allergy

A change in the proper functioning of the immune system can present itself as an allergy. Large-scale studies have indicated an alteration in the composition of the gut microflora, such as decrease in the numbers of lactobacilli, preceding the development of an allergy. Probiotics have been shown to reduce the incidence of childhood eczema by half. Probiotics may exert a beneficial effect on allergic reaction by improving mucosal barrier function. In addition, probiotics consumption by young children may beneficially affect immune system development. Probiotics such as *Lactobacillus* GG may be helpful in alleviating some of the symptoms of food allergies such as those associated with milk protein. Probiotics consumption may thus be a means for primary prevention of allergy in susceptible individuals[3,7 10].

VII.   EFFECTS OF PROBITOTICS ON ORAL CAVITY

Probiotics may act by direct interaction or indirect interaction on oral biofilm and microflora and vice versa.
Direct interaction may include:

- Involvement in binding of oral microorganism to proteins (biofilm formation).
- Action on plaque formation and on its complex ecosystem by compromising and intervening with bacteria to bacterial attachments.
- Involvement in metabolism of substrate (competing with oral microorganisms of substrate available).
- Production of chemicals that inhibit oral bacteria (antimicrobial substances)

Indirect interactions may include:

- Modulating systemic immune function selection pressure on developing oral micro flora towards colonization by less pathogenic species.
- Reduction of malodor[8,9]

Other effects

- ➢ Inhibit Growth of Pathogenic Bacteria
- ➢ Enhance Growth of Other Friendly bacteria
- ➢ Reduce Toxins
- ➢ Increase Immunity/Bacterial Resistance
- ➢ Produce Vitamins and Other Nutritional Factors
- ➢ Reduce Cholesterol
- ➢ Alleviate Flatulence

VIII.   ADVERSE EFFECTS

Probiotics safety has not been thoroughly studied scientifically, however. More information is especially needed on how safe they are for young children, elderly people, and people with compromised immune systems. Side effects of probiotics tend to be mild and digestive in nature leading to effects such as gas or bloating. More serious effects have also been seen in some

people. Probiotics might theoretically cause infections that need to be treated with antibiotics, especially in people with underlying health conditions. They could also cause unhealthy metabolic activities, too much stimulation of the immune system, or gene transfer (insertion of genetic material into a cell) [2].

IX. CONCLUSION

A good probiotic agent needs to be non-pathogenic, nontoxic, resistant to gastric acid, adhere to gut epithelial tissue and produce antibacterial substances. It should persist, albeit for short periods in the gastro-intestinal tract influencing metabolic activities like cholesterol assimilation, lactose activity and vitamin production. With the current focus on disease prevention and the quest for optimal health at all ages, the probiotics market potential is enormous. Health professionals are in an ideal position to help and guide the patients toward appropriate prophylactic and therapeutic uses of probiotics that deliver the desired beneficial health effects[3].

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Exploring Alternative Assessment in Education from Different Lenses

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I. INTRODUCTION

Assessment has necessarily become the vehicle and engine that drives the delivery of education and other related educational processes. It is a truism that 'what is assessed becomes what is valued, which becomes what is taught' (Broadfoot, 2004). Governments across the globe have realized the potential of educational assessment in engendering the much coveted educational goal of enhanced pupil learning. Impact of alternative assessment forms on pupils learning can be discerned from the fact that this framework of assessment is popularly called as *assessment for learning*. Recent decades have witnessed marked changes in the assessment perspective, assessment systems and assessment regimes. These changes entail integration of assessment in the teaching- learning process, making students partners in the learning process, empowering teachers to make judgments about their pupils' progress, and motivating teachers to provide their learners with individualized and qualitative feedback which could purposefully inform the next steps in learning. As pointed out by Birenbaum (1996), the term alternative assessment is like a large umbrella, 'a generic term currently used in assessment literature' (p.3) that shelters multitude of potential alternatives to traditional tests, such as, performance based assessment, authentic assessment, self- peer assessment, inquiry based learning projects, portfolios, etc.(Fox, 2008). Gardner (2012) further suggesting the centrality of learning emphasized in alternative assessment framework suggested that it is popularly called as 'assessment *for* learning' (Gipps et al., 1997).

Though this framework of assessment seems learner friendly yet it poses many intriguing issues still in the process of educational enquiry. For instance, what are the purposes, functions of the new modes of assessment? How will the goals of selection and certification will be handled through the alternative assessment framework? If allegations levied on traditional forms of assessment are severe then are we sure that 'assessment for learning' will be error free? Is there any positive or negative *backwash effect* (Broadfoot, 2004) of alternative assessment? What kind of alterations are to be incorporated in the long established educational regimes, school calendars required to integrate newer forms of assessment? What are the provisions made for re-orienting the conceptions and interpretive frameworks of various competing stakeholders- parents, teachers, school administration? And most importantly, how will this paradigm of educational assessment synergise the role expectations of educational assessment between home, school and society at large? These are few deeper questions whose solutions are to be sought for. Also, restricting oneself in the

boundaries of any one discipline may not help us locate all the solutions; therefore, an inter-disciplinary approach to alternative assessment is required.

This paper examines 'alternative assessment' reform (Fox, 2008), from few different perspectives, namely, economic, socio-political, psychological, and technological (Hargreaves, 2002). Each perspective analyses alternative assessment from differing lenses highlighting different issues and problems.

II. THE STUDY

Due to longstanding criticisms of traditional board examinations in the Indian society, and the advocacy of NCF 2005, Central Board of Secondary Education (CBSE) has introduced an assessment reform in all its affiliated schools, i.e, instating Continuous and Comprehensive Evaluation (CCE). This reform, as the name itself indicates, while acknowledging the role of learning in educational process makes an attempt to assess learners on 'continual' and 'periodic' basis so as to diagnose the learning difficulties and take the appropriate action there and then instead of postponing it to the year end. In addition, CCE considers both the scholastic and co- scholastic aspects of pupil's growth, thereby, making the assessment of pupil's personality comprehensive in character (NCERT, 2006, p. 25). Along with this reform, several other steps, such as, making X standard board examination optional etc. have also come up into the picture.

The study is based on the research conducted in three different pedagogical settings (Leach, 1999) in the region of New- Delhi in which the Continuous and Comprehensive Evaluation is launched in the year 2009 in secondary classes.

Research tools included non- participatory classroom observations and observations of Parent- Teacher Meetings, semi-structured interview protocol with teachers, students, and school heads; focused group discussions, an attempt was being made to probe into the teachers' pedagogical beliefs and assumptions, their epistemological stance, views about learners, perception about assessment practices, position on assessment reform etc. Furthermore, informal conversations with students were done to gauge their understanding and experience of assessment reform.

Document analysis of school records, teacher diaries, summative assessment question papers, formative assessment tasks-worksheets, school handbooks, school newspapers, textbooks, and helpbooks was done.

Detailed field notes were prepared of unobtrusive observation made of the formative assessment episodes, class discussions, practical laboratory observations and other contexts

of formative assessment. Further, teachers' ways of recording evidence, compiling records and ways of providing feedback were considered.

III. THE TECHNOLOGICAL PERSPECTIVE

House (1981) suggests that everyone shares a common interest in advancing the innovation. The only remaining issue is how best to implement it (Hargreaves, 2002). From the standpoint of assessment reform, the technological perspective explores the issues of organizing, structuring, and strategizing the development of new educational techniques along with the skills for implementing these tools in the existing system. The development of defensible technologies[i] - which are valid, reliable, fair, generalisable- not only requires adequate time, assessment literacy (Stiggins, 1997; Harlen, 2008) but also a mindset that respects the inclusion of these tools in the teaching-learning process (Harris & Brown, 2009). Apart from these, research cites problems of insufficient teacher development, inadequacy of time and resources for teachers to collaborate and implement their ideas into practice (Black, 1998b), apparent inability of alternative assessment forms to handle huge population through their child centric approaches leads to the emerging international trend of 'assessment *as* learning' (Torrnace, 2007).

Teachers are often found grappling with various assessment issues with the introduction of Continuous and Comprehensive Evaluation in schools. They complain of the lack of training done in this regard and find it an imposition by authorities. Nobody seems to be clear about its goals, principles, practices. All regurgitate standard statements ' it is learner friendly assessment ' while lacking the basic skills on how to incorporate it in the system, how to balance the summative and formative demands, development of tools and techniques, creation of assessment criteria, providing qualitative feedback and using it for further learning. All are struggling to understand the basic philosophy behind it and re-orienting their mental frameworks in consonance with the assessment reform. Teachers often mention:

' I had studied, taught for several years in an educational system driven by traditional testing…….I am skilled at teaching to test…..hmmm..though CCE system may be good but I don't know how to handle it'

Black (2003) had quoted a teacher calling formative assessment 'scary' and 'loss of control'. Research often reports that teachers tend to abandon the teaching profession when it comes to practicing alternative assessment practices in real time classrooms.

Few teachers were in strong favor of assessment reform but could not integrate the reformed practices in their classrooms. The incongruence between their perspective and classroom practices was glaring. Teachers mentioned that

'we had only one training session in the beginning of the year……and they told us unit tests is the tool for FA. It left me wondering…..Am I not doing it already in the traditional exam system.'

These statements are evident of the lack of professional training – both in- service and pre- service (as teacher training institutes in New- Delhi region do not offer any compulsory paper on assessment) – that has a detrimental impact on alternative assessment reform. Further, an unpublished research on the beginning teachers' problems states that Continuous and Comprehensive Evaluation has made the educational system messy. In fact, various studies have reported highly experienced teachers are mostly resistive of the change. Research reports that it is only by indulging the teachers in the process of action research that they can actually realize the potential of alternative assessment to their professional practice (Mathews, 2007).

………Apart from this, development of assessment criteria, communicating and sharing it with pupils and parents; making learners decide their course of learning themselves; and amking them autonomous were equivalent to madenss.

Classroom assessments present a morass of technological issues. Almost all the teachers in the three pedagogical settings were hassled by the recording compulsions made by Continuous and Comprehensive Evaluation. Some teachers quoted

Our position is reduced to that of clerks now….look at the copies we are try to come to grips with (referring to assessment record books and students response scripts).

Teachers found fault with the increased recording compulsions under Continuous and Comprehensive Evaluation. they suggested that earlier (referring to the traditional examination system) they had to make report card once at the end of every term, now, most of their time is occupied compiling assessment outcomes of pupils. In of the school, administration introduced a CCE Record book for these purposes (which had the provision of filling in detailed assessment criteria, demanded students' portfolios description, specific remedial measures taken for slow learners and other details) was called off due to teachers' protest on account of increased workload. While others retorted

…I don't think we are assessing human potential…we are actually reducing it to a grid…categorizing each and every aspect…..segmenting the child's capacities to fill our procedural requirements….

Hargreaves (2002) at this juncture noted down that 'each individual is made into a documented case, judged and compared as someone who may now, or at some other future unknown point, need to be trained or corrected, classified, normalized, excluded and so forth' (p. 86). This sort of disenchantment due to procedural compliance (Torrance, 2007) infiltrates in the teaching- learning process. As they say,

We are not left with any time to plan our lessons constructively, develop new teaching- learning material for our pupils….as we have to be on our toes to collect assessment evidence form pupils on the basis of which we can fill up the table.

It is noted that even the most change committed teachers felt exasperated due to increased requirements of assessment recording. Also, they lacked time management skills and were unable to manage the large number of formative assessment cycles as required under the CCE. This observation corroborated with Wilson's (1996) findings where he noted that formative assessment tasks such as writing anectdotal records, undertaking one-to-one conferencing and managing the expanding armory of assessment technology placed teachers under huge time pressures (Hargreaves, 2002). For instance, one teacher observed:

By the time, I finish one F A term is about to and I had to rush to take other formative assessments so as to complete the preliminary requirements

Moreover, it was common in the schools that as SA approached all the teachers hasted to complete their formative assessments. Consequently, the quality of tasks deteriorated and instrumentalism set in under the guise of formative assessment, thus, leading to the emerging trend of 'assessment as learning' (Torrance, 2007).

Broadfoot (2008) had noted down students' perception of alternative assessment reform in the following quotations:

I'd like the feedback to be a bit more personal but there are lots of students and I suppose the lecturers can't spend all their time giving feedback.

I'd love the opportunity to sit down with the person who has marked my work and go through it with them but it's not going to happen.

I try and read the comments and make note of them for the next time but I won't feel involved. I feel like a number.

On a daily basis you don't feel part of a two- way process at all because you don't have contact with the people you are supposed to be learning from. I've adopted the attitude now that if I want this degree I'm going to have to get on with it. Whether I do it with the aid of a lecturer doesn't matter to me.

It should be to judge what we have learned and how good the teaching is but I think it is just a way of categorizing us all.

Underlined text in the above quotations provides a glimpse of what is it that students are looking for in a feedback: may it be personal remarks, something which is relevant and familiar to them; or sitting down with examiners to unpack that is hidden in the feedback remarks, engage in assessment conversations with them; or noting it down to devise ways that could facilitate better performance next time. further, students feel that feedback should be indicative of what learning has occurred uptill now and what is left alongwit how it can be improved.

In addition to an urge of getting quality feedback, it could further be inferred that learners are so much accustomed to absence of feedback, or to low- quality feedback that they find it impossible for the teachers to work upon this aspect of educational assessment. An ingrained helplessness, at times frustration, is reflected within these quotations evocative of the urge for facilitation by teachers in the learning process, acquiring ways to foster their grades but somehow they are not feeling *involved* in the process or assume it not only difficult rather impossible to operationalise the formative assessment perspective in real world classrooms. Infact, quote 4 suggest that students are adapting their learning patterns in accordance to the absence of feedback as getting promoted to the next class is considered more important than learning.

As it was seen in the schools, teachers are engaged in the practice of formative assessment with an absolute absence of feedback or feeding back only in terms of marks or grades which do not satiate the necessary condition of formative feedback, i.e., 'for assessment to be formative the feedback information has to be used (Black, 1998)'. If the information about the gap is just recorded and summarized, then the action cannot be formative (Sadler, 1989).

And unfortunately teachers don't have an understanding of what is wrong with the process. They are administering endless number of short and atomized tests in the name of formative assessment but not indulging in the developmental and diagnostic process with the students. Consequently, Continuous and Comprehensive Evaluation has immensely increased the teachers' burnout and students' stress raising panoply of technological issues.

Furthermore, formative assessment requires changes in the timetable patterns of schools, for instance, teachers found it difficult to initiate and wind up a group activity in a single period and yearned for a double period which was unavailable due to the rigidity of school timetable, yielding to compromise in the quality of formative assessment practices. As teachers often bellowed, '….Half of the period is spent in making groups of students and explaining activity, by the time, they start working and collaborating with each other bell rings and the activity has to be called off leading to abrupt breaks in the developmental plan….'.

Whereas in schools that had pre-empted these difficulties and planned for a double period in advance had witnessed integration of 'assessment for learning' framework in their classrooms. To further illustrate this point, one of the schools witnessed for the study involved its students in science symposiums as a formative assessment activity. They had planned a weekly double period in advance during which students and teachers can indulge in detailed formative assessment activities.

Also, formative assessment is a resource intensive practice. In many scenario, teachers complain of lack of resources as the prime technological problem behind abandoning formative assessment practices. To illustrate this point further, a change committed teacher in a government school argued that 'even though I develop different assessment tools.. such as..this crossword for assessing students' conceptual knowledge … but inspite of investing so much time and effort principal asks me to leave it as he does not have money to get it photocopied for all students.' This observation resonates with Hargreaves (2002) finding that even though teachers broaden their assessment repertoires yet they are unable to confront problems in terms of their school's ability to accommodate implementation. These kind of constraints were well captured in the study of Stiggins (1997) where he argues that insufficient time, resources, professional development, and consultancy support for teachers to become virtuoso performers are but a few problems faced by teachers. Another pertinent technological issue is to manage large student population and carry out individualized, child centric assessment. One of the administrators commented ' reduce the class size from 50 to 30, and my teachers will do wonders', thereby, reflecting one of the facets of many technological problems faced by teachers involved in the alternative assessment reform.

In summary, technological perspective on alternative assessment draws attention to the issues of devising valid and reliable forms of assessment; problems faced by teachers while changing their perspectives, assessment beliefs, acquiring range of assessment skills and strategies, implementing them in classrooms and co-ordianting with students, parents and administration; handling the issues of time and resource constraints. Consequently, it seems that the challenge lies in creating assessment technologies which efficiently combine the

two diverse roles of assessment- selection & certification and motivating learning. As field suggests, only policy changes, structural modifications and imposition of different tools to so-called assess new skills will not help as there is a tendency to slip into old ways when the new methods are not easily adaptable.

However, Broadfoot (1996) notes that these are not simply technological challenges but represent an upshot of inappropriate use, political and bureaucratic interference or as Wilson (1996) suggests that these issues are deep down rooted under differing institutional priorities and requirements that can mitigate aginst any significant changes in assessment (Hargreaves, 2002).

IV.   THE CULTURAL PERSPECTIVE

Hargreaves (2002, p.76) argues that cultural perspective to alternative assessment entails the challenge of 'reculturing' (Fullan, 1993; Hargreaves, 1994) or rethinking the nature and purpose of classroom assessment. Historically, assessment had the sole purpose of reporting (making a comment or label) to parents and society at large about the quantity of learning that had taken place at the end of quantum teaching. This approach had origins in the tremendous faith held by societal forces in the principles of apparent fairness and scientific rationality of the formal testing. This form of assessment legitimized one's position in the society and assisted in the perpetuation of inequitable social order (Broadfoot, 1996).

Alternative classroom assessment, however, shifts the focus of assessment processes from product to the process of learning. A focus on self- progress rather than competition with peers; that is criterion based approach to assessment as compared to norm-based evaluation is the prime feature of 'assessment *for* learning' practices. Gardner (2012) argues that deceptively simple looking definition of formative assessment entails 'a complex weave of activities involving pedagogic style, student- teacher interaction, self- reflection (teacher and student), motivation and a variety of assessment processes.' (p.3). prior knowledge structures as held by learners come to play an important part in the learning and a common understanding about the teaching- learning processes needs to be arrived at by the means of dialogue about when the learning occurs (Harlen, 2000; Shephard, 2000). Broadfoot (2008: 126) has suggested that improving learning through assessment depends on the following factors:

"A recognition of the profound influence assessment has on the motivation and self- esteem of pupils both of which are crucial influences on learning; the creation of classroom culture based on mutual respect; the active involvement of pupils in their own learning and in self- assessment; the provision of effective feedback to pupils which allows them to recognize the next steps and how to take them; a view of teaching and learning in which feedback is seen as an essential part; adjusting teaching to take account of the results of assessment; sharing learning goals with pupils; the need for pupils to be able to assess themselves and understand how to improve; helping students to know and recognize the standards they are aiming for; the confidence that every student can improve; both teacher and pupils reviewing and reflecting on assessment data."

These principles or recommendations suggest a shift away from curriculum coverage and fixed response assessment towards 'uncoverage' (Hargreaves, 2002) in which the focus is to explore students' understanding of the concept. An openness is inherent in the approaches- opening up of a 'window' (Broadfoot, 1996) into one's mental representations, prior knowledge structures, understanding of the concept to the teacher, peers, and self ; and unpacking the assessment criteria for all to judge, in collaboration with teacher, the performance of the pupil. This openness is both the merit and demerit of the alternative assessment. As teachers put it,

' now, we have to be careful as parents can question us how did my child got that mark or grade….Record Books can't be cooked up as students and parents demand authenticity'
leading teachers to be more cautious and snatches their dictatorial powers (Kumar, 1991) of the classroom.

The cultural perspective of alternative assessment involves an interaction of cultures. As House (1981) puts it, '…it is blending of ideas with a cultural history' (Hargreaves, 2002), indicating the harmonization of understanding, role expectations, and cooperation among all those involved, in our case, teachers, students and parents.

Upon reflecting the role conflicts among the three participants, Filer (2000) argued that assessment outcomes interpretation by parents form a crucial component of assessment circle. Though methods of assessment changed with the launching of Continuous and Comprehensive Evaluation yet construal of assessment outcomes by parents, and society at large remain same as in the case of formal examinations which create confusion. For instance, in a Parents Teacher Meeting, parents are often found enquiring about the position or ranking of the child relative to others in the examinations; qualitative feedback seemed useless as they are habitual to comparison and competition approaches.

Ma'am, please help me understand where my child stands when compared to others of his age. Is his development- physical & mental- as per his age? Is he a bright or a dull child?

Specifically, parents of so- called 'high achievers' were disenchanted with the system as they used position of their child in classroom, in the batch for affectation to other parents. This observation was corroborated in Hargreaves (2002) work where he pointed out a teacher's concern: 'Parents would love to see how their child stacks up in the class, position in the class' (p.79).

All the more parents held a view that assessment tasks such as making power point presentations, models, charts; designing experiments; doing authentic activities (as opposed to cookbook science labs) etc. are '*extra- curricular*' activites and amount to wastage of their child's time. Pupils pointed out that their parents do not see the educative value of formative assessment tasks and ask them to study towards the examination rather than squandering to complete non- intellectual, crafts based tasks. Study habits valued by parents were incongruent to the

philosophy of formative assessment. Like teachers parents also urgently required training and change of outlook to understand the perspectives embodied in authentic and performance based tasks. It further highlights the issue of establishment of human communication among all the key players engaged in the assessment processes.

The sources of uncertainty in the execution of Continuous and Comprehensive Evaluation were multifarious. Teachers engaged in the formative assessment pursuit practiced an alteration of formative assessment thinking that it is assessment for learning. For instance, research had cited that teachers want their kids to see it's not just a good job but why it's a good job (Hargreaves, 2002, p.78) but in practice they are unable to translate it into practice. Teachers in the name of qualitative feedback gave their learners comments on their performance, such as, 'very good', 'outstanding', which did not elucidate any information about the learners' strengths and weaknesses. It is simply a comparative norm, a rating scale which had focus on competition rather than cooperation among learners. They use such adjectives as feedback, in lieu of anecdotal records, and for reporting to parents which do not provide any measures for adaptive action and modification of the teaching- learning process (Sadler, 1989).

An integral part of alternative assessment is devising and applying the assessment criteria themselves by the learners, together with the teacher. In a classroom, teacher asked students to generate the assessment criteria for their assignment of *investigatory projects* themselves. She divided them in groups and asked them to discuss and devise criteria for their own assessment by the teacher.

Ss: don't you know what to look up for a good work?

Ss: how do we know what are you expecting?

Ss: (giggling) ….haven't you planned enough for the class time today?

T: (patiently) … yes, you are right. Please help me in the assessment of your work. I'm a bit new and naïve….

The above episode is representative of the discomfort students' face when involved in the assessment process. They love it to be a mystery and have extreme faith in teacher's judgment. Planning of assessment criteria for themselves was interpreted as wastage of classroom time, inability of teacher to develop criteria by herself, and lack of lesson planning on teacher's part. Pupils doubted teachers' professional skills, assessment literacy, pedagogical content knowledge, thus, reflecting misconstrued perceptions of students, inadequacy of faith in the alternative assessment practices by the students themselves.

However, eventually students of the same class realized the importance of devising assessment criteria collaboratively. A *culture of mutual sharing*, participation in the assessment practices got a hold in the classroom practices. In the initial phases, teacher developed the practice of self assessment along with the practice of devising assessment criteria by students to which students reacted 'Why should I be truthful? Why would I rate myself low if the power is in my hands?'

But teacher instead of explaining handled it tactfully. She made two copies of all the answer scripts, one she assessed herself based on the criteria developed and the other she asked them to do themselves. Students were amazed to find that teacher

as well as students could reach at same grades with the help of criteria. This form of transparency gradually allured them and they started asking for this practice for all their future assignments. This made acquire responsibility of their own learning.

Moreover, while working for assessment criteria, students, at times, came up with such criteria which were not even anticipated by the teacher. For instance, while working for the criteria of making NETS for 3D shapes:

Student pointed out the characterstics like neatness, accuracy to which teacher explored what does it mean to be accurate and student clarified is a prism constructed actually a prism, i.e., are the dimensions correct?......and so on.

It reflects that students not only develop assessment criteria but a crisp conceptual understanding, in line, with the fact that conceptual clarity is enhanced teachers teach (Black, 2003).

In contrast, the culture of self assessment remained a surprise for parents, students and administration. Most of them looked at this practice as shirking the professional responsibilities and teachers often had to toil hard for demonstrating the educational value of it.

S1: My papa says why are you checking yourself…what does your teacher do?

S2: I may change my answers to align them according to criteria and hence raise my grades…

And it was accompanied by teachers' doubt that truthful self assessment may amount to malpractices. As one of the teachers said, 'I wondered what I will do if they all give themselves good marks.'

In one of the schools observed, teachers pre- planned assessment criteria for all the activities and pasted them on the bulletin board of the classroom and provided a copy in *Science Handbook* in the school's library for parents to access. They shared that the benefit of this process is that

In PTMs, no parent turns up asking why this grade or mark….they know the quality of their ward's work beforehand

To which another teacher added 'accusations of assessment biases, favouratism levied on us reduced and system became clean….'

Another key component was reflecting on one's progress over the period of time. to further illustrate the point, I would like to cite a mathematics workshop session conducted with pupils. Resource persons provided a sheet in which algorithm to make a 'paper fish' was given. Students made it while reading it and then they asked 'what are the learning outcomes?' to which students replied 'Measurement skills, reading with comprehension, sequencing of instructions, developing a whole by integrating parts…'

Initially, it seemed that learning outcomes like 'reading with comprehension, sequencing of instructions' are part of a language classroom. But while engaging with students I realized that measurement (which to me was the mathematical objective of the activity) only happened when students could read it thoughtfully and made sense of it. This highlights an individual's ability to ascertain various educational objectives when they were made to reflect upon it themselves.

It could be said that to successfully integrate alternative assessment in the scoio- cultural fabric of any society an interplay between the values, beliefs, and points of view between

all involved is mandatory. In this case, 'the task of educators is not to pander to popular prejudices and assumptions about assessment but to deepen everyone's understanding of learning and assessment issues' (Hargreaves, 2002, p.80).

V. THE POLITICAL PERSPECTIVE

Assessment serves as a 'communicative device' between the world of education and society at large. The spectrum of communication ranges from the most informal of exchanges to the extremely formal, spanning everything from school reports to high- stakes public examinations, and from individual job interviews to national monitoring (Broadfoot, 2004, p.9). The extreme faith in assessment outcomes by society manifests it with immense power which further raises the issue of power relations these new forms of assessment manifest- whether they amount of the Benthamite notion of panoptic surveillance (Broadfoot, 1996) or is it amount to a compromise on quality of education as there is no external check on what is happening inside the school premises in the name of classroom based assessment. According to Hargreaves (2002), political perspective on assessment acknowledges the inherent fact that all forms of assessment are acts of power- whether sheltered or exposed. All the more, alternative assessment encompasses the power struggle between the ideologies and interest groups between school and societies (p.82).

Torrance & Pyror (1998) identified two conceptually distinct approaches to classroom assessment. In Convergent assessment, learner is evaluated against a pre-determined external criterion. The power of choosing the assessment tool, way and time of its execution and decision making all resided in the hands of teacher. Divergent assessment, on the other hand, is integral to the teaching- learning process. The focus is on pupil's learning and the processes employed while learning. Students are not the mute spectators of assessment happening to them rather an active participant in the process of their assessment. Assessment Reform Group (2002) has culled out 10 principles of 'assessment for learning' framework which are as follows:

- Is a part of effective planning
- Focuses on how students learner
- Is central to classroom practice
- Is a key professional skill
- Is sensitive and constructive
- Fosters motivation
- Promotes understanding of goals and criteria
- Helps learners know how to improve
- Develops the capacity for self assessment
- Recognizes all educational achievement

By the same token, in classrooms teachers recollect from their experiences that communicating assessment criteria to students has its added benefits as students themselves know what is quality work to which they are striving for and teachers need not explain why pupils are getting particular grades as they know in advance the criteria to which they can compare their work to. By creating assessment criteria available to all, publicly contestable teacher often tends to redistribute classroom power. Assessment judgments become 'acts of explicit negotiation among all those involved' (Hargreaves, 2002: 82). In a classroom

practicing alternative assessment, it is a common feature that students disagree to teachers' voice; choose the kind of assessment tool through which he wants to be formatively assessed; possess the liberty to be assessed according to his learning paces and so on. It inadvertently manifests greater power in the hands of learners who, for instance, in case of portfolio assessment, possesses free will to choose the samples of his work to be assessed. It seems that changes of role neccessiated by successful implementation of alternative assessment leads to making assessment processes more democratic and student friendly. However, a closer look at the assessment processes may reveal few hidden features of alternative assessment reform.

On looking at assessment reform for students' lens a mixed viewpoint emerged that suggested the establishment of another form of power regime through alternative forms of assessment. Manifestation of power in the hands of few leads to establishment of hierarchical orders even more sinister as compared to traditional forms of examination. One student recounted that

It seems that I am under closer surveillance all the time………My body language, my interaction with my friends, listening skills, clarity of expression all is being watched upon by an external eye. I feel I am caged….

Hargreaves (2002) suggest that the political risks associated with alternative assessment becomes grave when it comes to assessment of affect as it tantamount to exercising behavioral surveillance over everything students do and teachers developing a questioning, judgmental attitude towards their pupils' activities- both inside and outside the classroom. With teacher also showing the similar concerns….

What do you want out of me…to ask a question and simultaneously open by Continuous and Comprehensive Evaluation Record Book to enter who participated, who was active….in this way, focus of classroom interaction goes away from teaching- learning to making assessment records.

In a Focused Group Discussion, teachers' interaction on the issue of using 'Class Response' as a formative assessment activity is indicative of the restlessness that this expectation of prolonged surveillance through formative assessment measures seems to have created:

X: had we not taken quiz earlier? What an enjoyment and learning activity it used to be? But now they expect me to open the jinxed (as students often call it) Continuous and Comprehensive Evaluation Record book and note down who took the initiative, who was more alert, who reasoned well…. And so on. Isn't rooting competition in everyday class practices?
Y: I simply can't ask questions from all the 50 in one class. And….I don't wish to initiate a 'rat race' for marks or assessment (as they now call it) in my class.

Also, Hargreaves (2002) mentioned a teachers' similar concern in his work in Ontario, Canada

There is just so much going on that all you are doing is testing. All you are doing is assessment. Theirs is very little so called teaching- learning going on because we are spending so much time testing (p.83).

The above statements reflect the stress created by new system by manifesting teachers with more power to judge their students which may be turn otherwise in practice. Teachers, in

some contexts, may use assessment as a tool to exercise power over students, their parents and may lead to several untoward consequences. One of which can be exemplified through the following extract

Students pointed out that 'Now, I don't wish 'Good Morning' to my teacher out of affection but in order to appease her as I had disagreed to her viewpoint yesterday in the class…'

To which researcher questioned 'is disagreement not accepted in your classroom?'

Student: though she says she encourages differing viewpoints yet it may go against me in co-scholastic assessment where they assess positive attitude, seeking extra help with teachers etc…I can't afford to lose grades …..

Teachers are often found making statements such as 'don't make noise ………marks of formatives are in my domain', thus, suggesting the use of classroom based assessment as a 'disciplinary mechanism' (Focault, 1977 as cited by Gipps, 1999) by teachers. By the same token, Hargreaves (2002) points out that alternative assessment has come to be synonymous for students compliance with the behavioral norms of schooling. Not only teachers, but peers also tend to use decadent techniques to harm fellow classmates when it came to group assessment and peer assessment. Peer assessment techniques which could be highly educative have deteriorated to snitching and spying by students. In group work, group leaders tend to dominate and present the work letting him to catch the spotlight while others are shadowed. These ideas found resonance in the works of French social theorist Michel Foucault (1977 as cited by Gipps, 1999; Broadfoot, 1996; Hargreaves, 2002). Hargreaves (2002) points out that Foucault (1977) argues that discipline is '…..finely graded, carefully regulated process of administrative control over body and mind where surveillance is perpetual and pervasive, intense and intrusive, continuous and remorseless in its applications and effects' (p.86). Further arguing that

The examination combines the techniques of an observing hierarchy with those of a normalizing judgment. It is a normalizing gaze, a surveillance that makes it possible to qualify, to classify and to punish (p.184).

Thus, suggesting that 'normalising judgment' – concept of a norm that acts as a basis of categorization- coupled with the act of surveillance makes educational assessment one of the most powerful instruments of locating each individual its place in society (Gipps, 1999: 259). The political implications of building a dossier of human capapcities, in alternative assessment, may be in the form of portfolios, continuous student assessment, self assessment, peer assessment etc. 'permit educational selection to be self guided and failure to be disclosed gradually, in stages, as in therapeutic, rather than sudden and shocking, disclosures about terminal illness that medical staff makes to hospital patients (Hopfl & Linstead, 1993 as cited by Hargreaves, 2002, p.86).

By the same token, Bernstein argued that there has been shift of emphasis from overt to covert assessment and from specific to diffuse evaluation criteria. Overt assessment, or "objective" evaluation, is based on specific criteria, precise measurement and standardization; while in progressive pedgagoy, assessment is covert and assessment criteria diffused thus making direct comparison between pupils difficult. Though covert assessment seems to be benign, however, they are potentially controlling

rather than progressive and liberating as they give more control over performance and success to teachers (Hargreaves, 1986 as cited by Gipps, 1999).

By the same token, Broadfoot (1996) and Hargreaves (2002) have argued that unending alternative assessments seem akin to the Benthamite's notion of panoptic surveillance which could be interpreted as a sophisticated new form of selection and scrutiny. Panopticism is a principle of discipline in which power is exercised through an all-seeing, invisible observer. Consequently, "the constant pressure acts even before the offences, mistakes or crimes have been committed. Its strength is that it never intervenes, it is exercised spontaneously and without noise" (Foucault, 1977, p. 206 as cited by Hargreaves, 2002). He goes to the extent of comparing alternative assessment to the ideal system of modern penal treatment which would be an indefinite discipline; an interogtion without end, an investigation that would be extended without limit to a particular and ever more analytical observation, a judgment that would at the same time be the constitution of a file that was never closed (p.227).

Also, formative measures of assessment envision liberatory classroom contracts (Gipps, 1999) and a re-organisation of teaching contracts between the teacher and the taught. It needs to be explored how the class power is redistributed among its members. Are the teaching – learning interactions democratic or there are other ulterior motives being propagated? To this end, teachers point out that 'I'm no more the boss…', arguing that transparency in the system ahs increased now. Teachers relate that making assessment criteria explicit leads to opening up the system to public scrutiny. They share that

'…unlike previous times, now students would come up and ask on what basis this grade is awarded… parents in parents teacher meeting ask us to open up the record books and would look into the basis on which we are assessing their wards'

These statements indicate an enhanced awareness on the part of parents in the alternative assessment framework and a forced openness of teachers' world to the public domain. Furthermore, this opening up takes place in several directions from students to students, teachers to teachers, teachers to parents, from student to teacher and so on.

The basic irony of the implementation of Continuous and Comprehensive Evaluation in classrooms was moving towards democratization of assessment outcomes through use of formative assessment on one hand and at the same time preparing children for high- stakes board examinations and entrance test in senior secondary classrooms. Parents, teachers, administrators all bothered for the loss of skills in students to study to the test in an objective manner and loss of teachers' abilities to teach to the test while engaging in Continuous and Comprehensive Evaluation assessment. One teacher recollected her own child's study patterns while preparing for class X board examination with respect to the current batch of students (who are being assessed under CCE):

My child developed studying patterns while X standard boards…. He knew what is relevant and disentangled it from what is noisy for examination. Skills like presenting your thoughts on paper, development of conceptual clarity, recognizing their own study cycles and… attitudinal skills of perseverance, managing work pressure from multiple ends and regulating stress………are seemingly absent in this system as the

pressure of 'marks' is over. They know that all will pass…. Some with A grade others with C, but they will get through. However, I wonder how are they going to organize themselves for upcoming challenges in senior secondary classes.

To this end, another Senior Secondary Chemistry Teacher noted that (while showing the comparative evidence of two consecutive years result sheet for first term of class XI science students:

You could see the difference….. the batch passing through CCE takes an entire term to acclimatize with the new system. Their first term result is bound to go down which is a prime concern for us.

These concerns exert considerable political pressure on the principal and administration to take recourse to standardized forms of testing and reporting in X standard otherwise the XII standard result would suffer. This was also acknowledged in the work of Hargreaves (2002) where he noted that political pressure at micro and macro levels can undermine the successful implementation of new strategies. By the same token, Principal of one of the schools said

Even I want learning to be enhanced, to assess my students with more democratic tools and reduce the pressure of marks from their heads but can't help as the accountability of my instituition is counted through the number of distinctions in XII class, by the number of students clearing high stakes medical and engineering entrance examination.

Hargreaves (2002) had cited that due to amplified pressure of higher education, many states in USA are gradually moving towards standardized assessment. He noted that under this pressure teachers forsake their so- called liberatory forms of alternative assessment practices in favor of rote test preparation, and exhausting themselves teaching to the test. This role conflict evident from the above statements leads to an undemocratic implementation of formative assessment in schools. The conflicting ideologies- where the policy makers are promoting formative assessment vs. school administration who are pressurized by the demands of high stakes examination – often end up making assessment reform a 'schizophrenic activity' (Earl & LeMaheiu, 1997; Firestone, Mayrowetz, & Fairman, 1998 as cited by Hargreaves, 2002). School and society; the world inhabited by educationists and the world of real and imagined public to whom assessment outcomes cater hold different and at times contradictory expectations from assessment and hence end up stressing differing assessment perspectives and practices in classrooms. This raises the issue of human communication and co-ordiantion among the competing stakes of various stakeholders involved- i.e. promoting assessment for learning vs. stressing assessment for the purposes of selection and certification, accountability and monitoring standards. Hargreaves (2002) further raises the question as in whose responsibility is to bring the vision of alternative assessment to fruition- state or school. While exploring the answer to this question in the context of Indian setting, it could be suggested that though policy makers seems to have made a movement in the direction of assessment reform yet the onus of making the real time change is manifested in the hands of schools. The purpose of assessment reform is to improve pupils learning and it lies under the purview of teachers and students who live and work in classrooms and only they themselves could only make it

happen. With State bearing the responsibility of providing the appropriate support structure to the school.

Conclusively, it could be suggested that political risks to alternative assessment have its origin in contradiction in the philosophy of alternative assessment that makes it democratic on one hand and dictatorial on the other.

VI. THE ECONOMIC PERSPECTIVE

This perspective delves deeper into the role of globalization, new means of livelihood, neo- liberal policies and change in assessment forms. Newby (2005) argues that curriculum for the new world- information revolution, dawn of knowledge era- requires pupils who are problem solvers, lifelong learners and hence fit into the economic setup of the present millennium. Harlen (2008) points out, that the conception of 'literacy' is no more restricted to the ability to read and write rather it connotes the ability to engage effectively with different aspects of modern life. In this age, literacy is no more unit-dimensional, it is probably a cluster of multi-dimensional abilities such as 'technological literacy', 'scientific literacy', 'mathematical literacy', 'political & social literacy' so on and so forth. Moreover, as OECD (1999) pointed out that, 'students cannot learn in school everything they will need to know in adult life. What they must acquire is the prerequisites for successful learning in future life' (p.9). Now, the focus seems to have shifted from *learning* to *learning how to learn.*

Consequently, assessment processes need to value learners who are capable enough to sift and select from the large pool of information available at a click of mouse from the internet, analyse the information and creatively solve problems. All the more, the need of the hour is not only to value the content of the material produced by children (as it is largely impossible to differentiate the real from the copied one) but the way they are reorganizing it, expressing the information in a more cogent, relevant manner to contribute to the growth of vast pool of knowledge. In this information age, Broadfoot (2008) argues that 'the espoused values of Higher Education are independence of thought, personal development and the ability to reflect on one's own practice and to use feedback to assess and manage one's own performance through self- refelction' and the paradigms of assessment which concentrate on the acquisition on the content knowledge are outdated.

To this end, it is found that people coming out of the education system are often termed as 'unemployable'- as NCF (2006) notes that 19 out of 20 graduate applicants and 6 out of 7 post- graduate applicants are unemployable- as they lack the requisite problem solving abilities. Such kind of education which cannot provide jobs to its successful candidates belies the hopes of upward mobility associated with educational processes.

Therefore, the question emerges '*How far the current assessment systems help or hinder in the achievement of academic and economic goals?'* To answer this question, it is necessary to unearth the subtleties associated with assessment processes.

Teachers, in the field, suggested that with the advent of Continuous and Comprehensive Evaluation academic rigour has taken a backseat. Teachers retort ….

As per the requirements of Continuous and Comprehensive Evaluation, a student who is being assessed formatively should show improvement in grades as learning difficulties are assessed on continuous basis and adaptive actions taken…….faliure of improvement is tantamount to lack of adaptive efforts on teacher's part and is an accountability issue………….hmnnn..though it is unethical but we have to take recourse of fake incremental grading……..

At times, it is seen that teachers' (in a Focused Group Discussion) are also found grudging that

Teacher 1: Continuous and Comprehensive Evaluation is another name of 'no detention policy'……we can't fail them whether they work or not……lower grades or failing means teacher is inefficient……

Teacher 2: Principal and government inspectors say 'can't you make him (children) learn in repeated efforts ..'; 'faliure means teachers are not doing their duty responsibly'….

Teacher 3: we have to run after students for assessing them continuously and they don't care…..as they know they will be promoted to next class in any case..

Also, a consonant version is elaborated by students suggestive that 'ma'am, no worries……our teacher handles it all.' Another source of loss of motivation is the relative low stakes of formative assessment activities. Students say 'who will work so much for 0.5 marks?' portraying lack of any intrinsic motivation among children to learn.

By0 the same token, concern emerging out of the field observations is about the nature of youth being created through alternative forms of assessment. Will they be problem solvers; or an educated unemployed generation is in process having no productive skills at all. Hargreaves (2002, p.90) argues ' Much of what passes for authentic curriculum and authentic assessment in the jargon of contemporary pedagogy,' says Meier (1998), ' seems to miss this point by giving into the search for entertainment and avoidance of boredom rather than in pursuit of clear purposes and powerful learning' (p.598). Furthermore, promoting alternative assessment as benign, humanistic and highly educative ways of assessment has a danger of propagating low educational standards in the upcoming generation further lowering the academic diligence. Hargreaves further points out the dilemma associated with alternative assessment

The danger of making "authentic assessment" into a "holy grail" of educational change is that it might well contribute to and become part of this wider discursive, rhetorical distortion, promising "feel good" improvement and empowerment in a world where poverty and inequity continue to rise. (p. 90)

Moreover, sheer complexity involved in creation of newer assessment technologies competent enough to assess 'ephemeral' educational objectives such as creativity, practical knowledge, social skills etc. tend to demotivate educationists and hence continue with traditional models or merit "mediocre" pieces of work as sophisticated forms of representing learning can seduce students and teachers 'into valuing form over substance, image over reality, with glossy covers, elegant fonts, and a sprinkling of multicovered graphs and flowcharts.' (p. 91). These forms of learning pose a serious threat and may lead to diminishing and trivializing the substance of learning, reducing it to mere surface appearances. While critiquing self assessment Hargreaves (2002) points out that such assessment tools have the tendency of cultivating an inwardly narcissistic, self indulgent, and self centered personality.

VII. DISCUSSION

Each of these perspectives on alternative assessment points to issues which can either hinder or foster the use of classroom based assessment for pupils learning. These lenses of viewing alternative assessment can make assessment an integrated and embedded teaching- learning process; a more critical, empowering and collaborative act; motivating pupils to be responsible for their own learning, encouraging them to be reflective and self- aware. Or alternatively, it highlights the potential risks associated with alternative classroom based assessment which might impact the educational processes adversely.

By drawing thoughtfully and critically from the above four perspectives, we can use move towards using assessment in educationally equitable and sustainable directions.

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Detection of Antibiotic Sensitivity in Multi Drug Resistant Microorganisms using Red Wine

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Abstract- Red wine is a complex fluid. It contains water, sugars, acids, alcohols, and a wide range of phenolic compounds. Red wine contains a number of biologically active compounds with beneficial effects on human health. The resveratrol is commonly found in food and drinks, including Red wine and grapes. Many studies have been documented towards health benefits of red wine consumption, including anti-oxidative, anti-carcinogenic, anti-inflammatory and anti-cardiovascular and antibacterial properties. Therefore, we evaluated the antimicrobial activity of red wine against multi drug resistant bacteria. The aim of the present study was to determine the antimicrobial activity of Red wine against 30 Multi Drug Resistant pathogenic strains of *Staphylococcus aureus*, *β haemolytic streptococci*, *Escherichia coli* and *Klebsiella pneumoniae* was studied using the agar well diffusion method.

Index Terms- Red wine, Multi Drug Resistant strains, Antibacterial activity.

I. INTRODUCTION

Recent years have seen an increased awareness in the importance of diet in the maintenance of health and well being. A diet rich in fruit, vegetables, olive oil, and red wine has been shown to help prevent the development of coronary heart disease and some cancers. The active components of this diet are believed to include phenolic compounds which act as antioxidants.[1]

Red wines have a higher content of total phenolics and contain a wider spectrum of phenolics than the white wines. Wine phenolics are divided into flavonoids and non-flavonoids. The family of flavonoids includes mainly flavonols, flavanols and anthocyanins, whereas the non-flavonoids include mainly phenolic acids (benzoic and hydroxycinnamic acids) and stilbenes[2].

The increasing antimicrobial resistance of pathogens isolated from humans and animals, combined with the increasing awareness of the consumers on chemical substances used as food preservatives, necessitates research for more efficient antimicrobials with fewer side-effects on human health. Several studies suggest that moderate wine consumption has beneficial effects on human health. The antioxidant and antiradical properties, particularly of red wine, attributed mainly to a high polyphenol content[3-5], appear to protect against the risk of coronary heart disease and cancer.

The most important and abundant alcohol in wine is ethanol. Under standard fermentation conditions, ethanol can accumulate to ~14–15%, but generally ethanol concentrations in wine range between 10–13%. The primary factors controlling ethanol production are sugars, temperature, and yeast strain. Ethanol is crucial to the stability, aging, and sensory properties of wine. As its production increases during fermentation, it increasingly limits the growth of most microorganisms, allowing *Saccharyomyces cerevisiae* to dominate the fermentation process.

The inhibitory activity of ethanol, combined with the acidity of the wine and the added potassium metabisulfite, allows wine to remain for years in the absence of air. During skin fermentation of red grapes, ethanol acts as an important solvent in the extraction of pigments and tannins. The dissolving action of ethanol probably reduces the evaporation of aromatic compounds along with carbon dioxide during fermentation.[6]

Through the 1990s, a remarkably consistent epidemiologic data has accumulated pointing to the reduced incidence of mortality and morbidity from coronary heart disease (CHD) among those who consume alcohol in moderation by comparison with abstainers. This reduction has been demonstrated for every end-point (death, myocardial infarction, or hospitalization for CHD), in every one of the diverse populations studied, in both sexes, and at all ages. This protection seems to be due in large measure, if not exclusively, to the ethanol present in those beverages classified as "alcoholic," but there is some evidence that wine confers additional benefits, due to its content of polyphenols[7].

Recently, the antimicrobial effects of various plant extracts against certain pathogens have been reported by a number of researchers [8]. Particularly, polyphenols of plant origin have been reported to have a variety of biological effects, including anti-oxidant, anti-carcinogenic, anti-inflammatory and anti-microbial activities. Specifically some phenolic compounds such as resveratrol, hydroxytyrosol, quercetin and a number of phenolic acids have been reported to inhibit various pathogenic microorganisms [9-12].Also, there are recent studies reporting the antimicrobial activities of wines and wine extracts against various pathogens[13,14].

Resveratrol, trans-3,4',5-trihydroxystilbene a phytoalexin that belongs to group of compounds known as stilbenes, can be found in dietary items including red wine, grapes and peanuts. It is well known as an inhibitor of cyclo-oxygenases and it inhibits activation of inducible nitric oxide pathway in mammalian macrophages[15].

Phytoalexins are low molecular weight secondary metabolites made by plants as a defence response to microbial infections[16]. The molecular function of resveratrol in chemo prevention and carcinogenesis are reviewed by experimental cancer cell models.

Resveratrol is going to be a promising molecule in future cancer prevention and therapy models.[17]

The aim of the present *in vitro* study was to dilute red wine for potential antimicrobial activities against Multi Drug Resistant pathogenic strains of *Staphylococcus aureus*, *β haemolytic streptococci, Escherichia coli* and *Klebsiella pneumoniae* with lower side effects and with higher antimicrobial properties.

II. MATERIALS AND METHODS

Wines

Red wines were purchased from local commercial markets, which are having less than 0.5% of ethanol (pH 3.18).

Antimicrobial activity tests (Microbial strains)
Antibiotic resistance of test strains

5 different strains from each of these organisms (*Staphylococcus aureus, β haemolytic streptococci, Escherichia coli* and *Klebsiella pneumoniae*) were taken for the study.The bacterial strains used for the tests were selected based on their resistance to antibiotics, because it was thought that it would be essential to experiment with strains already exhibiting resistance mechanisms. All isolates of the selected strains exhibited resistance to certain antibiotics. The antibiotic susceptibility test of the selected strains was determined by the standard disk diffusion method of Bauer et al. [18]. GPC strains were resistant to CZ(Cefazolin), CTX(Cefotaxime), AMC(Amoxyclav), A/S(Ampicillin/Sulbactam), E (Erythromycin) and GNB strains were resistant to CTX(cefotaxime), CAZ(Ceftazidime), CPM(Cefepime), CZ(Cefazolin), AMC(Amoxyclav), PIT(Piperacillin/Tazobactam).

Antimicrobial activity of serially diluted Red wine

The antimicrobial effect of the red wine was tested using the agar well diffusion method following the well-established method of Deans and Ritchie.[19] Overnight bacterial cultures were used for surface inoculation of Petri dishes containing 15 mL of MH agar. Each Petri dish was spread on with 0.5 mL of strain inocula streaked thoroughly all over the surface of the MHA. Subsequently, four equidistant wells, 4 mm in diameter each, were punched into the inoculated medium with sterile glass Pasteur pipettes and were filled up with serially diluted red wine at different concentrations of 1500mg/ml,750mg/ml and 375mg/ml. All plates were incubated at 37°C and inhibition zones were measured after 24 h. All the experiments were done with controls using sterilized distilled water.

III. RESULT

A total of 30 Gram positive and Gram negative organisms were isolated from various clinical samples. Out of these, 20 organisms showed Multi Drug Resistant which were selected for this study(Table 1).The results of the antibacterial pattern using the well diffusion method indicate that different bacterial strains demonstrated different levels of sensitivities towards the tested samples of diluted red wine(Table 2 and Table 3).

The organisms were tested for antibiotic resistance by Kirby Bauer disc diffusion method to conventional antibiotics such as CZ, E, A/S, CTX, CAZ, CPM, AMC, PIT. Antibacterial activity of red wine was tested against 5 different strains of *Staphylococcus aureus*, *β haemolytic streptococci*, *Escherichia coli* and *Klebsiella pneumoniae* and the efficacy of conventional antibiotic disk activity was compared with the red wine activity.

Red wine exhibited antibacterial activity against both GPC and GNB. All the organisms, both GPC and GNB were found to show susceptibility at 1500mg/ml with maximum inhibition(Table 2 & 3). For this study, dilutions were made of a standard solution of red wine at three different concentrations(1500mg/ml,750mg/ml and 375mg/ml).

The study analysis showed that the zone diameter in all the three concentrations of 1500mg/ml,750mg/ml & 375mg/ml with *β haemolytic streptococci* was more than the zones produced with *Staphylococcus aureus* (Table 2 and Figure 2).With respect to the Gram negative bacilli *Escherichia coli* exhibited higher zone diameter in all the three concentrations of 1500mg/ml,750mg/ml & 375mg/ml than the other Gram negative isolates *Klebsiella pneumoniae*(Table 3 and Figure 4).The inhibition zone of red wine against *Staphylococcus aureus, β haemolytic Streptococcus,E. coli* and *Klebsiella pneumoniae* strains increased whenever the total phenolic content of the Red wine was increased.

Red wine exhibited the antibacterial activity against both Gram-positive and Gram-negative strains. In all the dilutions, the diameter of the inhibition zone for GNB showed higher susceptibility than the GPC particularly *Escherichia coli* was more susceptible than the zone for *β haemolytic streptococci* strains, but in the results of previous study: ''Potential antimicrobial activity of red and white wine phenolic extracts against strains of *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans*''.[8] Most wine extracts exhibited some kind of antibacterial activity against both Gram-positive and Gram-negative strains. But almost all the extracts, the diameter of the inhibition zone for *Staphylococcus aureus* was greater than the zone for *E. coli* strain, indicating that the Gram-positive strain was more sensitive than the Gram-negative one.

Although our data differ from those reported previously, our study indicates that the Gram-negative strains were more sensitive than the Gram-positive strains. Gram-negative bacterial strains were more effective to the antimicrobial compounds.

Table 1: Multi drug resistant strains of GPC and GNB isolated from various clinical samples

Gram Positive Bacteria	No. of Samples	Gram Negative Bacteria	No. of Samples
Staphylococcus aureus	5	*Escherichia coli*	5
β haemolytic streptococci	5	*Klebsiella pneumoniae*	5

Table 2: Antimicrobial sensitivity pattern by zone of inhibition (mm) for GPC

Organisms Isolated (Gram Positive)	Zone of Inhibition (in mm) at Various Concentrations			
	1500mg/ml	750mg/ml	375mg/ml	Negative Control
Staphylococcus aureus 1	22mm	17mm	15 mm	NZ
Staphylococcus aureus 2	21mm	16mm	14mm	NZ
Staphylococcus aureus 3	21mm	15mm	13mm	NZ
Staphylococcus aureus 4	20mm	15mm	10mm	NZ
Staphylococcus aureus 5	19mm	14mm	12mm	NZ
β haemolytic streptococci 1	23mm	19mm	16mm	NZ
β haemolytic streptococci 2	22mm	18mm	15mm	NZ
β haemolytic streptococci 3	21mm	17mm	15mm	NZ
β haemolytic streptococci 4	20mm	15mm	12mm	NZ
β haemolytic streptococci 5	19mm	16mm	13mm	NZ

NZ - No Zone

Table 3: Antimicrobial sensitivity pattern by zone of inhibition (mm) for GNB

Organisms Isolated (Gram Negative)	Zone of Inhibition (in mm) at Various Concentrations			
	1500mg/ml	750mg/ml	375mg/ml	Negative Control
Escherichia coli 1	29mm	21mm	15mm	NZ
Escherichia coli 2	28mm	19mm	14mm	NZ
Escherichia coli 3	27mm	19mm	15mm	NZ
Escherichia coli 4	26mm	17mm	13mm	NZ
Escherichia coli 5	25mm	19mm	15mm	NZ
Klebsiella pneumoniae 1	27mm	18mm	15mm	NZ
Klebsiella pneumoniae 2	26mm	16mm	13mm	NZ
Klebsiella pneumoniae 3	25mm	18mm	14mm	NZ
Klebsiella pneumoniae 4	24mm	16mm	13mm	NZ
Klebsiella pneumoniae 5	24mm	15mm	12mm	NZ

NZ - No Zone

Figure 1: Conventional Antibiotic Disc Showing Multi Drug Resistance to GPC strain

Figure 2: Antibacterial activity of red wine showing sensitivity to GPC strains

Staphylococcus aureus   *β haemolytic streptococci*

Figure 3: Conventional Antibiotic Disc Showing Multi Drug Resistance to GNB strain

Figure 4: Antibacterial activity of red wine showing sensitivity to GNB strains

Escherichia coli

Klebsiella pneumonia

Figure 5: Maximum zone of inhibition for GNB and GPC at higher concentration (1500mg/ml)

IV. DISCUSSION

The bacterial strains used in this present study were chosen on the basis of their clinical Importance. In our study,the antibacterial activity of diluted red wine was analysed by the presence of inhibition zones and measuring of zone diameters (mm). From the results, it was evident that the red wine showed a maximum inhibitory zone at the concentration of 1500mg/ml for all the GPC and GNB strains. The antibacterial activity of red wine on the *E.coli* showed a largest diameter of clearance than the other strains. Moreover, the zone of clearance achieved by diluted red wine was compared to that of zone diameter with standard drugs, CZ, E, A/S, CTX, CAZ, CPM, AMC, PIT(Figure 1 and 3).

However, few reports are available on the antimicrobial activity of Red wine.Weisse et al. reported that red and white wines are as potent as bismuth salicylate against several bacteria responsible for traveler's diarrhea and that diluted ethanol induced no significant reduction in colony counts. [20] Sugita-Konishi et al. also showed the in vitro antibacterial activity of red and white wines against three potential entero-pathogenic bacteria; the activity was exerted by polyphenol free fractions and was lost after the evaporation of small molecules, particularly acetic acid, suggesting that this small molecule could be responsible for the antibacterial activity. [21]

Navarro et al. showed that several lactic acid bacteria occurring in Rioja red wine produced bacteriocins, antimicrobial peptides, during alcoholic and malolactic fermentation of wine. [22] Maria Daglia et al. found the antibacterial activity of red and white commercial wines against several strains of oral streptococci responsible for dental plaque formation and caries development and against *S. pyogenes*, which causes a wide range of human diseases, such as pharyngitis. [23]

Similarly, Dolara et al. found antibacterial activity against selected Gram-positive and Gram-negative pathogenic bacteria by two industrial and a homemade wine (produced by spontaneous fermentation with no added synthetic chemicals). The greater activity of the two industrial wines suggested that this action is not accounted for by bisulfite addition in the industrial process; moreover, the effect was not caused by polyphenols, ethanol, or the acidic pH induced by wine in culture

media, whereas acetic acid, a common wine constituent, was seen to induce an inhibitory effect similar to that of wine. [24]

It should be pointed out that our results suggest that the red wines exhibited sensitivity at higher concentration(1500mg/ml) for all the Gram positive and Gram negative strains. In all the above strains, the diameter of the inhibition zone for Gram negative strains was more sensitive than Gram positive strains(Table 2 and Table 3).

According to the results of our study, at higher concentration(1500mg/ml) red wine possess numerous action with a therapeutic potential for Gram-negative *E.coli*(29mm), *Klebsiella pneumoniae*(27mm) followed by Gram-positive *β haemolytic streptococci*(23mm) ,*Staphylococcus aureus*(22mm)(Figure 5).

In contrast to the study done by Chrissanthy Papadopoulou et al. [8] our study shows antibacterial activity more towards GNB. Therefore even the diluted red wine can be used as an effective antibacterial agent for both GPC and GNB bacteria.

V. CONCLUSION

The antimicrobial agent in wine seems to be a polyphenol that is liberated during fermentation and is active against bacteria at an acid pH.[25]

The higher concentration of red wine 1500mg/ml is an effective antibacterial agent as proved *Escherichia coli,Klebsiella pneumoniae, β haemolytic streptococci* and *Staphylococcus aureus;* where as the lower concentration of 750mg/ml,375mg/ml also showed inhibitory zone against Gram negative and Gram positive bacteria and this may be used as bacteriostatic agent as revealed by our study.The components of red wine showed extensive sensitive zone for Gram negative bacilli when compared to Gram positive organisms.

In conclusion, red wine was proved to exert in vitro antibacterial activity against Gram negative organisms. Thus red wine can be used in the treatment of infections as proved by our study when the world is facing the crisis with LACK of sensitive drugs for the lethal MDR GNR!!!

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OLED: A Modern Display Technology

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Abstract- As the time pass in this modern world many changes came into the field of display devices. First came the small LED (Light Emitting Diode) display which shows numeric contain then after jumbo CRT (cathode ray tubes) which is used today also but due bulkiness we do not carry from one place to another and also required large area. Then after came LCD (Liquid crystal display) which is lighter and easy to carry, but the main problem with LCD is that it cannot seen clear picture from different angles. This all problem will be overcome by revolutionary discovery of OLED (Organic Light Emitting Diode). OLEDs can be fabricated using Polymers or by small molecules in the flat panel display zone unlike traditional Liquid-Crystal Displays OLEDs are self luminous & do not required any kind of backlighting. This eliminates the need for bulky & environmentally undesirable mercury lamps and yields a thinner, more compact display. Unlike other flat panel displays OLED has a wide viewing angle (up to 160 degrees), even in bright light. Their low power consumption (only 2 to 10 volts) provides for maximum efficiency and helps minimize heat and electric interference in electronic devices. These are Cheaper, Sharper, Thinner, and Flexible.

Index Terms- Light Emitting Diode, Cathode Ray Tube, Liquid Crystal Display, and Organic LED.

I. INTRODUCTION

Organic light emitting diodes (OLEDs) have been receiving a lot of attention over the world as a new type of display technology. OLEDs have many advantages over conventional display technologies. OLEDs are energy conversion devices (electricity-to-light) based on Electroluminescence. Electro-luminescence is light emission from a solid through which an electric current is passed. First, the fabrication process is easy, and devices are thinner and lighter than those fabricated by cathode ray tube (CRT) display technology. Second, there are also some advantages over liquid crystal displays (LCD): OLEDS can be viewed from different angles and don't need a backlight. Finally, the drive voltage and power consumption are low. 1 The first commercial OLED display was introduced by Pioneer Electronics as the front panel of a car stereo in 1997. After that, some other applications are in the market, such as cell phones, digit cameras, GPS, radios etc. Another advantage of OLEDs is that they are current-driven devices, where brightness can be varied over a very wide dynamic range and they operate uniformly, without flicker. Both Active matrixes TFT's and Passive matrix Technologies are used for display and addressing purposes for high speed display of moving pictures and faster response. Already some of the companies released Cell Phones and PDA's with bright OLED technology for color full displays.

II. WHAT IS OLED?

An OLED is a solid state device or electronic device that typically consists of organic thin films sandwiched between two thin film conductive electrodes. When electrical current is applied, a bright light is emitted. OLED use a carbon-based designer molecule that emits light when an electric current passes through it. This is called electro phosphorescence. Even with the layered system, these systems are thin. Usually less than 500 nm or about 200 times smaller than a human hair. When used to produce displays. OLED technology produces self-luminous displays that do not require backlighting and hence more energy efficient. These properties result in thin, very compact displays. The displays require very little power, i.e., only 2-10 volts. OLED technology uses substances that emit red, green, blue or white light. Without any other source of illumination, OLED materials present bright, clear video and images that are easy to see at almost any angle. Enhancing organic material helps to control the brightness and color of light.

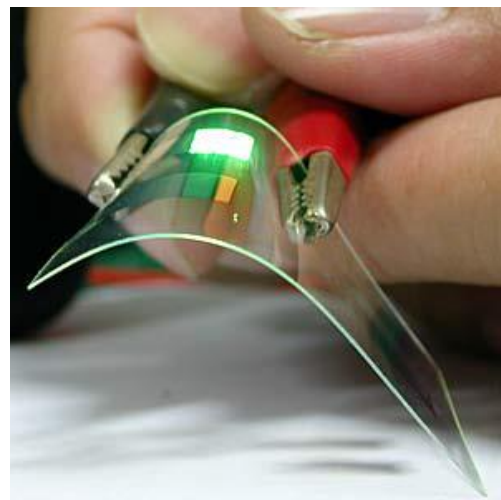*Figure 1: Demonstration of flexible OLED device*

III. WORKING PRINCIPLE & STRUCTURAL ASPECTS

Organic Light Emitting Diodes (OLEDs) are thin-film multi-layer devices consisting of a substrate foil, film or plate (rigid or flexible), an electrode layer, layers of active materials, a counter electrode layer, and a protective barrier layer At least one of the electrodes must be transparent to light.
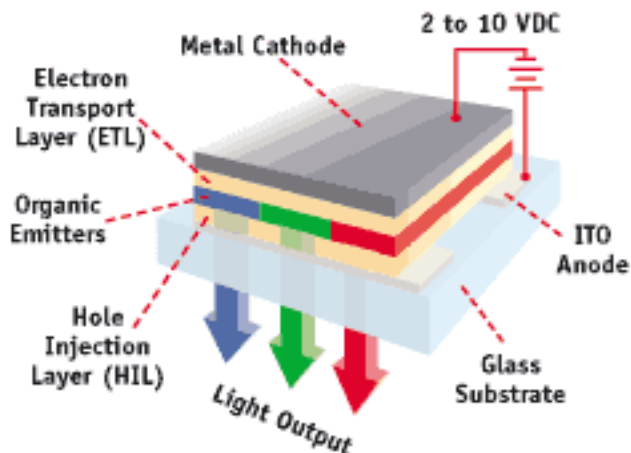
Figure 2 The typical structure of the OLED device.

The OLEDs operate in the following manner: Voltage bias is applied on the electrodes, the voltages are low, from 2.5 to ~ 20 V, but the active layers are so thin (~10Å to 100nm) that the electric fields in the active layers are very high, of the order of 105 – 107 V/cm. These high, near-breakdown electric fields support injection of charges across the electrode / active layers interfaces. Holes are injected from the anode, which is typically transparent, and electrons are injected from the cathode. The injected charges migrate against each other in the opposite directions, and eventually meet and recombine. Recombination energy is released and the molecule or a polymer segment in which the recombination occurs, reaches an exited state. Exactions may migrate from molecule to molecule. Eventually, some molecules or a polymer segments release the energy as photons or heat. It is desirable that all the excess excitation energy is released as photons (light).

The materials that are used to bring the charges to the recombination sites are usually (but not always) poor photon emitters (most of the excitation energy is released as heat). Therefore, suitable dopants are added, which first transfer the energy from the original exaction, and release the energy more efficiently as photons. In OLEDs, approximately 25% of the excisions are in the singlet states and 75% in the triplet states. Emission of photons from the singlet states (fluorescence), in most cases facilitated by fluorescent dopants, was believed to be the only applicable form of energy release, thus limiting the Internal Quantum Efficiency (IQE) of OLEDs to the maximum of 25%.

Figure.3: Different Light Emitting Polymers for different colors.

IV. BASICS OF LIGHT EMISSION

Light is one type of energy. So in order to emit light, the molecules must absorb energy from other sources. Once a molecule has absorbed enough energy, it can go to the excited electronic state. When the molecule relaxes to the ground singlet state, it can use different processes, one of which is to emit light. Fluorescence occurs when it returns from an excited singlet state to the ground singlet states. Because the two states have same multiplicity, it is spin-allowed and is very fast (10^{-5} to 10^{-8} seconds). Phosphorescence occurs when it returns from an excited triplet state: this is spin-forbidden and is often slow (10^{-4} seconds to minutes).

Colors	Red	Green	Blue
Efficiency (cd/A)	5.5	19	5.9
Lifetime (h)	80,000	40,000	7,000

Table.1: Present OLEDs efficiency and lifetime

V. FABRICATION METHODS FOR OLEDS

There are two methods to fabricate OLEDs: thermal evaporation of the organic small molecules and spin-coating polymer layers. Thermal evaporation is often performed in a vacuum. The vacuum pressure is usually about 10^{-6} torr or better. In addition to depositing molecules, it can also be used to deposit cathode materials. There are some advantages to using thermal evaporation. During the fabrication the thickness of each layer can be monitored easily, compared to spin-coating. The vacuum equipment is already in the semiconductor industry, and it is easy to achieve the multi-color displays by using shadow masks for depositing organic materials. Spin-coating is widely used in the polymer-based LEDs. The polymer layers can be deposited from solution directly, but the thickness can't be monitored during the deposition.

VI. OLEDS AS WHITE LIGHT SOURCE

In contrary to display applications where all colors are equally important, "good quality" white is of prime importance for general illumination. Individual colors are not as important. OLEDs have typically very broad band emissions, which makes them uniquely suitable for applications where white with high CRI and the desired position on the chromaticity diagram is desirable. Both small-molecular and polymeric systems with singlet (fluorescence) emitters have achieved full color with good positions on the CIE diagrams in Fig.4.

VII. FIVE BASIC METHODS OF PRODUCING WHITE LIGHT ARE KNOWN AND RESEARCHED AT THIS TIME.

1. Mixing two, or more different dyes (emitters), or polymers which emit different colors, in one layer: Copolymers whose segments emit different colors are also used as single

layers. Good quality white light was generated in OLEDs with three fluorescence emitters in a single layer with R, G, and B.

2. Deposition of three emission layers, each with different (R, G, B) emitters: One of the approaches to generate white light was to segregate three dopants into three separate emissive layers. The concept is enabled by the long diffusion lengths of triplet excitons, which may cross several layers before transferring the energy to an emitter. Triplets may migrate up to 1000Å. The thickness and the composition of each layer must be precisely controlled to achieve the color balance.

3. Using "horizontally stacked" narrow bands or pixels emitting in basic colors: (an analog of LCD displays): An extension of the tri-junction concept leads to another approach, basically similar to that used in LC flat panel displays, where the colors are separated and addressed independently as an array of individual pixels, dots, etc. The individual color-emitting segments / devices may be deposited as dots, miniature squares, circles, thin lines, very thin stripes etc. If that approach turns out to be feasible, and good white can be obtained, the system would have a number of advantages.

4. Using monomer-excimer complexes: The basic idea is to employ a lumophore, which forms a broadly emitting state, and a lumophore (or lumophores) which form excimers or exciplexes (excited states whose wave function extend over two molecules, either identical - excimers or dissimilar - exciplexes). Some phosphorescent dopant molecules indeed form excimers. These molecules are bound together only in the excited state but not in the ground state. The energy of the excimer is always lower than the energy of an excited single molecule and its emission is typically very broad. Thus, if an OLED is made with two blue dopants, one of which does not form excimers and the other does, the device will emit blue light from the former dopant, and lower-energy light (typically yellow) from the excimer of the latter dopant. The light from the blue dopant will mix with the light from the yellow excimer to make white light. None of the blue light will be lost because the excimer has no ground state to absorb it, and the blue emitter does not absorb yellow. The ratio of blue to yellow emission can be readily tuned by varying the ratio of the two dopants without the complication of energy transfer from blue to yellow.

Figure. 5: A few examples of Iridium – based emitters designed to cover the chromaticity spectrum

5. Using an efficient blue emitter and down conversion phosphors: In principle, this method utilizes coupling of a blue-emitting OLED with one or more down-conversion layers, one of which contains inorganic light-scattering particles. In an example, a blue OLED was prepared on a glass substrate with polyfluorene based light emitting polymer, a PEDOT/PSS hole injection layer on an ITO anode, and a NaF/Al cathode. Then, two separate layers of Lumogen TM F orange and red, molecularly dispersed in poly methylmethacrylate, were deposited on the other side of the glass substrate, followed by a layer of Y(Gd)AG:Ce phosphor particles dispersed in poly (dimethylsiloxane). The quantum efficiency of photoluminescence of the dyes in the PMMA host was found to be >98%, and the quantum yield of the Y(Gd)AG:Ce phosphor was 86%. The device produced excellent quality white light with CRI 93 and the blackbody T 4130K. At 5.5V, the device exhibits 1080 cd/m2 and 3.76 lumens per electrical watt. This concept could be obviously extended to other efficient blue-emitting OLEDs. As with other methods of generating white light, the lifetime of the blue emitting OLED is of a prime concern. All methods have been shown to produce good quality white**.**

VIII. COMPARISON

OLED and LCD

From calculator screens, LCDs are used in mobile phones, computers, and a lot more applications. OLEDs produce their own light unlike LCDs which require a backlight. Another advantage of OLED is the lower power consumption compared to the LCD which has a great amount of the power consumption. The lack of a backlight also means that an OLED display can be significantly slimmer than an LCD display. Manufacturing OLEDs could also be a lot cheaper than manufacturing LCDs [15].

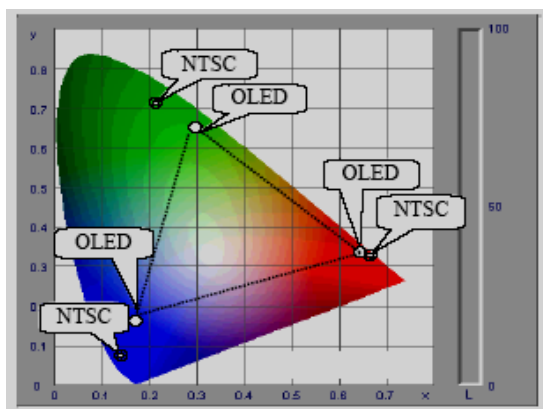**Figure. 4: A CIE chromaticity diagram showing the positions of "fluorescent" OLEDs in comparison with the NTSC standards.**

Fig 6 OLED v/s LCD
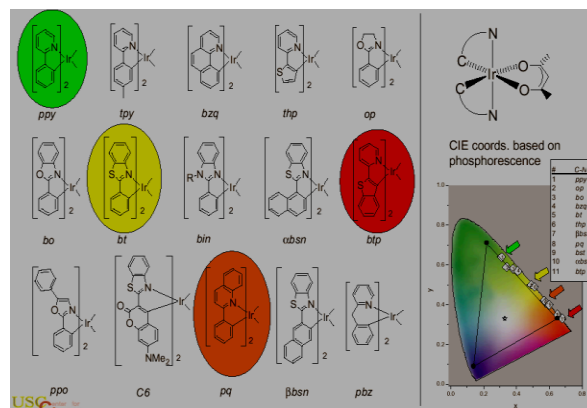
OLED and LED

OLED display can be thinner and lighter than LED display. They provide very wide and consistent color no matter where you are seated in the room. LED display tends to get significantly dimmer as one move away from center and many exhibit color shift. OLEDs are quite energy efficient. The greatest attribute of OLED is the ability to have the deepest blacks of any flat panel technology. OLEDs can make more colors than LED display.

IX. MERITS

The different manufacturing process of OLEDs lends itself to several advantages over flat-panel displays made with LCD technology.

- Lower cost in the future: OLEDs can be printed onto any suitable substrate by an inkjet printer or even by screen printing, theoretically making them cheaper to produce than LCD or plasma display. However, fabrication of the OLED substrate is more costly than that of a TFT LCD, until mass production methods lower cost through scalability.
- Light weight & flexible plastic substrates: OLED displays can be fabricated on flexible plastic substrates leading to the possibility of flexible organic light-emitting diodes being fabricated or other new applications such as roll-up displays embedded in fabrics or clothing.
- Better power efficiency: LCDs filter the light emitted from a back light
- Response time: OLEDs can also have a faster response time than standard LCD screens.

X. DEMERITS

- Outdoor performance: As an emissive display technology, OLEDs rely completely upon converting electricity to light, unlike most LCDs which are to some extent reflective.
- Power consumption: While an OLED will consume around 40% of the power of an LCD displaying an image.

- Screen burn-in: Unlike displays with a common light source, the brightness of each OLED pixel fades depending on the content displayed. The varied lifespan of the organic dyes can cause a discrepancy between red, green, and blue intensity. This leads to image persistence, also known as burn in.
- UV sensitivity: OLED displays can be damaged by prolonged exposure to UV light. The most pronounced example of this can be seen with a near UV laser (such as a Bluray pointer) and can damage the display almost instantly with more than 20mW leading to dim or dead spots where the beam is focused.
- Lifetime - While red and green OLED films have longer lifetimes (46,000 to 230,000 hours), blue organics currently have much shorter lifetimes (up to around 14,000 hours
- Water - Water can easily damage OLEDs.

XI. CONCLUSION

In the future, OLEDs will probably conquer a large portion of the micro display market. Their higher efficiency and lower weight will make them quite competitive with LCD displays. There are no *fundamental* obstacles for OLEDs to become a technology of choice for general lighting. However, there still exist a number of "*incremental*" roadblocks that have to be overcome, many of which may require inventions or major breakthroughs, and most of these roadblocks are materials related. The rate of progress will depend on the success in designing and synthesis of novel high performance, stable materials components of OLED devices to replace those that are still deficient.

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Land Use/ Land Cover Analysis Using Remote Sensing and Gis, a Case Study on Pulivendula Taluk, Kadapa District, Andhra Pradesh, India

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Abstract- Land, a non-renewable resource, is central to all primary production systems. The geospatial technology of Remote Sensing and GIS holds the potential for timely and cost – effective assessment of natural resources. The techniques have been used extensively in the tropics for generating valuable information about various surface features of the earth. Therefore, we have used Remote Sensing and GIS to study land use land cover changes, and Drainage pattern of Pulivendula Taluk, Kadapa district, Andhra Pradesh, India. The study area situated between parallels of $77^0 55'$ to $78^0 31'33''$ E longitude and $14^0 15'$ to $14^0 45'$N latitude with intended boundary falling in Survey of India toposheet no.57J02, 57J03, 57J06 and 57J07. The total area covered is approximately 1506 square kilometers. By using satellite images IRS- P6, LISS-III data of the study area four thematic maps such as location, Land use/ Land cover and drainage maps were prepared. It is observed that the important land use features like crop lands, barren lands or uncultivated lands, forest, built-up, soil and drainage pattern. The result shows that the crop lands are well distributed throughout the study area and it covers 887.03 sq. km (57.9 per cent). Forest occupies 162.49 sq. km and sharing about 10.79 per cent of the total land use land cover of the study area. The built-up land occupies 13.70 sq. km (0.91 per cent) and there was a rapid expansion of built-up lands. Barren land occupies 419.87 sq. km (27.88 per cent). Well developed dendritic drainage pattern is there in the study area. The spatial information of the surface will help in the optimal land use planning at the macro and micro level.

Index Terms- Land use/ Land cover Analysis, Remote Sensing and GIS, Pulivendula Taluk

I. Introduction

Land use and land cover change has become a central component in current strategies for managing natural resources and monitoring environmental changes. The advancement in the concept of vegetation mapping has greatly increased research on land use land cover change thus providing an accurate evaluation of the spread and health of the world's forest, grassland, and agricultural resources has become an important priority. The land use/land cover pattern of a region is an outcome of natural and socio – economic factors and their utilization by man in time and space. Land is becoming a scarce resource due to immense agricultural and demographic pressure (Sreenivasulu *et al.* 2013). Viewing the Earth from space is now

crucial to the understanding of the influence of man's activities on his natural resource base over time. In situations of rapid and often unrecorded land use change, observations of the earth from space provide objective information of human utilization of the landscape. Over the past years, data from Earth sensing satellites has become vital in mapping the Earth's features and infrastructures, managing natural resources and studying environmental change.

Remote Sensing data represent a powerful tool to understand the dynamics of the agriculture where the images allow a synoptic view of the area. In addition to an integrated data base, a Geographic Information System (GIS) combines different data sets and simultaneously, facilities spatial and temporal analysis (Kurt Fedra *et al.* 1998). The RS and GIS have played an important role in the present study to assess the natural resources. Anthropogenic changes in land use and land cover are being increasingly recognized as critical factors influencing global change (Jayaraju *et al.* 2011).

A total of three thematic maps such as location, drainage and land use and land cover maps were prepared based on image interpretation studies with limited checks. The land use-land cover pattern falls under the broad categories of built-up land, crop land, forest land and barren lands. In this study area major natural resource is forest. Because of human activities the extent of the land under forest is getting reduced. Recently the functioning of the real estate people and property promoters are bringing a serious disaster to forest area and agricultural land. This is an unhealthy situation of land management. In this context studies on land use land cover change detection are essential to understand the existing situation and plan for the future. The present study describes the various land use/land cover changes and categories of the study area.

Study area: The study area lies between parallels of $77^0 20'$ to $78^0 31'33''$E longitude and 14^0 15' to $14^0 45'$N latitude with intended boundary falling in Survey of India toposheet no. 57J02, 57J03, 57J06 and 57J07. The total area covered is approximately 1506 square kilometers. The climatic conditions of this area as its minimum temperature in November-January at about 28-300 C. The hottest temperature ranges between the 40-450C ranges during April-May. There are extensive outcrops of limestone, Dolomites, Granite and Quartzite in major parts of the area, which could be utilised as building material. The major minerals in the study area are vein type barites, asbestos and the small deposits of white clay and iron ore.

Figure 1: Location map of the study area

II.   MATERIALS AND METHODS

The study has made use of various primary and secondary data. These include Survey of India (SOI) topographic sheets of 57J02, 57J03, 57J06 and 57J07 of 1:50,000 scale and satellite image IRS P6 geocoded data of 1:50,000 scale. The Indian Remote Sensing Satellite (IRS) data was visually and digitally interpreted by using the image interpretation elements (such as tone, texture, shape, pattern, association etc.) and ArcGIS software was used for processing, analysis and integration of spatial data to reach the objectives of the study. Adequate field checks were made before finalization of the thematic maps. The main goal of this study is to extract the land use/land cover changes and categories of the study area.

Preparation of thematic maps: These maps are the true representation of earth's phenomena such as spatial distribution of natural resources existing at the time of survey (Sreenivasulu *et Al.* 2014). In the present study satellite image (IRS P6) which is a true record of the various environmental resources information on the base map. These map showing spatial distribution of forest, agriculture, soil, water resources etc., and prepared by visual interpretation of the satellite imagery. Visual interpretation is carried out based on the image characteristics like tone, size, shape, pattern, texture etc. in conjunction with existing map/literature.   These pre-field thematic maps are modified substantiated and confirm after limited field checks.

III.   RESULTS AND DISCUSSIONS

1). Analysis of Landuse / Landcover by using Remote Sensing Data: The land use/land cover categories of the study area were mapped using IRS P6 LISS-III data of 1:50,000 scale. The satellite data was visually interpreted and after making thorough field check, the map was finalized. The various land use and land cover classes interpreted in the study area include, Forest land, built-up land, uncultivated land, cultivated land, rivers, water bodies.

Figure 2: Land use/ Land cover map of the Study area

Table 1: Land use land covers classification system

S.No	Name of the class	Area in Sq. km	Percentage %
1.	Built up land	13.70	0.91
2.	Forest land	162.49	10.79
3.	Barren land	419.87	27.88
4.	Crop land	887.03	58.96

Detailed accounts of these land use /land cover classes of the study area are described in the following section.

1.1) Built–up land: Built–up land includes educational, health and socio-economic facilities like: games/ sport viewing centres and shops etc. These features are identified with their dark bluish green tone in the core and bluish tone on the periphery. They have a typical coarse and molted texture. These areas are also associated with the network of canals, roads and railway lines. In the study area, is an urban centre, found in the central part of the study area. Some smaller settlements and tiny towns are also found in the study area. The total area covered by the major and minor settlements in the study area constitutes 13.70 sq.km or 0.91 per cent of the study area. (Table 1).

1.2) Forest Land: Forest, comprises of thick and dense canopy of trees. These lands are identified by their red to dark red tone and varying in size. They are irregular in shape with smooth texture. The forests are found on the south eastern part of the study area. The study area covers mostly the dense and scrub forest. The relative concentration of scrubs, bushes and smaller trees are predominant in this category. In the satellite image such

forest are identified by yellow tone with smooth texture. The forest areas are Giddankipalli, Komanuthala, Mabbuchintalapalli, Sunkesula, etc. The total forest land occupies 162.49 sq. km (10.79%) of the study area.

Figure 3: Pie Diagram of Land Use/Land Cover

1.3) Barren Land: Barren land covers all lands which are uncultivable like mountains, deserts, bare exposed rock, strip mines, gravel pits and quarries. The areas which comprise barren lands are surrounded by the villages Lingala, Ippatla, Pulivendula, Vemula, Thonduru, Simhadripuram, and Chagaler. These lands occupy 419.87 sq. km (27.88%) of the study area and are suggested to be used for industrial and urbanization purposes (Table 1).

1.4) Crop Land: This encompasses both cultivated and irrigated lands. These are the lands mainly used for farming and

for production of food and other commercial and horticultural crops. The help of satellite data, it is possible to identify various agricultural land uses. These include the agricultural areas identified by their characteristic red tone, regular shaped agricultural fields and in associated with settlements, water bodies, etc. Crop lands are well distributed throughout the foot hills zones, along plain regions of the study area. These crop lands were noticed at Gurjala, Balapanur, Vemula, Kovaramguttapalli, Simhadripuram, Chagaleru, etc. Crop lands occupy 887.03 sq. km (58.96%) of the study area.

   2). Drainage pattern analysis: The arrangement of streams in a drainage system constitutes the drainage pattern, which in turn reflects mainly structural/ or lithologic controls of the underlying rocks. The area of study encompasses a miscellany of drainage patterns; however, dendritic drainage pattern is the most dominant type and occupies more than 95% of the area. Even though, difference in stream lengths and angle of connection, yet they are in general characterized by a treelike branching system, which is a dendritic drainage pattern that indicates homogenous and uniform soil and rocks.

   Radial drainage patterns also exist in the study area. They appear either as one-set or two-sets of Radial drainage patterns are develop surrounding areas of high topography where elevation drops from a central high area to surrounding low areas.

Figure 4: Drainage map of study area.

   2.1). Stream order (U): Stream order is a method for classifying the relative location of a reach (a stream segment) within the river basin. The applied method followed the procedure that modified by Stahler [12]. Stream order 1 has one connected edge, and then at the confluence of two1st -order streams assigns the downstream reach of order 2, and so on for the rest orders. In the study area has 4-stream orders, and thus a map was obtained using GIS system. In addition, the used GIS system enabled calculating the number of reaches in each order.
   2.2). Stream Number (NU): The count of stream channel in its order is known as stream number. The number of streams decreases as the demarcated watershed has the following stream orders and stream number.

IV. CONCLUSION

   The Indian Remote Sensing Satellite (IRS) data, image processing and Geographical Information System techniques were used to identify the land use categories such as built-up lands, cultivated lands, forest lands, water bodies and uncultivated lands. Satellite images in combination with predated topographic sheet of Survey of India were used for analyzing land use and land cover change detection. It is helpful for further macro and micro level planning. With the help of Geographic Information System the various land use and land cover zones are mapped, which in turn helps for decision maker for planning purpose. The crop lands are well distributed throughout the study area and it covers 887.03 sq. km (57.9 per cent). Forest occupies 162.49 sq. km and sharing about 10.79 per cent of the total land

use land cover of the study area. The built-up land occupies 13.70 sq. km (0.91 per cent) and there was a rapid expansion of built-up lands. Barren land occupies 419.87 sq. km (27.88 per cent). Well developed dendritic drainage pattern is there in the study area. The spatial information of the surface will help in the optimal land use planning at the macro and micro level.

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The Role of Molybdenum on Superconductivity in Tl-Based Cuprates

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Abstract- Bulk thallium based superconductors with nominal starting composition of $(Tl_{2-x}Mb_xBa_2Ca_2Cu_3O_x)$ were prepared through a solid-solid reaction technique. A Ba-Ca-Cu-O precursor was made for this purpose by mixing and grinding the stoichiometric amounts of $BaCO_3$, $CaCO_3$ and CuO followed by sintering at 850^oC. Finally, appropriate amounts of MoO_2 and Tl_2O_3 were added to the precursor and the whole mixture was calcined at 950^oC under oxygen flow. Different phases including the high- Tl-2223, Tl-2212, Tl-1223, Tl-1212 phases were formed in the resulting compound. Some other phases were also found when the Tl to Mo ratio was changed from 1.6 : 0.4 to 1 : 1 in $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ superconductor. From the resistivity measurements, the critical temperature $T_{c(0)}$ for the compound was found to around 89 K. The doping of Molibdenum (Mo) in Tl-cuprates induces pairing mechanisms to occur outside the CuO_2 layers and thus reducing high-T_c phase formation and hence the $T_{c(0)}$ value.

Index Terms- calcined, cuprate ,oxycarbonates

I. INTRODUCTION

Tl- based cuprates thin films are the more promising candidate for high critical current density, High frequency and high performance application and microwave passive devices operating at temperature above 77K. Tl-system has not only high transition temperature but also more superconducting phases than others. Hence comparative studies on structural and physical properties of this series of phases might provide us more information on the mechanism of high T_c superconductivity [1]. In 1988 Sheng and Hermann reported Tl-based superconducting cuprates with high critical temperature (120K) [2]. Tl-1223 and Tl-2223 phases were important due to relatively high critical temperature shown by them. Tl- based copper oxides are thermally unstable phases, and rapid loss of thallium takes place above 875^0C. Hence it was difficult to prepare pure single phase [3]. An excess quantity of thallium (compensating the loss of Tl by evaporation during heating) was necessary to the formation of the 1223 phase. In order to prevent Thallium loss during the reaction, samples had been wrapped in noble metal foils as Au, Ag, Pt, Ni foils had been used in the synthesis of Tl-based superconductors.[4] Both heating temperature and heating time were also important to the formation of the 1223 phase.[5] Recently, doped Tl-based cuprates have been extensively studied due to their stability and phase purity. Eder and Gritzner reported the formation of high quality Tl-1223 and Tl-1212 superconducting materials with well-connected grains by doping with rare earth oxides. The Tl-1212 crystallites are usually polygon shaped with dimensions in the order of 2-5µm [6]. The doping of Molybdenum showed greater ability of transition element to generate or to stabilize new superconductors by occupying the Thalium sites. The Transition element such as Mo, V, Cr collapsed the intergrowths of (110)-[1201]$_1$ [S$_2$CC] structure of the thalium oxycarbonates was not known. It was most probable that the atomic positions differ from those expected for the true rock salt layer. [7]. Stabilization of new superconducting thallium cuprates by Molybdenum with "1212" structure exhibited a T_c ranging from 40K, when as-synthesized, to 86K after annealing in a reduced atmosphere [8]. The doping of Mo and W in $TlSr_2CaCu_2O_7$ can stabilize the Tl-1212 phase. The Mo substituted 1212 phase showed superconductivity around 70 K. Some Mo-doped Tl-1222 samples also exhibited weak 100 K superconductivity [7]. The motivation behind the work was to see the effect of doping of molybdenum on the phase formation and critical temperature of Tl-based cuprates.

II. MATERIAL AND METHODS

The Mo doped Tl-based superconducting oxide powders were synthesized by the conventional with a two-step solid-state reaction method [9]. For precursors, stoichiometric amounts of $BaCO_3$, $CaCO_3$ and CuO were mixed and finely grinded in an agate mortar. The mixture was calcined in an open platinum crucible at 850^oC under oxygen flow for a total period of 16 h. The mixture was subjected to intermittent grindings after every 4 hours to avoid agglomeration formation. For the preparation of Mo doped Tl- based cuprate superconductor, a mixture of Tl_2O_3 and MoO_2 at ratio of 1.6 **:** 0.4 was synthesized by sintering with one of the precursor samples in a platinum crucible with a lid at 950^oC for 8 hours. Intermittent grindings were carried out after every 2 hours. The ratio of Tl_2O_3 and MoO_2 was varied to 1:1 for other compound. This mixture were added to another prepared precursors and sintered under the same experimental procedures and conditions. In order to prevent severe thallium loss and maintaining the stoichiometry of the products to ensure the formation of the desired phase during the reaction, samples were wrapped by Ag foil [4].

The resulting powders were pelletized for resistivity measurements at a pressure of 0.0280tonne/mm^2 using polymer press (PF-M15). The pellets were annealed at 600^0C for 6 hours under oxygen flow. Finally pellets were characterized by resistivity vs. temperature (R-T) measurement using a standard dc four probe measuring technique. The phase compositions of the final powdered sample were analyzed by X-ray diffraction by using a Philips PW1710 with Cu Kα1/Kα2 radiation. Scanning

electron microscopies (SEM) were performed using Hitachi field emission S-3600N.

III. RESULTS AND DISCUSSION

A. Results

The x-ray diffractograms of the compounds are shown in Fig. 1a & 1b. Some peaks are common for both compounds at 2θ =26.54, 26.76, 28.84, 32.08, 35.18, 38.74, 42.92, 48.28, 52.68 and 53.54. As the Molybdenum content was increased further, extraneous phases appeared in the synthesized compound. The peak (003), (004) and (101) (at $2\theta = 20.78^o$, 21.87^o and 25.04^0) were appeared for $TlMoBa_2Ca_2Cu_3O_x$ Cuprates. But, it vanished completely for $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ compounds. Again, Two peaks (0012) and (104) of the Tl-2223 and Tl-1223 phases (at $2\theta=30.02^0$ and 30.45^0) were prominent in $TlMoBa_2Ca_2Cu_3O_x$ compound whereas, it is much diminished in the $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ cuprate.

Figure 1: X-ray diffractogram of (a) $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ and (b) $TlMoBa_2Ca_2Cu_3O_x$ superconducting cuprates.

The disappearance of peaks at 29.88, 35.36^o and 45° in the diffractogram for the $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ compound is another important observation. Though it was begun with a starting nominal composition to form $(Tl_{2-x}Mb_xBa_2Ca_2Cu_3O_x)$ structure, the other phases Tl-2212, Tl-1223, Tl-1212 were also seen. X-ray powder diffraction reveals a multiphase mixture in the two samples.

From scanning electron micrographs, the surface morphology of the compound of $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ cuprate is seen partially separated and relatively large tetragonal like structures with better grain homogeneity (Fig 2a). The samples were conglomerate of randomly oriented lamellar microcrystals of 2223 phases with average dimension of 5μm.

Figure 2: Scanning Electron Micrographs (SEM)
(a) $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ and
(b) $TlMoBa_2Ca_2Cu_3O_x$ superconducting cuprates.

As the Molybdenum content was increased, the sample crystalizes into needle like structure which was preserved over the entire concentration range covered with dimension of 2μm.

The $T_{c(0)}$ value of $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ cuprate was found to be 89K and that of $TlMoBa_2Ca_2Cu_3O_x$ -cuprate was 80 K as indicated by Figs. 3a & 3b. The addition of more Mo can lead to a significant decrease in the superconducting transition temperature.

B. Discussion:

The new peaks obtained in the XRD of the $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ and $TlMoBa_2Ca_2Cu_3O_x$ cuprate samples can be explained from the fact that some additional possible unconventional pairing interactions may occur outside the CuO_2 layers in high-T_c superconductors.

Figure 3: Temperature vs Resistivity of (a) $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ and (b) $TlMoBa_2Ca_2Cu_3O_x$ cuprates.

The Mo doping promoted the growth of Tl-2223 and Tl-1223 superconducting phases and suppressed other phases. On the other hand Mo dopant may disturb the local oxygen distribution in both in the 2212 and 1212 lattice, which in turn lowers the T_c of the material [7]. The separation of tetragonal shaped like grains was much more complete in case of $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ (figure 2(a)). More completed separation reduces lump formation and leads to much better grain homogeneity. It is seen that the size of the crystals decreased from 5 μm to 2 μm as the content of Molybdenum increased in Tl-based Superconductor.

IV.   CONCLUSIONS

In conclusion, $Tl_{1.6}Mo_{0.4}Ba_2Ca_2Cu_3O_x$ and $TlMoBa_2Ca_2Cu_3O_x$ compounds are fabricated by doping of Molybdenum in the Ba-Ca-Cu-O precursor at nominal starting compositions. It is found that the lowering of T_c value in Mo doped Tl-cuprates may be due to intergrowth of oxycabonates of 1201 structure or for disturbing the local oxygen distribution in the phases [7] or it induces the additional pairing mechanisms formed at the outside the CuO_2 layers. The results show that great ability of transition element is to generat or to stabilize new superconductors by occupying the Thalium sites.

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Decreasing Call Blocking Rate by Using Optimization Technique

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Abstract- In Cellular networks, blocking occurs when a base station has no free channel to allocate to a mobile user. When a user moves from one cell to another then sometimes handover does not exist and call blocking occurs. Handover is the process when call transfers from one cell to another. In case of complete Handover blocking does not takes place. There are some techniques to remove call blocking such as Handover Prioritization Schemes, Auxiliary station, Guard Channel Prioritization Schemes, Call Admission Control Prioritization Schemes, Handover Queuing Prioritization Schemes. The main goal of this research paper is to investigate the handover research issues and developing schemes which can handle handovers traffic in order to support on-going calls when mobile users are switching between base stations.

Index Terms- Cellular system, Handoff, Blocking Probability, Queuing

I. INTRODUCTION

Cellular network is a radio network distributed over land areas called cells and each cell is serviced by a station called base station. Each cell is represented by hexagonal shape, each cell use different set of frequencies from its neighboring cells. Normally a practical cell is considered to be a circle but to think on it ideally the boundary portions of any radial cell cannot be captured easily due to the gap after integration of more than one cell.So on part of this a hexagon is assumed to be the largesr area covering the practical cell and capturing the gaps after integration of cells too[1].

Figure-1 Single cell

In cellular network blocking occurs when base station has no free channels to allocate mobile users. One distinguishes between two kinds of blocking, the first is called new call blocking which refers to blocking of new new calls, and the second is called handoff blocking which refers to blocking of ongoing calls due to the mobility of the users. [3][8]

Fig.2.New call and handoff call

The Global System for Mobile (GSM) communication has become a household term in our present world. This is due to the fact that communication in the life of man is so important and the use of the GSM network is not being limited to the rich alone but to all human beings be it rich, poor, old or young. This accounts for the ever-growing demand for GSM communication by people in the real sense of it as reported by the GSM association which could make congestion invertible [2][7].When congestion occurs call blocking occurs.

Call blocking can be reduced using techniques such as using auxiliary stations [7], Guard channel prioritization scheme, Call admission control prioritization scheme, Handover queuing prioritization schemes. This paper presents the survey of these four techniques and find out which technique is efficient today.

The Geographical area is divided into smaller areas in in the share of hexagon. These hexagon al areas are called as cells. A base station (BS) is located at each cell. The mobile terminal (MT) within that region is served by this BS.Before a mobile user can communicate with other mobile user in the network, a group channels should be assigned. The cell size plays a major role in the channel utilization. A user has to cross several cells during the ongoing conversation; the call has to be transferred from one cell to another to achieve the call continuation during boundary crossing [4].

Here comes the role of handoff .Transferring the active call from one cell to another without disturbing the call is called as the process of handoff .

A typical Cellular network is shown in fig (3), a limited frequency is allocated .But it is very successfully utilized because of the frequency reuse concept. To avoid the interference while neighboring cells are utilizing the same frequency, the group of channels assigned to one cell should be different from the neighboring cells.

If the MS is traveling while the call is in progress, the MS need to get a new channel from the neighboring BS to continue the call without dropping. The MSs located in the cell share the available channels. The multiple Access Methods and channel allocation schemes governs the sharing and allocating the channels in the cell, respectively [4].

The Cellular System

Fig.3.Cellulalar network system

II. REVIEW WORK

Handover-

Handover initiation is the process of deciding when a request to a handover. Handover is based on received signal strength (RSS) from the current base station and neighboring base station. The fig.4. Shows a mobile station is moving from the BTS (named BTS1) to another BTS (named BTS 2). The RSS of BTS1decreases as the mobile station moves away and increases as the mobile station get closer to BTS2 as a result of the signal propagation. From the below fig we find various approaches to handover initiation [5].

III. PROPOSED SCHEME

GSM Handover Prioritization Schemes-

Different ideas and approaches are proposed to increase the handover and reduce the probability of dropping. One approach is to reduce the handover failure rate is to prioritize handover call over new calls. Handover prioritization schemes reduce the call dropping probability and call blocking probability. Such schemes permits high utilization of band width while guaranteeing the quality of service of handover calls. Basic methods of handover prioritization schemes are auxiliary station, guard channels, call admission control (CAC), handover queuing schemes. Sometimes these schemes are combined together to get better result [7].

1. Using Auxiliary Station-

As above it is discussed that, in cellular system, blocking takes place whenever a base station has no free channel to allocate to a mobile user .Here two types of call blocking occurs first one is new call blocking and second one is handoff cal blocking .New call blocking refers to new calls, and handoff call blocking which refers to blocking of ongoing call .

In a cell there is a base station ,whenever a call arrives to base station then it connect, but when there is large number of call arrives then some of them would be blocked due to congestion. To reduce these problems auxiliary stations are used, when call arrives and base station is not free then these newly calls are engaged by auxiliary stations and as soon as possible auxiliary station find that base station has free channel then it transfers call to base station and call would be connected.

Fig.4.Auxiliary cell and base station

2. Guard Channel Prioritization Screams-

Guard channel schemes was introduced in 80's for mobile communication cellular network.Hawever the guard channels schemes stills used in telecommunications with the name of cutoff priority schemes .

Guard Channel schemes improving probability of successful handovers by simply resolving a number of channels exclusively for handover in each cell [5].

Remaining channels are shared equally between handover and new calls.Gaurd channels are established only when the no. of free channels is equal to or less than the predefined threshold.

In case if every fresh calls are bypassed and only handover request are served by the cells all channels then occupied.Gaurd channels are feasible because new calls are less sensitive to delay than the handovers.

To overcome the poor utilization of bandwidth the dynamic guard channel scheme was proposed where the number of guard channels in a radio cell according to the current estimate of handover arrival rate. The handover arrival rate could be derived from the current number of ongoing calls in neighboring cell and the mobility pattern so, to reduce the handover blocking probabilities close to the targeted objectives while limiting the new   call blocking probability to below level. The main characteristics of dynamic Guard Channel schemes is that it supports any number of classes of traffic each of which can have its own quality of services requirements in the term of channel needed and length of the connection.

The guard Channel schemes reduce the probability of dropping handover, it can say that at the same time the reservation of channel for handover restricts fresh calls from being served and increases their blocking probability to a high level [6]

3. Call Admission control Prioritization Schemes-

The area chosen for this proposed work is mobile communication, it is the fastest way to communicate all over the world, and it is the essential part of daily life. Compared to population growth mobile users are greatly increasing day-by-day. In such case, by accommodating as many calls as possible in the network and maintaining a reasonably high level of network

utilization will lead to congestion so that traffic will occur. To overcome this problem an efficient call admission control is proposed which limit the number of call connections in the network in order to reduce congestion [6].

The CAC admission control scheme refers to the task of deciding whether new call are admitted into the network or not. In this scemes CAC the arrival of new call are estimated and if they are higher than the predefined threshold level then some calls are restricted (blocked) irrespective of whether channel is available or not to decrease the probability of handover calls .In the CAC both the new and handoff calls have to access to all channels. If anew call that is generated in cell cannot find an idle channel the call is dropped immediately. If there is no queue provided for the new calls to wait [5].

4. Handover Queuing Prioritization Schemes-

Queuing handover call prioritization scheme queues the handover calls, whenever all the channels are in BSC. When a channel is released in the BSC, it is assign to one of the handover call in the priority queue. The Handover queuing technique reduces the call blocking rate, as new calls are not assign a channel until all the handover request in the queue are served. In the handover queuing schemes when the received signal strength of the BSC in the current cell reaches to certain define threshold the call is queued from service a neighboring cell. Then new call request is assigned a channel if the queue is empty and if there is at least of free channel in the BSC.

The calls would be queued until either a channel available in the new cell or the power by the base station in the current cell drops below the receiver threshold signal. If the call reaches the receiver threshold and no free channel if found then the call is blocked.

Queuing handover is possible due to the overlap regions between the adjacent cells in which the mobile station can communicate with more   than one base station (BS) .Thus queuing handover requests for certain time period equal to the time of the mobile host existence in the overlapping area.
Queuing is effective only when the handover requests arrive in groups and traffic is low First in First Out (FIFO) scheme is the most common queuing scheme where the handover requests are

ordered according to their arrival .The handover of the mobile station depends on the system such as moving speed, the direction of the mobile station and the cell size. In the FIFO handover Prioritization scheme   the probability of the blocking is decreased.

IV.   ANALYSIS ON REVIEW WORK

All the handover prioritization schemes allocate channels to handovers more frequently than the new call to guarantee the users QoS because new call is less sensitive to delay than the handover calls. Using auxiliary station call blocking can be reduced as it is clear that from above discussion when auxiliary stations are used then whenever any new call arrive it firstly connect to auxiliary station (if base station is not free at this moment) and when base station became free then auxiliary station connect that call to base station and thus probability of call blocking can be reduced.

Call blocking can be reduced by allocating sufficient guard channels for handoff calls and thus ensure improved QoS to user. The guard channel schemes are established only when the number of channels exclusively for the handover in each cell to improve the performance of cellular network system. The guard channel prioritization schemes are established only when the number of free channels is less or equal to predefined threshold. The value of the threshold directly affects the probability of the call blocking.

resources must be available to support the mobile user else the user will suffer a forced termination of his call in progress. Therefore careful resource allocation along with call admission control is required to mitigate the chances of forced chances or blocking probability of a call.

In handoff prioritization and handoff schemes in cellular network provide improved performance whenever increased In a cellular network, a mobile user may visit from one cell to another cell in his life time. In each of these cells, call blocking probability. The call blocking probability denotes the possibility of new the channel request being denied into the network from the resources. In handover prioritization schemes an important issue is to limit the call blocking probability due to lack of the resources in in the targeted neighbor cell. Call blocking is the fundamental QoS parameter in cellular network. The other important effective parameter in prioritization schemes is effective channel utilization method which makes effective use of cellular network resources. In this paper both the prioritized and non prioritized handover schemes are presented. Different prioritization schemes and there extensive classification are presented as well.

Non prioritized scheme handle the both new call and the handover call equally and does not differentiate between them .In this situation the BSC does not differentiate between the channel request either for fresh call or handover call.

All the handover prioritization schemes allocate channels to handover more frequently than the new call to guarantee the users QoS because new calls are less sensitive to delay than the handover calls. In this literature survey it is shown that the giving priority to the handover in each cell to improve the performance of the cellular network.

V.   FUTURE SCOPE:

The guard channel prioritization schemes are established only when the number of free channels is less or equal to predefined threshold. The value of threshold directly affects the probability of the call blocking.

Several other schemes to allocate channel for the handover request in the queue discipline have been proposed .For example queuing of new call arrivals is possible and is less sensitive regarding the queuing time than the case of handover .Queueing of the new call request shows more improvement than queuing of handover calls .In this scheme new call will be accepted if the number of free channels apart of those reserved for handover is enough for the new request otherwise the call will be placed in the queue.As soon as the channel is released by the completing a call or outgoing of the handover request than the new call is served immediately from the FIFO queue. Queuing of the new calls involves the concept of the guard channel and queuing schemes .

The performance analysis of queuing new call provide that the blocking of the handover calls decreases with the queuing probability of the new calls and increased in the total carried traffic because new calls will be ultimately served .

The handover prioritized schemes also achieves less force termination probability compared to other schemes.

Thus it is obvious from the above concept that the future scope of the handoff prioritization schemes are more than the other schemes.

TARGET RESEARCH APPROACH-
•Cellular technology
•Optimization techniques
•Handover management
•Base stations
•cells
•Call blocking probability
•BSC
•MSC
•Handoff
•Signal strength

VI.   CONCLUSION

Handover is the process that transfers an ongoing call from one cell to another cell as the user's moves through the coverage area of cellular system. The main goal of the handover procedure is that when cell moves from one cell to another then call blocking does not occurs.

Here in this paper mainly four prioritization techniques are used but handover techniques are the best techniques because in handover prioritization schemes, queuing handover call prioritization schemes queues the handover calls when all the channels are occupied in the BSC. When a channel is released in the BSC it is assign to one of the handover call in the queue .It can say that handover is the process that provides handover call and call blocking can be reduced.

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An Improvement in Window-based Protocols using Evolutionary Multi-objective Optimization

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Abstract- Evolutionary multiobjective optimization (EMO) optimizes multi-objectives, conflicting with each other, simultaneously. In this paper, EMO has been utilized to improve a window based protocol based on two parameters, Bandwidth Delay Product (BDP) and end-to-end delay. The problem has been simulated using gamultiobj tool in the MATLAB.

Index Terms- Evolutionary Multiobjective Optimization (EMO); Bandwidth Delay Product (BDP); Transmission Control Protocol (TCP); end-to-end delay.

I. INTRODUCTION

Multiobjective optimization is a problem of optimizing a number of objectives simultaneously which results into a set of solutions called Pareto optimal set. This set can be derived using evolutionary algorithms. Thus Evolutionary Multiobjective Optimization (EMO) is providing significant results in all domains.[1].

EMOs are applicable in handling routing problems in various types of networks. In [2] the EMO concepts have been utilized in routing for wireless ad-hoc networks. In this Pareto optimal sets are generated with the parameters Delay, robustness and energy in a sensor network. For the optimization of four QoS parameters bandwidth constraints, delay, traffic and number of hops in MANET (Mobile ad-Hoc Network), the Multiobjective Genetic algorithms have been used in [3]. A new algorithm for multicast routing has been proposed in [4] which solve GMM models for dynamic Multicast Groups which is named as Multi-tree Multiobjective Multicast routing algorithm (M-MMA).

In [5,6]A Fuzzy Multi-objective routing algorithm has been proposed in B-ISDN (Broadband Integrated Services Digital Network). The problem has been modeled in fuzzy multiobjective formulation. Multiple design objectives of the embedded systems are handled with multiobjective approach in [7] for the purpose of optimizing routing and topology. In [8] a shortest path routing problem in a computer network has been solved using a Multiobjective Strength Pareto Evolutionary Approach (SPEA). In a Wireless Mesh Network (WMN), the routing and QoS problem has been solved using multiobjective optimization in [9]. The parameters utilized are bandwidth, packet loss rate, delay and power consumption.

In window based protocols, sender keeps transmitting the packets equal to the size of window before waiting for first acknowledgement from the receiver. Ideally, these protocols give best throughput when pipe is filled with the packets. To ensure this, we need to have maximum possible bandwidth-delay product (BDP). [10. (This value must be constrained by the receiver buffer size).

EMO can be used to determine the best suitable path for TCP connection and determine the optimal window size. There are two major advantages supported by EMO. First of all overheads of formula designing are eliminated. Without EMO we may need to integrate all the parameters (as per user requirements and type of network), where as EMO provides a platform to integrate these parameters as separate formulae.

Second major advantage is the Pareto set, which defines a non-dominant set of solutions, i.e., all Pareto solutions are equally good in performance. So, in case of congestion, link failure etc., computations required for computing alternative are reduced as equally good alternatives are already proposed.

This paper is divided into four sections. Section II introduces the basic concepts of Evolutionary Multiobjective Optimization. The proposed approach is discussed in section III. Result analysis is carried out in section IV. Section V is the conclusion and future scope.

II. EMO BASIC CONCEPTS

A multiobjective optimization problem (MOP) is defined as need of concurrent optimization of more than one objective. Mathematically we can define it as

Optimize

$$F(Y) = \{f_1(Y), f_2(Y), f_3(Y)\ldots\ldots f_k(Y)\}$$

Subject to

$$C_1(Y) = 0$$
$$C_2(Y) >= 0$$

Here, $F(Y)$ represents the set of objectives to be optimized; k is the number of objectives in set $F(Y)$ where Y is the set of independent variables. C_1 and C_2 represent the equal and non-equal constraints. These objectives may be conflicting in nature, i.e. improving one may result into deterioration of the other.

We look for 'trade-offs' as a single solution cannot simultaneously, optimize all the required objectives. Pareto-optimality is the term used. Say, we have a vector y^* such that,

$f_i(y) <= f_i(y^*)$ for all i= 1 to k

(not worse than, in terms of all objectives)

and

$f_j(y) < f_j(y^*)$ for at least one j

(is better than, in terms of at least one objective)
The solutions in vector y^* are called non dominant.

To solve MOP, evolutionary algorithms are used and hence the term Evolutionary Multiobjective Optimization (EMO). These algorithms are inspired from Evolution theory of Darwin stating survival of the fittest. They solve MOP; by treating solutions to any problem as population of individuals. Depending upon how good a solution is, a fitness value is assigned to each individual. This fitness value is derived from the functions/objectives which are optimized by the individual.

Similar to Darwin's biological evolution genetic operators, EAs involves following operators: Selection, Crossover and Mutation. Selection operator selects the individuals from parent population which will reproduce children solutions for the next generation. Crossover operator combines the two solution individuals resulting into two new solutions. For genetic diversity some changes are made into an individual, this is called mutation.

We need to put some bounds over the convergence of an evolutionary algorithm. For this we can use any stopping criteria such as limiting, number of generations, time limit, fitness limit etc. Thus, when EA stops we get a set of optimal solutions to our problem, which are equally good in terms of performance.

III. PROPOSED APPROACH

In this paper, two objective functions have been optimized, namely, end-to-end delay and BDP (bandwidth delay product). For efficient throughput, maximization of BDP [11] and minimization of end-to-end delay is done.

We have modeled the network as a graph G= (N, E), where N is the nodes and E edges. Among nodes we have source node S ϵ N and let D be some destination, D ϵ N. Let (i, j) ϵ E be a link from node i to node j. d_{ij} and b_{ij} be the delay and available bandwidth for the link (i,j). Say P represents the path from source to destination. Objective functions can be formulated as shown

$$Delay = \sum_{i,j \epsilon P} d_{ij} \tag{1}$$

Delay for every link (i, j) from source to destination is added to calculate the total end-to-end delay for a given path.

$$BDP = \sum_{i,j \epsilon P} \min(b_{ij}) * 2 * d_{ij} \tag{2}$$

The bottleneck bandwidth in the path P is multiplied with the round trip time. Assuming delay for a link is same for both way communications. This product must be constrained to maximum value of buffer size, in order to avoid buffer overflow at the receiver.

We limit our population size at each generation to be 50. Most common selection methods are roulette wheel selection and tournament method. We use tournament selection as it converges faster than roulette [12].

We have used two-point crossover as it mostly gives the best results [13].

To maintain the diversity, crowding distance parameter is used wherein, the individuals, with maximum crowding distance are selected. The Figure 1 below depicts the flow of our evolutionary algorithm.

Figure 1 Evolutionary Algorithm Flowchart

IV. EXPERIMENT AND RESULTS

To evaluate the effect of EMO in increasing the throughput in TCP sliding window protocol we use gamultiobj solver available in MATLAB. We generate a fitness function using end-to-end delay and BDP parameters. The population size at each generation is limited to 50. Tournament method is used for selection where tournament size is 2. Two point crossover operator is utilized with 0.8 crossover fraction. An inbuilt function named distancecrowding is available in MATLAB which is utilized for diversity maintenance. For the selection of individuals from a Pareto front, 0.35 Pareto front population fraction is used. Constraint-dependent mutation is done Number of generation iterations is limited to 150. Figures 2, 3 and 4 below shows the pareto front values obtained at different generations. At end, we obtain the points where both the parameters are simultaneously optimized.

Figure 2 Pareto front at generation 37

Figure 3 Pareto front at generation 99

Figure 4 Pareto front at generation 114

V. CONCLUSION AND FUTURE SCOPE

EMO proves to be efficient method in calculating the best possible path for our TCP connection having minimum end-to-end delay and maximum bandwidth-delay product. The optimized value of BDP decides the optimum size for the window to have maximum throughput. Using EMO, the overheads of formula designing have been eliminated. We have separately mentioned the required parameters (equation 1 and 2). Also, at end of EA, we get a Pareto set of solutions. So, if a failure occurs for a selected link, then computations for determining the alternative path are reduced, as pareto-set defines the equally good possible alternatives.

Further improvements can be made by considering parameters like advertised window, buffer capacity etc to evaluate better window size.

Certain congestion avoidance or congestion control measures must be added on alongwith.

We have used the technique of EMO in TCP layer, which can also be implemented at almost all the OSI protocols to get optimized results.

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Simulated PGA Shaking Maps for the Magnitude 6.8 Lake Tanganyika earthquake of December 5, 2005 and the observed damages across South Western Tanzania

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Abstract- The South Western Tanzania (SWTZ) is found within the Western branch of the East African Rift Valley (EAR) system, one of the most seismically active regions in African continent (Mavonga, 2010, 2007). The SWTZ area was strongly shaken by the magnitude 6.8 earthquakes that occurred on December 5, 2005, along Lake Tanganyika, living communities dwelling close to the earthquake epicenter in fears (USGS, 2005). No seismic sensors were close enough to provide instrumental recordings of the event, but few citizens who experienced the strong ground shaking provided eyewitness report via online questionnaire system (Did You feel it?) operated by the US Geological Survey (USGS) for global earthquake predictive shaking maps. The USGS predictive ground shaking maps can take minutes to days to generate depending on the availability of internet in the earthquake affected areas. The main objective of this study is to demonstrate how simulated earthquake peak ground acceleration (PGA)shaking maps can be used to rapidly assess the impact of the earthquake for faster deployment of emergency responses when earthquake magnitude and epicenter location are available. We simulate the magnitude 6.8 earthquake of December 5, 2005 and measure the initial P-wave information for estimation of earthquake source parameters (event location and magnitude). Then, we apply the estimated earthquake magnitude and epicenter location to the SWTZ PGA ground attenuation relationship in order to predict the eminent S-wave PGA values expected from the earthquake across the region and map them as PGA shaking maps. The simulated shaking maps of the magnitude 6.8 earthquake and the damage levels reported at different locations were comparable. Proving that simulated PGA shaking maps can be used for early warning and rapid earthquake impact assessments.

Index Terms- empirically estimated PGA, predictive shaking maps, simulated earthquake PGA maps; Scenario earthquake.

I. INTRODUCTION

Scenario earthquake ground shaking maps describes the ground motion generated by a large earthquake at each grid point across the affected areas , giving a quick indication of the extent and nature of shaking effects   used as a proxy for earthquake expected damage assessment and as tool for fast emergency responses (Allen et al., 2004; Wald et al., 1999). That is, in case of the occurrence of large earthquakes, rapid estimation of areas expected to experience strong ground shaking can be an advantageous for deployment of emergency teams and provision of early warnings to public.

Where denser seismic networks are available, Shaking maps are produced directly from instrumentally recorded data. When only sparse networks are operational, algorithms are implemented to allow faster local characterization of event location and magnitude from data recorded by few closer to epicenter stations and from which predictions of strong ground motion mapped as shaking maps are performed via region empirical attenuation relationships. Where no instruments are available, macroseismic systems that collect reports from actual people who experience the event, generate ground shaking maps from eyewitness reports.

Wald et al., (1999) developed systems called USGS ShakeMaps that generate earthquake ground shaking maps by combining instrumental peak ground measurements and the data predicted in sparsely covered areas from ground attenuation equations with considerations for local geological conditions. Allen et al., (2004) developed shaking maps generation methodology that utilizes initial information from earthquake preliminary motions (P-waves) observed by few closer to the event epicenter stations for estimation of event source information (location and magnitude) and predictions of up-coming earthquake final motion (S-wave) at target site. The two methodologies provide accurate results when denser seismic networks are available, with accompanying knowledge of geological conditions across the region (Allen et al., 2004; Wald et al., 1999). Deployment of denser seismic networks is closetful as well as accurate characterization of geological conditions across the seismically active region.

The USGS DID YOU FEEL IT? (DYFI) system, collects macroseismic seismic intensity data as eyewitness report from internet users who experience ground shaking as well as any damage reports to generate earthquake intensity maps immediately as they are reported (Wald et al., (2011). These ground shaking maps are called Community Internet Intensity Maps (CIIM) and they contribute greatly in quick assessment of the scope of the earthquake for emergency especially when instruments are not available to record data ((Wald et al., 2011, 1999). Provided that internet will remain functioning as well as power systems even during strong ground shaking, CIIM can provide direct first assessment of earthquake hazard if people can take the filling of the online questionnaire as the first priority to their safety (Wald et al., 2011).

Matsuoka and Yamamoto, (2012), developed QuakeMap which is earthquake ground shaking maps generation system

triggered automatically by the publications of seismic waveform records from Japanese seismic network portal site. Here, pre-established ground amplification factors at each station, are required to first convert recorded data to base rock level , as well as some interpolation technique to estimate spatial distribution of ground motion parameters at the base rock level for the whole region (Matsuoka and Yamamoto, 2012). The methodology must wait for the stations to report the final seismic data that wastes some valuable warning times.

In this study, we introduce the earthquake peak ground acceleration (PGA) simulation procedure that uses simple C-program for predicting earthquake expected PGA at each grid point and Generic Mapping Tool (GMT) based C-shell script for map generation. In the prediction of grid point PGA values, rapidly estimated earthquake source parameters earthquake preliminary motion (P-waves) and region P-wave based PGA attenuation relationship are the only parameters required. The study aim at demonstrating that, it is possible to rapidly predict the damage pattern of the earthquake by simulating the expected PGA values from rapidly estimated earthquake source parameters. To evaluate the methodology, we apply the numerical simulation techniques to the magnitude 6.8 earthquakes of 2005 along Lake Tanganyika to produce the preliminary P-wave information and predict the peak ground shaking and damage distribution. We compare the simulated PGA shaking maps to the values generated by USGS system for the same earthquake using observed peak ground motions (S-wave) and eyewitness reports.

II. THE DECEMBER 5, 2005 LAKE TANGANYIKA EARTHQUAKE

The magnitude 6.8 earthquake of December 5, 2005 along Lake Tanganyika was strongly felt across the SWTZ and surrounding countries and as far as Nairobi, Kenya (see Figure 1).
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Figure 1 The USGS Internet Intensity Map for magnitude 6.8 earthquake of Dec 5, 2005 in Lake Tanganyika (USGS, 2013)

Several damages as well as fears for strong ground shaking were reported by eyewitnesses near the epicenter areas and at several distances from the epicenter (see Table 1).

Table 1: Reported earthquake effects at particular distance

s/n	Repoters distance (km)	Reported Situation
	55	dozen house collapsed, roofs falling buried childrens
	70	Two deaths, dozen of houses collapses in Kalemie, steel roof falling
	845	felt in Arusha,
	315	In Bunjumbura, three story building sway in two waves of the quake.
	417	Bukavu, felt
	794	Kampala, felt
	475	Kigali, felt
	147	In Kigoma (150km) set panicked people running from buildings.
	797	Felt in Kireka,
	405	Kirundo, Caused people running in Angola searching shelter.
	973	felt in Lilongwe, Mombasa , and Ruanda
	646	Lubumbashi, felt
	969	Felt in Nairobi, Nairobi- people scared running down tall buildings
Source: USGS(2013)		

Using these macroseismic (eyewitness report) data, the USGS DYFI system, generated and published the earthquake shaking intensity distribution shown in Figure 2.

Figure 2 Community Internet Intensity Map for Magnitude 6.8 earthquake of December 5, along Lake Tanganyika.

From Figure 2, most damages were observed near the epicenter, but the earthquake was strongly felt along most part of SWTZ region.

III. METHODOLOGY

The goal is to produce PGA predictions and its spatial distribution paying special attention to maximum values that will indicate the potential damaged zones. Our predictions are based on the event magnitude and epicenter location information released rapidly following the observation of earthquake initial P-wave motions.

A. Determining PGA at Grid Points

In Knowing earthquake magnitude and its epicenter location, first uniformly spaced grid of phantom stations are created across the affected region with spacing for each grid point kept constant at 0.1° by 0.1 °. Utilizing the estimated event geographical location, the epicentral distance between each grid point and event location are estimated using Equation (1).

$$R = 111.19\sqrt{\cos(LatG) * (LonG - LonE)^2 + (LatG - LatE)^2}$$
(1)

Where R is distance between grid point and event epicenter in kilometer, LatG and LonG are latitude and longitude coordinate of grid point, and LatE and LonE are latitude and longitude coordinate of event.

Then, the peak ground acceleration (PGA) values at each grid point are predicted using an empirical attenuation relation based on base rock shown in Equation (2).

$$PGA = 1.42 \exp(1.43M) R^{-1.2} (0.719 \ln(\tau)) \quad (2)$$

Where M is the earthquake estimated magnitude, R is the distance from the event epicenter to the grid point center and τ is the P-wave observation time window selected as 4 seconds. The reason for the selection of time window of 4 seconds is due to several researches in EEW systems that suggests the use of at

least three seconds of P- wave data for arriving at reasonable estimations of earthquake parameters (Lawrence et al., 2011; Satriano et al., 2011; Cochran et al., 2009; Lawrence et al., 2009; Wald et al., 2006; Allen, 2004).

B. Earthquake PGA Data Mapping

After completing the PGA assessment for all the grid points, the computed earthquake PGA values are used as input to the C-shell mapping script containing ordered Generic Mapping Tool (GMT) commands. This is the C-shell script that inputs PGA values into various GMT mapping commands to transform the gridded PGA datasets into PGA AlertMaps visual display that is colour coded according to hazard level of predicted PGA value at each grid cell. The PGA AlertMaps can be useful for determining which sub-regions to notify of incoming significant ground motion.

For easy visualization of predicted PGA values at various grid points, color code is used according to the following categorization: red- yellow represented severe shaking, green represented strong shaking and light blue to blue represented the decreasing weak shaking. The red – to orange represents the severe ground shaking region with ground shaking level that are above 0.5g. This will be the area that is predicted to have severe ground shaking, and most damages are expected here. Green region will be the areas predicted with ground shaking levels below 0.5g but above 0.1g. Strong ground shaking is expected in this region, but not necessarily with damages. The blue region will be with ground shaking levels below 0.1g, representing a weak ground shaking region and no damage is expected here. By looking on colour coded PGA AlertMaps, areas requiring immediate emergency response were expected to be easily identified by colours for faster rescue operation planning.

IV. RESULTS AND DISCUSSIONS

A. PGA Shaking Maps for Magnitude 6.8 of December 5, 2005, Lake Tanganyika earthquake

The simulated PGA values were mapped as shaking maps, for easy identification of severe, strong and weak shaking areas by map colours (see Figure 3).

Figure 3 PGA Ground Shaking Map using P-wave method

From Figure 3, severe shaking is indicated by red- yellow colour, which is mostly in epicentral region. Strong ground

shaking is green coloured and weak ground shaking is coloured bluish.

B. Comparisons for PGA Ground shaking maps for Magnitude 6.8 of December 5, 2005, Lake Tanganyika earthquake

The PGA shaking maps simulated in this study and the published ground shaking maps generated from eyewitness reports by USGS DYFI system are compared as shown in Figure 4.

Figure 4: Comparisons of Earthquake Shaking Maps generated from this study data and USGS reports

According to Figure 4, P-wave PGA shaking maps form this study, show large areas experiencing severe and strong ground shaking, while the USGS published ShakeMaps show only areas very close to the epicenter as experiencing severe and strong shaking. For the weak ground shaking, the USGS ShakeMaps categorizes most part of SWTZ and Tanzania under weak shaking ground due to the earthquake, while the this study PGA shaking maps only categorizes areas at some distance under weak ground shaking.

B. Relating simulated P-wave PGA values to the eyewitness reports

There is correlation between PGA values to the experienced damages, but not always absolute agreement since experiences and damage can be affected by many other factors, including the quality of earthquake engineering, type soil cover, as well as construction practices. Generally speaking, PGA values of 0.001 g to 0.01 m/s² are perceptible by people, 0.02 g to 0.2 m/s² people lose their balance, and above 0.50 g very high; well-designed buildings can survive if the duration is short. Table 2 compares the eyewitness reports and simulated PGA values.

Table 2. Comparisons of Simulated PGA and Eyewitness reports

s/n	Repoters distance (km)	Reported Situation	Simulated PGA	Warning type
	55	dozen house collapsed, roofs falling buried childrens	1.91	Severe
	70	Two deaths, dozen of houses collapses in Kalemie, steel roof falling	1.44	Severe
	845	felt in Arusha,	0.07	Weak
	315	In Bunjumbura, three story building sway in two waves of the quake.	0.23	Strong
	417	Bukavu, felt	0.17	Weak
	794	Kampala, felt	0.08	Weak
	475	Kigali, felt	0.14	Weak
	147	In Kigoma (150km) set panicked people running from	0.59	Severe

		buildings.		
	797	Felt in Kireka,	0.07	Weak
	405	Kirundo, Caused people running in Angola searching shelter.	0.23	Strong
	973	felt in Lilongwe, Mombasa , and Ruanda	0.05	Weak
	646	Lubumbashi, felt	0.11	Weak
	969	Felt in Nairobi, Nairobi- people scared running down tall buildings	0.05	Weak

From Table 2, area located below 150 km from the earthquake epicenter, like Kigoma and Kalemie were simulated within the region of severe ground shaking with possible damages, categorization which agrees with eyewitness reports. Areas at a distance of more than 150 km but within the range of 400 km, are simulated with strong ground shaking, in agreement with eyewitness reports. Areas above 400 km and within 900 km, are simulated in weak ground shaking, and are also in agreement with eyewitness report. Generally, the eyewitness collaborates well with predicted level of PGA values.

V. CONCLUSION

The SWTZ is seismically active and citizens dwelling in the region need to be warned for any large earthquake approaching them. Because earthquake source parameters can be out-sourced from real-time system's web-based publications, simulation of earthquake impacts through simulation is demonstrated in this study for rapid emergency responses and early warning application.

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Germination Response of Dodder Seeds with Some Agricultural crops Seeds in Laboratory Conditions

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Abstract- Experimental research was conducted in the laboratory of plant protection, department of plant production in Technical Institute / Mosul City in Iraq. On 08.10.2013 to 20.10.2013 .The experiment was include by planting(50) seed with two replication from (20)crop by using(25) Dodder seeds with each Petri dishes by addition a control treatment. Found the germination percentage of Dodder seeds as following: With Sorghum 90% ,With Flax 50%,with Piper 52% , with Egg plant 53% , with Alfalfa 57 % ,with Squash 5% , With Barley 7% , with Melon 8% , with Lentil 9% , with Wheat 10% , with Lettuce 2% , with Tomato 4% , with Millet 1% , there isn't Dodder seeds emergence with Corn ,Bean, Watermelon , Cucumber , Buckwheat , Okra , Safflower. The emergence Dodder seeds alone as control was 4% , clear from above data ,the presence of crop seeds were necessary to germinate Dodder seeds with some crops, also Dodder cant able complete their life cycle by absence the host, which clear the impact of Dodder in growing stage of crop plant and reflects on yield, that require more studies about physiological process to find suitable control in emergence stage by using wild botanical extractions as biological control which consider friendship of ecology to achievement sustainable agricultural development.

Index Terms- Dodder , Germination , Seeds, Response , Iraq

I. INTRODUCTION

Dodder seeds are brown, yellow or grey and 1-2 mm in diameter. The seeds are slightly pear shaped and similar in size to clover and Lucerne seed . A single plant can produce over 2000 seeds, which can remain viable in the soil for up to 20 years [1]. Dodder is a parasite weed that causes serious problems in Iraqi land with all plants, it is widespread there is identified more than 150 species. Dodder emergence as a rootless, leafless stem, dependent on the food reserve stored in the seed for its immediate survival. A suitable host, such as alfalfa or certain weeds , must be found with in a few days (5-10) or Dodder seedling will die [2] . Dodders are annual parasitic plant that reproduce by seed and do not have any leaves and chlorophyll to live from-they therefore must obtain all of their growth requirements by attaching themselves to other living green plants (host plants) . Host plant include these grown for agricultural purpose , ornamental plants , range plants and weeds

Dodder seeds germinate near the soil surface and send up slender which rotates slowly until it touches the stem or leaf another plant and begins to wind around it . On a host plant , the Dodder stem will immediately form small appendages called hustoria. Soon after attaching to a host plant ,the lower end of the Dodder withers and break its connection with the ground , while the upper of the stem grows rapidly [3] . It is a true obligate parasite , spread by seed , in the genus Cuscuta , the defining characteristic of the mature embryo is the absence of cotyledons . This may be attributable to the fact that the first job of the young stem is to search for a host , not to photosynthesize . Each ovary bears four ovules but one or more may abort . which °and 1 mm across . The fruit is an indehiscent oblong to sub globes capsule bearing a persistent style , enclosed by the corolla . Each capsule bears 4 seeds . Dodder plant °°°°°°°°die after germination in the absence of a host plant [4].

II. MATERIALS AND METHODS

Dodder seeds were collected in autumn 2012 from Piper plant could be cultivated in °parasite on Piper plant, then dried the Dodder seeds for prepare seeds to the study . Experimental study was conducted in the Department of plant production . Technical Institute of Mosul, in date 08.10.2013 , by planting(50) seeds in two replications for 20 crops and (25) of Dodder seeds in Petri dishes by using double filter paper as planting media for germination under experimental ecology conditions which the temperature was 25C° in germinator ,that consider optimum condition to germination, which advocated with many researchers . been observation samples were cultivated on a daily form, there found the completion of germination of crop seeds in all treatments which planted after 6 days. Where had calculated germinated Dodder and °°crop seeds on the last counting day after 12 days . The water requirement of Petri dishes was daily given about one milliliter to each seed for covering water demand and on sure the germination. the emergence of embryo and the rise of part of radical adopted the status for germination in calculated seed emergence in the last count . through data which obtained from study estimated the percentage of seedlings of crops and Dodder emergence , the table (1) gives some information about practical experiment.

Table (1) Shows practical Data about process of germination :

Replications	N0.of seeds	Date planting	Date counting	Water amount.ml
1	50 crops	08.10.2013	20.10.2013	50
	25 Dodder	08.10.2013	20.10.2013	50
	50 crops	08.10.2013	20.10.2013	50
2	25 Dodder	08.10.2013	20.10.2013	50
control	25 Dodder	08.10.2013	20.10.2013	25

To calculate the percentage of seed germination used the following formula:
% Seed germination=N0.of Seeds germinated / Total of seeds x 100 .

III.   RESULTS AND DISCUSSION

Through estimation of germination tests on a various seed crops , observed variation in the percentage of seed germination as the table (2),this belong to differentiation the viability of crop seeds, this not the aim of this study, but the important purpose was focus on the Dodder very dangerous parasite plant which causes damage to all plants in growing stage , in this study found the variation of the Dodder germination responsible with crop seeds as the table (2) , which clear as the following : with Sorghum 90%,with Flax 50% ,with Piper 52% , with Eggplant 53% , with Alfalfa 57 % , with Squash 5% , with Barley 7% , with Melon 8% , with Lentil 9% , with Wheat 10% , with Lettuce 2% , with Tomato 4% , with Millet 1% , there isn't Dodder germination with; Bean ,Corn ,Watermelon ,Cucumber , Buckwheat , Okra and Safflower, the percentage of germination in control was 4% . these data indicates the relation between Dodder seeds and crop seeds in emergence by different levels , this belong to various chemical composition of seeds which helps Dodder seeds to emergence .Must be benefit from studies to find suitable methods to control Dodder dangerous plant, because was wide spread, there are over 150 types of Dodder *(Cucuta sp)* worldwide, belongs to the Convolvulaceae plant family and because of Dodder are annual parasitic plants that reproduce by seed and do not have any leaves or chlorophyll to live from – they therefore must obtain all of their   growth requirements (water. Minerals. carbohydrates) by attaching themselves to other living green plants (host plants) .Dodder effect in all plants in special growing stage by the reason of lowing photosynthesis efficiency and reducing the new branches growing ,the yield loosing in Alfalfa reaches 500% , which advocated by [5] , the

control of Dodder plant require wide studies, the applying of herbicides on Dodder were not effective. In study the results show that water extracts of four common plant species were used, they are *Cynodon dactylon L.* , *Imperata cylindrica L.* , *Sorghum halepense L* and *Phragmites communis L* . To test the effect of these extracts on the growth of Dodder infecting Eggplant enormously. The result showed water extract of weeds under investigation have significant effect on the degree of killing Dodder in comparison with control treatment after 30 days. The extract of *Cynodon dactylon L.* has the highest effect of controlling Dodder, also has the highest effect of stimulation growth and improving quality of Eggplant after 30 days of treatment [6] . The table (2) shows the percentage of seeds germination in Dodder and Crops by comparison with Dodder control treatment.

In Biological Control ,Several disease organisms are known to infect dodder including *Fusarium tricinctum* and *Alternaria species*, which attack swamp dodder (*C. gronovii*), *and A. alternata* and *Geotrichum candidum,* which attack field dodder (*C. pentagona*). Researchers in China have found that a suspension of *Colletotrichum gloeosporioides* can selectively control the dodder species *C. chinensis* and *C. australis* in soybeans. Difficulty in culturing and applying these organisms has limited their commercialized use [7].

The recommendation of this study to find better ways in seedling stage of economic crop plants to kill the Dodder in emergence stage before its parasite on the hosts plant , by biological selective control to achieve sustainable agricultural development .

Table (2) indicates some information's about seeds emergence of Dodder and Crops

Crop kind	%Crop emergence	% Dodder emergence
Sorghum	98	90
Flax	75	50
Pepper	70	52
Eggplant	65	53
Alfalfa	90	57
Squash	80	5
Barley	92	7
Melon	80	8
Lentil	75	9
Wheat	85	10
Lettuce	70	2

Tomato	75	4
Millet	5	1
Bean	50	0
Corn	90	0
Watermelon	98	0
Cucumber	92	0
Buckwheat	85	0
Okra	90	0
Safflower	98	0
Control	-	4

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A Study on Academic Attitudes that Affect the Post-Graduation Programmes

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Abstract- A great deal of research has explored the academic reasons that affecting the students are who do not pursue post-graduation programs. Lack of adequate academic guidance and advice which students need to help them understand the academic requirements and, develop their goals. Basically, students from poor background are put to greater disadvantage since they are not academically prepared to crack the highly competitive examinations. The random sampling technique was used to select the sample of the study. A sample of this study comprises both male and female students of the various departments in Arts and Science Colleges of Coimbatore district in Tamilnadu. The data collected from 625 students were drawn on the basis of survey methods. Likert five point scale was used to analyze the data. The present study is related to the academic attitude and the demographic variables like gender, habitat and income. It revealed that majority of the students who do not continue their higher education affected by the academic difficulties.

Index Terms- Academic, Attitudes, students, gender, habitat, income, postgraduate.

I. INTRODUCTION

Human life if full of tasks and sub tasks. The vision of higher education in India is to realize the country's human resource potential to its fullest with equity and inclusion. In recent years, the nation has embarked upon initiating a number of development linked strategies for promotion of higher education. The demand and supply of qualified manpower in the Indian economy as it is integrated with the world economy shows signs of structural change. The expected gross enrolment ratio is 15 percent to 30 percent by the year 2020[1]. The report on UGC 2010 to 2011 states that 12 percent of the students have joined post-graduation programmes[2]. Lack of adequate academic guidance and advice which students need to help them understand the academic requirements and develop their goals[3]. The present study entitled "A study on Attitudes of Students in Post-Graduation Programs with respect to Gender, Habitat, and Income" is an empirical research in higher education focusing on academic performance and aspirations among students in Coimbatore district of Tamilnadu State. In this study the focus is mainly on the academic attitudes that affect the students who do not pursue the post-graduation programs. Three variables like gender, habitat and income related to the academic attitudes. There are varieties of academic attitudes like subject papers, seminars, work load, medium of language, student teacher relationship, passing marks, stress, learning materials etc. It

determined and implications of academic attitude influence the demographic variables among these students. So the researcher decided to carry on the research the academic attitudes that affect the students continuing higher education.

II. REVIEW OF LITERATURE

The research literature demonstrated some academic attitudes that affect the students not pursuing higher education. Corcoran (2002)[4] looks at the ways in which shifts in the size of the higher education sector affected student attitudes towards the institution. One of the findings of this project is that the staff and students here, by and large, like one another. Makinen et al (2004)[5] have measured the level of commitment felt by their subjects in their subject major, to socialising within the institution, and to a particular future career as indices of motivation. More than one third of students without either of these expressed commitments considered a change of major, five per cent considered quitting altogether. This is reflected in the proportion of students, who actually did change subjects or withdraw. Christie et al (2004)[6] have found that among their subjects, no single reason emerged as being particularly important in tipping the scales towards a decision to leave. They have noted that students would usually under-represent their own academic difficulties which could also be assumed to play a part. Barbara Cooke (2012)[7], Students who choose the 'wrong' major often confuse choosing a major with choosing a first career. They reveal that the students do not hope to continue their education career. From the above reviewing the related literature, it is seen that various reasons to affect the higher education sector.

III. OBJECTIVES

1. To construct a scale to measure the academic attitude towards post-graduation programs.
2. To assess the academic attitude of students relating to the personal variables like Gender, Habitat and Income.

IV. METHODOLOGY

The research design constitutes the blueprint for the collection, measurement and analysis of data. The study conducted a survey type questionnaire to know the academic attitudes that affected the students who do not continue their higher education. The design of the study also allows the researcher to ensure unprejudiced representation of the

population of interest. A sample of this study comprises both male and female students of Arts and Science colleges of Coimbatore District in Tamilnadu. A sample of 625 students was selected using the random sampling technique. The researcher used a Likert scale to measure. This scale consists of five points to construct the questionnaire for primary data collection. The scale was used to construct after the identification of various dimensions of academic attitudes of the respondents. On the bases of, the demographic variables like gender, habitat and income that most influence the academic attitudes of respondents, data was coded and a database was created using the SPSS package. The collected data was analysed by qualitative and quantitative manner. The specific technique to be used in testing hypothesis of the sample was selected. Some techniques like Chi-Square and student t tests like ANOVA were utilized.

V. HYPOTHESIS

1. There will be no significant difference between gender and academic attitudes of students towards post-graduation programs.
2. There will be no significant difference between Habitat and academic attitudes of students towards post-graduation programs.
3. There will be no significant difference between income and academic attitude of students towards higher education.

VI. RESULTS AND DISCUSSION

6.1 Academic attitude and Gender

This was a survey of academic attitudes of students relating to the demographic variable like Gender. It can be measured in terms of percentage analysis and chi square test. The results are presented in Table No - 1.

Table No. 1
Results of Chi-square Analysis of Academic Attitude with respect of Gender

Description	Male	Female	Chi-square value	df	P value	Level of significance
Academic Attitude	302	323	1.210	623	0.546	0.05

Test of Hypothesis 1: Academic Attitude and Gender

From the research data in table no.1 above, it is seen that to a great extent, the male and female respondents participated. In percentage analysis, the female respondents are more in number than the male respondents. Further analysis using chi square is analysis presented by the academic attitude considered in the study as personal variable gender. Each of the academic attitude variables is compared with the study fact and chi square test is applied and the results are presented with suitable hypothesis.

The results of chi square value are 1.210, p value 0.546 and the degree of freedom 623. The chi-square significance level stands at 0.05. So the findings indicate that the majority of the respondents were female with a percentage of 52 and the rest were male with a percentage of 48. The table no.1 indicates that the academic attitudes of male and female respondents have no significant (p value >0.05) relationship at a level of significance.

Graph1 – Gender wise distribution of respondents

(Source: Primary Data)

The above graph.1 represents gender wise distribution of the respondents, 48% of the respondents are male and 52% of the respondents are female. The p-value of 0.546 was found not significant at 0.05 levels with 623 degrees of freedom. The results concerning the academic attitudes of male and female students towards post-graduation programs did not differ significantly. So, the null hypothesis was not rejected.

6.2. Academic attitude and Habitat

In this study the academic attitude relates to the demographic variable like Habitat. The statistical tool like percentage analysis and chi-square analysis are implemented. The results are presented in Table No.2.

Table No. 2
Results of Chi-square Analysis of Academic Attitude with respect of Habitat

Description	Habitat	Respondents	Chi-square value	df	P value	Level of significance
Academic Attitude	Rural	487	2.841	621	0.585	0.05
	Urban	118				
	Sub urban	20				

(Source: primary data)

Test of Hypothesis 2: Academic Attitude and Habitat

The second hypothesis framed the habitat of students that affect the academic attitude. Basically, habitat is divided into three categories like rural, urban and suburban. The above Table no. 2 indicate that rural background respondents are more in number than the urban and sub-urban respondents. The Chi square analysis and percentage analysis are implemented. The

Chi-square value is 2.841; P value 0.585 with degree of freedom 623 at the level of significance is 0.05. Each academic attitude compared the habitat variable by using chi square test. The finding indicated the majority of academic attitude of respondents have no significant influence with demographic variable habitat at significant level of 0.05.

Graph 2 – Habitat wise distribution of respondents

(Source: Primary Data)

The graph-2 shows the habitat of respondents. In the above picture represented, the highest respondents came from a rural area, comprising a percentage of 78. The 19% of the respondents came from urban place. The lowest number of respondents came from a sub-urban area comprising 3% only. The p-value of 0.585 was greater than the significant at 0.05 levels with 623 degrees of freedom. The results relating to the academic attitude of rural, urban and sub-urban respondents did not differ significantly. So, the null hypothesis was not rejected.

6.3. Academic attitude and Income

The purpose of a study to find out the relationship between the income level respondents and their academic attitudes. The statistical tools implemented are percentage analysis and chi-square analysis. The following results are presented in Table No. 3.

Table No. 3
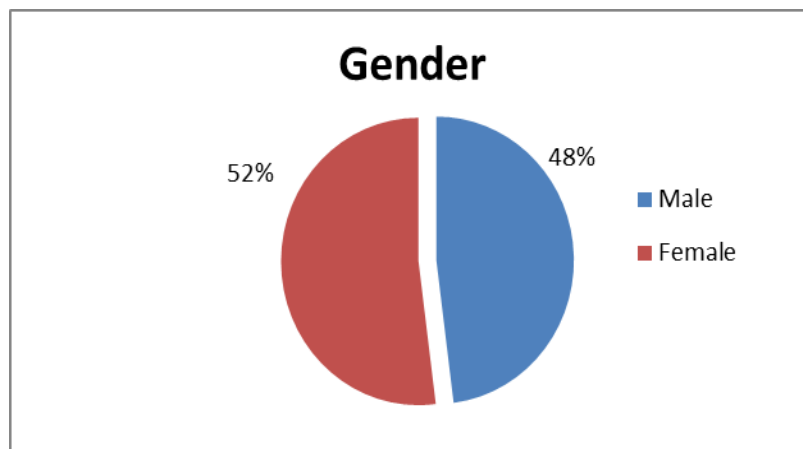**Results of Chi-square Analysis of Academic Attitude with respect of Income**

Description	Income	Respondents	Chi-square value	Df	P value	Level of significance
Academic Attitude	Below Rs.15,000	490	7.386	619	0.287	0.05
	Rs.15,001 – Rs.25,000	105				
	Rs.25,001 – Rs.50,000	16				
	Above Rs.50,001	14				

(**Source: primary data**)

Test of Hypothesis 3: Academic Attitude and Income

The above analysis indicated the income level of the respondents affect the academic attitude of higher education. The majority of the respondents came from below Rs.15,000 income level. The lowest number of respondents came from the above Rs.15000 income level. In this section the results of chi-square analysis is calculated at chi-square 7.386 and degree of freedom 619. The final p value 0.287 above is at the significant level of 0.05. The results concluded academic attitudes have no significant influence (p value > 0.05) on the income level.

Graph 3 – Income wise distribution of respondents

(**Source: Primary Data**)

The above graphical representation expressed the family income level of the respondents. The graph shows 78% of the respondents are below Rs.15,000 income level, 14% of the respondents are Rs.15,001 – Rs.25,000 income level, 3% of the respondents are Rs.25,000 – Rs.50,000 income level and only 2% of the respondents are above Rs.50,001 income level. The majority of the respondents came from below Rs.15000 income level. The p-value of 0.287 was more than the significant level at 0.05. It indicated that the academic attitude of family income level of respondents has not differed significantly. So, the null hypothesis was not rejected.

VII. MAJOR FINDINGS

Based on the results the academic attitudes were analyses relating to the gender, habitat and income. From the findings it is observed that the majority of the respondents were female with 58 percent, 78 percent of respondents came from the rural area and the highest number of respondents' income level is below Rs.15000. The study findings indicate that the academic attitudes have no significant relation to gender, habitat and income level. Basically, the respondents were poor background and lowest financial support. So the government should provide financial support, create an increased awareness of higher education, give technological background and other improvement steps to help them continue their higher education.

VIII. CONCLUSION

A nation's strength and development depend on its education system. In this study, the finds may help in providing useful suggestions and information. The study highlights the variables and attitudes experienced by higher education. It is evident that

lack of academic guidance and counseling directly affect the in higher studies. The students pointing to the motive of changing their life course have been putting in a lot of effort and entering higher education. Furthermore, the government's plan to upgrade and generate awareness of higher education. Also, the students need to develop their technological advancement and strong educational environments.

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Transdermal Nitroglycerine as a Tocolytic in Preterm Labor

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Abstract-

Objective: To determine the effect of transdermal nitroglycerine for acute tocolysis in preterm labor with regard to its efficacy in delaying delivery for 48 hours to allow the maximum benefit of glucocorticoids to take effect on the foetal lungs, and analysis of side effects.

Methods: The present study was conducted in the Department of Obstetrics and Gynaecology, Government Lalla Ded Hospital, Srinagar from February 2007 to December 2008. After fulfilling the inclusion criteria seventy five pregnant women presenting at 24-36 weeks of gestation in preterm labor were included in the study to receive 2 doses of transdermal nitroglycerine applied 24 hours apart as patches for tocolysis. Patients, in whom delivery was delayed for at least 48 hours to obtain benefit from two doses of corticosteroids, were taken as cases of primary success.

Results: Excellent results were seen in 66(88%), of the total patients receiving therapy in whom progression of labor could be postponed successfully. In the remaining 9 patients, progress` of labor could not be stopped in 6(8%) despite giving tocolysis while as therapy had to be discontinued in 3(4%) patients due to development of severe headache or other side effects.

Conclusion: Glyceryl trinitrate, transdermal patch is an acceptable, cost effective, complication free and a fairly reliable management in preterm labor and assists in delaying delivery for 48 hours to allow the maximum benefit of glucocorticoids to take effect on foetal lung and thus improves neonatal outcome.

Index Terms- Transdermal nitroglycerine, Preterm labor, Corticosteroids, Tocolysis.

I. INTRODUCTION

Preterm labor refers to the onset of uterine contractions of sufficient strength and frequency to effect the progressive dilatation and effacement of cervix between 20 and 37 weeks of gestation. It is a leading cause of neonatal morbidity and mortality worldwide and complicates 5-10% of all pregnancies. [1] It accounts for more than 85% of all perinatal complications &deaths. About 50% cases of preterm labor occur spontaneously whereas iatrogenic induction to avoid maternal or fetal compromise and preterm rupture of membranes (PROM) account for 25% each. [1, 7, 8]

In many instances preterm labor represents the desperate needs of the growing fetus to escape from the unfavorable intrauterine environment. Many modalities of treatment are presently being recommended to halt preterm labor. Bed rest and hydration are most commonly recommended in managing preterm labor but without any proven benefit, therefore making drug therapy the mainstay of modern management. [2] Although many drugs are now routinely available and although no single drug has a clear therapeutic advantage, it is usually the side effects of the drugs which will determine which ones to use in a particular woman. The literature clearly supports the use of parenteral tocolysis over oral therapy in delaying delivery for at least 24 to 48 hours so as to allow time for administration and effect t of corticosteroids to enhance pulmonary maturity and reduce the severity of fetal respiratory distress syndrome and prevent intraventricular hemorrhage.

Nitroglycerine, a nitric oxide donor is an effective choice as a tocolytic agent due to its high efficacy, lesser side effects and better patient compliance. [5] It is a vasodilator that is essential for maintenance of normal smooth muscle tone of uterus. The principal pharmacological action of nitroglycerine is relaxation of vascular smooth muscle, and consequent dilatation of peripheral arteries and veins, especially the latter. Pregnancy is prolonged by its direct effect on the uterine blood flow.[7] In our study conducted on 75 pregnant women in preterm labor it was found that transdermal nitroglycerine was effective in delaying delivery upto48 hours and beyond and prolonging gestation to variable periods.

II. MATERIALS AND METHODS

Our study was conducted in the labor ward of L.D Hospital for a term of two years from February 2007 to December 2008. All the patients presenting with preterm labor were scrutinized to select the patients for tocolysis. A total of 75 pregnant women presenting with preterm labor and fulfilling the inclusion criteria were enrolled into study after explaining the procedure offered and obtaining written consent. The inclusion criteria were: painful, regular uterine contractions palpated, at least 3 contractions every ten minutes for more than an hour with or without cervical changes at the gestational age of 24-36 weeks. Tocolysis was given in only those patients

where maternal or fetal benefits outweighed the risks/side effects of tocolytic drugs and there were no medical or obstetrical contraindications to use of tocolysis.

The exclusion criteria were: multiple gestations, obstetric hemorrhage, fetal anomaly, gestation <24 or >36 weeks, chorioamnionitis, fetal distress and intrauterine death, and uterine anomalies like bicornuate uterus or uterine fibroids, hypersensitivity reactions, hypertension or diabetes.

Successful tocolysis was described as continuation or pregnancy for at least 48 hours after the tocolytic therapy allowing time for corticosteroid administration to accelerate fetal lung maturity whereas failed tocolysis was described as delivery occurring within 48 hours or discontinuation of therapy due to development of intolerable side effects.

Patients in the study were admitted with strict bed rest to the labor ward. At the outset of treatment maternal and fetal measurements were recorded every 15 minutes during first two hours followed by hourly recording while patient remained in the ward. After the pelvic examination was completed, the patient was placed in the lateral recumbent position and externally monitored for fetal heart tones and contractions. Intravenous boluses of 500 ml of normal saline was infused as a protective measure against the hypotensive effect of nitroglycerine and diminishes the contractions of an irritable uterus and help to differentiate this condition from preterm labor. Once the diagnosis was confirmed and basic investigations obtained, tocolytic therapy was initiated as 10 mg nitroglycerine (Nitroderm TTS) patch was applied directly to the skin of the abdomen. If after one hour there was no reduction in contraction frequency or strength, an additional patch was applied. Not more than two patches (2mg) were to be worn simultaneously. Mild headache was treated with paracetamol. Patches were kept in place for full 24 hours, at the end of which they were removed and women reassessed.

The primary outcome measure of this study was delay in delivery for at least 48 hours to buy time for administration of two of corticosteroids(betamethasone 12mg intramuscularly, repeated in 24 hours) to improve foetal lung maturity.

III OBSERVATIONS

Our study included 75 patients with preterm labor once they fulfilled the inclusion and exclusion criteria. In the study group n, the gestational age ranged from 26 to 36 weeks with a mean gestational age of 31.96±3.02 weeks. The age of participating subjects ranged from 18 to 37 years, with a greater majority of patients in study group in the age group of 21 to 25 years (40%). Primigravidas formed the major segment comprising of 47(62.66%) out of a total of 75 patients. In the study group the mean cervical dilatation was seen to be 1.28=0.67. (Table 1)

Baseline Maternal Variables (Table 1)

Maternal Age(years)	21-25
Gestational Age (weeks)	31.96=3.02
0	47(63%)
>1	28(37%)
Cervical Dilatation	1.28=0.67
PROM	27(36%)

Outcome of tocolytic therapy with Transdermal Nitroglycerine Patch (Table 2)

	Number of subjects (n)	Percentage (%)
Pregnancy Prolongation beyond 48 hours	66	88
Failure of therapy	6	8
Discontinuation of therapy (intolerable side effects)	3	4

Preterm rupture of membranes was the most common cause for initiation of preterm labor which was present in 21(28%) subjects. More than 59 (78%) subjects did not have any previous history of abortions while only 7(9%) had 2 or more abortions in the past. A review of other associated conditions in provided in table 2.

The progression of labor could be postponed successfully for more than 48 hours in 66(88%) out of 75 patients in the study group. The delay in delivery time was desirable for administration of two doses of betamethasone given 24 hours apart to improve neonatal outcome. In 6 patients the progression of labor could not be stopped and they progressed towards delivery or needed alternate tocolysis. Table 3 shows an overview of side effects or nitroglycerine therapy. The major side effects of nitroglycerine therapy were headache in 33(44%) and hypotension in 21(28%) subjects. In 2 patients therapy had to be discontinued due to development of severe headache or hypotension (table3).

Side effects associated with tocolytic therapy. (Table 3)

	Number of subjects (n)	Percentage (%)
Headache	33	44
Hypotension	21	28
Light headedness	6	8
Nausea/vomiting	6	8
Rash	9	12
Chest discomfort	0	
Fetal heart rate changes		

IV CONCLUSION

Incidence of preterm labor is quite high in our country [2] compared to developed countries (11% in USA) [1] It has been found to be 22% in our study. Obstetricians who face such patients on everyday basis also face the dilemma of managing an established preterm labor with very few drugs with proven or equivocal efficacy which differ in uterine specificity and both maternal and foetal side effects. These tocolytic drugs inhibit uterine contractions and relax the myometrium by different mechanisms leading to arrest of preterm labor.

The aim of delaying delivery has double benefits: one is to buy enough time to administer two doses of glucocorticoids in order to reduce the incidence and severity of respiratory distress syndrome while arranging for in utero transfer to a centre with services for dealing with even extreme prematurity; and the second benefit is to reduce the perinatal mortality and morbidity associated with severe prematurity.

Nitroglycerine, a nitric oxide donor and potent smooth muscle relaxant, acts on smooth muscle by elevating cyclic guanosine monophosphate. [9] It has a rapid onset and a short duration (half-life of 2 minutes) and has been used increasingly for various obstetric emergencies including removal of a retained placenta [11], facilitating foetal extraction during caesarean delivery; correction of uterine inversion [12] and intrapartum external version of the second twin.

III. CONCLUSION

The nitroglycerine patch appears to be a safe, cost effective and a relatively safer method of halting the progress of uterine contractions in pre-term labour especially in low resource settings of our developing countries where advanced healthcare facility is not available to the vast majority of population. A delay in delivery for even a short period can drastically improve the neonatal outcome in these patients due to corticosteroid benefit and time gained in referral to a higher centre with better neonatal care available and thus decreases perinatal mortality.

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An Analysis on Multi-Agent Based Distributed Data Mining System

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Abstract- The Distributed Data Mining (DDM) is a branch of the field of data mining that offers a framework to mine distributed data paying careful attention to the distributed data and computing resources. Usually, data-mining systems are designed to work on a single dataset. On the other hand with the growth of networks, data is increasingly dispersed over many machines in many different geographical locations. Also, even as most practical data-mining algorithms operate over propositional representations are known as first order learning. In existing system, the concept of knowledge is very important in data mining. In order to get the correct knowledge from the data mining system, the user must define the objective and specify the algorithms and its parameters exactly with minimum effort. If the data mining system produces large number of meaningful information by using a specialized data mining algorithm like association, clustering, decision trees etc., it will take more time for the end- users to choose the appropriate knowledge for the problem discussed. Even choosing the correct data mining algorithm involves more time for the system. Developing a data mining system that uses specialized agents with the ability to communicate with multiple information sources, as well as with other agents requires a great deal of flexibility. The main objective of this paper titled on "**An Analysis on Multi-Agent Based Distributed Data Mining System**" describes the knowledge integration, Knowledge Integration in Distributed Data-Mining and Heterogeneous vs. Homogeneous Data-Mining, a literature survey of Multi-Agent Based Distributed Data Mining System, a Model Of Multi –Agent System Based Data Mining,   the improving DDM performance by combining distributed data mining and multi-agent system and   Data Mining using Multiple Agents.

Index Terms- MAS – Multi agent System, DDM- Distributed Data Mining, DMA – Data Mining Agent , ILP- Identify Local Pattern, KI – Knowledge Integration.

I. INTRODUCTION

Data-mining or Knowledge Discovery is concerned with extracting knowledge from databases and/or knowledge bases using machine learning techniques. The first order learning is to enables us to explore the aspects of knowledge integration and theory refinement which do not appear in propositional systems. Software has the response to the problem of using the vast amounts of information stored on networked systems. There are many types of software agent; however, agents are typically thought of as being 'intelligent' programs which have some degree of self-sufficiency. We intend to design an open, flexible data-mining agent. A group of these agents will be able to co-operate to discover knowledge from distributed sources.

In DDM, one of the two assumptions is commonly adopted as to how data is distributed across sites: homogeneously (horizontally partitioned) and heterogeneously (vertically partitioned). Both viewpoints adopt the conceptual idea that the data tables at each site are partitions of a single global table. In the homogeneous case, the global table is horizontally partitioned . The tables at each site are subsets of the global table; they have exactly the same attributes. In the heterogeneous case the table is vertically partitioned, each site contains a collection of columns as sites do not have the same attributes. However, each tuple at each site is assumed to contain a unique identifier to facilitate matching. It is important to stress that the global table viewpoint is strictly conceptual. It is not necessarily assumed that such a table was physically realized and partitioned to form the tables at each site. The development of data mining algorithms that work well under the constraints imposed by distributed datasets has received significant attention from the data mining community in recent years. Local computation is done on Improving DDM Performance by Combining Distributed Data Mining and Multi-Agent System.

The Multi-Agent Learning is a number of co-operative distributed learning systems have been produced. Each agent has a data-source and a clustering algorithm. The agents propose rules which characterize the data seen and review other agents' proposals. Eventually consent about the knowledge extracted from the data is reached. Each agent has local knowledge and either an inductive or deductive learning algorithm. Agents attempt to solve a problem-solving task by either retrieving the knowledge required, or by using learning to acquire it. Failures result in communication with other agents which are passed sub-goals, which are then treated as tasks.

There are three ways learning can occur when data is distributed. These relate to when agents communicate with respect to the learning process:
• The first approach gathers the data in one place. The distributed database management systems is used to provide a single set of data to an algorithm is an example of this. The problem with such an approach is that it does not make efficient use of the resources usually associated with distributed computer networks.

• The second approach is for agents to exchange information at the same time as learning on local data. This is the approach taken by and no revision or integration is needed, as the agents are effectively working as a single, tightly coupled, algorithm over the entire data. This restricts the agents to using learning algorithms that have been specially modified to work in this way. Thus the main disadvantage with this approach is that it does not allow the use of future learning algorithms.

• The third approach is for the agents to learn locally, and then to share their results, which are then refine it and integrate it by other agents in their own search for data and knowledge. This model permits the use of standard algorithms, and also allows inter-operation between different algorithms. The main problem here is how to integrate the local results. We are adopting the latter approach, as it provides distributed processing together with flexibility in taking part in future algorithms.

Why Agents For DDM?

The following are in the support of using agents in DDM:

Autonomy of data sources: A DM Agent may be considered as a modular extension of data management system to handle the access to the underlying source with the given constraints on the required self-sufficiency of the system, data model.

Interactive DDM: Assisting agents may limit the amount of human user who supervises and interferences with the running data mining process.

Active Selection of sources and data Gathering: One challenge for intelligent DM agents acting in open distributed data environments in which the DM checks the data sites available and their content may change at any time. DM agents may be applied to select data sources according to the given criteria.

Scalability of DM to massive distributed data: To reduce network and DM application server load ,DM agents may be let to transfer the local data sites in a DDM system, which performs mining tasks locally.

Multi-Strategy DDM: For some complex application setting an appropriate combination of multiple data mining technique may be more beneficial than applying one particular technique.DM agents learn their action depending on the data retrieved from different sites and mining tasks to be done.

Collaborative DM: DM agents may operate independently on the data they may have gathered at local sites and then combine their respective models .DM agents may talk with each other and jointly plan a solution for the problem.

Security and Trust worthiness: Agent based DDM has to manage with the problem of ensuring data security and privacy. Agent code and data security play a big role in DDM system by which Data mining agents may get information even form partial integration to a certain extent and with some probability.

The following sections describe the relationship between theory revision, knowledge integration, Knowledge Integration in Distributed Data-Mining and Heterogeneous vs. Homogeneous Data-Mining, a literature survey of Multi-Agent Based Distributed Data Mining System, a Model Of Multi –Agent System Based Data Mining, the improving DDM performance

by combining distributed data mining and multi-agent system and Data Mining using Multiple Agents.

2.1. Knowledge Integration

If this approach is adopted, then the local theories have to be integrated. It must be remembered that each agent's local results are correct for that agent's view of the data[4]. Thus the fundamental problem is to compare local theories with previously unseen data, i.e. other agent's data. This data is of course summarized by the results produced by the other agents. Both theory revision and knowledge integration as resources in helping to produce a single global result is taken care off. There appear to be three alternatives:

• The first approach involves a supervisor agent, in which one agent attempts to integrate all the local theories. However, this may lead to the transmission of large amounts of the original data, in order to test the accuracy of the new knowledge.

• The second is a democratic version of the supervisor approach, with the agents working as a team to integrate their local results.

• The third approach involve search agent taking other agent's theories and integrating them locally. It can be seen from this discussion, the knowledge integration is a fundamental one in creating a distributed data-mining architecture.

2.2. Knowledge Integration in Distributed Data-Mining

Individual agents will produce new knowledge based on their discovery goals, and the view of the distributed data. This individual knowledge will have to be integrated, so that it accounts for all views of the data. Theory Refinement and Knowledge Integration are related techniques. Theory refinement involves revising a theory with respect to new training examples. Knowledge integration involves combining two theories into a single unified theory. However, the learning techniques used for both are similar, and ILP algorithms in particular appear to make little distinction between revising clauses in response to new examples, and combining two sets of clauses and then revising them to fit the existing example.

Our initial decision to use an ILP learning algorithm [5] was based on the insight that many ILP algorithms provide support for theory revision and knowledge integration. An agent based on such an algorithm could be used to both induce and integrate knowledge. However, there is far more to consider than simply choosing an appropriate algorithm. Firstly, we must consider the nature of the data and discovery goals given to each agent. Then it must be considered when the agents should co-operate: either before, during or after learning. Finally, if it is decided that the co-operation should take place after learning, it should be decided how the agents will integrate the set of local results in order to reflect a global solution to the data-mining goal.

2.3. Heterogeneous vs. Homogeneous Data-Mining

If each agent in the system is associated with a single database, then there are two basic types of interaction to

consider. If each agent has the same discovery goal, and the same database scheme, though normally with different values, is referred to this as homogeneous data-mining. In this case the problem for the agents is to resolve partial results based on each partial view of the whole of the data.

If each agent has a different database and discovery goal, then the agents may use theories found by other agents as sub-theories. For example, if one agent learns a definition of parent, then a second agent might use this in its definition of grandparent. We refer to this as heterogeneous data mining.

3. LITERATURE SURVEY

Data mining**,** also called knowledge discovery in databases, in computer science, is the process of discovering interesting and useful patterns and relationships in large volumes of data. The field combines tools from statistics and artificial intelligence such as neural networks and machine learning with database management to analyze large digital collections, known as data sets[1].

Distributed data mining (DDM) is an important research area. One of the approaches suitable for the DDM is to select relevant local patterns from the distributed databases. Such patterns, often called prototypes, are subsequently merged to create a compact representation of the distributed data repositories. To assure obtaining homogenous prototypes the feature selection requires collaboration of agents [2]. The task of distributed data mining is to extract and integrate knowledge from different sources. Solving such tasks requires a special approach and tools, different from those applied to learning from data located in a single database. One of the approaches suitable for the DDM is to select relevant local patterns from the distributed databases [3]. Knowledge integration (KI) is the process by which organizations identify, acquire, and utilize knowledge from external sources. Existing studies on KI have either researched what knowledge organizations gain from which sources or what processes are needed to do that [4]. With the rapid advancement of information technology, flood of digital data collected by business, government, and scientific applications need analyzing, digesting, and understanding. Scalability has become a necessity for data mining algorithms to process large data more effectively and extract insightful information from large data [5]. In cooperative multi-agent systems, roles are used as a design concept when creating large systems, they are known to facilitate specialization of agents, and they can help to reduce interference in multi-robot domains. The types of tasks that the agents are asked to solve and the communicative capabilities of the agents significantly affect the way roles are used in cooperative multi-agent systems [6]. MAS represent a promising approach for complicated data mining tasks due to its configuration flexibility and parallel processing. This is exploited in encapsulation of computational modeling, pre-processing and post-processing methods reflecting industrial standard specifications. The ontology of computational agents' capabilities is proposed and included in the model. The agent, which implements the DL model, supports matchmaking, system integrity checking and automated creation of the system[7].Massive amounts of data that are often geographically distributed and owned by different organizations are being mined DM infrastructures to fully exploit

the benefit of the knowledge contained in these very large data repositories[8]. A communication mechanism between multi-agents was established in the system, in order to achieve two approaches to deal with information processing in a distributed way. An algorithm for each approach has been modified from the original forms of decision tree building/ making algorithms so that it can work under multi-agents computing environments as well as single computing environments [9]. An ADDM system concerns three key characteristics: interoperability, dynamic system configuration, and performance aspects, discussed as follows. Interoperability concerns, not only collaboration of agents in the system, but also external interaction which allow new agents to enter the system effortlessly [10].

4. AN ANALYSIS ON MULTI-AGENT BASED DISTRIBUTED DATA MINING SYSTEM

One or more agents per network node are responsible for examining and analyzing a local data source. In addition, an agent may query a knowledge source for existing knowledge. The agents communicate with each other during the discovery process [6]. This allows the agents to integrate the new knowledge they produce into a globally coherent theory. In addition, a supervisory agent, responsible for coordinating the discovery agents may exist. A graphical interface allows the user to assign agents to data sources, and to allocate high level discovery goals. It allows the user to critique new knowledge discovered by the agents, and to direct the agents to new discovery goals, including ones that might make use of the newly discovered knowledge. The following Agents are employed in Data Mining:

Categorization Agent:-Categorization agent classified terms in-lieu of format. Such subject have separate category in various form; which category is valuable for any instance and it follow that event summarization.
Objective:-three level of category maintain (high, middle, low) it perform under based.
Data mining agent: - A data mining agent [7] is a software program built for Pre-purpose of finding information efficiently. It is a type of intelligent agent that operates valuable information to find the relationship between different pieces of information. It is a type of agent to detect major trend changes
Objective: - DMA finding suitable new pertaining information efficiently
Filtering Agent:-A Filtering agent filter required information; it will check contents and attachment task both include in On End of Data Filters (smart screen, intelligent content filtering, file filtering, Multiple AV Scan)
Objective: - Searching message and check filtering reinforcement.
Information Agent:-An individual or company that is charged with explaining the various transaction of another party to anyone who need to know
Objective: - Delivery of commodity to give or keep Information.

Figure : 1   A model of Multi –Agent system Based data Mining

User Interface Agent: - The user interface is the space where interaction between humans and machines occur effectively and control of the machine feedback from machine, operate making decisions.
Objective: - Interaction between human and machines operate all levels.
Interface Agent: - Interface agent to be a program that can also affect the objects in a direct manipulation interface, but without exploit instruction from user. The interface agent reads input that the user presents to the interface and it can make changes to the objects the user sees on the screen.
Objective: - Defining of objects it depends on input and output.
Extraction Agent:-Extraction agent extracts set of information regarding object and is used its dilute for any such information for further needs. Any information fetch it explain every criteria of objects. Collect complete information about the concept. It shows object detailed in well-mannered.
Objective:-Launch every bit of information in detailed manner.
Retrieval Agent:-In retrieval agent retrieve information which one has been extracting. Whether this agent executes information using data sets and visualization effects etc. it will display exactly induced information as well. Such functional value used in this format for retrieving procedure.
Objective: - Execute information according to demand specification.
Office Agent: - According to portal, office agent will choose information where it finds suitable. Different types of office agent occur; they work and uses are totally different. It depends on functioning values and does their own business. It is very purposeful ordinal nature of point.
Objective:-According to the work through this agent is altered as per work nature.
Workflow agent:-the workflow agent can be configured for polling on demand processing. When configured for polling, the workflow agent periodically polls (quires) in the database work queue for batches of task to be processed. Workflow depends on polling.
Objective: - Priority techniques use to analyze workflow.

4.1. Improving DDM Performance By Combining Distributed Data Mining And Multi-Agent System

Typically communication is a bottleneck. Since communication is assumed to be carried out exclusively by message passing, a primary goal of many DDM methods in the literature is to minimize the number of messages sent. Some methods also attempt to load-balance across sites to prevent performance from being dominated by the time and space usage of any individual site. As pointed out in , Building a monolithic database, in order to perform non-distributed data mining, may be infeasible or simply impossible in many applications. The cost of transferring large blocks of data may be unaffordable and result in very inefficient implementations. Surveys provide a broad, up-to-date overview of DDM touching on issues such as: clustering, association rule mining, basic statistics computation, Bayesian network learning, classification, and the historical roots of DDM. The collection describes a variety of DDM algorithms (association rule mining, clustering, classification, preprocessing, etc.), systems issues in DDM (security, architecture, etc.), and some topics in parallel data mining. Survey discusses parallel and distributed association rule mining in DDM. Survey discusses a broad spectrum of issues in DDM and parallel data mining and provides a survey of distributed and parallel association rule mining and clustering. Many of the DDM applications deal with continuous data streams. Therefore, developing DDM algorithms that can handle such stream scenarios is becoming increasingly important.

4.2. Data Mining using Multiple Agents

Data-mining systems differ in certain ways from the machine learning algorithms which they are typically derived from. Firstly, they have to cope with large amounts of data. For example, learning over a census database containing information on millions of families is very different from looking at a few hand-crafted examples of 'model' families. The second problem is that real world data has a tendency to contain errors and missing information [8].

Finally, a data-mining system aims to discover knowledge that is novel, useful, and understandable, which typically requires a human to focus the search and to provide feedback on the knowledge discovered. Our high-level model is shown in Figure 2. One or more agents per network node are responsible for examining and analyzing a local data source. In addition, an agent may query a knowledge source for existing knowledge such as rules or predicate definitions [9] .The agents communicate with each other during the discovery process. This allows the agents to integrate the new, individual knowledge they produce into a globally coherent theory. A user communicates with the agents via a user-interface. In addition, a supervisory agent, responsible for coordinating the discovery agents may exist. Figure 2 shows this agent next to the user-interface. The interface allows the user to assign agents to data sources, and to allocate high level discovery goals. It allows the user to critique new knowledge discovered by the agents, and to direct the agents

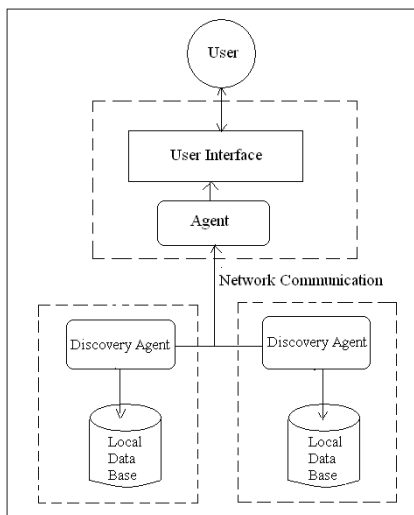to new discovery goals, including ones that might make use of the new knowledge.

Figure 2: Data-Mining Using Multiple Agents

As far as possible, intention is to base the work on the integration of existing technologies in the field of software agents and first order learning. This is in order to concentrate on the core issues of distributed data-mining. We intend to use agents based on Agent Oriented Programming, and the techniques developed as part of the Knowledge Sharing Effort.

Intelligent agents represent an important opportunity to optimize knowledge management. Agents and data mining can work together to achieve required target. Data mining agents perform various functions of data mining. It is increasingly significant to develop better methods and techniques to organize the data for better decision making processes. In a competitive world, modern organizations focus on locating, storing, transferring and efficiently using their own information in order to better manage their intellectual capital. Main focus is to find methods and techniques to organize huge data provided by transactions or other activities and to extract useful patterns, relations, associations from data etc. In different applications, it is necessary to know what to do, when and how to do it, in order to complete the pre-established tasks for the proposed objectives, by means of self-decision systems. These systems are known in literature as agents. Intelligent agents act robustly in a flexible, open environment. Knowledge discovery process can be assisted by agents in order to increase the quality of knowledge and to simplify the main processes of identifying patterns from huge data volumes. Intelligent agents and data mining share the same objectives in order to assist decision making process.

Agents, are special types of software applications, have become increasingly popular in computing world in recent years. Some of the reasons for this popularity are their flexibility, modularity and general applicability to a wide range of problems like data filtering and analysis, information brokering, condition monitoring and alarm generation, workflow management, personal assistance simulation and gaming. Intelligent agents can help making computer systems easier to use, enable finding and filtering information, customizing views of information and automating work.

5. Conclusions and Future Enhancement

This paper describes some of our work about an agent-based approach to distributed knowledge discovery. Our goal is that agent-based knowledge discovery will allow us to maximize the usage of distributed computing resources, and minimize the preface and propositional results which do not reflect on the more complex aspects, as well as facilitate the easy integration and use of multiple agents . As far as possible, our intention is to base our work on the integration of existing technologies. This is in order to concentrate on the core issues of how agents can resolve different views of the world. However, the main area of investigation is how the agents should interact, and how the knowledge should be integrated. We are currently investigating how agents should be selected to work on a given discovery goal. A solution for this problem could be an intelligent system based on agents. Data mining and intelligent agents can make a common front to help people in the decision making process, to elaborate decisional

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Analytical Survey on Ant and Fuzzy Clustering Based Data aggregation Techniques in Wireless Sensor Network

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Abstract- Wireless Sensor Networks (WSNs) plays a vital role in different structured applications such as health scrutinizing, ecological observing in industries, farms, colonized areas and so on. Wireless sensor networks (WSN) engage numerous sensor nodes for data transmission with inadequate power. Due to lower cost property of wireless sensors, the degree of usability is also large in vast applications. Sensor networks are group of sensor nodes which forward sensed data to base station responsively. As sensor nodes are supported by battery, a proper utilization of energy is crucial to use networks for prolong lifetime. Hence, the challenge lies in reduce the sensor network traffic, collision found inside the network, and reduce degree of data that need to send to base station. The main objective of data aggregation algorithms is to collect and aggregate data in a proficient way so that network lifetime is enhanced. Most preferred manner to extend lifetime, reduce time and cost during data transmission enhances the WSN. One such technique is data aggregation, a more interesting approach for data collecting in shared environment and active access through wireless connectivity.

The issue in data Aggregation is about the avoidance of several difficulties in terms of resource utilization, energy consumption, network lifetime, time utilized and cost required. The main problem in sensor network faces link failures and node collapses causing system failures intentionally. The principle objective of ant and fuzzy clustering based data aggregation research is not just to point out the fact about network risks keep on rising every day, but rather to defeat problems arising, just as any other system property. Extended Network lifetime should be tackled during data transmission with minimum cost and time through clustering techniques based data aggregation. This survey planned to concentrate on various data aggregation based clustering techniques in WSN, more specifically on ant and fuzzy clustering as a system property. A parametric comparison of these data aggregation techniques is also tabulated along with their advantages and issues.

I. INTRODUCTION

Clustering based data aggregation in the recent research becomes an essential and recognized concern for WSN. The earlier stages of research involved large demerit in the capacity of node, also time needed for network processing is also high on wireless distributed systems. Researchers believe that in order to prolong network lifetime, a more concentration is required on the detection of node failures and link breakdown. Relevant to other clustering system and quality entity, node cooperation still needs more focus during data aggregation. However, network functionality with sensor nodes still faces disconnection during data transmission. The huge time taken and expensive node usage, results in complexity as well as frequent unsuccessful network concerns, similar to other failure general purpose methods. Therefore, numerous exclusive and ensuing techniques to clustering based data aggregation techniques are recently proposed.

In the following survey intends in examining a variety of clustering techniques or methods for data aggregation in WSN more specifically regarding ant and fuzzy clustering. For the purposes of this survey, depict data aggregation clustering into three more convenient phases, such as general clustering technique in data aggregation along with analysis, ant clustering in data aggregation and finally fuzzy clustering in data aggregation of WSN. The review is more about evaluation agenda in clustering nodes that focus on each phase. The evaluation outline includes different issues and response conditions devised in order to explore operational functions of existing approaches in data aggregation based clustering and their respective needs in terms of energy conservation, network lifetime, packet delivery ratio, latency and various other parameters.

In this survey work, more application specific sensor network data gathering protocols, ant and fuzzy clustering techniques are discussed. The investigation is commonly on network lifetime issues in wireless sensor networks and made extensive ideas to categorize available data clustering techniques. More focus is made on three main issues, which are network lifetime, time and computational cost. This study denotes an exhibition of ant and fuzzy clustering based data aggregation model with respective concepts and issues targeting the sensor network.

The objectives of the survey is as follows
1) Spot the insufficiency or lack along with benefits of current clustering techniques and data aggregation approaches.
2) Exploit the outcomes from present techniques to decide existing desires of clustering based data aggregation.
3) Verify whether certain techniques are valuable enough for data aggregation and by this mean value further investigate the design presented in the existing models.

4) If no such technique is found valuable enough, the survey outline the foundation of the development of new fusion of clustering techniques with main objective to maximize the advantages and minimize the insufficiency found in existing techniques. More particularly in energy consumption, network lifetime, packet delivery ratio, latency and various other parameters.

Along with the objective for survey, a variety of principal expectation is set to anticipate survey to be more precious. The purpose of the survey is to outline the clustering techniques and data aggregation methods appropriate for application of technical principles. In addition, certain approach for developing, communicating, and managing sensor node in network. Generally, network lifetime and node cooperation through clustering is highlighted at various stages, more specifically the ant and fuzzy clustering is highly important.

II.   CLUSTERING BASED DATA AGGREGATION METHODS IN WSN

A WSN is an arrangement of large range of sensor nodes. In WSN, Sensor nodes are closely deployed. Normally sensor nodes are tiny as well as these tools are inadequate in energy computation capacities, storage, and probably pose global identification. Wireless sensor networks merge with hundreds to thousands of sensor nodes that gather information from a neglected position and transmit the gathered data to a particular user, as per constraint of application. In Wireless Sensor Network each individual sensor node is capable to sense in different approach but comprise restricted signal processing and communication potential.

Sensor nodes transmit the data to the base station. Since sensors are energy constrained, the challenge lies in transmitting data for all sensors directly to the base station protectively. Data generated from adjacent sensors is frequently unnecessary and highly interrelated. Moreover, the sum of data generated in large sensor networks is often enormous for the base station for handling. So data aggregation intends in collection of only most important data from the sensors and also make accessible to the sink in an energy efficient manner balancing minimum data latency. The principle objective of data aggregation is to merge the received data from various sensor nodes route and avoids redundancy as well as reduces the amount of transmissions, thus saving energy. With data aggregation, the strength and correctness of data obtained by entire network is enhanced. Additionally reduce the traffic load and conserves energy of the sensors in the network. Various data aggregation approaches in WSN are elaborated below

A. Structure Free Data Aggregation

In structure-free approaches the data aggregation is possible with the establishment of local information. The major advantage of structure-free data aggregation is no more additional energy is required to build any structure. Hence, probability of energy consumption is high. In structure-free data aggregations there is no preferred data gathering framework, each node along with incident data to proof sends any request initially for evaluating the next hop to the sink. Any node which receives this request is a next hop holder.

Data aggregation protocols more focused on tree-based or cluster-based structured approaches as presented in [1] minimizes the communication cost, thereby extending the lifetime of sensor networks. An adaptive energy aware aggregation tree for wireless sensor networks is proposed in [2] with highest energy available and is selected as the parent node for aggregation. Although structured approaches are appropriate for data gathering applications, they gain high maintenance overhead in dynamic cases for event-based applications.

B. Structured Data Aggregation

Structured data aggregation is a kind of aggregation in which the network evolves specific structure. Structure based data aggregation is further categorized into four types namely cluster based, flat network based, tree based and grid based. Structured aggregation as the leading data gathering approach in WSNs suffers from high level maintenance overhead in dynamic states for event-based applications. The types of structured data aggregation are detailed below.

C. Cluster Based Data Aggregation

In cluster-based data aggregation protocols, sensor nodes are further classified into small groups termed clusters. The group formation holds a cluster head in each cluster. The cluster head is selected in order to aggregate data nearby and transmit the aggregation output to base station. The cluster head interacts with the sink node straightforwardly with the facility of extended range of radio transmission. On the other hand, this is moderately unproductive for energy controlled sensor nodes. Hence, cluster heads generally form a tree structure to send aggregated data.

The main advantage of hierarchical or cluster based routing is the scalability and efficient communications. More researcher choice for data aggregation is cluster techniques due to its advantage. However, the cluster technique faces a load balancing problem. A detailed cluster based data aggregation techniques are discussed further, in order to pinpoint the merits and demerits.

III.   ANALYSIS OF RECENT TRENDS IN CLUSTERING BASED DATA AGGREGATION FOR WSN

Communication among sensors conserves a huge amount of energy and thus the sum of data transmission should be reduced in order to improve the lifetime of the sensors as well as successful bandwidth utilization. Hence, data aggregation process as elaborated in [3] is required in order to avoid redundancies in the received from various sensors. Similarly, an algorithm related to data aggregation in WSN is discussed in [4] detecting network utility maximization problem. Moreover, distributed energy efficient algorithms called AEEDPSH and ADLBPSH are presented in [5] based on the distance measured from the base station, sensor

residual energy also arranging of sensor nodes to swap between sleep and active mode. Surveillance of various research papers for clustering based data aggregation techniques in WSN are detailed below:

A. Clustering Techniques in Data Aggregation

In cluster based data aggregation all regular sensors are able to forward a data packet to cluster head (CH) that aggregates data packet from all the usual sensors of its cluster and sends the important data to the base station. The cluster based networks for data aggregation saves the energy of the sensors. A critical survey and overview on secure data aggregation and clustering in wireless sensor networks are briefed in [6] and [7]. This survey encloses clustering based data aggregation techniques in order to increase the energy, thus extending network lifetime. The lifetime of the WSN is significantly increased on adopting aggregation techniques. At the time of aggregation the amount of transmission are minimized by merging the similar data from the neighboring areas. With the facility of clustering technique and aggregating the correlated data, energy is greatly minimized in gathering and broadcasting the data. An energy efficient cluster based aggregation protocol (EECAP) for WSN is presented in [8] focusing mainly on aggregation protocol with divergent sink placements. The arrangements of sink like middle of the sensing field, border of the sensing field or at a location selected arbitrarily in the sensor field decides the system performances.

EECAP provides better performance than LEACH as security is a concern. An enhancement of LEACH called secLEACH is proposed in [9] that maintain the structure of the original LEACH, as well as ability to perform data aggregation. In addition to EECAP, an Energy Efficient Clustering and Data Aggregation (EECDA) protocol for the heterogeneous WSNs is proposed in [10] which merge the concepts of energy efficient cluster based routing and data aggregation to achieve a better performance in terms of lifetime and stability.

Moreover, the challenging task in clustering based data aggregation is the election of cluster head (CH). The cluster head selection decides the sensor coverage range preservation in WSN. Cluster-Based Network Organization in [11] is based on a location of coverage-aware cost metrics that support nodes deployed in closely occupied network areas as better candidates for cluster head nodes, active sensor nodes and routers. Additionally, Adaptive Decentralized Re-Clustering Protocol (ADRP) for Wireless Sensor Networks in [12] also elects the CH and next heads based on residual energy of each node and the average energy of each cluster. However, ADRP with coverage-aware cost metrics increases coverage-time over the monitored area.

Moreover, Cluster-Based Network Organization [11] and ADRP [12] struggles in balancing the load. Therefore, the load balancing drawback is overcome in [13] location based clustering protocol guaranteeing balanced size cluster formation and balanced dissipation of node energy. Thus manages the load on the sensor nodes. The cluster head rotation protocol achieved balanced energy consumption among the nodes within the cluster thus prolonging the network lifetime.

Even though above data aggregation based clustering techniques are able to provide scalability, energy conservation and network lifetime, the single CH is more complex to manage the nodes even with better election process. Therefore, a novel technique is in need with a substitute for main CH in order to preserve sensor nodes.

B. Ant Clustering in Data Aggregation

Ant-colony algorithm to clustering mechanism selects the best path from cluster head to base station. The aggregation behavior of ant in communication with sensor nodes is discussed in [14] which spots the movement of an ant governed by the amount of pheromone deposited at different location of the search position.

More ant-colony based clustering approaches are handles in the recent years of research for improving the network lifetime, stability and energy conservation. One such method is ant colony optimization algorithm (ACO) in [15] namely the ACO-MSS to solve the problem of examining the optimal movements of the mobile sink to maximize the network lifetime. The proposed ACO-MSS takes favor of the large-scale finding capacity of ACO and incorporates successful heuristic information to search a near globally optimal solution. Multiple useful aspects such as the prohibited areas and the maximum moving space of the sink are considered to aid the real applications.

In addition to ACO-MSS, another clustering technique like an improved plain-based ant colony routing algorithm called IP-ACRA presented which optimizes the initial pheromone distribution. The IP-ACRA is modified to clustering-based routing algorithm termed IC-ACRA in [16]. The IP-ACRA intends at gathering the algorithm union velocity and maximizes the probability of determining the optimal path. Based on the IP-ACRA, IC-ACRA is applicable to a large scale network which is a drawback in ACO-MMS. Furthermore, a mathematical performance analysis between IP-ACRA and classic ant colony routing algorithm is determined to improve the network lifetime.

The ant-colony based clustering technique in IP-ACRA faces an issue in providing QoS for wireless sensor network. This limitation is overcome with the development of routing scheme in [17] called ant-based clustered multi-path QoS routing (ACMQ). ACMQ intends at irregular clustering, sensor nodes struggle in cluster heads (CHs) using both the energy heterogeneity of adjacent sensors and the numerous cluster radius differing with their location from the Sink. Additionally, ACMQ adopts the M/M/1 queuing model to determine the numerical buffer memory. Also, the moving character of ant is proposed to build multi-path routing table in taking into account the buffer memory, the residual energy and the geographic location of relay CHs. Additionally, the similar Ant-based Clustered Multi-path is followed in [18], based on clustering and ant colony optimization for wireless sensor networks. A multipath routing protocol (MRP) based on dynamic clustering and ant colony optimization (ACO) is proposed to extend the network lifetime as in previous techniques. But both the techniques need an extra attention on bandwidth utilization.

Additionally, an algorithm for gathering sensor reading based on chain forming using Ant Colony Optimization (ACO) technique is presented in [19] in order to provide prolonged network lifetime. The ACO offers the shortest network nodes chaining instead of

initiating from the extreme node and using Greedy algorithm. The head functions duration is defined for each node based on its required energy to perform the certain role in the recognized chain.

The role based activity restricts fast node's energy reduction and thus extends network lifetime. However, the impact of data correlation on the network performance for this routing protocol still needs an additional focus, as role based activity traces single target. The problem of single target tracking in controlled mobility sensor networks is addressed in [20].

The proposed approach comprise of migrating the mobile nodes in order to envelop nodes in a finest way. Thus describes a plan for electing the set of new sensors position. Each node is then allocated in one position within the set in the way to reduce the total migrated distance by the nodes. All the above ant-colony clustering technique concentrates on shortest path selection facilitating the process of packet transmission. But the ant clustering techniques is possible enhanced on fusion with other clustering techniques.

C. Fuzzy Clustering in Data Aggregation

Minimizing energy consumption and extending network lifetime are always been a challenging task in sensor networks. Most of the energy conservation during data transmission is due to the long distance of nodes from base station. Recent years researches regarding fuzzy clustering are a proficient manner of minimizing energy conservation and prolonging network lifetime of WSN. The fuzzy based clustering improves the network lifetime with better cluster head selection strategy. The three robust parameters like lifetime enhancement, energy consumption, transmission time and computational cost plays important role in deciding the performance of WSN. Fuzzy system selects the cluster head based on certain constraints like node density, residual energy and so on.

A cluster head selection strategy embedded with the traditional Fuzzy c-means algorithm is proposed in [21] with minimum distance and maximum residual energy criteria satisfied. The approach focus on residual energy of a node resulting in extended network lifetime. In Leach algorithm there is a straight interaction between cluster head with all other nodes in the cluster. But sometimes is not realistic if the cluster size is large. Similarly, a generalized fuzzy logic based approach is proposed in [22] for energy-aware routing in wireless sensor networks. This generalized approach is elastic, flexible and tunable. Hence the approach contains sensor networks with different kinds of sensor nodes holding different energy metrics.

The fuzzy sets not only prolongs the network lifetime also extends the sensor coverage of the network as in [23]. The approach determined the adjacent nodes distance measures of each sensor nodes to facilitate the data transmission. Based on the priority, nodes move from each other to increase the coverage area in the target field. In order to improve the energy efficiency and achieve the network load balance, an unequal clustering scheme based on fuzzy logic is presented in [24]. Local data of unsure cluster heads including residual energy, space to base station and local density were taken into account for the purpose of cluster construction. The CH possibility to final decision making in CH used adaptive max-min ACO to find optimal path between cluster head and base station.

Total lifetime is an important concern, which is straight associated to the energy. An energy efficient dynamic clustering protocol is proposed in [25] for WSN, which uses fuzzy logic to select the cluster heads. Here, the cluster head selection is centralized, but the data collection is shared. In contrast to LEACH, this approach is able to extend the sensor network lifetime and also attains the best number of clusters in every round. This algorithm is standard and holds less computational load for larger WSN but fails in achieving the QoS. The problem of evaluating the comparison of two sets of linguistic summaries of sensor data is discussed in [26]. The fuzzy measure similarity itself could be used openly, but since the beginning locate similarity hold a function of a level cut, an aggregation operator is also adopted.

The dynamic clustering protocol faces clustering problem and the node localization difficulties. An efficient algorithm termed fuzzy logic based energy efficient hierarchical clustering in [27] is proposed to solve the clustering problem and node localization. The algorithms evolve cluster construction and well-organized data transfer. Moreover, only few cluster head based techniques minimizes the resource utilization. Clustering is renowned technique for attaining high scalability and well-organized resource allocation in WSN. A Fuzzy c-Means (FCM) clustering approach is proposed in [28] to determine the optimal number of clusters in WSN. Energy reduction analysis for sensor network denoted that the stability region holds advanced for finest selection of number of clusters.

Although, the fuzzy clustering techniques provides a better optimal solution in the determination of shortest path with the extended lifetime and energy utilization, an efficient technique is still required to offer prolonged lifetime, as single cluster heads struggles in the process of data transmission.

IV. PARAMETRIC EVALUATIONS

A survey of total 12 approaches is specifically elaborated below in table with distinct demerits in order to address network energy utilization, node cooperation, lifetime of network, latency, packet delivery ratio, and so on based on data aggregation and clustering techniques. Based on the results of the survey, a variety of observations and propose recommendations are provided for improving data aggregation in WSN. A table below depicts the parametric evaluations of the various approaches.

The aggregation protocol in EECAP [8] placement the sink at the middle, border or at a location selected arbitrarily in the sensor field making node alive. However, the stability of the node is better during the initial operations of the sensor networks and falls down gradually in final stages of packet transmission. Even though secLEACH [9] withstands the ability of data aggregation, the sensor node cooperation in the network is unnoticed, moving to and fro in search of neighboring areas sensing field.

Similar to EECAP, EECDA protocol in [10] incorporates cluster head election technique and selected path with maximum sum of energy residues for data transmission instead of the path with minimum energy consumption. Therefore, selection and calculation regarding sum of energy residues takes high computational time.

Since the cluster head selection is a major issue in the clustering based data aggregation techniques. Cluster-Based Network Organization in [11] concentrated on CH election but needs a few more attention on load balancing.

More particularly, the ant-colony based clustering techniques in data aggregation are focused. The ant colony optimization algorithm (ACO) in [15] namely the ACO-MSS solved optimal movement problem to maximize the network lifetime. But the issues lies in managing the large scale and also faces link failures.

Even though the limitation of ACO-MSS is resolved in clustering-based routing algorithm IC-ACRA [16], the network traffic occurrence is unnoticed during the transmission and needs an extra care on increasing QoS. In addition to ant-colony based clustering technique related approach in Ant-Based Clustered Multi-Path QoS Routing (ACMQ) [17] distributed traffic load among multiple paths.

In addition to ant-colony optimization based clustering technique; fuzzy clustering techniques are also considered. Moreover, as fuzzy approach is flexible, elastic and easily tuned for different network and node criteria basically by altering shapes of the fuzzy sets as in [22]. The generalized approach in [22] faces a high computational cost due to the evaluation of fuzzy sets shapes in each condition.

Table I: Performance Metric Evaluation on Clustering Based Data Aggregation Techniques in WSN

Network Lifetime	Packet Delivery Ratio	Latency	Energy Consumption	Resource Utilization	Communication Time	Computational Cost	Network Traffic	Scalability	Link Failures	Node Breakdown	Bandwidth Utilization
Energy Efficient Cluster Based Aggregation Protocol (EECAP)											
Y			Y			Y				Y	
Cluster-Based Network Organization											
		Y		Y		Y					Y
Security of Clustered Sensor Networks (secLEACH)											
	Y		Y			Y				Y	
Energy Efficient Clustering and Data Aggregation (EECDA)											
Y			Y					Y	Y		
Ant Colony Optimization Algorithm (ACO-MSS)											
	Y				Y			Y	Y		
Controlled Mobility Sensor Networks for Target Tracking Using ACO											
	Y				Y					Y	
Clustering-Based Routing Algorithm termed IC-ACRA											
Y					Y		Y				
Ant-Based Clustered Multi-Path QoS Routing (ACMQ)											
	Y		Y					Y		Y	
A generalized Fuzzy logic based approach											
	Y	Y	Y							Y	
Unequal Clustering Algorithm for WSN based on Fuzzy logic and improved ACO											
	Y		Y		Y						
Fuzzy Logic Based Energy Efficient Hierarchical Clustering											
		Y				Y		Y		Y	
Fuzzy Based Clustering Protocol											
		Y	Y		Y			Y			Y

The unequal clustering algorithm in [24] to determine the shortest path between CH and base station which provides lower communication cost. Still the unequal clustering algorithm fails in considering the main parameters like the maximum local density and the biggest competence radius in the process of inter-cluster routing. An energy efficient dynamic clustering protocol as in [25] for WSN selects the cluster head using fuzzy logic. The cluster head selection is centralized, but the data collection is shared. Even though, the algorithm involves less computational load, the QoS is left unnoticed during data transmission.

The same problem arises in fuzzy logic based energy efficient hierarchical clustering [27] for the more complex dynamic and distributed networks. The potential network generation is more complex. Therefore, novel technique challenges of the network are required in order to ensure service quality, network lifetime, time and computational cost.

V.   CONCLUSION

A systematic review on clustering based data aggregation methods concludes the pros and cons of the existing approaches. Discussions regarding current trends in clustering techniques of data aggregation for WSN, more specifically the ant-colony and fuzzy clustering define the demands of network lifetime, energy consumption, transmission time and computational cost essential of a network. The parametric evaluation provides overall clustering based techniques and data aggregation performance. This survey motivation helps in the election of proper efficient approach. The survey offers the researchers not only with reasons to the responses given to each issue, but also a comparison from different features of all approaches surveyed.

The facts collected from the review and the data gathered from studies motivated further investigation on usefulness of developing novel WSN with prolonged lifetime, lower time and less computation cost.

A. *Future Direction*

Survey conveys the uncovered aspects of different areas in clustering based data aggregation techniques of WSN with lack of support. The future directions provides a way to better performance in upcoming novel techniques considering the above limitations

1) An extra attention is required more specifically in the parts of cluster head election, network lifetime, transmission time and computational cost.
2) A novel technique is in need to increase the lifetime of the nodes due to maximum number of node and link failures.
3) Moreover, the proposed techniques should provide a double cluster heads as a substitute of main CH, in order to reduce the load of CH.
4) A novel technique with the adoption of ACO, is able to minimize the time and cost involved in collecting the local information.

Above areas of need become part of future work. On fulfilling the above needs, ant and fuzzy clustering based data aggregation techniques is able to achieve better network lifetime as well as minimized time and cost during information gathering for a complete wireless sensor network.

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An Effect of Forging Process Parameters on Filling the Job Weight: An Industrial Case Study

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   Abstract- Since the defects causes high rejection rates, it is important to move any production process in the direction of eliminating all imperfections as a part of an effective continuous improvement program. Forging process is no exception to this. In present study, the various forging defects that occur in the components during closed-die hot forging process are investigated initially. The investigation is done with the help of Quality Assurance department in a forging industry. During investigation, the various defects that causes high rejection rates are identified and unfilling defect which has major contribution in high rejection rate is selected for study purpose. The fish-bone diagram is used to explore the possible causes of unfilling defect, through a brainstorming session. It is observed that the three process parameters having major responsibility to fill the job weight. These parameters are- billet weight, heating temperature, and heating time. The best combination of these process parameters must be followed during the production process in order to reduce the rejection rate due to unfilling forging defect. To get the best parameter combination, DOE technique (like Taguchi method) is the most powerful approach. But before going to use Taguchi method, it is very much necessary to determine the effect of selected process parameters on output. Therefore, the objective of this paper is to present the effect/influence of selected process parameters on filling the job weight. For this purpose, OVAT analysis is used here. Engineers and Scientists often perform OVAT experiments, which consists of varying only one factor or variable at a time with keeping others constant.

   Index Terms- Unfilling, Fish-bone diagram, Process Parameters, OVAT analysis.

I.   INTRODUCTION

Forging is defined as a metal working process in which the useful shape of work piece is obtained in solid state by compressive forces applied through the use of dies and tools. Forging process is accomplished by hammering or pressing the metal. It is one of the oldest known metalworking processes with its origin about some thousands of years back. Traditionally, forging was performed by a smith using hammer and anvil. Using hammer and anvil is a crude form of forging. In modern times, industrial forging is done either with presses or with hammers powered by compressed air, electricity, hydraulics or steam. Forging process produces parts of superior mechanical properties with minimum waste of material. In this process, the starting material has a relatively simple geometry; this material is plastically deformed in one or more operations into a product of relatively complex configuration. Some examples of shapes obtained now-a-days by forging process are- Crane hook, connecting rod of an IC engine, spanner, gear blanks, crown wheel, pinion etc.

   Though forging process gives superior quality product compared to other manufacturing processes, there are some defects that are lightly to come if a proper care is not taken in forging process design. Defects can be defined as the imperfections that exceed certain limits. There are many imperfections that can be considered as being defects, ranging from those traceable to the starting materials to those caused by one of the forging processes or by post forging operations. In forging process, defects like unfilling, mismatch, scale pits, surface cracking, fold and lap, improper grain flow etc. are responsible for high rejection rates. In this study, unfilling forging defect is focused. Unfilling defect can be defined as some section of die cavity not completely filled by the flowing metal, or metal does not fill the recesses of the die cavity completely during the forging process. It causes due to improper design of the forging die, die wear, improper use of forging techniques, less raw material, poor heating of raw material inside the furnace, etc. It can be avoided by proper die design, using proper raw material and proper heating of billets inside the furnace to get the desired forgeability of raw material. The effect of unfilling defect is that the job dimensions cannot be filled; ultimately the required final job weight cannot be filled completely as per the requirements of company standards. Due to presence of this defect, there will be insufficient material stock on forged component for subsequent machining operations, hence the job gets rejected. In order to increase the product quality and to reduce the rejection rate due to defects, the design activities need to systematically consider various designs and process related parameters and finally come out with the best parameters combination for better process performance.

II.   METHODOLOGY

   To get the best process parameters combination, design of experiments (DOE) technique (like Taguchi method) is the most powerful approach. But before that, one important step is to determine the effect/influence of selected process parameters on final output. For this purpose, OVAT analysis is used here. OVAT (one-variable-at-a-time) analysis is one of the simplest and most common approaches to see what effect is produced by the input parameters on the final output. It is a method of designing experiments involving the testing of factors or causes, one at a time instead of all simultaneously. It involves:

- Moving one input variable, keeping others constant at their baseline (nominal) values, then,
- Returning the variable to its nominal value, and repeating for each of the other inputs in the same way.

OVAT is frequently preferred by modelers because of practical reasons. In case of model failure under OVAT analysis, the modeler immediately knows which is the input factor responsible for the failure. Despite of all criticisms, some researchers have articulated a role for OVAT and showed they can be more effective under certain conditions as number of runs is limited, primary goal is to attain improvements in the system, and experimental error is not large compared to factor effects, which must be additive and independent of each other.

III. INPUT DATA COLLECTION AND PROBLEM IDENTIFICATION

During the investigation that done with the help of QA department, in a forging industry, it is clear from the monthly rejection report (Table 1) for the month of December 2013, company has manufactured 14 types of gear blanks. In the total production of 12945 numbers, 787 numbers got rejected. It means the plant has a rejection rate of 6.08% in that month. This much rejection rate cannot be tolerated by the company, this lead to undergo detail study in the company about the defects that caused this much rejection rate and the remedial actions suitable for that to reduce the rejection rate. From the information of Table 1, two charts are plotted. Chart 1 shows that Part No. 2876 has maximum rejection and Chart 2 shows that 'Unfilling' defect has major contribution in rejection of part No. 2876. Therefore, Part No. 2876 is selected here for study purpose and trying to attack on unfilling defect in that product.

Figure 1 shows fish-bone diagram that used during brainstorming session for unfilling forging defect. During the brainstorming session, it is observed that the three process parameters (billet weight, heating temperature of furnace, and heating/soaking time of raw material/billet inside the furnace) having major responsibility to fill the die cavity. Therefore, these three process parameters are selected here for trial purpose.

As per the Process Standard of company, the ranges of three process parameters (which are selected for trial purpose), for the Part No. 2876 are- Billet Weight: 6.25 Kg +/- 0.05 Kg, Heating Temperature of furnace: 1200 ^{0}C +/- 50 ^{0}C, and Heating/Soaking Time for billets inside the furnace: 60 min. +/- 10 min.
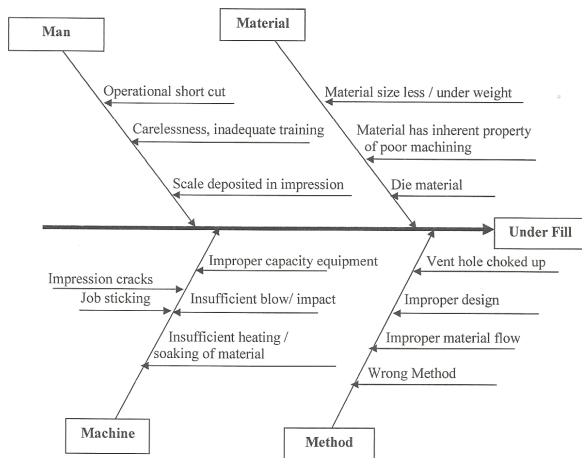
Figure 1: Fish-bone diagram for unfilling (underfilling) forging defect

Table 1: Monthly Rejection Report (Dec. 2013)

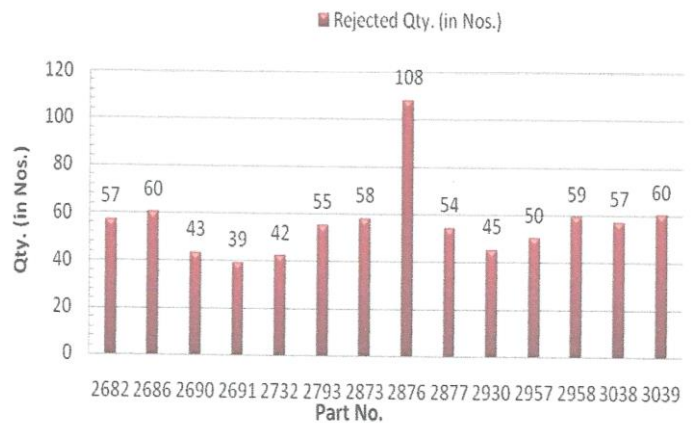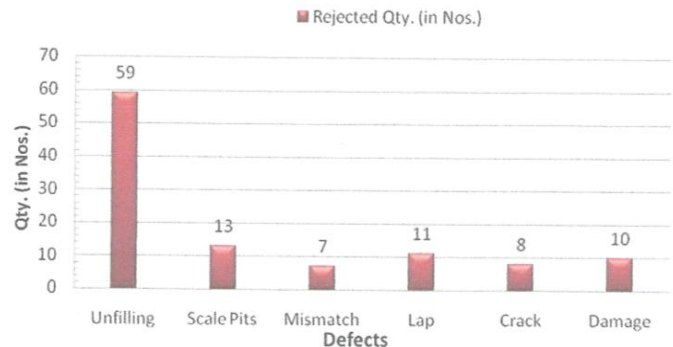| Sr. No.	Part No.	Production Qty. (in Nos.)	Defect wise Rejected Qty. (in Nos.)						Total Rejected Qty. (in Nos.)	Rejection (in %)
			U/F	S/P	M/M	Lap	C/R	D/M		
1	2682	1080	27	9	5	7	6	3	57	5.28
2	2686	900	22	5	12	9	9	3	60	6.67
3	2690	1100	10	18	3	10	0	2	43	3.91
4	2691	850	1	6	19	3	7	3	39	4.59
5	2732	975	17	8	7	5	4	1	42	4.31
6	2793	1000	20	4	12	9	10	0	55	5.50
7	2873	995	27	11	9	6	3	2	58	5.83
8	2876	1000	59	13	7	11	8	10	108	10.80
9	2877	790	32	8	5	3	2	4	54	6.84
10	2930	600	8	15	14	3	0	5	45	7.50
11	2957	875	15	8	16	2	6	3	50	5.71
12	2958	1000	24	4	9	13	8	1	59	5.90
13	3038	930	11	23	4	7	7	5	57	6.13
14	3039	850	24	11	7	7	5	6	60	7.06
Total		12945	297	143	129	95	75	48	787	6.08

Chart 1: Part number wise rejected Qty.

Chart 2: Defect wise rejected Qty. for Part No. 2876

IV. EXPERIMENTAL DETAILS

A. Selection of Process Parameter levels and output of trials:

There are three input process parameters selected with their three levels. Details of parameters and their levels used in this study are as shown in Table- 2. Unfilling defect is as shown in Photographs- 1 and 2. It is very difficult to predict the occurrence of this defect at a particular place on a job, but this defect directly affects the required final job weight. So, the selected output for this study is required final job weight. As per the Company standard, the required final job weight for Part No. 2876 is 5.50 Kg +/- 0.05 Kg.

Table 2 : Process Parameters with their Levels

A	Billet Wt. (in Kg)	6.20 (A1)	6.25 (A2)	6.30 (A3)
B	Heating Temp. (in ^{0}C)	1150 (B1)	1200 (B2)	1250 (B3)
C	Heating Time (in min.)	50 (C1)	60 (C2)	70 (C3)

Photograph 1: Unfilling defect at front side of job

Photograph 2: Unfilling defect at back side of job

B. Design of Experiments:

The design of experiment is carried out by OVAT methodology. Table 3 shows the layout of experiments to be carried out according to OVAT analysis. Total 9 trials to be conducted. In first 3 trials, billet weight is varied, while heating temperature and time are kept constant at middle level of limits. For rest of the trials, heating temperature and time are varied respectively one-by-one with keeping remaining parameters constant at middle level of limits.

C. Experimental Set-up:

A Series of experiments are conducted to evaluate the influence of process parameters on job weight. The trials are carried out with 2 Ton Pneumatic Hammer. Electronic weighing machine is used for weight measurement. The experiments are conducted by keeping all other parameters constant. The constant parameters

are air-fuel ratio (6:1) to furnace burner, type of furnace oil (cbfs), air pressure (75 psi) to hammer, type of hammer, die wear within limit, skilled operator, etc. Photograph 3 shows hammering operation with 2-Ton hammer during experimentation and photograph 4 shows electronic weighing machine to be used for weight measurement purpose.

Table 3 : Layout of experiments

Trial No.	Parameters Combination		
	A	B	C
1	6.20	1200	60
2	6.25	1200	60
3	6.30	1200	60
4	6.25	1150	60
5	6.25	1200	60
6	6.25	1250	60
7	6.25	1200	50
8	6.25	1200	60
9	6.25	1200	70

Photograph 3: Hammering Operation

Photograph 4: Electronic weighing machine

V.   RESULTS AND DISCUSSION

After the conduction of trials, the results for job weight are collected and they are analyzed by means of OVAT analysis using Minitab 14 software. Table 4 shows the results of trials and discussion for OVAT analysis is as follows:

Table 4: Results of Experiments

Trial No.	Parameters Combination			Job wt.
	A	B	C	
1	6.20	1200	60	5.38
2	6.25	1200	60	5.45
3	6.30	1200	60	5.49
4	6.25	1150	60	5.43
5	6.25	1200	60	5.45
6	6.25	1250	60	5.40
7	6.25	1200	50	5.46
8	6.25	1200	60	5.45
9	6.25	1200	70	5.42

1)   OVAT analysis of Billet weight:

Table 5: Results for Billet weight analysis

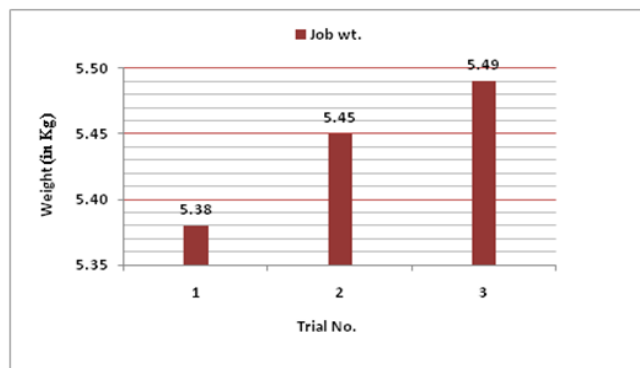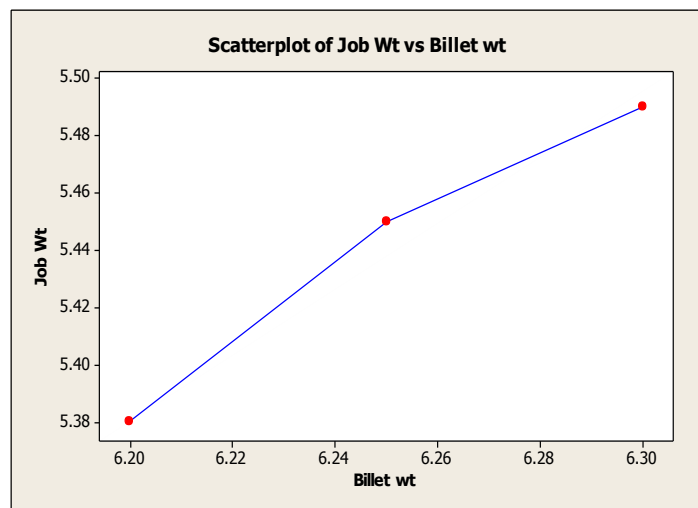| Trial No.	Billet wt.	Result
1	6.20	5.38
2	6.25	5.45
3	6.30	5.49

Chart 3: Trend chart of billet weight analysis

The selected levels of billet weight are 6.20, 6.25,and 6.30 Kg. Heating temperature and time are kept constant at middle level of limits and trials are taken. From table 5 and chart 3, it is observed that, in Trial No. 1, as billet weight is at lower side of limits, there is heating loss. Due to this, there is material loss and resulted into unfilled job. In Trial No. 2, billet weight is increased by 0.05 Kg as compared to trial No. 1, so there is compensation of heating loss. Therefore, there is optimum job weight. In Trial No. 3, as billet weight is at higher side of limits there is minimum heating loss, hence there is no unfilling of job.

Graph 1: Scatterplot of job wt.-vs-billet weight

From graph 1, it is clear that, as billet weight increases, the job weight also increases. Hence, billet weight is influencing factor on job weight.

2)   OVAT analysis of Heating Temperature:

Table 6: Results for Heating Temperature analysis

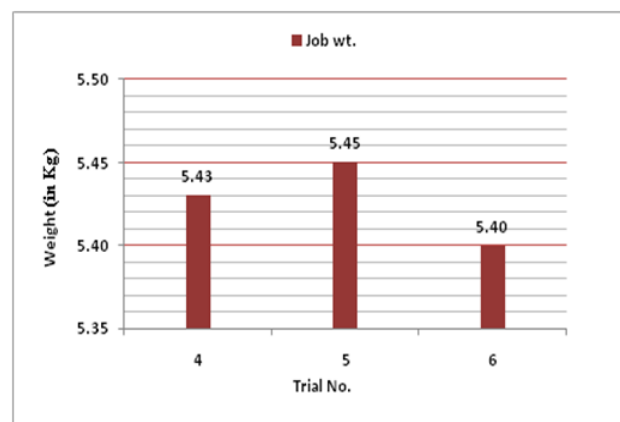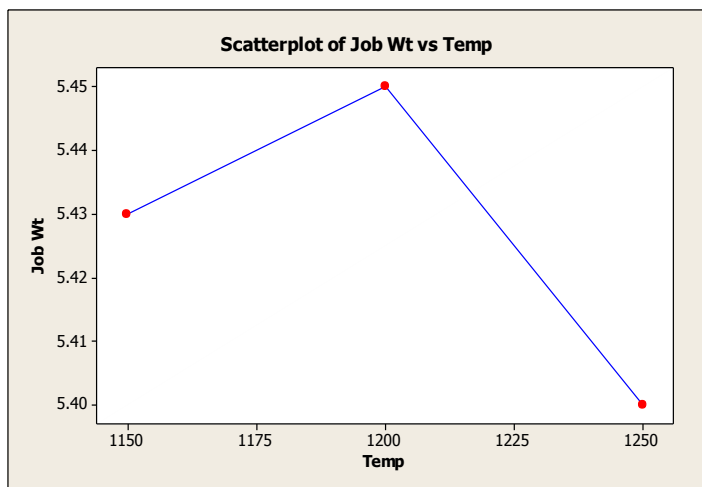| Trial No.	Temp.	Result
4	1150	5.43
5	1200	5.45
6	1250	5.40

Chart 4: Trend chart of heating temperature analysis

The selected levels of heating temperature are 1150, 1200, and 1250 ^{0}C. Billet weight and heating time are kept constant at middle level of limits and trials are taken. From table 6, chart 4 and graph 2, it is observed that, in Trial No. 4, as heating temperature is at lower side of limits, there is improper material flow, resulted in unfilled job. In Trial No. 5, heating temperature is increased by 50 ^{0}C as compared to trial No. 4, so there is proper material flow, resulted into optimum job weight. In Trial No. 6, as heating temperature is at higher side of limits, there are more scale losses. So material loss is more, resulted into unfilled job. Hence, heating temperature is influencing factor on job weight.

Graph 2: Scatterplot of job wt.-vs-heating temperature

3) OVAT analysis of Heating Time:

Table 7: Results for Heating Time analysis

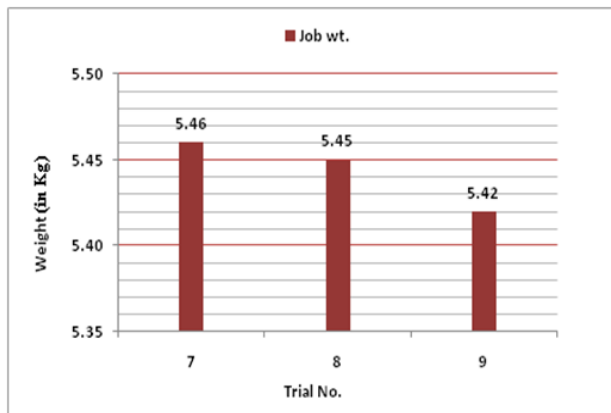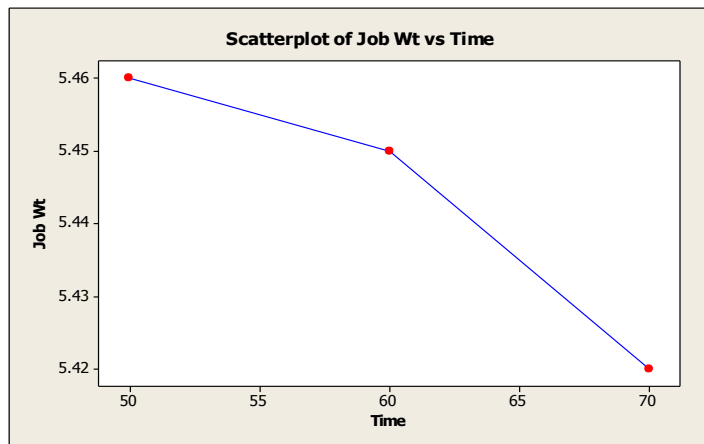| Trial No.	Time	Result
7	50	5.46
8	60	5.45
9	70	5.42

Chart 5: Trend chart of heating time analysis
The selected levels of heating time are 50, 60, and 70 min. Billet weight and heating temperature are kept constant at middle level of limits and trials are taken. From table 7 and chart 5, it is observed that, in Trial No. 7, as heating time is at lower side of limits, there is less heating loss, resulted into no unfilling of job. In Trial No. 8, heating time increased by 10 min. as compared to trial No. 7, but as billet weight is at middle level of limits, still there is optimum job weight. In Trial No. 9, as heating time is at higher side of limits, again there are more scale losses, so material loss is more, resulted into unfilled job. From graph 3, it is clear that, as heating time increases, there are more scale losses so material loss is more, therefore job weight get decreased resulting into unfilling of job weight. Hence, heating time is influencing factor on job weight.

Graph 3: Scatterplot of job wt.-vs-heating time

VI. CONCLUSION

Following conclusions are drawn from this study:
- Less billet weight resulted into unfilled job. As well as due to high heating temperature and time, there is excessive scale loss, resulted into unfilled job.
- Due to high heating temperature and time, there will be improper microstructure and hardness of job.
- Low heating temperature and time resulted into forging rupture and improper microstructure of job.
- When heating losses (scale losses) are more, job is getting rejected due to unfilling. As per the design

calculations, scale loss below 4% of sum of net weight, flash weight, and slug weight of job is preferable in box type oil fired furnace. Heating loss is more when the heating temperature and duration of heating the billets is more.

- Heating temperature 1200 ^{0}C to 1250 ^{0}C would be better at 6.30 Kg billet weight with 50 min. heating time.
- Hence, the selection of process parameters with their levels is proper and they are having the influence on filling the job weight.
- In order to get the best combination of these parameters, the optimization is necessary by using the DOE technique (like Taguchi method).

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Microbial Inoculants- A Boon to Zinc Deficient Constraints in Plants: A Review

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Abstract- Zinc is an essential micronutrient which plays a macro role in the growth and productivity of the plants. Zinc (Zn) deficiency hinders metabolic and physiological activity in plants due to its inevitable role as an enzyme cofactor. Many Indian soil exhibit Zn deficiency with the content much below the critical level of 1.5ppm. The conditions that make unavailability of zinc to plants are high pH, low organic matter content, high usage of P fertilizer, less textured soil and utilization of synthetic fertilizer to correct Zn deficiency which results in unavailability of zinc after seven days of application. An alternative eco-friendly approach to overcome Zn deficiency constraint in plants is by the application of microbial inoculants as a biofertilizer. Rhizospheric microorganisms play a vital role in the conversion of unavailable form of metal to available form through solubilization mechanism.

Index Terms- Deficiency, microbial inoculants, solubilization, zinc.

I. INTRODUCTION

Micronutrients are important for the optimum growth and productivity of the plants. Though these elements are required in critical amounts, they are very important to plant development and for profitable crop production because they work 'behind the scene' as activators of many plant functions. Of the several micronutrients that increase plant growth and productivity Zn plays a vital role. Zn is an important component of enzymes that drive and increase the rate of many important metabolic reactions involved in crop growth and development. It exerts a great influence on basic plant life processes such as N_2 metabolism and uptake of N_2 and protein quality; photosynthesis and chlorophyll synthesis, resistance to abiotic and biotic stresses and protection against oxidative damage (Potarzycki and Grzebisz, 2009). When the supply of Zn to the plant is inadequate, crop yields and the quality of production will be adversely affected. Thus for proper function of crop plants a certain minimum level of Zn supply is essential.

Zn deficiency has become a serious problem affecting nearly half of the world's population (Cakmak, 2009). This is actually due to low Zn content of the crops grown in Zn deficient soils. Many Indian soils exhibit the deficiency of Zn with the content much below the critical level of 1.5ppm (Tiwari and Dwivedi, 1994). It is expected to increase from 42% in 1970 to 63% by 2025 due to continuous depletion of soil fertility (Singh, 2009). To overcome this constraint farmers supplied Zn in the form of fertilizers like $ZnSO_3$ which in turn transformed into different insoluble forms depending upon the soil types, soil chemical reactions and becomes totally unavailable in the environment

within 7 days of application (Rattan and Shukla, 1991). Therefore, efficient and economical methods to correct Zn deficiency have to be devised. Recently bacterial based approach was devised to solve these micronutrient deficiency problems (Anthoni Raj, 2002). They play a predominant role in the solubilization, transport and deposition of metals and minerals in the environment. Thus microorganisms play a major role in the transformation of unavailable form of metal to available form depending upon the reactions involved and the products formed (Lovely, 1991). The secretion of organic acids appears to be the functional metal resistance mechanism that chelates the metal ions extracellularly(Li *et al*., 2007).

Thus the following review explains the importance of micro-organisms as an alternative tool to alleviate synthetic fertilizer and to overcome Zn deficiency in plants – a major nutritional constraint today.

II. ZINC IN SOILS

The total amount of Zn present in the soil is dependent on the type, intensity of weathering, climate and numerous other predominating factors during the process of soil formation (Saeed and Fox, 1977). All types of soils may be influenced by Zn including loam, sands, clays, loess, alluvium and soils formed from basalt, sandstone, granite, volcanic ash and many other rocks (Hafeez *et al*., 2013). Deficiencies of Zn occur in many parts of the world on a wide range of soil types, semi- arid areas with calcareous soils, tropical regions with highly weathered soils and sandy textured soils in several different climatic zones tend to be the most seriously affected (Akay, 2011). High pH and high content of $CaCO_3$, organic matter, phosphate and copper can fix Zn in the soil and give rise to the reduction of available (Zn) (Kapoor *et al*., 2002). The submerged soils are well recognized for the lack of Zn availability to the plants; particularly due to the reaction of Zn with free sulphide (Mikkelsen and Shiou, 1977). Zn deficiency area may be related to weather conditions, Zn deficiency increases in cold and wet conditions. It may be due to the limited root growth in cool soils, or reduction activity of micro- organisms (Alam *et al*., 2010). According to the FAO, about 30% of the cultivable soils of the world contain low levels of plant available Zn (Sillanpaa, 1990). Indian soils are generally low in Zn and as much as half of the country soils are categorized to be Zn deficient. Total and available Zn content in Indian soils ranged between 7- 2960mg kg^{-1} and 0.1- 24.6mg kg^{-1} respectively with an average deficiency of 12 to 87% **.**

III. IMPORTANCE OF ZINC IN PLANTS

Zn is vital to the crop nutrient as it plays a structural constituent or regulatory co- factor of a wide range of different enzymes and proteins in many important biochemical pathways and these are mainly concerned with carbohydrate metabolism, both in photosynthesis and in the conversion of sugars to starch, protein metabolism, auxin metabolism, pollen formation and the resistance to infection by certain pathogens (Alloway, 2008). It is also a part of the enzymes such as superoxide dismutase and catalase which prevents oxidative stress in plant cells. Early development of fruits or tubers is also influenced by Zn. In the process of cell differentiation after flowering high levels of IAA or Zn in the plant will increase cell differentiation. The greater the cell differentiation the larger and denser will be the fruit (www.alcanada.com/index_htm_files/Zinc). The regulation and maintenance of the gene expression required for the tolerance of environment stresses in plants are Zn dependent (Cakmak, 2000). Thus Zn plays an indispensable role in various enzymatic reactions, metabolic processes and oxidation- reduction reactions of plants.

IV. ZINC DEFICIENCY IN PLANTS

For optimum function of crop plants a certain minimum level of Zn supply is essential. If the soil which is a principal resource from where plants draw their Zn needs is unable to supply the minimum amount of Zn thens a Zn deficiency situation arises. Inadequate supply of Zn to the plant result in the cessation of physiological functions which lead to the development of visible symptoms of stress such as interveinal chlorosis (yellowing of the leaves between the veins), bronzing of chlorotic leaves, small and abnormally shaped leaves, stunting and rosetting (leaves form a whorl or shortened stems) (http://www.zinc.org/info/zinc). Many researchers observed that zinc is closely related to N_2 metabolism pathway of plants, thus causing a reduction in protein synthesis for Zn deficient plants. Zn deficiency significantly affects the root system including root development (Fageria, 2004). Epstein and Bloom, 2005 indicated that the flowering and fruiting process were greatly reduced under severe Zn deficiency. Quality of harvested products, plant susceptibility to injury by high or light temperature intensity and to infection by fungal diseases can also increased by Zn deficiency (Cakmak. 2000). Zn seems to affect the capacity for water uptake and transport in plants and also reduce the adverse effects of short periods of heat and salt stress (Tavallali *et al*., 2010). Zn deficient plants exhibit low levels of auxins such as IAA. Many research shows us that Zn is required for the synthesis of tryptophan, which in turn is the precursor for the synthesis of IAA. In the absence of IAA plant growth is stunted particularly internodes growth and leaf size (www.alcanada.com/index_htm_files/Zinc). A more direct influence of Zn deficiency is that of grain or seed yield which are reduced to a greater extent by Zn deficiency (www.alcanada.com/index_htm_files/Zinc). Plants vary considerably in their requirements for Zn. Crops with high Zn requirements include corn, onion and spinach. Those with medium requirements are barley, beans, beet, canola, cucumber, lettuce, lupines, potato, radish, sorghum, soybean, tobacco and tomato (Schulte, 2004).

V. UNAVAILABILITY OF ZN TO PLANTS

In soils, Zn is found in both available and unavailable forms. There is plenty of Zn in soil to support crop growth, but the crop exhibit deficiency due to the presence of unavailable fractions. There are many adverse factors in the soil that affect the Zn availability to plants. These include low total Zn content, neutral or alkaline pH, high salt concentration, and high calcium carbonate content in calcareous soil (Antoniadis and Alloway, 2002). In the case of soils characterized by high contents of hydroxyl (OH^-) ions, it is difficult to get a crop response even after applying Zn. The lower availability of Zn under alkaline conditions is attributed to the precipitation of Zn as $Zn(OH)_2$ or $ZnCO_3$ (Shukla and Mittal, 1979). The higher carbonate contents in alkaline soils also absorb Zn and hold it in an unexchangeable form (Udo *et al*., 1970). These factors contribute to the low availability of Zn at higher pH values. Heavier textured soils with larger CEC have higher capacities for Zn adsorption than light textured soils (Stahl and James, 1991). Zn usability decreases by decreasing temperature and light intensity due to limited root development. Zn usability by plants decreases with high levels of P in the soil. Zn uptake by plants is inhibited by some metal cations such as Cu^{2+} and Fe^{2+}. Organic matter which behaves much like a chelate in holding Zn in the soil also forms an important factor for Zn availability. Low organic matter contents in soils give rise to Zn deficiency as it is observed that available Zn increases with increase in organic matter in soil. Thus the role of Zn in a plant is complex in which the interaction reduces its availability.

VI. NEGATIVE EFFECT OF CHEMICAL FERTILIZER

Green revolution has greatly increased the food crop production in India but resulted in the depletion of soil micronutritents pools. Soil health relies on a balance of macronutrients and micronutrients, as well as microbial health. Farmers gave more attention towards NPK than micronutrients in the intensive cultivation method. The increased use of NPK fertilizers devoid of micronutrients has no doubt increased the food production but it brought a host of problems related to micronutrient deficiencies, of which Zn deficiency is the most predominant. Zn deficiencies are most commonly corrected by application of the Zn fertilizer to the soil since its requirement is modicum. Several different Zn compounds are used as fertilizers in which $ZnSO_4$ is the most common. It is estimated that about 85,000- 90,000 tones/ annum consumption of $ZnSO_4$ in agriculture either through straight fertilizer application or through micronutrients mixture. This indicates the indispensable role of Zn in plant development and for profitable crop production. Supplementation of Zn in the form of fertilizers like ($ZnSO_4$) also remains vain because only 1- 4% is utilized by the crop and 75% of applied Zn is transformed into other mineral fractions which is not available. Thus correction of Zn deficiency via fertilization is not always successful due to agronomic and economic factors which include reduced availability of Zn due to

top soil drying, subsoil constraints, disease interactions, and cost of fertilizers.

VII. ALTERNATIVE SOURCE TO CHEMICAL FERTILIZER

External addition of soluble Zn to alleviate deficiency results in the transformation of about 96- 99% to various fractions of unavailable forms and about 1- 49% is left as available fraction in the soil. So the water soluble Zn (ZnSO$_4$. 7H$_2$O) advocated and applied in the soil cannot be detected beyond 15 days of period (Rattan and Shukla, 1991) and become unavailable which make the Zn nutrition to the plants critical. This requires a system that releases the required quantity of Zn that are converted to unavailable state and retained in the soil to available form. Numerous microorganisms, especially those associated with roots have the ability to increase crop growth and productivity. This effect has been due to the involvement of these organisms in the solubilization of unavailable mineral nutrients (Cunningham and Kuiack, 1992). Zinc solubilizing potential of few micribial genera such as Bacillus sp, Pseudomonas sp and Aspergillus sp were explored by researchist recently (Saravanan et al., 2003). Thus microbial inoculants will be an alternative approach to overcome constraints due to synthetic fertilizer, and to revive soil's fertility resulting in the intensive farming.

VIII. MECHANISM INVOLVED IN SOLUBILIZATION OF ZINC

The rhizospheric microorganisms play a pivotal role in the enhancement of crop production by the solubilization of unavailable form of metal into available form. This metal solubilization was due to the production of organic acids and pH drop by organisms (Alexander, 1997). Plants take up Zn as (Zn^{2++}) divalent cation. The release of organic acids that sequester cations and acidify the micro environment near root is thought to be a major mechanism of Zn solubilization. A number of organic acids such as acetic, citric, lactic, propionic, glycolic, oxalic, gluconic acid etc have been considered due to its effect in pH lowering by microorganisms (Cunnigham and Kuiack, 1992). Organic acid secreted by micro- flora increase soil Zn availability in two ways, they are probably exuded both with protons and as counter ions and consequently, reduce rhizospheric pH. In addition, the anions can chelate Zn and increase Zn solubility (Jones and Darrah, 1994) which results in the conversion of available form (Zn^{2+}) to plants.

IX. CONCLUSION

Supplementation of both macro and micro nutrients is required for the healthy growth of the plants. Lack of awareness in farmers about the importance of micro nutrients lead to the major economic loss due to its deficiency in plants. Though farmers rely on synthetic fertilizers to correct Zn deficiency it still remains a major issue in agriculture. Therefore, application of microbial inoculants will be a viable alternative technology to overcome Zn deficiency and the negative impact of chemical fertilizer on plant and its environment.

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Session Key Authentication Mechanisms for Wireless Sensor Network Users

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Abstract- Seamless roaming over wireless network is highly desirable to mobile users, and security such as authentication of mobile users is challenging. Recently, due to tamper-resistance and convenience in managing a password file, some smart card based secure authentication schemes have been proposed. This paper shows some security weaknesses in those schemes. As the main contribution of this paper, a secure and light-weight authentication scheme with user anonymity is presented. It is simple to implement for mobile user since it only performs a symmetric encryption/decryption operation. Having this feature, it is more suitable for the low-power and resource-limited mobile devices. In addition, it requires four message exchanges between mobile user, foreign agent and home agent. Thus, this protocol enjoys both computation and communication efficiency as compared to the well-known authentication schemes. As a special case, we consider the authentication protocol when a user is located in his/her home network.

In this paper, we propose a privacy-preserving universal authentication protocol, called Priauth, which provides strong user anonymity against both eavesdroppers and foreign servers, session key establishment, and achieves efficiency. Most importantly, Priauth provides an efficient approach to tackle the problem of user revocation while supporting strong user untraceability**.**

I. INTRODUCTION

A privacy-preserving user authentication scheme should satisfy the following requirements [1]: (1) Server Authentication: a user is sure about the identity of the foreign server. (2) Subscription Validation: a foreign server is sure about the identity of a user's home server. (3) Provision of user revocation mechanism: due to some reasons (e.g., the subscription period of a user has expired or a user's secret key has been compromised), user authentication should allow a foreign server to find out whether a roaming user is revoked. (4) Key establishment: the user and the foreign server establish a random session key which is known only to them and is derived from contributions of both of them. In particular, the home server should not know the session key. (5) User anonymity: besides the user and its home server, no one including the foreign server can tell the identity of the user; and (6) User intractability: besides the user and its home server, no one including the foreign server is able to link any past or future protocol runs of the same user. When user revocation is supported in an authentication protocol, it is more challenging to achieve user untraceability because on one hand, information is given to foreign servers to identify revoked users, but on the other hand, the information should not enable foreign servers to link other protocol runs of the revoked user. More specifically, the protocol runs involved by a revoked user before his revocation should remain anonymous and unlinkable. This is referred to as backward unlinkability in roaming service. In addition, for a time-limited revocation due to, for example, suspension of service for a period of time, the anonymity and the unlinkability of the revoked user's protocol runs after the revocation period should also be maintained. We refer to this property as forward unlinkability in roaming service. Requirement (6) includes backward and forward unlinkabilities which, until now, are unsolved problems.

In this paper, we assume that the attacker has total control over all communication channels among the user, foreign server and home server. That is, the attacker may intercept, insert, delete, or modify any message in the channels. Particularly, we consider four major types of threats to user authentication, namely, message en route threat, false mobile user threat, DoS attack and deposit-case attack [4]. The message en route threat includes that an attacker relays and/or redirects messages. The false mobile user threat includes the case where an attacker could impersonate a foreign/home server, as well as the case where mobile users under the control of an attacker collude. DoS attack refers to the overwhelming service requests from attackers in the purpose of blocking services from genuine mobile users. In deposit-case attack, the user is honest while there is a malicious server M, who will make the foreign server V to believe that the home server of the user is M without being detected by the user nor its home server.

In this paper, we address the problem of authentication in WSNs, particularly authenticated broadcast/multicast by sensor nodes and outside user authentication. The problem of authenticated broadcast/multicast by sensor nodes is not addressed by the existing authentication schemes for WSNs. Symmetric schemes like mTESLA and its variations proposed for base station broadcast authentication use Message Authentication Code (MAC) and are efficient in terms of processing and energy consumption.

However, they suffer from the following issues:
  ➢ Provide delayed authentication.
  ➢ Not scalable in terms of number of senders.
  ➢ Multiple senders cannot broadcast simultaneously.
  ➢ Very slow for large scale sensor networks.
  ➢ DoS attack against storage due to late authentication.
  ➢ If a sensor node wants to broadcast a message, it unicasts the message to the base station, which then broadcasts that message on behalf of that node.

This paper makes two main contributions: (1) We show some security weaknesses of current user authentication protocols in wireless communications. (2) We propose a privacy- preserving universal authentication protocol called Priauth. By introducing Verifier-Local Revocation Group Signature with Backward Unlinkability (VLR-GS-BU), it can satisfy all requirements described above. Also, Priauth only requires the roaming user and the foreign server to be involved in each protocol run, and the home server can be off-line. Additionally, Priauth belongs to the class of Universal Authentication Protocols in which same protocol and signaling flows are used regardless of the domain (home or foreign) a roaming user is visiting. This helps reducing the system complexity in practice.

Furthermore, Priauth supports verifier-local revocation, which means that verifiers (i.e., foreign servers) can, based on the revocation list (RL) sent from the home server, check locally whether a roaming user is revoked. Note that VLRGS- BU is not originally designed for authentication purpose and a direct application of it imposes two problems in Priauth. Firstly, it does not allow Priauth to support new group member joining after system setup. Secondly, it does not provide Priauth the single registration property commonly available in most existing authentication protocols, which requires a user only to register once at the home network before being able to access the global network. We will provide solutions to these two problems to make Priauth practical.

II. AUTHENTICATIONS IN WSN

Authentication in WSN can be divided into three categories, namely base station to sensor nodes, sensor nodes to other sensor nodes, and outside users to sensor nodes. The problem of authenticated broadcast by the base station has been widely addressed. We focus on the other two categories, i.e., authenticated broadcast/multicast by the sensor nodes and outside user authentication.

A. Authenticated Broadcast/Multicast by Sensor Nodes

There are many critical situations where a sensor node needs to send a quick message. For example: In a forest fire alarm application, sensor nodes deployed in a forest should immediately inform authorities about the event and the exact location of the event before the fire spreads uncontrollably. In a traffic application, whenever a sensor node senses an accident (or a traffic jam) on the road it sends an immediate message in all directions to alert other traffic approaching this location. Consider the military application scenario discussed where a troop of soldiers needs to move through a battlefield. Sensor nodes deployed there detect the presence of the enemy and broadcast this information immediately throughout the network. Soldiers, passing near these sensor nodes, use this information to strategically position themselves in the battlefield.

All these scenarios require a message to be sent as quickly as possible. Due to wireless media, transmission and reception of a message consume considerable time. Moreover, in most cases a message propagates through several hops to reach the desired destinations. Therefore, the signature generation time and the verification time should be as small as possible. A delayed message may have undesirable effects. For example, it may

result in fire spreading uncontrollably and a traffic jam becoming worse. A delayed message regarding the presence of an enemy in the battlefield may cause the death of soldiers while moving through the battlefield. In all the above situations, message authentication is required otherwise a malicious entity may exploit its absence. For example, an adversary may send fake messages to block traffic towards a specific region or to turn traffic towards a specific direction. In battlefield, sensor nodes deployed by the enemy can disseminate wrong information about enemy's movement, thus deceiving soldiers. Moreover, in all the above mentioned scenarios, sensor nodes on the path from the sender node to the receiver(s) relay the messages towards destination.

Wireless communication allowing an adversary to inject false messages during multi hop forwarding causes sensor nodes to relay false data and deplete their energy. Hence, sensor nodes on the path should be able to authenticate and filter out false messages as early as possible to save relaying energy. Therefore, they are also potential receivers of these messages, arising the need of authenticated multicast by sensor nodes. In battlefield application, all sensor nodes in the network are potential receivers of critical information, arising the need of authenticated broadcast by sensor nodes. To summarize, all these scenarios require a secure mechanism which, on one hand, enables all sensor nodes in the network to send an immediate authenticated message to report a critical situation, and on the other hand, enables every receiver to verify this message.

B. User Authentication

Sensor nodes data may be confidential and in some situations only the subscribed users, who have paid, are allowed to obtain this data. A user authentication mechanism aims to prevent unauthorized users to access data from sensor nodes. Usually, a mechanism to provide an outside user access to sensor nodes data requires three tasks:

1) User Authentication allows only legitimate users of the data to access it.

2) Access Control allows a user to access only the data which he is entitled to access.

3) Session Key Establishment enables secure exchange of user queries and confidential data between users and sensor nodes.

In centralized user authentication, all users are authenticated through the base station. This mechanism is easy to deploy because the base station is a powerful device which can perform complex cryptographic operations. However, this approach has a few drawbacks. Firstly, it makes the base station a single point of failure. Secondly, it causes sensor nodes near the base station to deplete their energy quickly as for every user request; they relay packets between base station and queried sensor nodes. Furthermore, it causes a severe DoS attack where an adversary sends fake request messages causing sensor nodes to relay them towards the base station for verification, increasing network traffic and depleting their energy. User authentication schemes discussed all suffer from these problems. To avoid this kind of DoS attack, a user should be locally authenticated by the sensor nodes without the involvement of a third entity, i.e., a distributed approach.

This approach reduces traffic congestion and transmission overhead within the network. However, it puts the burden of authentication on sensor nodes. As sensor nodes are resource constrained devices as compared to the base station, a lightweight user authentication mechanism is needed for sensor nodes to verify authenticity of the users.

III.   SESSION KEY ESTABLISHMENT

To provide secure transmission of data from sensor nodes to user, a session key needs to be established. For this purpose, any secure key exchange protocol could be used here. However, an identity based one-pass key establishment protocol is an attractive choice for resource constrained sensor nodes. It reduces the number of messages exchanged during key establishment phase i.e., only one party computes and sends its ephemeral key to the other party, for example, identity based one-pass key establishment protocol presented. That single message can be combined with user request message (in user authentication phase) which is signed by the user. It further reduces the communication. It also avoids the man in the-middle attack. The only message exchanged between the user U and the sensor node A for key establishment will be signed by U and verified by A, which makes it difficult for an intruder to send fake ephemeral key to the sensor nodes on behalf of U.

To establish a session key, U randomly computes its ephemeral key R. U then sends R, together with his signature, to A in authentication phase. If U's signature is valid and user authentication succeeds, both A and U compute session key SK using the key derivation function c as SK = c(IDAjjIDUjjTSjjTAU), where TS is the time stamp to avoid replayed messages and TAU is a common secret computed by both parties using R and their secret keys. At this point, the session key SK is ready for encrypting data.

User Revocation: User revocation can be divided into two cases; firstly, to revoke a user whose access time period has been expired, and secondly, to revoke a malicious user. These two cases can be treated differently. To handle the first case, at the time when base station calculates the secret key for a user U, the expiry time ET of the user can be used as a parameter to calculate the secret key. After his access time period expires, his secret key will automatically expire. If he now sends a signed request, it will not pass verification. In the second case, the base station issues an authenticated revocation list containing malicious user's ID. Sensor nodes store it until the malicious user's expiry time is passed. Thus, if next time that user attempts to access data from sensor nodes, the sensor nodes reject his request without going through authentication process. After his access time expiration, his secret key will expire and he will not be able to successfully authenticate himself to the system. In WSN, the case of the malicious users is not very common. Therefore, storing IDs of malicious users until their expiry time will not impose an unreasonable storage overhead on sensor nodes. To efficiently handle storage, user's access period can be kept short so that sensor nodes do not store malicious users' IDs for a long time. After that time period only the private keys of the legitimate users are updated for next time period. The duration of this period depends on how frequently the event of the malicious

users occurs. Although some figures would help to improve the readability of framework, space limitation does not allow it.

IV.   FURTHER RESEARCH SCOPE

So far the proposed authentication schemes are based on either cryptography or physical layer information. An integration of these two primitives are desirable to secure the emerging wireless networks. For example, in highly dynamic networks, such as mobile ad hoc networks, vehicular ad hoc networks, or delay tolerant networks, it is hard to maintain a central authority to efficiently distribute and manage the key. Therefore, users without any pre-established contact have to initialize a shared secret or associate to each other on-the-fly. Traditional cryptography based Diffie-Hellman key exchange technique can serve for this purpose. However, it is subject to man-in-the-middle attack. In order to prevent the man in- the-middle attack, two parties usually rely on a shared secret. Thus, it brings the dilemma that Diffie-Hellman is used to generate a shared key between two parties, but in order to prevent the man-in-the-middle attack, we need a pre-shared secret between the two parties. A possible and promising solution to this problem can be a cross-layer security design. By exploiting the unique properties of the wireless channel, the two parties can somehow identify or authenticate the message exchanged in the Diffie-Hellman protocol without relying on a preshared key. For example, Alice knows it is Bob sending the Diffie-Hellman key exchange messages to her when she observes a signal characteristic associated with these messages, and this characteristic can only be induced at a particular location where Bob is at.
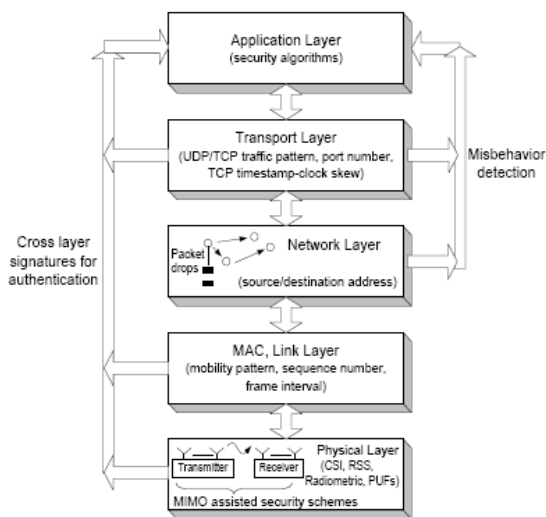

Fig. 1. Cross layer security schemes

For intrusion or malicious behavior detection, it is also desirable to examine multiple layer information to improve the probability of detection. The dependency and correlation between multiple layer behaviors or observations can be used to detect malicious/selfish nodes. An illustrative example of a cross layer signature scheme for authentication as well as misbehavior detection is given in Fig. 1. Physical layer CSI/RSS/radiometric information and emerging technologies, such as MIMO

(multiple-input and multiple output) can be combined with the MAC layer sequence number/frame interval/mobility pattern and Transport layer TCP time stamp/traffic pattern/port number to generate a strong authentication scheme to authenticate a node. For misbehavior detection, network layer source address and destination address can be used along with the transport layer traffic patterns.

V. CONCLUSIONS AND FUTURE WORK

The main contribution of this research work is to propose an authentication framework which provides two features; quick authenticated broadcast by sensor nodes and user authentication. Existing broadcast authentication schemes in WSN do not handle the problem of authenticated broadcast by sensor nodes. The proposed ID-based Online/Offline Signature (IBOOS) based broadcast authentication scheme is an attractive solution to this problem. An ID-based Signature (IBS) based distributed user authentication scheme is also proposed to authenticate outside users. Session keys secure the further communication between users and sensor nodes. The main advantage of this framework is its re-usability, that is, it can also be reused with new IBS and IBOOS schemes for security and performance improvements. In the future, we intend to focus on user access control to provide a complete ID-based authentication framework which would enable the sensor nodes, on one hand, to broadcast a message to quickly respond to some critical situations and, on the other hand, to control user access according to his access privileges. We are on the way to implement the proposed framework on real sensor nodes to get actual results. In this paper, we have proposed a novel protocol to achieve privacy-preserving universal authentication for wireless communications. The security analysis and experimental results show that the proposed approach is feasible for real applications.

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Application of Ground Water Modeling in Development of Sustainable Water Resources Framework

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Abstract- Water has a determining role in every aspect of our life. Groundwater problems unfold slowly and incrementally, as the cumulative effect of many individual impacts of abstractions and contamination sources corroborate themselves. Monitoring & Effective groundwater resource management requires an optimum balancing of the increasing demands of water and long-term maintenance of the complex natural resource This paper reviews use of groundwater models in planning and developing the water harvesting structures including quality aspects of the groundwater and thereby predicting the fate and movement of the chemical in natural, urban or hypothetical scenario. The results show that Analytical and numerical groundwater flow models can be used in development of sustainable water resource framework if the proper sets of input variable are defined. The results of these evaluations indicate groundwater models can provide an efficient and readily-accessible tool to aid in designing systems for collection and storage of water.

Index Terms- groundwater, sustainable, flow, resource, variable

I. INTRODUCTION

The groundwater model is a representative scale model of a groundwater situation or aquifer which can be used to predict the effects of hydrological changes like groundwater abstraction for industrial purpose or irrigation development on the behavior of the aquifer. Nowadays the groundwater models are used in various water management plans for urban areas as well as in rural areas. As the computations in mathematical groundwater models are based on groundwater flow equations, which are differential equations that can often be solved only by approximate methods using a numerical analysis, these models are also called mathematical, numerical, or computational groundwater models. The purpose of modeling can vary widely, and the approach used may depend on site-specific needs, current understanding of the hydrogeological system, availability of input data, and expectation and use of the model results [11].
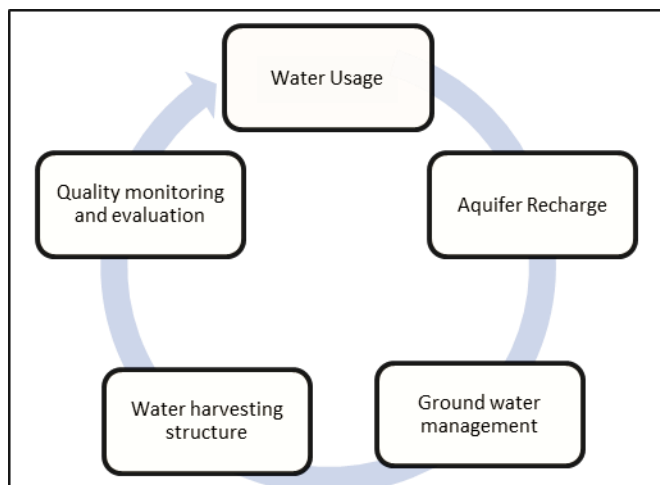
The principle for fundamental assumption of model is the conservation of masses (H.Darcy, 1856) [1]. Field investigations are essential for development of models. Results depend on the quality and quantity of the field data available to define input parameters and boundary conditions (Wang and Anderson, 1982) [2]. Modeling may be of limited value when a remedy can be readily identified, available data indicate there is not an environmental problem, or the site is too complex to model realistically. If a site is poorly characterized or poorly understood, any simulation of the transport and impacts of contaminants using models could be misleading. The use of models under such circumstances can help to support only limited types of decisions, such as planning and prioritizing activities. As a general rule, it is prudent to continually question the results of modeling and the potential consequences of decisions based on misleading results, and consider what can be done to verify results (U.S. EPA, 1996c) [3]. Because major decisions frequently are based on modeling results, it is essential that modeling be conducted in a manner that provides confidence that the results portray field conditions. Thus, the effort must be documented in detail.

This paper identifies fundamental types of models and the necessary documentation required for development of a water harvesting structure. We first describe the results from literature review, including a summary of selected codes and their capabilities, as well as an assessment of the types of hydrogeological conditions. The subsequent sections provide the approach for deciding which code might be most appropriate for a given modeling effort, and where we put the decision approach to practical use.

II. PRINCIPLE

The concept of Sustainable development was first brought up in the Brundtland report (WCED, 1987). It is defined as the development which meets the need of the present generation without compromising the ability of future generation to meet its need [4]. When a development project begins in an area then the rate of extraction gets higher than the rate of recharge which results in continual lowering of water level. Hence, the emphasis of groundwater management practice has to be utilized in an efficient and sustainable manner contributing to the economic and social well-being of the community. A sustainable groundwater development depends on the understanding of processes in the aquifer system, quantitative and qualitative monitoring of the resource and the interaction with land and surface water development [5]. The following key principles reflect different aspects of concern in the evolution of sustainability in groundwater development:

i. Conservation of groundwater resources;

ii. Protection of groundwater quality; and

iii. Consideration of environmental impacts

Figure 1: Ground Water sustainability cycle

The movement of groundwater through porous media is described by the following partial differential equation, which is based on Darcy's law and the conservation of mass (McDonald and Harbaugh, 1988) [6]:

$$\frac{\delta}{\delta x}\left(Kxx\frac{\delta h}{\delta x}\right) + \frac{\delta}{\delta y}\left(Kyy\frac{\delta h}{\delta y}\right) + \frac{\delta}{\delta z}\left(Kzz\frac{\delta h}{\delta z}\right) - W = Ss\frac{\delta h}{\delta t}$$

where,

Kxx, **Kyy** and **Kzz** are values of hydraulic conductivity in the x, y, and z directions along Cartesian coordinate axes, which are assumes to align with the principal directions of hydraulic conductivity (LT^{-1}),

h is the hydraulic head (L),

W is a volumetric flux per unit volume and represents sinks and/or sources (T^{-1}),

Ss is the specific storage of the porous material (L^{-1}), and
t is time(T).

2.1 Classification

Models can be based on a single equation or a set of governing equations that represent the processes occurring like ground water flow, solute transport, etc. [7]. They can be classified as analytical or numerical, deterministic or stochastic, or steady state or transient. In addition, models can be one, two, or three-dimensional.

a. Analytical Models

Analytical models are generally based on precise solutions to one or two-dimensional ground water flow or transport equations. These equations are simplified forms of more complex three-dimensional ground water flow and solute transport equations used in numerical modeling. Analytical models require basic fundamental information of the flow system, including a horizontal aquifer base, uniform hydraulic and chemical reaction properties, and simple flow or chemical reaction boundaries. In addition, analytical models are typically steady-state and one-dimensional, or two-dimensional. Analytical models are best used when designing data collection plans prior to beginning

field activities or as an independent check of numerical model results.

b. Numerical models

Numerical models solve the partial differential flow or solute transport equations through numerical approximations using matrix algebra and discretization of the modeled domain. The accuracy of numerical models depends on the model input data, the size of the space and time discretization, and the numerical method used to solve the model equations. Where the ground water system is very complex, and where sufficient data exist to simulate the complexities in detail, a numerical model may be able to simulate the system with greater accuracy. Generally, they can be used to model irregular boundaries, variations in input parameters such as hydraulic conductivity and recharge, vertical flow gradients at recharge and discharge areas, transient flow conditions, complex multilayered hydrogeological framework, and other complexities. Numerical models are best used when the field data shows that ground water flow or transport processes are relatively complex and ground water flow direction, hydrogeological or geochemical conditions, and hydraulic or chemical sources are sinks that vary with time and space.

2.2 Selection of an appropriate Model

A variety of ground water flow model are available now and they are used quite extensively to design and evaluate the impact of the groundwater withdrawal systems. The selection of a model is done in three steps

a. Model Selection Process

Construction of an appropriate model at the site
Code selection
Model Evaluation

The three important factors that must be considered while choosing an appropriate model code are
   i.   Site Environmental Characteristics
   ii. Demography and land use
   iii. Contamination characteristics(if present)

Successful ground-water modeling requires the selection of a computer code that is not only consistent with the site characteristics but also with the modeling objectives. The most common code selection mistakes are selecting codes that are more sophisticated than are appropriate for the available data or the level of the result desired, and the application of a less sophisticated code that does not account for the flow and transport processes that dominate the system [10].

b. The Code Selection Process

To meet the specific modeling needs there are several suitable computer codes that could potentially be chosen from a large number of published codes presented in the scientific literature[9]. Ideally, each candidate code should be evaluated in detail to identify the one most appropriate for the particular site and modeling objectives. However, the resources to complete a detailed study are seldom available, and usually only one to two codes are selected based upon a cursory review of code capabilities and the experience of the modeler.

Regardless of whether a detailed or more cursory review is performed, it is important for the user to be cognizant of the following factors and how they will affect code selection:

   i. Code Capabilities consistent with: User needs Modeling objectives, Site characteristics, Contaminant characteristics, Quality and quantity of data

  ii. Code Testing involves: Documentation, Verification, Validation

 iii. History of Use Acceptance: Theoretically, the reviewer should obtain a copy of the computer code, learn to use the code, select a set of verification problems with known answers, and compare the results of the model to the benchmark problems.

c. Model Validation

Model validation, which involves checking the model predictions against independent field investigations designed specifically to test the accuracy of the model, would almost never be practical during the code evaluation and selection process

2.3 Application

The Department of Agriculture, Punjab carried out a ground water study for irrigartion purpose. The study area is from Indo Gangetic basin. It covers Farozpur, Muktsar and Faridhot(approximately 651,079 hectares). The annual rainfall is 300 mm and the soil present is alluvial deposits. Irrigation is carried out by canal and ground water. To monitor the depth of ground water table 60 observation wells were installed by Groundwater Cell of Department of Agriculture, Punjab. Observation was taken twice a year during June (Pre monsoon period) and October (Post monsoon period) [8].

Based on June/October water level contour maps were drawn and 10km X 10km grids were superimposed on it. For computing sources/sink terms, the draft and discharge was distributed to various cells. Inputs included water requirement of crops, canal and tube wells, water availability and ground water quality. In this study the quality of water was divided into five categories <2.0, 3.0, 4.0, 5.0 and 6.0 dS/m.

A water allocation model was developed to maximize ground water pumpage considering the input parameters and hydraulic head [8]. The maximum discharge is given by the equation

$$Max\ Z = \sum_{i=1}^{14} . \sum_{j=1}^{11} Qi, j$$

Where Z= Total discharge at all nodes,

Q_{ij} = Tube well discharge at i^{th} row and j^{th} column

i= number of rows; j= number of columns

$h_{i,j} <= R_{i,j} - X$

$h_{i,j} >= R_{i,j} - Y$

$R_{i,j}$- reduced level

X= upper limit of the water table depth (m)

Y=lower limit of the water table depth

A two dimensional transient flow equation was used and the ground water variables were incorporated as decision variable in management model. Hydraulic constraints at all nodes were added in the model so that the water level would not rise or fall under specified limit.

Actual irrigation was found at 90% level of evaporation transpiration constraints. A number of simulations run were then carried out to maximize pumping to raise the water table. The simulation optimization results under water table <2m in parts of Jaladabad and Muktsar whereas declining table trend was observed in Fazilka, Khuian Sarwar and Abohar. The declining water table in the area was controlled by reducing the pumping in the area. The problem of area having water table depth<2m was solved by increasing the pumping limit to maximum possible discharge limit.

III. CONCLUSION

Ground water is an important natural resource and should be utilized in a manner that both quantity and quality problems is avoided. The key principles in developing a sustainable ground water frame work are conservation of groundwater resources, protection of groundwater quality and consideration of environmental impacts. Mathematical models provide a quantitative framework to synthesize data of a ground water system and it plays an important role in understanding the water systems behavior when subjected to stress and changing conditions. The complex systems require special efforts to develop the monitoring network and monitoring tools for predictive analysis.

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Islamic Finance Instruments: Experiences in the Oil and Gas Sector

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Abstract- Islamic finance industry witnessed a remarkable development and increasing growth until the Islamic financial institutions imposed in the global financial environment. Islamic finance has become a reality, an important approach, the added value to the reality of global economic and a bridge of the interdependence between the Islamic world and the Western world. In this context, this paper comes to reveal certain aspects of Islamic finance, that has the means of distinct, diverse renewable and which is not owned by other conventional systems. This study will address: The experiences of Islamic financial instruments in the oil and gas sector and develop a mechanism for development. In regard to how strong role Islamic banks and other financial institutions have had in financing the oil and gas sectors, this study found that, it is possible for Islamic methods of finance to make an effective contribution towards developing oil and gas – quite apart from developing investments in the banks and financial institutions themselves, and thereby helping to bring about the desired development in the Arab and Muslim countries.

Index Terms- Islamic Finance, Internationalization, Investment, Joint Venture, Islamic Banking and Institutions

I. INTRODUCTION

The Middle East region - and the Arabian Gulf states in particular - stands in the vanguard of those countries that hold sway over the world energy balance, given that it possesses most of the world's oil reserves – to say nothing of its huge reserves of gas (Hasan et al,. 2010). The oil and gas sector is nothing if not capital-intensive, a fact that requires capital sums to be pumped regularly into this sector in order to fund exploration, drilling, production, development, maintenance and distribution (Dwabh, 2007).

Oil investments in the Middle Eastern countries depend, mainly, on the internal funding resources of the national oil companies, as well as on international capital markets and foreign direct investment. Even though most countries put a ban on foreign capital participating in major oil-industry operations, some states permit arrangements for dividing up production (Richardson, 2007). In the light of most predictions that suggest dependence on Middle East oil and gas resources is set to increase in the coming years (Gohar, 2006), there will need to be a growth in financing in line with a growth in demand for oil and gas, not least because this sector represents the main, underlying source of national revenue in most of the Arab countries, and those of the Gulf in particular (Nienhaus, 1986). This naturally places a burden of responsibility on the banks and Islamic financial institutions to make effective contributions towards meeting the funding needs of the oil and gas sector. For they have adopted as their main goal to have a stake in bringing about social and economic development in Muslim lands; and they in particular are seeing record growth, given that they are thought now to number more than 300 institutions in various parts of the world, with total assets exceeding 300 billion dollars – expected to grow to a trillion dollars by 2014. Their assets have risen at an average rate of 24% p.a. over the past decade, and even on a conservative estimate are expected to maintain that average rate of growth during the next few years (www.asharqalawsat.com).

This, then, is the context in which the present study aims to explore Islamic finance instruments and experiences in the oil and gas sector, and to discover how those instruments and experiences have been strengthened in the age of economic and financial globalization, helping to meet the development needs of the oil and gas sector in Islamic countries, and how they have realized the developmental aims of the Islamic banks and financial institutions and as a consequence brought about ongoing development in the Arab and Islamic countries.

A. ACTUAL FUNDING BY ISLAMIC BANKS AND FINANCIAL INSTITUTIONS IN THE OIL AND GAS SECTOR

Actual funding by Islamic banks and other financial institutions reflects a trend towards financing the oil and gas sector, whether directly or indirectly, since this is viewed as a pivotal sector in the Arab and Islamic countries generally and in the Gulf Cooperation Council (GCC) states in particular. In the light of the information we have we will therefore refer below to a number of test cases of Islamic banks and other financial institutions being involved in this sector, and also to the finance instruments they have used.

1 – Financing Malaysia's PETRONAS Oil Company:
Petronas Trading Corp is a subsidiary of the Malaysian Government oil company PETRONAS. This company entered into a contractual arrangement with the Islamic Development Bank to purchase, on Islamic *murabaha* terms, crude oil worth USD 100 million from member states of the Islamic Conference Organization in order to refine it and then resell it (Dwabh, 2007).

2 – Financing the Turkish PETROL OFISI Company:
Turkey's Petrol Ofisi made a contractual *murabaha* arrangement to buy oil derivatives worth USD 92.5 million over two years through joint Islamic financing. Those participating in the financing of this deal were Kuwait Finance House (to the tune of 15 million dollars), both Citibank and the Turkish Evkaf

Bank, and three other Islamic banks. Kuwait Finance House and the Turkish Evkaf Bank acted as sponsors and partners in this deal (www.islamicfi.com/arabic/news).

3 – Financing the Bahrain Oil Company (BABCO):

The Bahrain Oil Company (Babco) needed to develop its own oil refinery in order to reach further world markets with products meeting the latest international technical and environmental specifications, and thus to secure greater returns. It therefore set about getting joint financing from Islamic and conventional banks that amounted to about USD 1.011 billion, coming from 9 regional and international banks, so as to complete its tasks in 2007 (www.islamicfi.com/arabic/news).

4 – Financing the UAE's DOLPHIN Energy Company:

Dolphin is a company that invests in energy, and it is partnered by the Mubadala (Exchange) Development Company, owned by the Abu Dhabi Government, and by the French Total and American Occidental Petroleum (www.islamicfi.com/arabic/news). In view of its efforts to extract gas from Qatar's North Field, process it at Ras Laffan and then deliver the dry gas through a pipeline to the UAE, the company depended on funding shared between Islamic and conventional banks in order to achieve its mission by the end of 2006.

The company estimated its funding needs over a 4-year period at USD 3.45 billion, with one billion to come from Islamic financing and the remaining 2.45 billion dollars to come from conventional financing. There were 14 banks participating in the Islamic financing deal. In the lead were 5 major banks: the Dubai Islamic Bank, the Gulf International Bank, ABN Amro, BNP Parisbas and City Group. Additionally, there were several other institutions, namely: HSBC Amanah, Barclays Bank, Natixis Banque Populaire, Societe General, West LB, Export Development Canada (EDC), Sao Paulo, AMA China Construction Bank and Commercial Bank of Qatar.

That deal is the largest Islamic finance deal in the oil and gas sector, with the Islamic finance taking two forms: *ijara* (leasing) and *istisna* (manufacturing finance). For the company, acting for the participating financial institutions, sets up various prior-leasing agreements that govern the relationship between the two parties as regards using that financial regime (www.asharqalawsat.com).

5 – Financing the Indonesian PERTAMINA Oil Company:

Indonesia's Pertamina, one of South-East Asia's biggest oil and gas companies, is owned by the Indonesian Government, operates refineries, produces oil derivatives and markets them alongside other commercial activities to do with energy and petrochemicals. Even though Indonesia has large reserves of oil, Pertamina imports substantial quantities of oil from the Middle East, particularly from Kuwait and Saudi Arabia. In order to obtain the oil supplies it needs, the company generally relies on short-term credit facilities.

(www.islamicfi.com/arabic/news) Within this framework the company obtained joint Islamic finance amounting to USD 322 million in order to purchase crude oil under the Islamic *murabaha* system for 6 months from several banks, foremost among these being the Kuwaiti House of Finance, which acted as co-sponsor of the deal, contributing towards it to the tune of USD 40 million, along with a number of other banks including the Dubai Islamic Bank and HSBC.

6 – Financing the EQUATE Petrochemicals Company:

Equate is a Kuwaiti company dealing in petrochemicals. This company managed to obtain credit facilities amounting to USD 600 million for its activities by way of joint financing spread among Islamic and conventional banks. The Kuwaiti House of Finance arranged the Islamic finance tranche of 300 million dollars in accordance with Islamic *ijara* and *murabaha* formulas, with 9 regional and international banks participating in that tranche. Meanwhile the Kuwait National Bank – the second partner to the deal – arranged a tranche, also of 300 million dollars, from those commercial banks that took part in financing the company. Eleven regional and international banks combined forces to provide that conventional tranche of money (www.islamicfi.com/arabic/news).

7 – ATLAS International's Islamic Energy Portfolio:

ATLAS International structured and put forward a Shari'a-compliant investment portfolio valued at USD 100 million in the domain of energy in a broad sense of the term (www.islamicfi.com/arabic/news). This covers oil and gas, power generation and distribution and water purification. The investment portfolio depends on the periodic distribution of dividends, as well as on the possibility of achieving capital gains through registering and offering energy companies' stocks on the Arab stock markets.

Other Finance Experiences / Instruments Used in the Oil and Gas Sector:

a. GCC Energy Fund

The GCC Energy Fund is the first privately-financed equity fund in the energy sector in the GCC states. The Emirates National Oil Company Ltd (ENOC) (reference 3), with its headquarters in Dubai, is the joint founding sponsor and investor in this Fund. (http://www.ameinfo.com/ar). The aim of the GCC Energy Fund, whose capital amounts to USD 300 million and which enjoys the sponsorship of the Gulf International Bank (GIB) and Standard Bank and is run by GCC Energy fund Managers Ltd, is to accumulate capital, initiate commercial transactions and select investments through acquiring stock in companies and operational projects in a range of energy sector activities. In doing so, it structures, monitors, designs and implements appropriate working strategies for each investment.

b. The Yanbu National Petrochemicals Company (YANSAB)

The Yanbu National Petrochemicals Company (YANSAB) is one of the companies affiliated to the Saudi Arabian Basic Industries Corporation (SABIC). The latter holds 55% of YANSAB's capital, amounting to SAR 5626 billion, while its partners in the Ibn Rushd and Tayef companies own 10%. Around 35% of the company's capital, represented by 39375 million shares valued at SAR 2 billion, has been put to an IPO at a nominal value of SAR 50 per share, with a minimum of 10 and a maximum of 5000 shares.

Through this financing YANSAB is endeavouring to build up its industrial complex at Yanbu Industrial City, scheduled for completion by mid-2008. This is to enable it to enter a phase of annual energy production in excess of 4 million metric tons of petrochemical products, thereby raising the productive and export capacity of Saudi Arabia's petrochemicals industry (www.alriyadh.com).

c. The International Company for Petroleum and Natural Gas Pipelines

The Egyptian-Kuwaiti Holding Company, in partnership with 4 major Egyptian companies operating in the petroleum industries, set up the 'International Company for Petroleum and Natural Gas Pipelines' with a starting capital of USD 400 million and a paid-up capital of USD 200 million, offering 400,000 of the company's shares on the Egyptian stock market at USD 100 per share. The company aims to cover domestic demand for gas pipelines as well as to export the surplus to foreign markets (www.alriyadh.com/net).

d. The Direct Investment Fund in the Egyptian Petroleum Sector

This fund is under study by the Kuwaiti Al-Kharafi Investment Group. It has been allocated a paid-up starting capital of USD 1 billion and is aimed at direct investment in exploration, drilling, extraction and piping of gas and in the petrochemicals industry in regional markets generally. The Kharafi Group's share of the Fund's capital will be somewhere between 50% and 60% of its gross capital, while the Fund's investments will be 40% within Egypt and 60% outside the country (www.alriyadh.net).

e. The Global Investment House (Global) Energy Fund

The Global Investment House (Global) is seeking to offer a new publicly-subscribed investment fund that will specialise in energy, oil and oil derivatives, with capital inputs varying between a minimum of 5 million and a maximum of 100 million Kuwaiti dinars. The Fund's capital is to be invested in energy projects and companies, whether in the State of Kuwait, elsewhere in the GCC region or in North Africa (www.ameinfo.com).

B. BOLSTERING THE ROLE OF BANKS AND ISLAMIC FINANCIAL INSTITUTIONS IN FINANCING THE OIL AND GAS SECTOR

Oil demand forecasts indicate that the world will need 92 million barrels per day (mbpd), after a peak of 93 mbpd in 2010, then rising to 110 mbpd by 2020, as compared with 77 mbpd in 2002.

The Middle East enjoys abundant resources and huge reserves of oil and gas. The region has a 69% share of the total of 1050 billion barrels representing proven reserves of crude oil worldwide in 2001; it also has a 31% share of worldwide oil production and around 50% of exports (Bright, 2003).

Furthermore, investment in oil and gas in the Arab Gulf countries has seen continuous growth, amounting to USD 30 billion during 2005, with the value of single contracts going above USD 350 million. This year is expected to set the pace for new contracts (reference 23), making quite clear just how important this region is for both the present and the future state of the world oil and gas market. How important oil is for the GCC states is evident from the fact that it accounts for roughly a third of total GNP and about three quarters of government revenues and of annual exports. These countries, as a group, command a share of about 45% of the world's reserves of oil and 25% of crude oil exports, as well as owning at least 17% of the world's proven reserves of natural gas (Fasano et al,. 2003).

All of the above reflects the promising role of the oil and gas sector – and in particular the fact that it still dominates the communications sector, in which it stands alone in having about 96% of the world energy market allocations. It also accounts for 28% of energy supplies to industry, of which 9% goes to electricity generation Ahmad and Hassan (2007).

As part of the market for primary energy resources as a whole, natural gas has had a constantly growing share. It increased from 18% in 1973 to around 23% in 2001. Several factors have combined to drive this increase: rising oil prices and a big need on the part of energy consuming countries to achieve self-sufficiency; the diversification of energy sources; and the environmental concerns that have been manifested in recent times in connection with global warming and climate change. Natural gas has the lowest carbon density when compared with other fossil fuels, followed by oil and then by coal. The use of natural gas has increased also as a result of the general growth of the petrochemicals industry, being the most important raw material in a sizeable group of different products (Bright, 2003).

Such significant growth in the oil and gas sector has opened up the possibilities for banks and other Islamic financial institutions to bolster their role in assisting development. This is by participating in a way that is much more than just financing this sector, which in general needs the considerable sums of money which these banks and institutions are able to provide. Specifically, it is by joint and mutual financing undertaken between one Islamic bank and another, thanks to the features which distinguish such banks and institutions in their ability to offer financing formulas such as involve risk-spreading and other activities that traditional banks and financial institutions do not offer. Under these formulas the oil and gas sector can be financed as follows, through the various stages of exploration and drilling, extraction, oil refining or gas treatment, and distribution:

1. MURABAHA

By this method banks and Islamic financial institutions can fund the commodity needs of companies in the oil and gas sector against a profit margin on the price for which a commodity was bought. The companies in question pay their dues over a suitable time span, as set out below:

I. Crude oil is purchased and then sold to refineries by *murabaha*.

II. Refined oil is purchased and then sold to oil distributors by *murabaha*.

III. Crude natural gas is purchased and then sold to gas treatment plants by *murabaha*.

IV. Dry or uncontaminated gas is purchased and then sold to gas distributors by *murabaha*.

V. Oil and gas companies' requirements, either in the form of fixed assets (capital financing) or in the form of production and operational equipment (working capital financing), are purchased by *murabaha*, in respect of whatever stage it may be (exploration and drilling, extraction, oil refining or gas treatment, or distribution). In this way *murabaha* provides oil and gas companies with whatever they require in the way of either fixed or moveable assets, thereby developing the Muslim Arab economy, which is in need of people to promote investment and create projects.

2. MUSHARAKA

By this method banks and Islamic financial institutions can fund companies in the oil and gas sector as follows:

I. *Musharaka* ending in transfer of ownership

This way banks and Islamic financial institutions can fund oil and gas companies through partial funding of the company's capital, with the company itself funding the other part. The company can then be entitled to purchase the share of the banks and Islamic financial institutions according to a timetable, taking over ownership as the banks and Islamic financial institutions withdraw and assign ownership in full to the company.

In the *musharaka* contract there is agreement as to both parties' share of the capital, on the term of the *musharaka* and on how the withdrawing company's share is to be paid up, how administration and settlement is to be carried out and how profit and loss is to be distributed. Profit can go in accordance with what has been agreed, while loss is borne in proportion to the capital share. Such an arrangement encourages companies to achieve profits so as to be in a position to withdraw, and thus to have a speedy transfer of ownership, particularly if the *musharaka* contract contains a promise by the banks and Islamic financial institutions to sell their share in full to the company if it has paid off its own share.

The oil or gas company will be a trustee of the funds it has at its disposal, and the banks and Islamic financial institutions are entitled to get guarantees against incompetence or negligence. A company does not guarantee the funding provided to it by banks and Islamic financial institutions, and so the *musharaka* venture is all about gains and losses. Thus *musharaka* ending in transfer of ownership is one means by which projects can own their profits, something which whets the appetites of companies to own capital, and thereby to increase production and expand their developmental horizons.

II. Setting up and Taking Shares in Oil and Gas Companies:

This way banks and Islamic financial institutions set up or take shares in companies that invest in the oil and gas sector. Through setting up companies Islamic banks can take a share in part of their capitalization and offer the remaining part to public subscription. This provides significant long-term financial resources to these banks and other institutions which can then be directed towards direct investment in the oil and gas sector in one or more of the stages of production and distribution. Setting up or taking shares in companies furthermore activates the capital markets. Thereby the banks and Islamic financial institutions, through implementing investment projects in that vitally important sector, are contributing towards realizing their developmental goals, the effect of which is to serve the economy of the Arab nation.

3. MUDHARABA

By this method banks and Islamic financial institutions can fund companies in the oil and gas sector as follows:

I. Cash Funding

By this method banks and Islamic financial institutions provide the necessary funding to oil and gas companies in one or more of the stages of production and distribution. Both parties agree on a division of whatever profit may arise from the investment according to shares specified between them, and it is up to the banks and Islamic financial institutions to lay down conditions ensuring that their funding is used properly. If losses occur the banks and Islamic financial institutions are fundamentally obliged to bear them, provided there has been no proven incompetence, negligence or infringement on the part of

the company; and in the event of there being losses, the company will get nothing at all in return for its efforts, whatever they may have been. Both sides, then, lose what they have contributed. In this way Islam puts money and labour on an equal footing: they make profits together, or they lose money together, with the capital provider losing his capital and the employer losing his labour.

This is what motivates the capital provider, as represented by the banks and Islamic financial institutions, to be keen to choose viable projects, while also motivating oil or gas companies to want to achieve profits so as to have earnings commensurate with their efforts and to maintain their standing in the marketplace.

II. Oil and Gas Investment Funds

While banks and Islamic financial institutions are setting up investment funds they collect funds from small investors as much as from the big players, and those funds are then invested in the oil and gas sector - in one or more of the stages of production and distribution – either through direct investment (that is, material investment) or through indirect investment (that is, through investing in the shares of that sector).

The funds are issued in return for investors' money in the form of investment documents in accordance with the Shari'a-compliant *mudharaba* regime (Dwabh, 2007). These documents represent a joint share of *mudharaba* capital, and they contain what is the predominant *mudharaba* formula as approved by the Muslim legal experts: this is *mudharaba* with multiple capital providers, so that more than one person provides the money while some single entity provides the labour. This formula, moreover, is inserted under restricted   *mudharaba*, since the investment path has to be directed specifically towards oil and gas operations (Izz al-Din, 1993).

4. ISTISNA'

Istisna' means manufacturing items of goods to order using materials to be supplied by the manufacturer, and to particular specifications and at a specified price, the payment of which may be by immediate or deferred lump sum or in instalments.

For three of the schools of Islamic law (the Maliki, Shafe'i and Hanbali schools), *istisna'* is a type of forward buying which is called 'forward buying for industry', while the Hanafi school takes the view that it is a self-contained contract. This difference shows itself in the fact that the Hanafis do not make it a condition that the cost should me met when the contract is agreed, but it may rather be deferred or paid in instalments. With the other three schools, however, all the forward buying conditions have to be applied, the most important one being that the cost must be met at the time of the contract (Omar, 2004).

So it is that banks and Islamic financial institutions can draw up an *istisna'* contract between themselves and oil and gas distribution companies (the customer) under which the banks and Islamic financial institutions are obliged to deliver oil derivatives after refining, or gas that has been treated, to distribution companies according to set specifications, on a specified delivery date and at a price agreed upon to be paid in instalments. The banks and Islamic financial institutions then make an independent contract with the oil refining or gas treatment companies requiring the particular company to manufacture or produce the goods in place of the first contract, and to deliver them within a specified time period that takes precedence over the period stated in the first contract, and at a price which is

lower than the first price by a margin representing the return to the banks and Islamic financial institutions as per that contract. These banks and Islamic financial institutions pay this price in several payments or as a cash lump sum, after which they take possession of the goods from the refining company (the seller or manufacturer) by the due date for delivery and then consign them to the distribution company (the purchaser or the party that has commissioned the production of the goods). The banks and Islamic financial institutions can also empower anyone they see fit to take delivery of and then forward the goods, although any such procedures must be in the form of real rather than just paper transactions (Ahmad, 2000).

Istisna' thereby manages to create a perfect circle integrating those who have the expertise with those who have the capital. It provides oil refining or gas treatment companies with the capital outlay for their production needs, while they pay off this debt through their products by surrendering whatever goods have been agreed upon to the banks and Islamic financial institutions. The *istisna'* regime furthermore enables the banks and Islamic financial institutions to achieve   a dual function and purpose in both funding and broadening the base of beneficiaries by way of financing both the seller and the purchaser: this not only brings in the profits they seek but also helps to achieve economic and social development for the Arab and Muslim countries.

5. TA'JIR TAMWILI (LEASE FINANCING)

Through this method the banks and Islamic financial institutions purchase the capital assets needed by oil and gas companies (Dwabh, 2007) and lend them out to them through a lease funding contract, under which those companies may make use of the leased assets against payment of a fixed rental amount. Such a contract should, however, be linked to one of the following arrangements:

I.   An independent deed of gift (*hiba*) in respect of the capital asset leased to the company, this being dependent upon the company's paying the rental amount in full.

II. The promise of a *hiba* in respect of the capital asset leased to the company once the company has paid the rental amount in full.

III. The promise to sell the leased asset to the company, once it has paid the rental amount in full, at a price that has been agreed with it.

IV. Giving the company the option of purchasing the leased asset at market price once the lease period is over, after the company has fully paid all the rental instalments due during that period.

V. Giving the company the right to exercise the option of owning the leased asset at any time it wishes: the leased asset may be sold to the company in due course of time at market price under a new contract, or as may be agreed with the company at the time of the sale.

Thus *ta'jir tamwili* (lease financing) enables oil and gas companies to have their capital asset requirements met at one or more stage of production and distribution without needing to set aside part of their own funds for the purchase and thus to put a burden on their budgets. As a result they have greater liquidity and therefore better chances of using their funds for the most worthwhile of their other activities and, by doing so, securing further good investments.

II.   CONCLUSIONS AND RECOMMENDATIONS

What the above study shows, in summary, is that there has been a trend for banks and Islamic financial institutions to finance the oil and gas sector, with a leading part being played by the Kuwait Finance House. These institutions have for this depended on joint financing, in particular with the traditional banks. We have observed, too, that the forms of financing that the banks and Islamic financial institutions have depended on have been *murabaha, ijara* and *istisna'*. *Murabaha* and *ijara* have played the biggest part as financing vehicles, but alongside them there has been indirect investment in the capital markets through investment in the shares of oil and gas companies. All this is in addition to other experiments made by traditional banks and financial institutions depending on traditional financing and on setting up companies and investment funds which invest in the oil and gas sector, whether directly or indirectly. When we consider and review just how strong a role Islamic banks and other financial institutions have had in financing the oil and gas sector, we find that it is possible for Islamic methods of finance to make an effective contribution towards developing oil and gas – quite apart from developing investments in the banks and financial institutions themselves, and thereby helping to bring about the desired development in the Arab and Muslim countries.

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Hemimegalencephalic Variant of Epidermal Nevus Syndrome: Case Report

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Abstract- The epidermal nevus syndrome (ENS) is an uncommon neurocutaneous disorder in which epidermal nevi are found in association with congenital abnormalities of the brain, eye, and/or skeleton. The association of epidermal nevi and neurologic abnormalities was comprehensively described by Schimmelpenning 4 in 1957. Pavone et al. 7 (1991) identified a homogeneous variant of ENS with hemimegalencephaly, gyral malformation, mental retardation, seizures and facial hemihypertrophy.

We found 57 previously reported cases with the hemimegalencephalic variant of epidermal nevus syndrome, in which the most frequent associated features are severe epilepsy, in about half of cases with neonatal onset, mental retardation/developmental delay, ocular/visual involvement, and facial abnormalities. Here we report a 11-year-old boy with the neurologic variant of ENS with hemimegalencephaly, facial asymmetry, seizures and mental retardation.

Index Terms- Epidermal nevus syndrome, Hemimegalencephaly, Epilepsy, Mental retardation; Organoid nevus syndrome;

I. INTRODUCTION

Epidermal nevus syndrome (ENS) is an uncommon neurocutaneous disorder in which epidermal nevi (EN) are found in association with congenital anomalies of the brain, eye, and/or skeleton.[1] Most of EN are present at birth and frequently follow the lines of Blaschko. Their incidence has been reported to range from 1 to 3 per 1000 live births, without gender predominance.[2,3] In 1957 Schimmelpenning and subsequently Feuerstein and Mims described the association between these skin lesions and central nervous system involvement, additionally reporting ocular and skeletal abnormalities. The ENS, also known as 'organoid nevus syndrome', 'linear sebaceous nevus syndrome', 'Schimmelpenning–Feuerstein–Mims syndrome', 'Solomon syndrome', and 'Jadassohn's nevus phakomatosis', is now considered a heterogeneous group of disorders [4].

Hemimegalencephaly (HME) is the commonest brain malformation associated with ENS. The association of HME and EN together with the presence of hemifaciallipoma, epilepsy and mental retardation was first described in 1955 by Gross and Uiberrak [5,6]; subsequently, Pavone and colleagues found out further 17 patients with similar neurological findings in a literature review of 63 ENS cases.[7]

II. CASE REPORT

This 11 year old boy was the second of three children born to unrelated parents. The other two siblings were reported to be healthy. During Pregnancy, mother took tablets for aborting this child. Delivery was Institutional and uneventful. Birth weight was 2.5 kg. Developmental milestones were delayed in all domains. Child started to have right focal seizures from six months of age and is still persisting inspite of multiple antiepileptics. Child is now on adequate dose of four antiepileptics.

Child has facial asymmetry, weakness and motor clumsiness of the right arm and legs. Tone and power was reduced in corresponding limbs. Babinski sign was positive on right side.

Skin examination revealed a epidermal nevus on left forehead deviating toward left bridge of nose Fig.(C). Neurological examination revealed a macrocephaly (head cirumference = 54.5 cm, left (30cm) > right (24.5cm); Hypertrophy was observed in left upper and lower limb. Left thumb size was bigger than right thumb. BERA revealed left sided profound sensori-neural hearing loss.
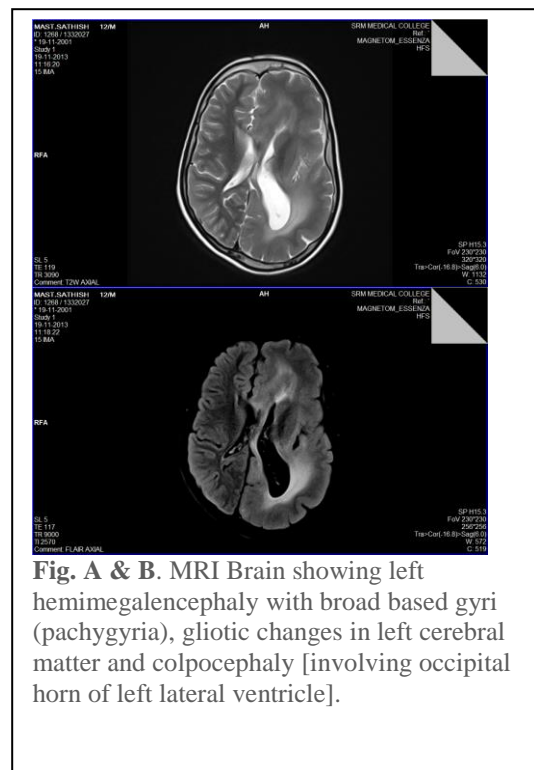

Fig. A & B. MRI Brain showing left hemimegalencephaly with broad based gyri (pachygyria), gliotic changes in left cerebral matter and colpocephaly [involving occipital horn of left lateral ventricle].

Binnet-kamet Scale demonstrated a moderate mental retardation (I.Q- 50). Ophthalmologic examination was unremarkable. Oral examination showed enamel hypoplasia with crowding of teeth. The EEG showed a severe subcortical seizure activity. Magnetic Resonance Imaging showed large left cerebral hemisphere with pachygyria and colpocephaly, altered signal intensity of white matter in left cerebral hemisphere. (Fig. A & B). Skin biopsy of the lesion showed thickening of epidermis resembling squamous papilloma.

III. DISCUSSION AND CONCLUSIONS

Epidermal nevus a congenital hamartoma of embryonal ectodermal origin is classified on the basis of component; namely sebaceous, apocrine, eccrine, follicular, or keratinocytic. An estimated one third of individuals with epidermal nevi have involvement of other organ systems; hence, this condition is considered to be an epidermal nevus syndrome (ENS).

ENS is a congenital neurocutaneous disorder characterized by linear epidermal nevus with significant involvement of the nervous, ophthalmologic, and/or skeletal systems.[2].

Fig.C : Showing epidermal nevus on left forehead deviating along left bridge of nose.

Clinical manifestations include Linear epidermal nevus, which may be bilateral, asymptomatic patches or plaques, with the head and the neck, as well as the trunk, being the most common sites. The lesions may have verrucous appearance and lack erythema and pruritis.

Neurological manifeststion include hemiparesis contralateral to skin and hemimeglencephaly lesion, mental retardation, seizures, and movement disorder. Eye manifestations include lipodermoid, coloboma, choristoma. Skeletal manifestations include kyphoscoliosis. Intracranial and/or intraspinal lipomas may occur. The basis of the cause may be the activation of an autosomal dominant lethal mutation that survives by mosaicism. These cells might survive only by being adjacent to normal ones.

Diagnosis: MRI can be used to evaluate intracranial involvement. MRIs may show cerebral atrophy, dilated ventricles, hemimegalencephaly (usually ipsilateral to the major skin lesions and contralateral to neurologic deficits), pachygyria, or enlarged white matter. EEG findings are abnormal in approximately 90% of patients. In almost all patients who had focal paroxysmal electroencephalographic abnormalities, the epileptiform focus was ipsilateral to the major skin lesions. Pavlidis E et al [8] in his case report and literature review has reported 57 cases of ENS in which the hemimegalencephaly was ipsilateral to the skin lesion in majority of children similar to our case report.

Treatment: No ideal medical therapy for the cutaneous lesions of epidermal nevus syndrome exists. Therapy is often challenging. Epidermal nevi are usually resistant to topical and intralesional steroids, dithranol, topical retinoids, and cryosurgery. Topical calcipotriol may be effective. The concomitant skeletal and ocular defects such as cataracts and lid anomalies can usually be surgically repaired. The CNS defects may lead to epilepsy which is usually resistant to antiepileptics. Periodic EEG and skeletal radiological analysis may be important to the long-term care of the child.

Genetic counselling

The child and/or the family should be reassured that ENS is not a genetic disorder that can be passed to future children.

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Advanced College Surveillance System

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Abstract- Among the various technological devices and systems, GSM based tracking system will pass complete information about the student and there activities. The RFID system is utilized as a board module to attach the parts of the object say student (identity card, tag, etc.) and follow the object then and there. In this paper, a novel fingerprint reconstruction algorithm is used to automate the whole process of taking attendance for staff and lecturers, manually which is a laborious and troublesome work and waste a lot of time, with its managing and maintaining the records for a period of time is also a burdensome task. The designed model is studied under laboratory scale and the results are analysed.

Index Terms- GSM, RFID, Renesascontroller, finger print reconstruction, Security, GSM modem.

I. INTRODUCTION

In recent year there is need for better way for maintaining student and staff database in institutions, to bring safe and secure campus for better learning environment. Campus as already taken smart steps such as planning, training staff and implementing technology and yet serious maintenance and security vulnerabilities persist.

In certain application such as various activities related to staff and student of the institution, during analysis, data collected on various files, decision points and transactions handled manually. It's time consuming and costly.

College should haven for education. New development in surveillance technology using controller based maintenance in college/ universities. Improves security as well as enhance operations and minimize time.
To overcome drawback of manual system we propose a new digitalized maintenance system.

II. LITERATURE SURVEY

In previous work [1], GSM and RFID based college maintenance system is used where RFID tag provided, when is read by reader, it compares the codes with predefined codes in the machine, based on correctness it sends an acknowledgement to the parents of that student and it also maintains a record of check in and check out timings of student, which can be further transferred to the administrator via network systems.
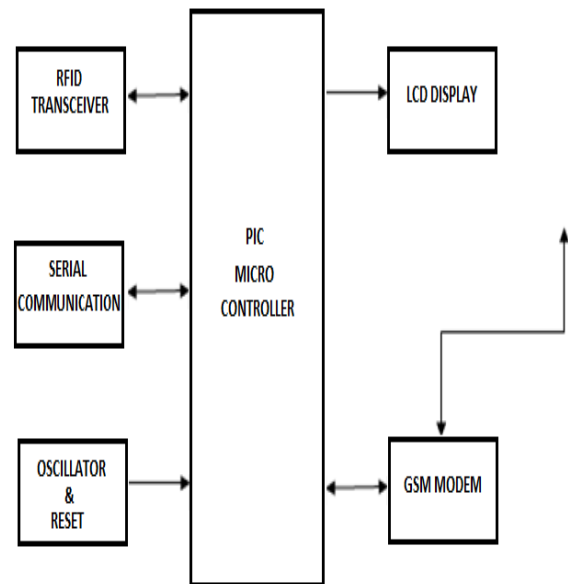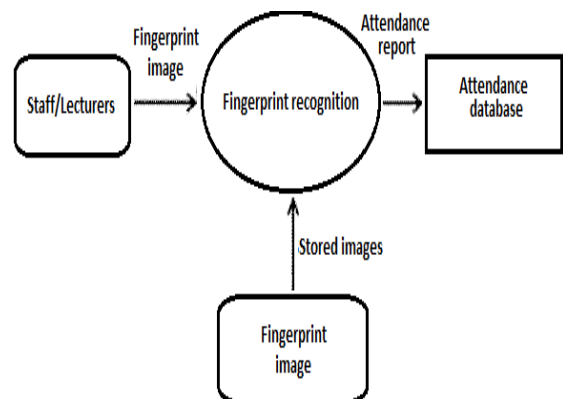

Fig1. Block diagram

In [2] a novel fingerprints reconstruction algorithm reconstructs the phase image from minutiae. The proposed reconstruction algorithm is used to automate the whole process of taking attendance for staff and lecturers, manually which is a laborious and troublesome work and waste a lot of time, with its managing and maintaining the records for a period of time is also a burdensome task.

Fig2. Attendance management system

So current research which has been presented above is developed and additional enhancement is carried out in our approach, to overcome the limitation, to provide more efficient and reliable system we propose certain improvements by combining the above two functional blocks which yields more

stable, reliable and high performance system for college maintenance.

III. DESIGN AND CONSTRUCTION DETAILS OF PREVIOUS WORK

b. *RFID*

Many types of RFID exist, but at the highest-level, we can classify RFID devices into two classes namely, active and passive tags. Active tags require power source either connected to powered infrastructure or use energy stored in an integrated battery. In the laterals, tag's lifetime is limited by stored energy, balanced against the number of read operations.

Fig3. RFID reader and tag.

c. *GSM System*

The GSM system has been recognized as a successful cellular phone technology for diverse applications including the ability to roam worldwide with the certainty of being able to operate on GSM networks in exactly the same way. GSM achieved this by the digital TDMA (time division multiple access) approach. By adopting this technique, more users can be accommodated within the available bandwidth. In addition to this, ciphering of the digitally encoded speech is adopted to retain privacy. Using the earlier, it is possible for anyone with aid of scanner receiver to listen the calls and a number.

d. *GSM Modem*

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

e. *GSM network interface*

The network structure is defined within the GSM standards. This facilitates the information interchanges can take place. It also enables to a large degree that network elements from different manufacturers can be used.
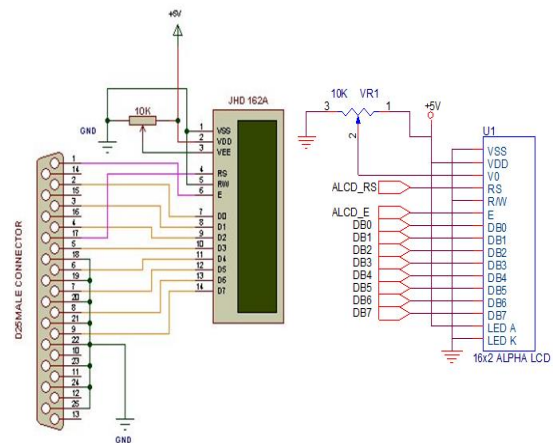
Although the interfaces for the GSM cellular system may not be as rigorously defined as many might like, they do at least provide a large element of the definition required, enabling the functionality of GSM network entities to be defined sufficiently.

Fig4. GSM module

f. *Alpha-numeric LCD display*

A liquid crystal display is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly. In liquid crystal displays (LCDs) of liquid crystal technology is the most common applications. An advanced VGA computer screen from the pervasive wrist watch and pocket calculator, this type of display has evolved into an important and ambidextrous interface.

Fig5.ALCD architecture

g. *PIC micro controller*

PIC 16F77A PIC micro controller is used for this project. The PIC micro controller program reads the data of RFID. The micro controller programming is done using embedded C, a middle level language for control units. The PIC microcontroller 16F877A has an operating speed Max 20 MHZ, voltage (2-5.5v). Memory consists of flash program RAM, EEPROM and data memory. Displayed data of RFID are transferred into RS 232, which is interfaced with microcontroller through MAX232.
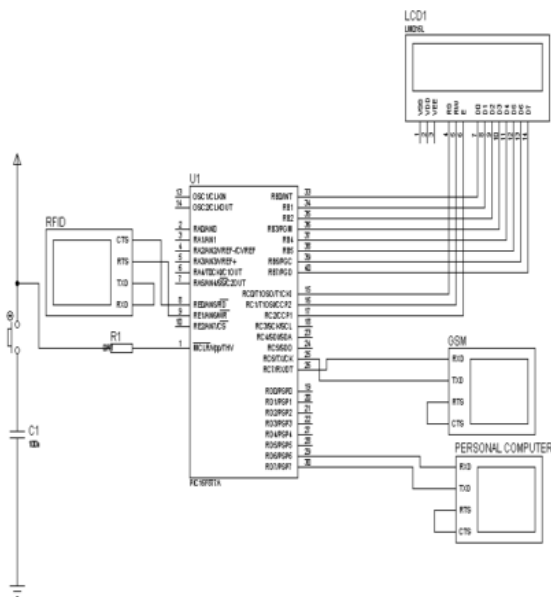
Fig6. Circuit diagram

IV. PROPOSED WORK

In our paper, we illustrate a compact system which can perform following functions

1. Biometric authorization (finger printing)
   - For staff/lecturers attendance validation, after verification controller sends remainder message about timetable of current day.
   - Certain rooms in colleges needs extra security, such rooms can be monitored automatically by allowing the persons (lab assistants attenders etc.) with limited access.
2. RFID

In institutions, students should be present for predefined hours.

   - Student's attendance is updated in the database and also informing about the Students check in and checkout timings for his/her parents through a message sent from the controller using GSM.
   - At the end of semester if any student has a shortage of attendance controller brings into notice of student's parents by sending a message, whose GSM mobile numbers are stored in database.
   - Due status of student
     - ➢ E-notice to students by keeping a remainder (beginning 3 to 4 days) half yearly or quarterly (say any month when college starts) by making use of his/her unique code (usn).
     - ➢ An atm deposit facility to pay fees as his/her dues are cleared, Hence after his/her deposit automatically e-receipt is generated for confirmation of payment
3. GSM

   - If any student wishes to know his due details, instead of going to college, by using GSM SMS facility with his/her usn as code, controller verifies and replies to respective students.
   - Instead of manual notice system, notices can be displayed using GSM on the display systems located in some remote area.

4. AUTOMATED PERIODIC BELL

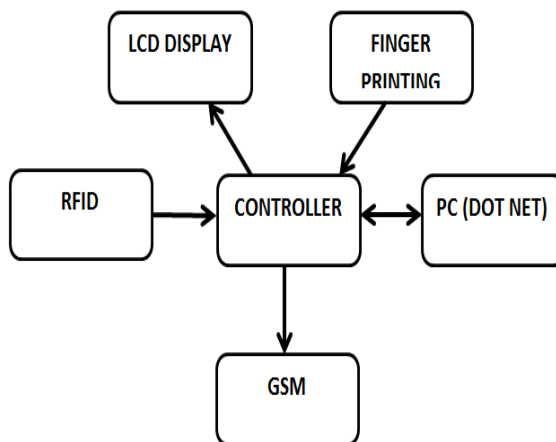To generate periodic alarms automatically according to the reprogrammed timings.

Fig6. Block diagram of proposed system

Fig7. Snap shot of proposed system

V. RESULT AND DISCUSSION

In our system we have combined RFID, fingerprint and GSM are connected with Renesas controller and varying data is sent to GSM modem which is displayed in LCD. Through this experiment and implementation, we came to know that, staff can be monitored using fingerprint module, students can be monitored using RFID and GSM module is used for transceiving SMS's for assigned function. Our system can be extended to monitor the objectives and also can be controlled the hijacking further consequences.

VI. ADVANTAGES AND DISADVANTAGES

➤ *Merits*

- Attendance is checked and validated automatically, so that paper usage is reduced.
- Conventional methods followed in institutions are time consuming and costly these can be overcome by adopting our proposed method.
- Manual periodic bell are replaced by system which generates periodic alarms automatically according to the reprogrammed timings.
- Conventional notice boards eradicated completely by smart board displays.

➤ *Demerits*

- Implementing new technology leads to more complexity and costly at initial stages.

VII. CONCLUSION

The efficient utilization of the RFID, fingerprint and GSM technology is successfully designed and implemented. The observations clearly showed that the accuracy and security level may be extended to the public level. Finally our system yields more reliable and faster processing as real time system

VIII. FUTURE WORK

Though there are more advantages in our system, but still there exist some limitations in our system.
In Finger print
- Require large processing power for image enhancement
- Require large memory capabilities for storage

In RFID
- Mis-usage of tag by students false/fake attendance

Every system has its own advantages and disadvantages, in eliminating these limitations we propose some enhancements.
Inspite of RFID and Fingerprint we can also make use of wireless Iris recognition system
But using iris system we identify certain limitations like
- Its costly at installation and maintenance
- Time consuming
- Not applicable to large community like institutions

Therefore to eliminate fake/false attendance of students in RFID tag we make use of object counter as shown[3].

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Hard ware implementation of area and power efficient Carry Select Adder using reconfigurable adder structures

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Abstract- In data processing processors, adder is a basic digital circuit. To perform any arithmetic operation, addition is the basic operation to perform. To compute fast arithmetic operations adder must be fastest. CSLA is the fastest adder when compare to RCA and CLA. From the structure of CSLA it is observed that there is a scope to reduce area further so that power can be lowered [3-4]. This paper proposes a new architecture of CSLA using reconfigurable adder structures (RAS) and is compared with regular SQRT CSLA, CSLA using BEC [7]. The experimental analysis shows that the proposed CSLA using RAS is having advantages regarding area and power.

Index Terms- area efficient, low power, CSLA, BEC, SQRT CSLA and RAS

I.INTRODUCTION

In VLSI designing, most important areas of research is to design area and power efficient data processors. In digital adders, speed of addition operation depends on the propagation of carry bit through the adder. In a conventional RCA sum of each bit is generated only after the previous bit has been summed and carry propagated into the next position. Next position bits has to wait until it found the previous carry bit takes longer computation time to perform addition. For fast addition operation CLA is designed which occupies more area and consumes more power. CSLA is designed to compromise between small delay and large area of CLA and longer delay and small area of RCA [5-6].

This paper provides comparison of existed designs and proposed design of CSLA using RAS. This paper structured as follows. Section II deals with literature survey. Section III deals with CSLA using dual RCA. Section IV explains about CSLA using BEC. Section V deals with CSLA using RAS. Section VI deals with the delay and area evaluation of all groups of CSLA using RAS. Simulation results are mentioned in section VII. Results are compared and analyzed in section VIII and section IX concludes the work. Section X indicates the future scope of this work

II.LITERATURE SURVEY

By generating multiple sums by considering Cin=0 and Cin=1 and then select a carry to generate sum so that the carry propagation delay has been overcome which is proposed by o.j.Bedrij.1962 [1].

Maximum carry propagation delay in last stage of carry save adder is to be reduced through BEC method which is proposed by Ram Kumar.2010 [2]. Instead of using dual RCA in SQRT CSLA, BEC method is proposed which replaces one set of RCAs

thus the total area and power will be reduced to great extent which is proposed by B. Ram Kumar and Harish.M.kittur.2011 [7].

III.CSLA USING DUAL RCA

Structure of 16 bit SQRT CSLA using dual RCA is shown in fig.1. It consists of five groups with different sizes of RCAs. The delay and area evaluation of basic blocks used in regular CSLA is shown in table I[7]. The numerals with in square braces of fig.1. specifies the delay.

The structure of group2 is shown in fig.2. Consists of two sets of 2 bit RCA. Selection input c1 arrival time is t=7 which is later than s2[t=6] but earlier than s3[t=8]. Therefore sum2[t=10] is the summation of delay of mux[t=3]. Similar evaluation can be done for remaining other groups[7]. Area and delay evaluation of all groups listed in table II.

TABLE I

Delay and area of basic blocks of CSLA using dual RCA

Basic blocks	Delay(number of gates in critical path)	Area (total number of gates)
XOR	3	5
2:1 MUX	3	4
Half adder	3	6
Full adder	6	13

TABLE II

Delay and area count of groups in 16bit CSLA using dual RCA

Group	Delay (number of gates present in critical path)	Area (number of gates)
Group 1	7	26
Group 2	13	57
Group 3	16	87
Group 4	19	117
Group 5	22	147

Fig.1. 16bit SQRT CSLA using dual RCA

Fig.3. 16bit SQRT CSLA using BEC

Fig.2. Delay and Area evaluation of Group2 of CSLA using dual RCA

Fig 5. Delay and Area evaluation of Group2 of CSLA using BEC

H is a Half Adder
F is a Full Adder

Fig.4. BEC logic

the 16 bit SQRT CSLA using BEC is shown in fig.5. Area and delay evaluation of each group is done manually by referring table1 and listed in table III.

Fig.6. Reconfigured Half Adder

IV. SQRT CSLA USING BEC

Structure of 16bit SQRT CSLA using BEC logic is shown in fig.3. It also consists of 5 groups with different sizes of RCAs. Structure of BEC logic is shown in fig.4. In regular CSLA second set of RCA with Cin=1 can be replaced with BEC logic to reduce the area and power of conventional CSLA[]. Group2 of
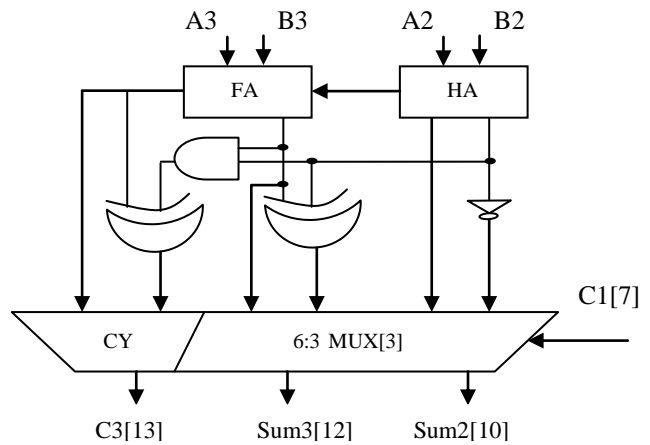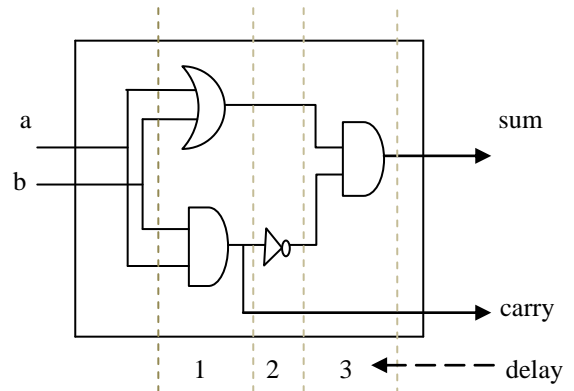
Group2 of 16bit SQRT CSLA using RAS is shown in fig.9. Total gate area and delay for each group is mentioned in table V.
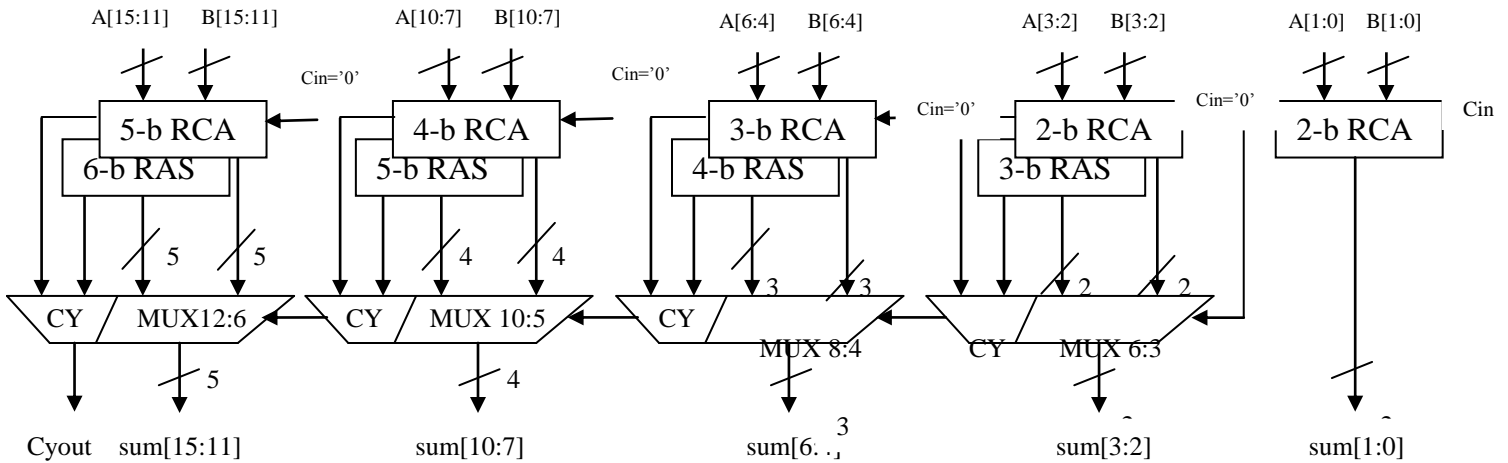

Fig.7. 16bit SQRT CSLA using RAS

TABLE III

Delay and area count of groups in 16bit CSLA using BEC

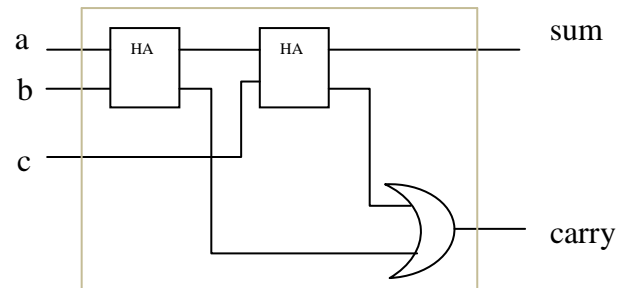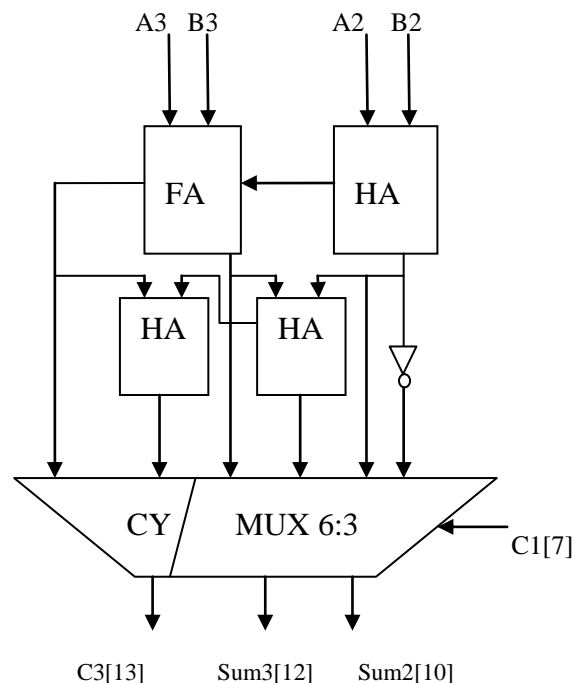| Group	Delay (number of gates present in critical path)	Area (number of gates)
Group 1	7	26
Group 2	13	43
Group 3	16	66
Group 4	19	89
Group 5	22	112

Fig.8. Reconfigured Full Adder

V. SQRT CSLA USING RAS

Simple gate level modification of half adder, full adder blocks can reduces total gate area without affecting the delay. Reconfigurable half adder and full adder structures are shown in fig.6.and fig.8.

The structure of SQRT CSLA using RAS is shown in fig.7. First set of RCAs consists of all full adders can be replaced with reconfigurable adder structures hence the area reduced further. The second set of RCA of regular CSLA, BEC logic of CSLA using BEC is replaced with RAS logic consists of only half adders and not gate. Hence the area reduced furthermore. The delay and area evaluation of reconfigurable adder structures is shown in table IV. Calculation procedure of delay and area is similar to the methods followed for SQRT CSLA using BEC[7].

Fig.9.group 2 of CSLA using RAS

TABLE IV

Delay and area of reconfigurable structures of CSLA using RAS

Basic blocks	Delay(number of gates in critical path)	Area (total number of gates)
2:1 mux	3	4
Half adder	3	4
Full adder	6	9

TABLE V

Delay and area count of groups in 16bit CSLA using RAS

Group	Delay (number of gates present in critical path)	Area (number of gates)
Group 1	7	18
Group 2	13	34
Group 3	16	51
Group 4	19	68
Group 5	22	85

VI. DELAY AND AREA EVALUATION METHODOLOGY OF 16-BIT CSLA USING RAS

Evaluation of delay and area of each group of the proposed structure is similar to the evaluation of SQRT CSLA using BEC. SQRT CSLA using RAS uses reconfigurable structures of half adder and full adder having less number of gates, hence area reduced to great extent.

Estimation of maximum delay of 16 bit CSLA using RAS is similar to the delay estimation of 16 bit CSLA using BEC[7]. By referring Tables III and V, it is clear that, the gate count in CSLA using RAS is reduced without affecting the delay.

Area evaluation has been determined as follows

Group1:-
Gate count=FA*2 =9*2=**18**

Group2:-
Gate count=FA+(HA*3)+NOT+(MUX*3)
=9+(4*3)+1+(4*3)=**34**

Group3:-
Gate count=(FA*2)+(HA*4)+NOT+(MUX*4)

=(9*2)+(4*4)+1+(4*4)=**51**

Group4:-
Gate count=(FA*3)+(HA*5)+NOT+(MUX*5)

=(9*3)+(4*5)+1+(4*5)=**68**

Group5:-
Gate count=(FA*4)+(HA*6)+NOT+(MUX*6)

=(9*4)+(4*6)+1+(4*6)=**85**

(ref table IV for individual gate areas of RAS blocks)

VII. SIMULATION RESULTS

	Value
a[15:0]	9e5a
b[15:0]	ca97
cin	0
sum[15:0]	68f1
carryout	1

Sumout with Cin='0'
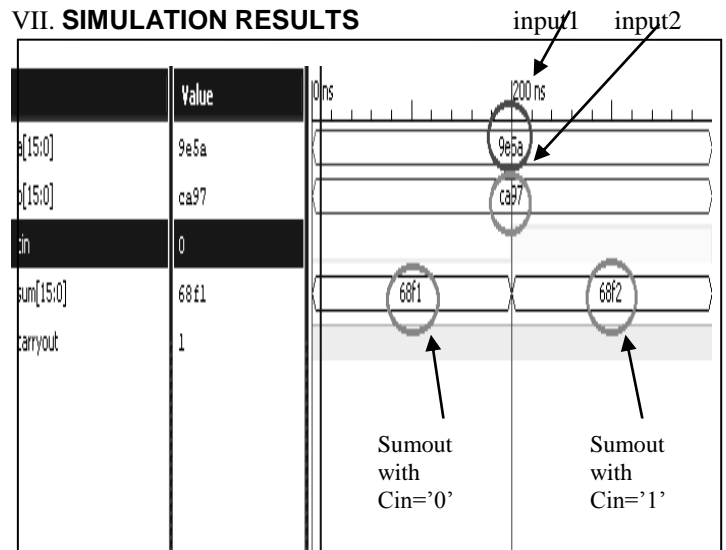
Sumout with Cin='1'

input1   input2

TABLE VI

Comparison of CSLA using RAS with CSLA using BEC and CSLA using dual RCA

Group	16 bit SQRT CSLA using dual RCA	16 bit SQRT CSLA using BEC	16 bit SQRT CSLA using RAS
Group 1	26	26	18
Group 2	57	43	34
Group 3	87	66	51
Group 4	117	89	68
Group 5	147	112	85
total	434	336	256

VIII.RESULT ANALYSIS

Efficiency of the SQRT CSLA can be evaluated using the comparison of number of gates utilized in the existing adders and the proposed SQRT CSLA using RAS which is shown in table VI. From the comparison table it is clear that, the proposed SQRT CSLA using RAS saves 178 gate areas than regular CSLA, 80 gate areas than SQRT CSLA using BEC without affecting gate delays. So the proposed design has given better results as compared to existing designs.

IX.CONCLUSION

A simple gate level reconfigurable approach of full adder and half adder is proposed in this paper to reduce the area and power of SQRT CSLA. The proposed CSLA with RAS is simple, low power, area efficient for VLSI implementation.

X.FUTURE SCOPE

This proposed design is implemented for 16bit word size and parameters like area, delay, power are evaluated. This work can be further extended for 32 bit, 64 bit, 128 bit and so on.

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Differential Biomass Allocation to Above-Ground Plant Components by Two Invasive *Sida* Congeners in a Dry Tropical Peri-Urban Vegetation in India

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Abstract- Differing biomass allocation strategy could be a necessary plant-trait associated with invasive weeds in an alien environment. The present study focused on exploring differential biomass allocation pattern as an invasive plant-trait in the two pantropical invasive malvaceous weeds *Sida acuta* Burm f. and *Sida cordifolia* L. in an anthropic peri-urban vegetation in Indian dry tropics. Eighty plant individuals from each of these two congeners across their varying developmental stages were clipped off from their dominantly growing study site at the polluted bank of Kali river in Bulandshahr (28º04' & 28º43' N lat. and 77º08' & 78º28' E long.) in the national capital region of India. The plant individuals were separated into different above-ground plant components (leaf, stem-axis, branch and reproductive parts that included flowers/capsules/seeds). They were oven-dried, weighed and the mass fractions of each component estimated as its dry weight relative to total above-ground plant biomass. In the weedy and ruderal vegetation here, these two congeners with > 47 g m^{-2} above-ground biomass and about 25% importance value index, showed striking difference in their biomass allocation strategy. *S. acuta* had significantly higher leaf and branch mass fractions, reflective of its profuse branching habit and differentially higher biomass investment for photosynthetic function. In contrast, *S. cordifolia* had significantly larger reproductive mass fraction (for increased colonizability) and stem-axis biomass. The overall stem biomass was comparable, indicative of common perennial tendency for firm establishment in the alien environment. With increasing plant size, both the congeners showed a similar trend of decreasing leaf mass fraction and increasing mass fractions of support and reproductive structures. Biomass allocation was significantly influenced by species, growth phase (reproductive/vegetative) and ontogeny. Thus, the present study indicated a strategic differing pattern of biomass allocation to different plant components by the congeners *S. acuta* and *S. cordifolia* which could be attributed to their invasibility in dry tropical environments.

Index Terms- *Sida acuta*, *Sida cordifolia*, invasiveness, plant-traits, species diversity

I. INTRODUCTION

Alien plant invasions have become a serious environmental problem and have posed a grave threat to native biodiversity all over the earth ecosystem [1]. The anthropogenic interventions in tropics, as a result of increasing human population and improved trans-continental transport, can be considered to have significantly contributed to the increasing pressure of the invasive species here. The peri-urban vegetation in Indian dry tropics has been reported to be infested with a considerable number of alien plant species [2, 3]. Commonly, these invasive alien plants grew aggressively and formed monocultures e.g. *Parthenium hysterophorus, Ageratun conyzoides* [4, 5] by outcompeting native plants. Such invasive alien species are well known for their ability to alter species composition, structure and function of invaded ecosystems, and have caused huge environmental damage and economic loss worldwide [6]. Identifying the factors and plant traits that contributes to the success of invasive plants is very important for predicting and controlling potentially invasive plants, and it becomes further important in the light of the fact that the mechanisms underlying invasiveness are still not well elucidated [7-9].

The ability to differentially allocate biomass to its different organs has been attributed to the considerable success of invasive plants in dry tropics [10]. Some workers have reported that successful invasive species allocated more biomass to leaves and less to roots than native species [11, 12]. This pattern of biomass allocation may promote irradiance capture, which may not be a growth deterrent under dry tropical conditions, but, it may impair water and nutrient absorptions, indicating that invasions may be environment dependent. Thus, environmental conditions must be taken into consideration while identifying the traits contributing to invasiveness. It has been suggested that successful invasive species must either use limiting resources more efficiently than native species or use them selectively at times when they are unavailable to the latter, provided life history traits are similar between invasive and native species [13]. In addition, phylogenetic relatedness of invasive and similarity of ecological conditions should also be taken into account and the comparisons of traits across these could be a powerful approach to evaluate the invasiveness of alien plants [7, 8, 14].

Identification of the traits that are associated with invasiveness of alien species is often considered useful for better prediction of the potential of invasive species before introduction or for their control in the existing environment [15]. The present work was undertaken to understand the characteristic invasibility of two common alien congeners of *Sida* (family Malvaceae) in peri-urban vegetation in Indian dry tropics in terms of their differential biomass allocation pattern. *Sida acuta* Burm f. frequently dominates improved pastures, waste and disturbed places roadsides [16]. The plant is native to Mexico and Central

America but has spread throughout the tropics and subtropics [17]. *Sida cordifolia* L. is commonly known as Indian ephedra because of the presence of alkaloid ephedrine. This plant is native of tropical and subtropical part of Africa, Australia, China, Nepal, Sri Lanka, Bhutan and Pakistan [18]. While *S. acuta* is considered as an exotic invasive weed in India [19-21], *S. cordifolia* is a naturalized/invasive weed here [19].

The major objective of this work was to investigate: (i) the structure of *Sida*-infested vegetation in a dry tropical peri-urban anthropo-ecosystem, and (ii) variation of morphological traits and allocation of biomass to different above-ground components in the congeners *Sida acuta and Sida cordifolia* at a site.

II. MATERIAL AND METHODS

Study area

The present study area was Bulandshahr (28º04' & 28º43' N lat. and 77º08' & 78º28' E long.) located at distance of 72 km from Delhi in the western part of Uttar Pradesh, 237.44 m above sea level. The district of Bulandshahr lies between Ganga and Yamuna rivers. It is about 84 km in length and 62 km in breadth. The district is known as 'milk belt' of UP. The soil of the district includes broad belt of excellent alluvial soils formed from depositions by the Ganga and Yammuna river. The Bulandshahr city shares common boundaries with Meerut, Ghaziabad, Gautam Budh Nagar (Noida) and Aligarh city on its various sides. The Ganga separates it from Moradabad and Badaun city and Yamuna separates the city from Haryana state and Delhi.

The vegetation here mainly comprised of mosaic of annual weeds and ruderals. Several exotic weeds intruded in this area included *Sida* and its congeners. Bank of polluted Kali (black) river (KRB) was selected that witnessed abundant growth of *Sida acuta* and *Sida cordifolia*. This river originates in Muzaffarnagar and after a long journey merges with Ganga in Farukhabad district. This KRB site witnessed the intensive dumping of urban and sewage wastes. Agricultural fields, however, lay along its banks in the adjoining areas. A stretch of 2 km along the bank of the Kali river was selected for intensive sampling in this study.
The climate of the study area has three major seasons: rainy (Jul-Oct), winter (Nov-Feb) and summer (Mar-Jun). The mean maximum and minimum temperature was in the month of June (41.5 ºC) and January (8.0 ºC) respectively. Annual mean rainfall was 642.3 mm received mostly during monsoon (Jul-Oct).

Plant sampling

The phytosociological data analysis of the study site was done through a total of 50 randomly laid quadrats (each 25×25 cm) across the bank of Kali river. For density estimation of grasses, every emergent tiller was considered as one individual. Above-ground biomass (AGB) was estimated through ground level harvesting. The aboveground tissues were considered to be within the quadrat, if their roots lay in the quadrat. In the laboratory, the plant samples were washed, dried at 60-80℃ for 36-48 hrs and weighed. The above-ground biomass of species was used as a dominance measure. Importance value index (IVI) of each species was calculated according to Curtis and McIntosh [22] and relative importance value index (RIVI) as IVI/3 according to Risser and Rice [23].

Species diversity

Species IVI was plotted against species rank (highest to lowest) [24] for the study of the dominance diversity structure of the vegetation under study.
α diversity of the vegetation (species count, Shannon-index, Simpson index) was estimated according to Magurran [25] and Gupta and Narayan [26]. β diversity was estimated by dividing the total number of species at the site by the average number per sample [27].

Biomass sampling of *Sida* congeners

Eighty individuals of each of the two species *Sida acuta* and *Sida cordifolia* were randomly selected from the study site (KRB). The plant individuals were picked at varying stages of their growth. The selected individuals were cautiously clipped off from the plant base. Shoot length (SL) of the fresh individuals was measured from the top to bottom of the plant at the study site. Basal diameter of all plant individuals was also measured. All plant individuals were taken to lab, separated into different above-ground components *viz.* stem (stem-axis and branch), leaves and reproductive parts (flowers and capsules), oven-dried at 80̊ C for 48 hrs and weighed. Biomass allocation to different components was characterized by fractions (stem-axis mass fraction, SAMF; branch mass fraction, BMF; stem (stem-axis + branches) mass fraction, SMF; leaf mass fraction, LMF and reproductive part (flowers + capsules) mass fraction, RPMF), expressing the biomass of each organ relative to that of the total above-ground biomass.

One hundred fresh leaves of matured plant individuals were randomly collected from study site. Leaf area of all leaves was measured by digital leaf area meter (Systronics).

Statistical analysis

The relation of plant's above-ground component mass fractions (stem mass fraction; SMF, leaf mass fraction; LMF and reproductive part mass fraction; RPMF) to total above-ground biomass (log scale) was studied. A linear regression model was used to evaluate the biomass allometric relationships between each component mass fraction and total above-ground biomass [28]. To determine the biomass allocation changes with increasing plant size, all aboveground component mass fractions (SAMF, BMF, SMF, LMF and RPMF) were regressed against shoot length. For this, a second order polynomial regression model was used. The difference in the morphological traits of plants was statistically (SPSS 17.0) examined by t-tests (two tailed).

All plant individuals were separated over two developmental phases (reproductive and vegetative). Contribution of biomass to different above-ground components by *S. acuta* and *S. cordifolia* was compared at both developmental stages. With the help of two-way ANOVA (SPSS 17.0), effect of phase, species and their interaction on dependent variables (SAMF, BMF, SMF, LMF and RPMF) was measured keeping phase and species as fixed factors.

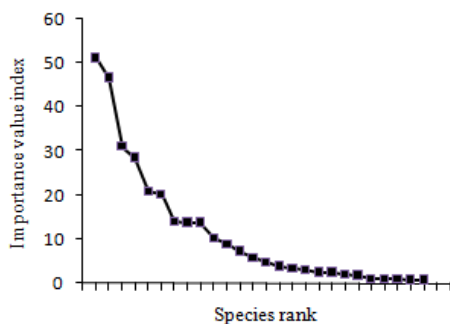## III. RESULTS

Vegetation structure

A total of 27 angiospermic plant species distributed over 11 families were recorded in this study. Poaceae, Malvaceae and

Table 1. Plant species, their density (D, individuals m^{-2}), frequency (F, %), above-ground biomass (AGB, g m^{-2}) and relative importance value index (RIVI) at Kali river bank site in a dry tropical peri-urban region.

Species	Family	D	F	AGB	RIVI
Cynodon dactylon (L.) Persoon	Poaceae	248	84	28.9	17.0
Sida acuta Burm F.	Malvaceae	151	100	39.1	15.6
Digitaria adscendens (Kunth) Henrard	Poaceae	121	84	18.6	10.3
Parthenium hysterophorus L.	Asteraceae	51	92	27.8	9.5
Sida cordifolia L.	Malvaceae	67	100	8.4	6.9
Malvastrum tricuspidatum (R. Br.) A. gray	Malvaceae	67	74	11.2	6.7
Peristrophe bicalyculata (Retz.) Nees	Acanthaceae	34	84	5.7	4.7
Cassia obtusifolia L.	Leguminosae	14	66	12.1	4.6
Dactyloctenium aegypticum (L.) P. Beauv.	Poaceae	44	58	7.0	4.6
Cassia occidentalis L.	Leguminosae	5	58	8.9	3.4
Abutilon indicum (L.) Sweet	Malvaceae	8	66	4.3	3.0
Croton bonplandianum Baillon	Euphorbiaceae	5	66	1.9	2.4
Poa annua L.	Poaceae	10	34	3.5	1.9
Acrachne racemosa (Roemer & Schultes) Ohwi	Poaceae	9	34	1.5	1.6
Others (13 species)	-	29	-	10.4	7.9

Leguminosae were the dominant families which contributed to 56% of the recorded flora. *Sida acuta* was the most dominant annual forb in this vegetation that showed highest plant biomass occupancy (39.1 g m^{-2} AGB) (Table 1). Both congeners *S. acuta* and *S. cordifolia* showed presence across all randomly sampled quadrats (Frequency 100%), AGB > 47 g m^{-2} and contributed to about 25% of total RIVI of the vegetation. The second most frequently encountered flora was *Parthenium hysterophorus* (> 90%). The third congener *Sida ovata* occupied 17th rank in terms of RIVI. However, the most dominant species in terms of RIVI was the grass flora *Cynodon dactylon* (RIVI 17.0).

Species diversity in terms of Shannon index was 1.16, Simpson index 0.09, and β diversity was 2.31. The dominance-diversity curve indicated a major share of resource between *Cynodon dactylon*, *Sida acuta* accounting for > 32% of RIVI followed by *Digitaria adscendens* and *Parthenium hysterophorus* that accounted for about 20% of RIVI (Figure 1). A meagre share of resource was equitably distributed among the majority of tail-ending species.

Figure 1. The dominance-diversity structure of vegetation at Kali river bank site in a dry tropical peri-urban region

Plant level traits

The mean stem-axis biomass of *S. Cordifolia* was significantly higher than that of *S. acuta* (p < 0.05) (Table 2). In contrast, the number of branches and branch mass fraction (BMF) was higher in *S. acuta*. The number of leaves as well as leaf mass fraction (LMF) was also higher in *S. acuta*. However, the leaf biomass per leaf was higher for *S. cordifolia*. In contrast to BMF and LMF that were higher in *S. acuta*, RPMF was recorded higher for *S. cordifolia* (p < 0.001).

The biomass partitioning to leaves (LMF) and reproductive parts (RPMF) differed significantly with the change of species of *Sida* in the present study (Table 3). The variation in SAMF, SMF and LMF appeared significantly influenced by growth phase (vegetative and reproductive). The SMF was also influenced by species-phase interaction (p < 0.001).

Allocation pattern

Biomass investment to different plant components in both *S. acuta* and *S. cordifolia* varied with vegetative/ reproductive phase of development (Fig. 2). In vegetative phase of *S. cordifolia*, SAMF and BMF together accounted for over 50% of its total AGB. On the other hand, in *S. acuta* the leaf component alone accounted for over 60% of its total AGB. In reproductive phase *S. acuta* contributed more to branches (22%) and leaves (32%) while *S. cordifolia* invested more to reproductive parts (30%).
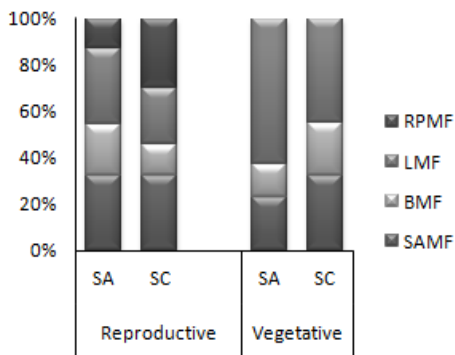
Table 2. Plant-level traits (mean ± SE) of *Sida acuta* and *Sida cordifolia* in a dry tropical peri-urban region.

Traits	*S. Acuta*	*S. cordifolia*	p value (t Test)
Shoot length (SL) (cm)	28.90 ± 2.52	27.63 ± 2.54	ns
Basal diameter (BD) (cm)	0.42 ± 0.04	0.40 ± 0.03	ns
Basal area (BA)	0.22 ± 0.04	0.17 ± 0.02	ns
BD/SL ratio	0.016 ± 0.001	0.019 ± 0.001	< 0.01
Branch no.	13.32 ± 0.93	10.64 ± 0.72	< 0.05
Total leaf no.	167.28 ± 30.38	99.9 ± 15.15	≤ 0.05
Total no. of flowers	183.35 ± 41.10	148.95 ± 25.37	ns
Total no. of capsules	180.85 ± 46.85	117.17 ± 25.91	ns
No. of rep parts (flowers + capsules)	273.78 ± 62.87	251.48 ± 46.56	ns
Stem-axis biomass (g)	1.31 ± 0.28	2.53 ± 0.53	<0.05
Branch biomass (g)	2.54 ± 0.65	1.41 ± 0.49	ns
Stem biomass (g)	3.34 ± 0.78	3.03 ± 0.69	ns
Leaf biomass (g)	1.26 ± 0.19	1.10 ± 0.20	ns
Single leaf biomass (g)	0.008 ± 0.001	0.012 ± 0.001	<0.001
Reproductive part biomass (g)	2.00 ± 0.52	3.27 ± 0.66	ns
Shoot biomass (AGB) (g)	5.61 ± 1.23	5.76 ± 1.23	ns
Stem-axis mass fraction (SAMF)	0.27 ± 0.01	0.31 ± 0.01	ns
Branch mass fraction (BMF)	0.23 ± 0.02	0.12 ± 0.01	<0.001
Stem mass fraction (SMF)	0.41 ± 0.02	0.41 ± 0.02	ns
Leaf mass fraction (LMF)	0.52 ± 0.03	0.39 ± 0.03	<0.01
Rep part mass fraction (RPMF)	0.14 ± 0.02	0.25 ± 0.02	<0.001
Leaf area (cm^2)	6.18 ± 0.57	7.56 ± 0.75	ns

Table 3. Results of the ANOVA of the different above-ground biomass components of *Sida acuta* and *Sida cordifolia* in response to their vegetative and reproductive phases.
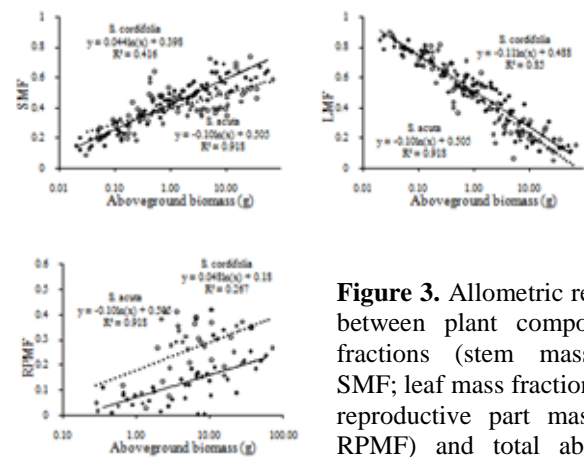
Variable	Source	df	Sum of sq	F	P
SAMF	Species	1	0.056	2.455	0.119
	Phase	1	0.096	4.188	0.042
	Interaction (species × phase)	1	0.021	0.931	0.336
BMF	Species	1	0.007	0.503	0.48
	Phase	1	0.005	0.368	0.545
	Interaction (species × phase)	1	0.133	9.694	0.002
SMF	Species	1	0.011	0.827	0.364
	Phase	1	1.093	85.123	<0.001
	Interaction (species × phase)	1	0.184	14.326	<0.001
LMF	Species	1	0.101	5.726	0.018
	Phase	1	5.287	300.416	<0.001
	Interaction (species × phase)	1	0.0001	0.004	0.949
RPMF	Species	1	0.353	32.94	<0.001
	Phase	1	-	-	-
	Interaction (species × phase)	1	-	-	-

Figure 2. Biomass allocation to different above-ground components by *Sida acuta* and *Sida cordifolia* at two different developmental phases (reproductive and vegetative). Codes: SAMF, stem-axis mass fraction; BMF, branch mass fraction; LMF, leaf mass fraction; RPMF, reproductive part mass fraction; SA, *Sida acuta*; SC, *Sida cordifolia*.
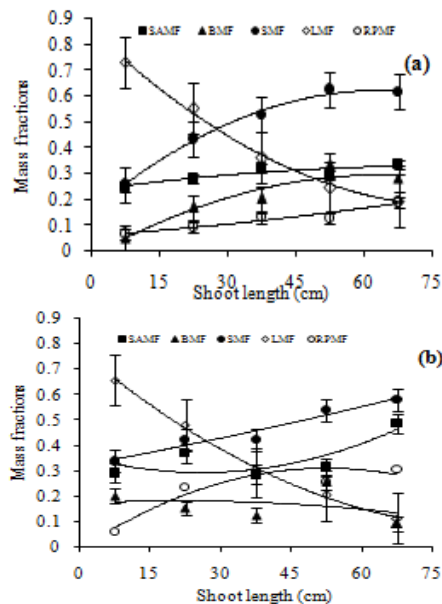
The LMF declined significantly with increasing plant size of both the *Sida* congeners (Fig. 3), albeit it was higher for *S. acuta*, particularly at higher plant sizes. In contrast to decreasing pattern of LMF, SMF and RPMF increased significantly with above-ground biomass. However, at lower plant size, SMF was higher for *S. cordifolia* while at higher plant sizes, it was higher for *S. acuta*. Compared to the SMF and LMF, RPMF was significantly greater ($p < 0.001$) for *S. cordifolia*.

Figure 3. Allometric relationships between plant component mass fractions (stem mass fraction, SMF; leaf mass fraction, LMF and reproductive part mass fraction, RPMF) and total above-ground biomass (log scale) of *Sida acuta* (filled squares and solid line) and *Sida cordifolia* (open circles and dotted line) at Kali river bank site in a dry tropical peri-urban region.

The allometric relationship among the different above-ground plant components were studied by regression equation of second order polynomial (figure 4). Despite LMF being higher in *S. acuta* compared to *S. cordifolia*, both the weed species showed

a comparable declining trend with ontogeny. The SMF increased with plant size in both the species although the increase was recorded to be higher for *S. acuta* in the mid of the growth stages. However, the reproductive allocation (RPMF) was significantly higher in *S. cordifolia* compared to *S. acuta*.

Figure 4. Variation of stem-axis mass fraction (SAMF), branch mass fraction (BMF), stem mass fraction (SMF), leaf mass fraction (LMF) and reproductive part mass fraction (RPMF) in relation to shoot length of (a) *Sida acuta* and (b) *Sida cordifolia* at Kali river bank (KRB) site in a dry tropical peri-urban region. Curves represent best-fit second-order polynomial regression. Regression equations and R^2 values are presented in table 4.

IV. DISCUSSION

A discerning difference in biomass allocation strategy in the congeners *S. acuta* and *S. cordifolia* with strong perennial tendency was evident from this study in the weedy and ruderal vegetation along the bank of polluted Kali river in the Indian dry tropical region. The mosaic of vegetation in the presently studied peri-urban region [26] indicated occurrence of variously dominated weeds in different patches of vegetation, some of which are turning invasive and some naturalized/invasive. This increasing dominance of *Sida* congeners, particularly *S. acuta* in the studied peri-urban vegetation indicated its growing influence across the various anthropo-ecosystems in the peri-urban region here.

The major invasive characteristic of *S. acuta* could be attributed to its larger leaf number as well as allocation to leaf component (> 50%), that possibly allowed it to outcompete other incumbent weeds/ruderals through its presumably higher

Table 4. Regression equations and R^2 values of stem -axis mass fraction (SAMF), branch mass fraction (BMF), stem mass fraction (SMF), leaf mass fraction (LMF) and reproductive part mass fraction (RPMF) with shoot length of *Sida acuta* and *Sida cordifolia* at Kali river bank (KRB) site in a dry tropical peri-urban region, as presented in figure 4.

Species	Regression equation	R^2 value
S. acuta	SAMF = $-2E-05x^2 + 0.002x + 0.232$	0.778
	BMF = $-8E-05x^2 + 0.010x - 0.027$	0.920
	SMF = $-0.000x^2 + 0.014x + 0.153$	0.992
	LMF = $0.000x^2 - 0.017x + 0.862$	0.996
	RPMF = $1E-05x^2 + 0.001x + 0.061$	0.931
S. cordifolia	SAMF = $1E-04x^2 - 0.005x + 0.357$	0.639
	BMF = $-2E-05x^2 + 0.001x + 0.171$	0.012
	SMF = $8E-06x^2 + 0.003x + 0.317$	0.942
	LMF = $9E-05x^2 - 0.015x + 0.772$	0.996
	RPMF = $-0.000x^2 + 0.012x - 0.005$	0.880

photosynthetic ability [7, 29, 30]. The remarkably higher biomass allocation to photosynthetic tissues is intelligible from the mean LMF of 0.46 reported for herbaceous species by Poorter and Nagel [31], 0.26-0.41 for herbaceous weeds in dry tropics by Gupta [2], 0.27-0.38 for invasive weeds *Chenopodium murale* [10] and *Ageratum conyzoides* [4]. Its LMF, however, declined with ontogeny although it remained higher than *S. cordifolia*, as evinced at higher plant sizes, in particular (fig. 3).

The biomass allocation to support structure was comparable in both the *Sida* congeners. However, the trend of biomass investment to main axis and branches varied significantly in these two congeners. In *S. acuta* the number of branches and differential biomass investment to branches (BMF) (reflective of its profuse branching) was significantly higher. In contrast, the biomass allocation to stem-axis was higher for *S. cordifolia*. This characteristic difference in allocation indicated a perennial tendency [10] of these two alien invasive congeners for successful establishment and naturalization in this dry tropical region. The overall stem allocation (SAMF + BMF) was not significantly different. Thus, the growth strategy of greater biomass investment to stem component for firm establishment in the newly invaded area can be attributed to the perennial tendency of this herbaceous weed to shrubby life-form, as reported by some taxonomic workers in the neighbouring regions [32, 33]. The SMF of these two congeners compared well with the range reported for the herbaceous weeds in the region [10], but higher than that reported for herbaceous species [31]. Besides higher stem-axis allocation in *S. cordifolia*, single leaf biomass and reproductive allocation (RPMF) were also significantly higher. Thus, pronounced invasive character of *S. cordifolia* could be attributed to higher biomass investment to reproductive structures [34, 35]. This alien weed is reported to have higher number of seeds (~10 /capsule) compared to *S. acuta* (5-8 /capsule) [36] and seed size as observed in this study.

Reproductive allocation to the scale of 30% of its total AGB corroborates its strategic invasive and expansionist capacity [10].

The study reflected shift in allocation strategy varying with the growth phase, species type and ontogeny. This indicates a high plastic response of the congeners of *Sida* that facilitated its adaptation and establishment under alien environments. With increasing plant size, while LMF declined on one hand SMF and RPMF increased with the other. Across different plant sizes over varying developmental stages, the higher RPMF for *S. cordifolia* at all ontogenetic points and higher LMF for *S. acuta* reflected a distinguishable difference in their invasive growth strategy. Different plant-traits are often suggested to promote invasiveness of different species, as a universal syndrome of traits to characterize all invasive species appears too simplistic [37-40].

In conclusion, the study reflected a strategic alteration in biomass allocation to different plant components by the congeners *S. acuta* and *S. cordifolia*. While *S. acuta* allocated differentially higher biomass to photosynthesizing leaf component, *S. cordifolia* allocated relatively higher biomass to reproductive structural components. Biomass allocation varied with ontogeny, growth phase (vegetative/reproductive) and plant species.

ACKNOWLEDGEMENTS

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Use of Hybrid Shunt Active Power Filter for Power Quality Improvement

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Abstract- Supply of uninterrupted sinusoidal voltage of constant magnitude is the most important aim of the electrical distribution system, but this task is very tough and is becoming more difficult due to the increasing size and number of nonlinear and poor power factor loads. Some of the most important causes of poor power quality is harmonics and high neutral current. Harmonics and neutral current deteriorate power quality as well as affect the system at large and makes significant impact. In this paper a control scheme based on PI controller has been proposed for generation of reference current to mitigate the harmonics and neutral current for two different topologies. The proposed methodology not only reduces the complexity but also offers simplicity to implement and increases reliability of the system. Analysis and simulation of three phase four wire shunt active power filter under balanced and unbalanced load condition have been done using MATLAB/ SIMULINK and detailed simulation level results have been presented to validate the proposed methodology*.*

I. INTRODUCTION

The quality of electrical power is one of the major growing concerns for utility as well as consumers. The increasing use of non linear and poor power factor loads such as Power electronic converters, Arc furnace, Adjustable speed, uninterruptable power supplies etc. are the responsible factor for the power quality issues. The most important factors of poor power quality are harmonics and high neutral current. Poor power quality factors such as switching phenomena results in oscillatory transients in the electrical supply, connection of high power non-linear loads contributes to the generation of current and voltage harmonic components, voltage sags are generated due to the high economical losses, short-term voltage drops (sags) can trip electrical drives or more sensitive equipment, leading to costly interruptions of production etc.

To ensure the good power quality at utility and consumer end, above mentioned factor must me controlled in prescribed limit. Power quality can be controlled to a greater level by merely controlling two most important factors i.e. harmonics and neutral current. Different topologies and methods have already been proposed to nullify and control these two factors. A control strategy for a three phase four-wire shunt active filter is proposed in [1]. In this work the power circuit is based on a three-leg IGBT inverter, with the dc-link composed by two capacitors connected in split. A disadvantage of this topology is the fact that

the size of the dc-link capacitors has to be over-dimensioned. An Experimental investigation of the operation characteristic of 3-phase 3-wire APF in 3- phase 3-wire balanced/unbalanced and 3-phase 4-wire balanced/unbalanced system is proposed in [2]. It is found that three-wire active filter is only suitable for three-phase three-wire system. N. Mendalek in [3] proposes the modeling and control of a 3-phase 4-leg split capacitor shunt active power filter topology. A simulation model is proposed here, in which shunt active power filter is implemented to compensate harmonic content and neutral current in three phase four wire system.

It comprises of voltage source inverter with dc link capacitor, PI controller and hysteresis band for pulse generation. In this paper section I gives the Introduction, II presents problem identification, III describes proposed methodology, IV consists of Control strategy, V consists of Simulation results and at last section VI gives the conclusion.

II. PROBLEM IDENTIFICATION

The definition of power quality given in the IEEE dictionary originates in IEEE Std 1100: Power quality is the concept of powering and grounding sensitive equipment in a manner that is suitable to the operation of that equipment. Power quality problems are common in most of commercial, industrial and utility networks. Natural phenomena, such as lightning are the most frequent cause of power quality problems. Switching phenomena resulting in oscillatory transients in the electrical supply, for example when capacitors are switched, also contribute substantially to power quality disturbances. Also, the connection of high power non-linear loads contributes to the generation of current and voltage harmonic components. Between the different voltage disturbances that can be produced, the most significant and critical power quality problems are voltage sags due to the high economical losses that can be generated. Short-term voltage drops (sags) can trip electrical drives or more sensitive equipment, leading to costly interruptions of production. For all these reasons, from the consumer point of view, power quality issues will become an increasingly important factor to consider in order satisfying good productivity. On the other hand, for the electrical supply industry, the quality of power delivered will be one of the distinguishing factors for ensuring customer loyalty in this very competitive and deregulated market. Harmonic content and high neutral current in power supply is one of the most important factors effecting power quality.

A. Total harmonics distortion (THD)

According to IEEE-519, total harmonics distortion is defined as the summation of the effective value of the harmonics components in the distorted waveform relative to the fundamental component. It can be calculated for either voltage or current.

Principles for controlling harmonics: Harmonic distortion is present to some degree on all power systems. Fundamentally, one needs to control harmonics only when they become a problem. There are three common causes of harmonic problems:

1. The source of harmonic currents is too great.

2. The path in which the currents flow is too long (electrically), resulting in either high voltage distortion or telephone interference.

3. The response of the system magnifies one or more harmonics to a greater degree than can be tolerated. When a problem occurs, the basic options for controlling harmonics are:

1. Reduce the harmonic currents produced by the load.

2. Add filters to remove the harmonic currents off the system, block the currents from entering the system, or supply the harmonic currents locally.

3. Modify the frequency response of the system by filters, inductors, or capacitors.

B. Problem of High Neutral Current in power system can cause following problem

1. Overloading of feeder
2. Overloading of transformers

3. Voltage distortion
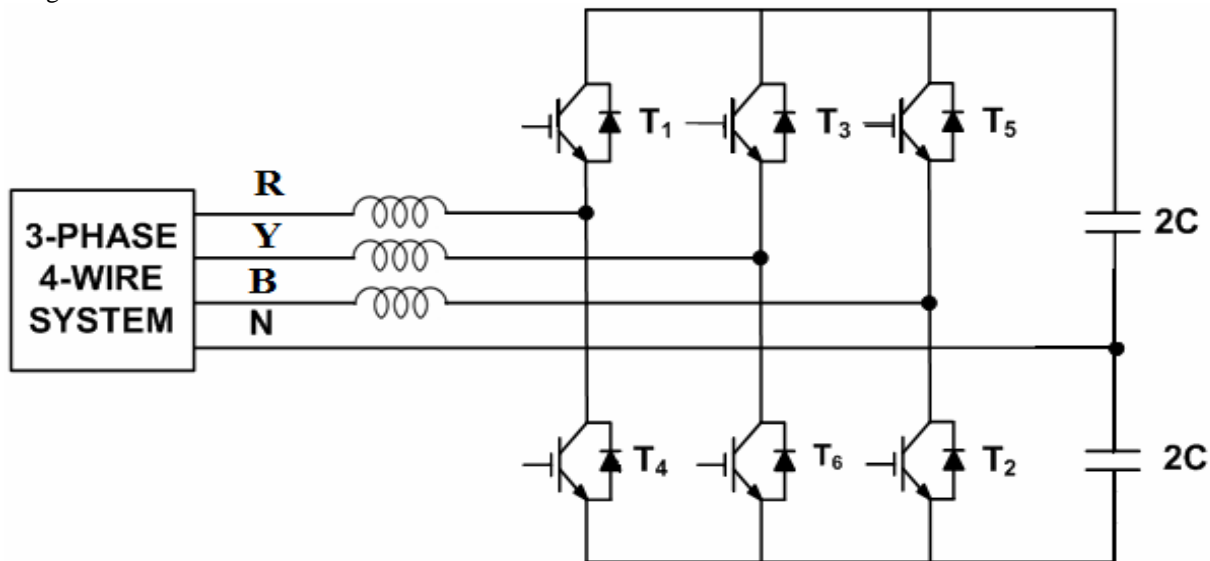4. Common mode noise

III. PROPOSED METHODOLOGY

The APF is aimed to compensate harmonic content in phase currents, neutral current, reactive power and unbalanced nonlinear load currents in three phase 4-wire distribution systems. In addition, the dc-link capacitor voltages are regulated and equalized to eliminate the imbalance problem which is due to the presence of dc component in the neutral wire current.

A. Four-Wire Active Filter Topologies

For three-phase, four-wire system, four leg approaches are proposed in place of three single-phase converters. The four-wire converters can take either of the two forms as shown in Fig. 1(a) and (b)
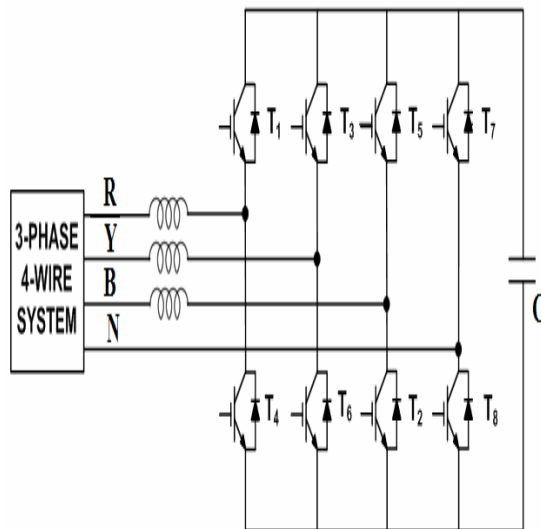a) Capacitor midpoint topology,
b) Four Switching- leg topology

The 1st approach utilizes a standard three-phase converter where DC link capacitor is spitted and the midpoint of the capacitor is connected to the fourth wire, to provide the return path for the neutral current. The second approach uses four switching legs in which three of the switching legs are connected to the three phase conductors through a series inductance, while the fourth leg is connected to neutral conductor, to provide the return path.

(a)

Fig.1 (a) Capacitor midpoint topology, (b) Four switching-leg topology

B. Significance of D.C. Capacitor

Under steady state operating conditions the dc voltage control loop keeps the dc voltage constant. However, transient changes in the instantaneous power absorbed by the load generate voltage fluctuations across the dc capacitor. The amplitude of these voltage fluctuations can be controlled effectively with an appropriate dc capacitor value. When designing the capacitor the following assumptions are made:

i) In steady state, the fluctuating voltage of the capacitor is very small compared to the average voltage.

ii) The converter is lossless.

The voltage fluctuation in the dc capacitor under steady state is due to the variation of the harmonic power 80w and the energy stored in the inductor. The current in the inductor has two components, the distorted current and the ripple current superimposed on the reference due to the switching action of the converter. The first current is a periodic ac waveform, hence the energy variation is null. The second part consists of the energy that the inductor discharges in the capacitor within one switching period. During the on state, energy is accumulated across the inductor and this energy is absorbed by the capacitor during the off state. Because the switching frequency is high, the effect of this energy variation on the dc bus is neglected.

The capacitors are designed to limit the dc voltage ripple to a specified value, typically 1 to 2 %. In our case the capacitor should be designed for the worst case. Since the active filter will operate in several modes (single phase or unbalanced load). It follows that the capacitor value is load dependent and simulation is one way of evaluating the worst possible case.

In the steady state, the real power supplied by the source should be equal to the real power demand of the load plus a small power to compensate the losses in the active filter. Thus, the DC capacitor voltage can be maintained at a reference value. However, when the load condition changes the real power balance between the mains and the load will be disturbed. This real power difference is to be compensated by the DC capacitor.

This changes the DC capacitor voltage away from the reference voltage. In order to keep satisfactory operation of the active filter, the peak value of the reference current must be adjusted to proportionally change the real power drawn from the source. This real power charged/discharged by the capacitor compensates the real power consumed by the load. If the DC capacitor voltage is recovered and attains the reference voltage, the real power supplied by the source is supposed to be equal to that consumed by the load again.
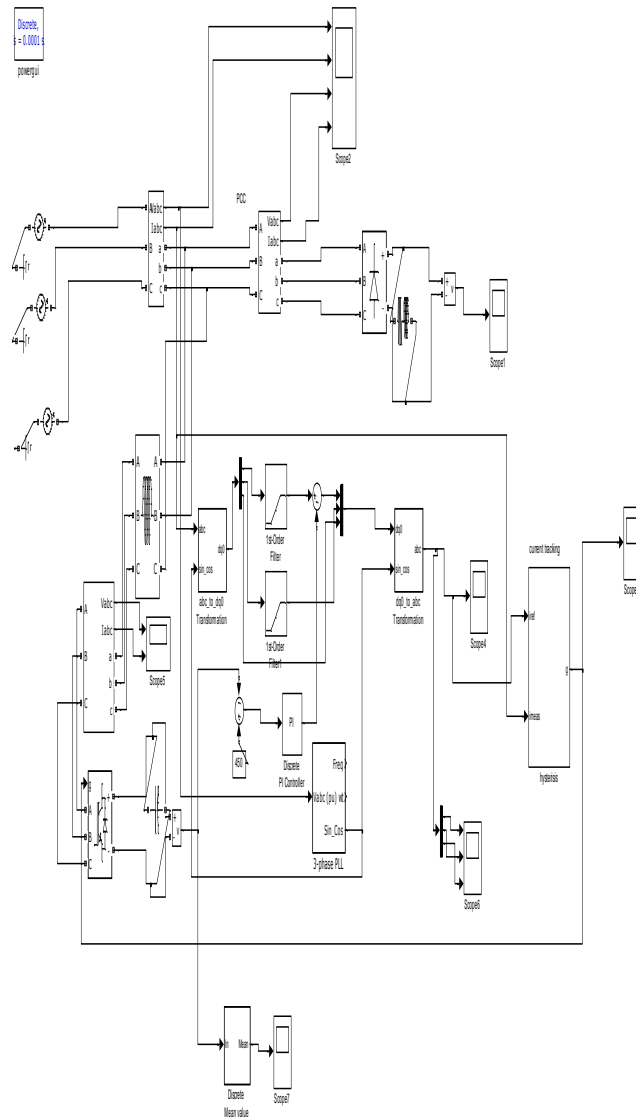
IV. CONTROL STRATEGY

The peak value of the reference compensating currents (I max) is estimated by regulating the DC link voltage. The reference current templates (Isr*, Isy* and Isb*) are obtained by multiplying this peak value (Imax) by the three-unit sine vectors (Usr, Usy and Usb) in phase with the three source voltages. These unit sine vectors are obtained from the three sensed line to neural voltages. The reference neutral current (Isn*) is obtained by negative sum of the three phase reference currents. Also, three current sensors are used to sense the three line currents (Isr, Isy and Isb) as compared to two used in three-phase, three-wire system, and neutral current is obtained by negative sum of the three line currents. The complete schematic diagram of the three phase, four-wire shunt active filter is shown in Fig.2. The conventional three-phase PWM converter is replaced by a four switching-leg converter.
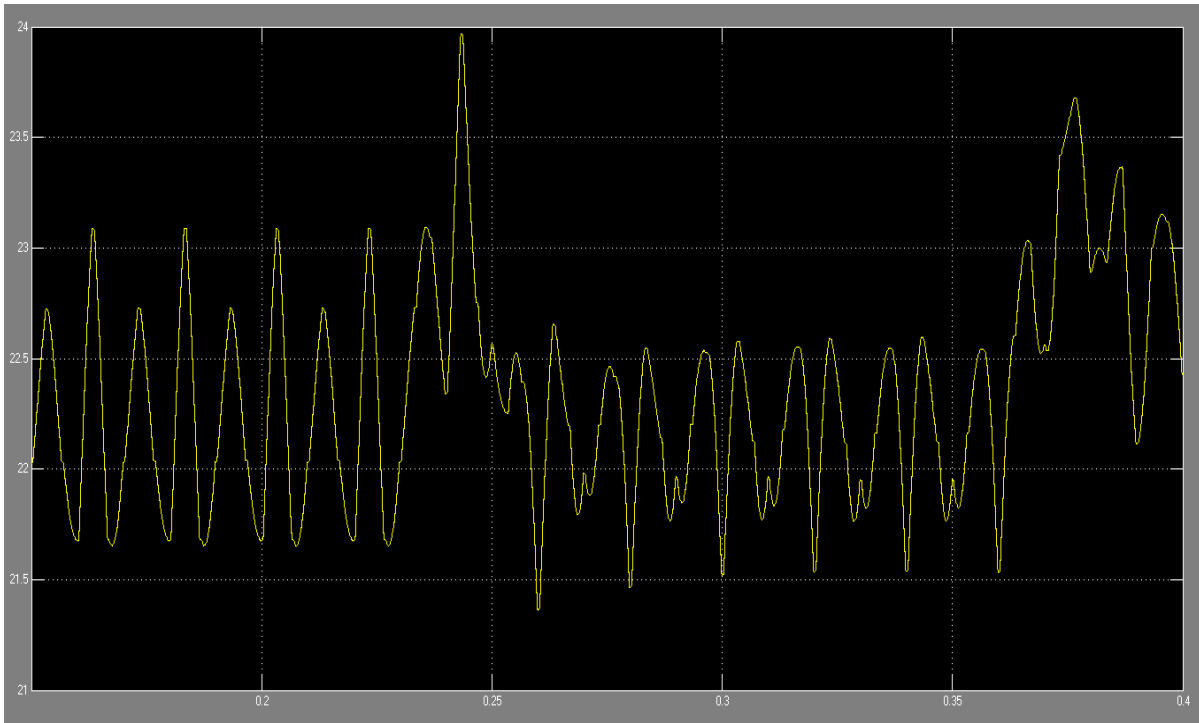
The actual capacitor voltage is compared with a set reference value. The error signal is then fed to a PI controller. The output of PI controller is considered as peak value of the supply current. This peak value of the current is multiplied by the unit sin vectors (Usr, Usy and Usb) in phase with source voltages to obtain the reference currents (Isr*, Isy* and Isb*). Difference of these estimated reference source currents and sensed actual currents, are given to a hysteresis based, carrier less PWM current controller to generate the switching signals of PWM converter. The difference of reference current template and the actual current decides the operation of the switches. To increase the current of particular phase the lower switch of the PWM converter of that particular phase is switched on while to decrease the current the upper switch of the respective phase is switched on. These switching signals after proper isolation and amplification are given to the switching devices. Due to these switching actions current harmonic current and reactive power of the load, so that only active power is drawn from the source.
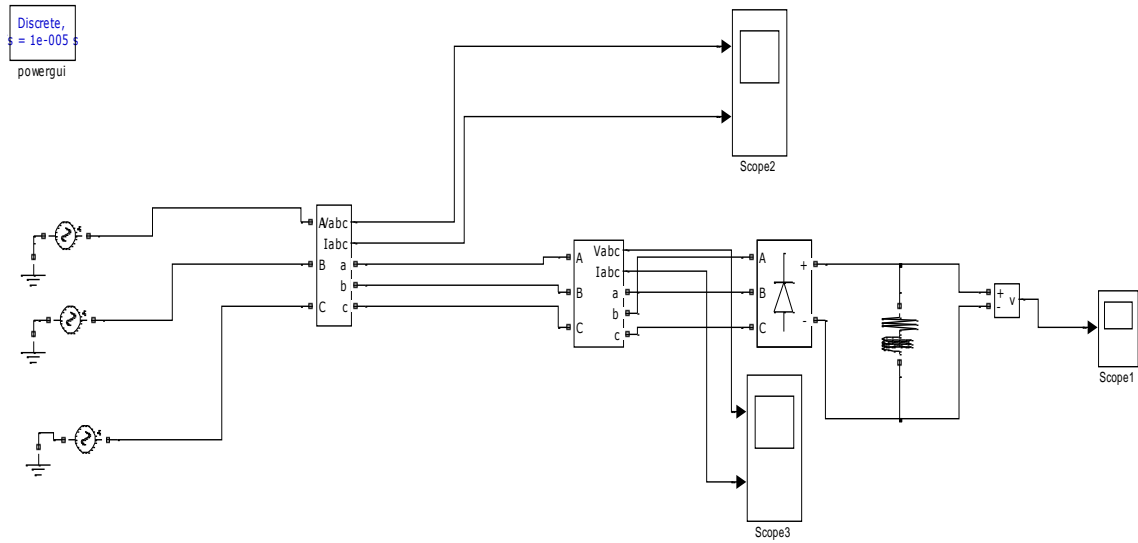
V. RESULT

Simulation model is built using MATLAB/SIMULINK/r2010a version and its tool of simpower system. Model is simulated for both the balanced and unbalanced load conditions and for both the topologies. Simulation model is as shown in fig.3. Table 1 described earlier different parameters selected for the simulation for 5 kVA compensation capacity for both the topology.
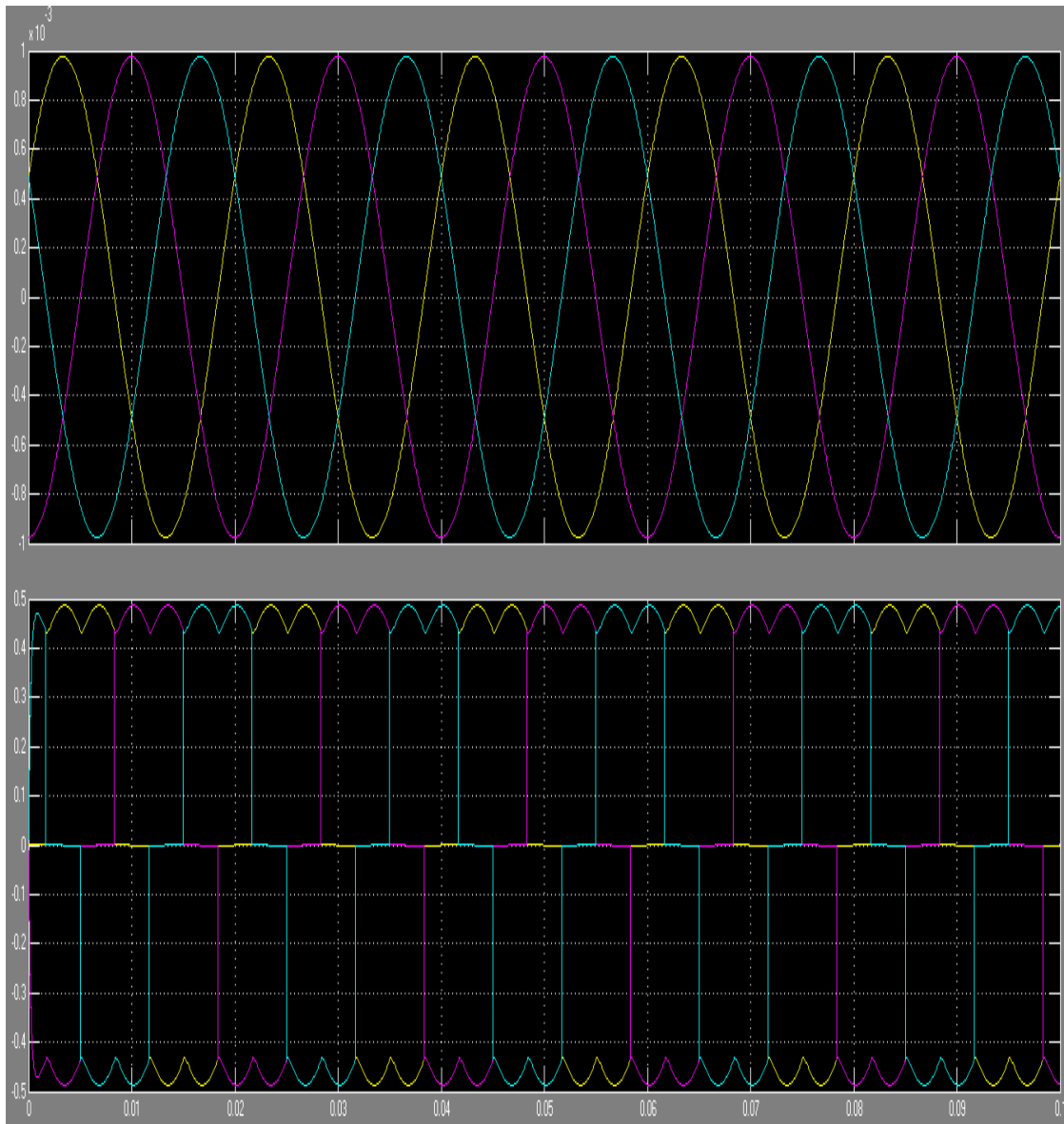
Fig. 3 Simulink model of Shunt Active Power Filter for compensated waveform.

Fig 4.compensated output waveform

Fig.5 Simulink model of Shunt Active Power Filter for uncompensated waveform.

Fig 6.compensated output waveform

VI.   CONCLUSION

Both the topologies (four switching leg topology and capacitor mid-point topology) of three phase four wire shunt active power filter has been investigated for the compensation of harmonic, reactive power, neutral current, power factor improvement and input current balancing in three-phase, four wire system. Theoretical concepts have been proved by simulation results. Both the topologies worked satisfactorily with the proposed control scheme but the four switching leg topology is preferred over capacitor mid-point topology. capacitor mid-point topology, two capacitors of double value for same peak to peak ripples in dc voltage are required. Also in the capacitor midpoint topology, third harmonic current components would flow in an uncontrolled manner through DC capacitor, as compared to four switching-leg topology. As the entire neural current flow through the DC link capacitor, it is recommended to use capacitor midpoint topology in smaller rating system, if preferred due to the requirement of less switches.

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Noise Pollution around the Airport with Noise Exposure Forecasting Modeling

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Abstract- The operation of airports results in environmental impacts associated with high levels of different noise. These may have severe and negative effects on surrounding residents. Aircraft noise is a significant and critical component of the aviation global economic infrastructure. If there is to be growth in aviation, the environmental impacts of aviation must be mitigated. In this paper, a model for the noise pollution of IKIA has been calibrated with the use of noise forecasting software. The calculated model is based on operations and flight data recorded by the airport. The flight data include the type and number of aircrafts, number of runways, etc. which depend on day-time and night- time operations. The results of this model explain the land use of airport and finally explain some methods for decreasing the effects of noise pollution of airport like enforcement of appropriate environmental regulations on the airliners.

Index Terms- airport, noise, pollution, modeling.

I. INTRODUCTION

THe method commonly used to quantify environmental sounds consists of evaluating all the frequencies of a sound in accordance with a weighing that reflects the facts that human hearing is less sensitive at low frequencies and extremely high frequencies than in the mid-range frequencies. This is called "A" weighing, and the decibel level measured is called the A-weighted sound level (dBA).

The Federal Aviation Administration (FAA) requires that environmental documents address noise impact around airports using an impact threshold of Day Night Average Sound Level (DNL) 65dBa. The problem of noise around airports is that it has a history almost as long as that of aviation itself. As the number of planes increased, so did the noise, and so did the number of complaints [1]. Public pressure led to the introduction of many different types of constraints at an increasing number of airports in an effort to keep both annoyance and complaints to a minimum. Noise pollution surrounding the IKIA airport is a growing concern in Tehran. This includes regions such as those near this airport where development is occurring. The FAA has identified the effects of noise pollution on populations in areas surrounding airports as an i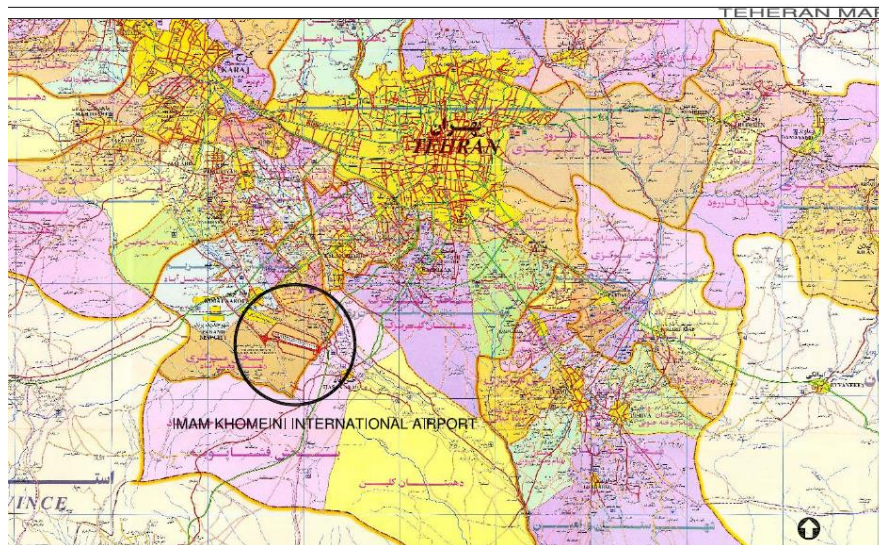ssue that needs consideration. Studies that assess noise impact demonstrate its adverse impact on affected areas [1]. The FAA has developed mapping methods with software that produce noise contours of varying magnitude around aircraft sources. This study intends to answer the following research question: What are the dimensions and magnitude of noise levels of the current footprint of noise pollution around the IKIA airport. To answer this question, use noise exposure software for estimating the noise of aircraft near the airport.

II. AIRPORT NOISE MODELING

The computer simulation of the noise exposure level that use at IKIA airport and its surrounding areas is conducted using the noise exposure forecasting(NEF) modeling, The noise exposure forecasting modeling, as used in the current study, computes noise exposure levels. The noise metric computed by the model is the annual average Day–Night Sound Level. The widely-used DNL metric is known to be highly correlated with community annoyance and is associated with a variety of land use guidelines that suggest where incompatibilities are expected to exist between the noise environments and various human activities. Data input to the NEF includes runway coordinates, flight tracks, flight operations and types of aircraft. NEF computes the overall noise exposure at points on the ground around the airport. Data was modeled for a period between March 2010 to March 2011. The use of NEF in computer-based noise modeling not only gives the noise exposure levels based on the current flight operations, but also allows for the prediction of future noise levels due to a projected increase in flight operations. This is especially useful for a rapidly growing city like Tehran and IKIA airport.

III. IKIA AIRPORT SPECIFICATION

Imam Khomeini International Airport is located 40km in the southwest of Tehran (Figure1). Being the airport of the capital is a huge advantage in the sense that Tehran is a leader city in its country in terms of economics, industries, culture, and that Tehran is also the most populated Iranian city.

Figure 1: Imam Khomeini International Airport Site in the map [6]

Moreover, Tehran offers numerous possibilities to reach other major Iranian provincial towns thanks to a developed road network, rail network, and domestic air traffic network.

The total airport site is about 13500 Ha and it is divided in two parts, a northern one and a southern one, separated by an important spine road connected to Tehran. Figure 2 shows the whole region of IKIA airport. Today, only the northern site of the airport is developed but it already represents about 1400 Ha. The large wide areas surrounding the airport offer an important development potential in order to turn IKIA into the main prestigious gateway of Iran.

Figure 2: The whole region of IKIA Airport [6]

Next section describes the methodology used for creating the noise exposure map.

The data and assumptions used for leading such a study are presented and detailed below.
Data summary:
• Distance to city center : 40 km
• Airport site area: 13500 Ha
• Airport reference point coordinates:
- Latitude: 35 24 58 N;
- Longitude: 051 09 08 E;
- Elevation: 1007 meters.
Specifications for all planned runways are summed up below:

- Length of scheduled runways is 4200 m;
- Width of runways is 60 m with 15 m shoulders;
- Distance between parallel runways will be 400 m;

IV. NOISE MODELING METHODOLOGY

The contours are calculated by the combination of noise from many individual aircraft movements. All types of aircraft and operations are taken into account including their specific noise and performance characteristics. The NEF model generates the noise exposure level by computing the sound energy from individual events over an array of grid points around the airport.

The process of generating noise exposure contours is therefore calculated by summing up the noise level at each grid location depending on the airport characteristics, aircraft operations by aircraft type and engine thrust level along each flight track. The cumulative noise exposure levels at all grid points are then used to develop noise exposure contours for selected noise metric values.

The noise impact study was conducted in several steps:
 summarizing the airport characteristics
   Select the aircrafts that are used in airport.
 defining the typical flight tracks for each time frame.
 computing the day and night events per runway and flight tracks.
running and calculating the Noise Exposure Forecasting to produce the selected noise exposure contour sets.

V. AIRPORT OPERATIONS

A split between day and night operations was computed based on the data provided by IKIA airport authority [6]. By this data can divide all the flights with the type of the aircraft. In Table 1 percentage of the aircraft usage is shown.

Table 1: Percentage of the aircrafts usage in the airport

Aircraft type	Internal usage (percent)	International usage (percent)
Fokker 100	47	3
Boeing 727	12	
M-D 80	3	
ATR 42 – 72	5	
Airbus 300	1	10
Airbus 318/319/320/321	7	34
Airbus310		
Airbus 330	12	20
Boing 747		6
Tupolof 154	25	5
Boing 737		12
Airbus 340		10

VI. AIRPORT CHARACTERISTIC

In Table 2, the percentage of runway usage is shown. Only one runway is used for takeoff and landing operations for the airport.

Table 2: Percentage of the runways usage in the airport

Runway	Usage of the runway for takeoff and landing (percent)
11R	-
29L	-
11L	40
29R	60

As a consequence of the standard wind orientation, most of the operations happen on the 29R runway (from East towards West). In Figure 3, tracks for the aircraft on the runway are shown. The ICAO also provides a standard departure charts instrument. In Figure 4 the sample charts for takeoff and landing that were used for the analyzing in the software are shown. These charts were created using the Microsoft Excel. A sample of the excel sheet is shown in Table 3.

According to IKIA existing Airport Information Publication (AIP), the procedures for outbound aircraft are mainly concentrated on seven radials originating from IMAM KHOMAINI VOR/DME or destination to KAHRIZAK NDB. These exit radials were used to model the flight tracks followed by the various aircraft that will be accommodated at IKIA Straight-in approaches were assumed on each runway.
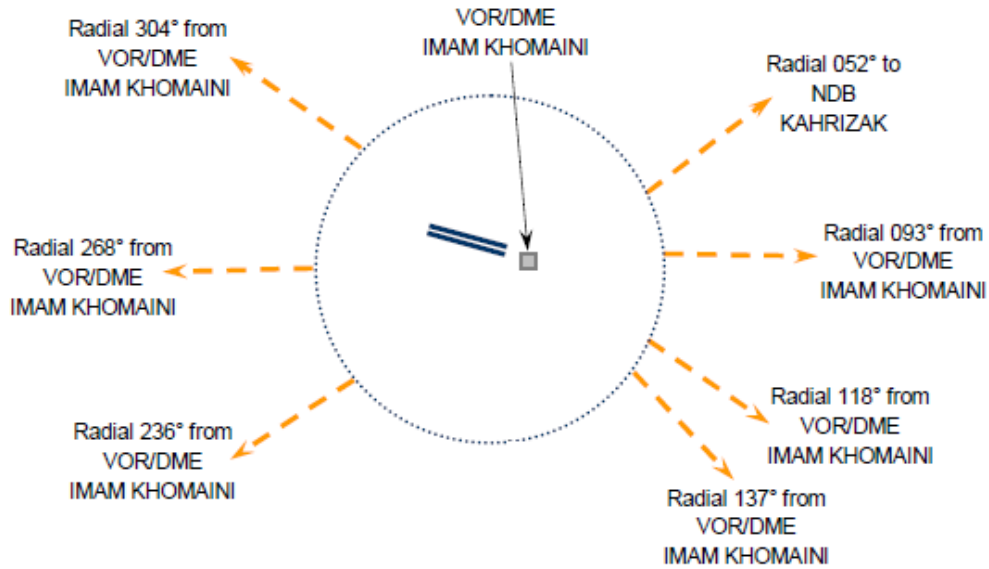
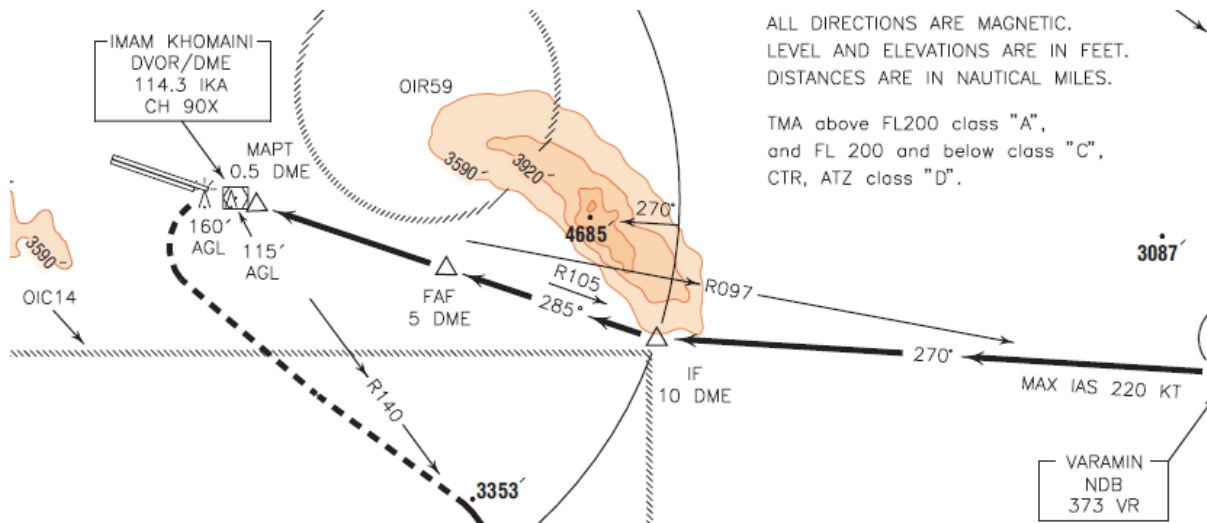**Figure 3: Tracks for the aircraft on the runway**

Figure 4: Sample chart for Approach in the runway

Table 3: Sample of Excel sheet for aircraft tracks

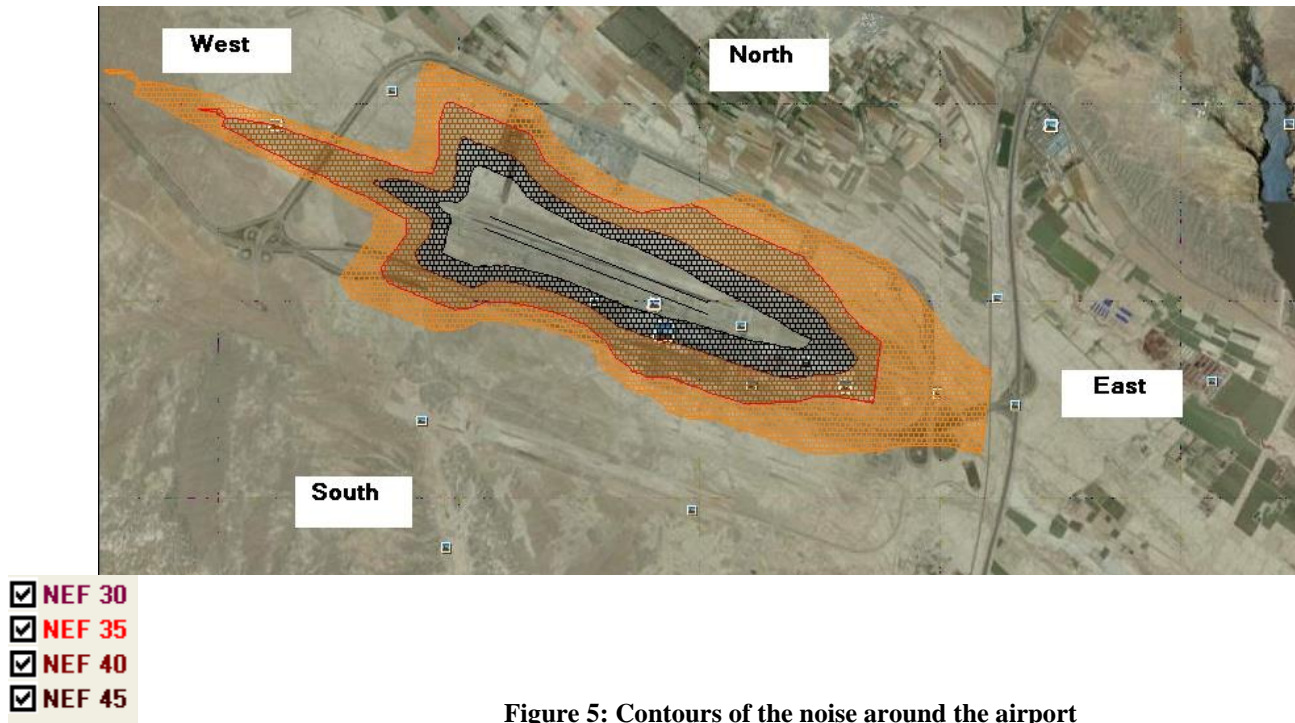| TYPE	DEP/DEST	SID	RUNWAY	ANGLE
T154	Adnan Menderes Airport TURKEY	MIVAK	29 R	5
B742	Göteborg-Landvetter Airport SWEDEN	MIVAK	29 R	5
A310	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A310	Dubai International Airport EMIRATES	1 SAV1	29 R	54
B737	Urumqi Diwopu International Airport – Urumqi, Xinjiang CHINA	DEHNAMAK	29 R	198
A306	Paris Orly Airport FRANCE	MIVAK	29 R	5
A320	Dubai International Airport EMIRATES	1 SAV1	29 R	54
B722	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A306	Frankfurt International Airport GERMANY	MIVAK	29 R	5
A306	Paris Orly Airport FRANCE	MIVAK	29 R	5
A310	Birmingham International Airport – Birmingham, England	MIVAK	29 R	5
T154	Damascus International Airport SYRIA	PAVET	29 R	5
A343	Bahrain International Airport	1 SAV1	29 R	54
A306	Birmingham International Airport – Birmingham, England	MIVAK	29 R	5
T154	Damascus International Airport SYRIA	PAVET	29 R	5
MD11	Amsterdam Airport Schiphol – Haarlemmermeer, near Amsterdam	MIVAK	29 R	5
A306	Dubai International Airport EMIRATES	1 SAV1	29 R	54
T154	Damascus International Airport SYRIA	PAVET	29 R	5
B742	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A310	Birmingham International Airport – Birmingham, England	MIVAK	29 R	5
A310	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A306	Frankfurt International Airport GERMANY	MIVAK	29 R	5
A306	Hamburg Airport GERMANY	MIVAK	29 R	5
A320	Vienna International Airport AUSTRIA	MIVAK	29 R	5
A320	Vienna International Airport AUSTRIA	MIVAK	29 R	5
MD11	Amsterdam Airport Schiphol – Haarlemmermeer, near Amsterdam	MIVAK	29 R	5
A306	Frankfurt International Airport GERMANY	MIVAK	29 R	5
A310	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A306	Frankfurt International Airport GERMANY	MIVAK	29 R	5
A310	Dubai International Airport EMIRATES	1 SAV1	29 R	54
A306	Paris Orly Airport FRANCE	MIVAK	29 R	5
B742	Dubai International Airport EMIRATES	1 SAV1	29 R	54
T154	Damascus International Airport SYRIA	PAVET	29 R	5
A306	Birmingham International Airport – Birmingham, England	MIVAK	29 R	5
A310	Birmingham International Airport – Birmingham, England	MIVAK	29 R	5

VII.   ANALYZING WITH NOISE EXPOSURE FORECASTING MODELING

This paper uses the noise exposure forecasting because its availability. The NEF consists of a map of the noise contours plotted over the airport layout at each time period. Noise contours for NEF 30, 35, 40 and 45 noise levels are shown on the map.

In this software, NEF+35=DECIBEL and for discussion, should change the numbers of NEF to decibels. In the chart below, define the steps for modeling the noise of the airport.

At the end by selecting the aircraft type and enter the data that was shown in the Excel format in the software, calculate and run the software. In Figure 5, import the contour in the Google Earth map.

Figure 5: Contours of the noise around the airport

Invert the output of software to decibels:

Black contour: 80 decibels Brown contour: 75 decibels

Red contour: 70 decibels And at last contour 65 decibels.

In table 4, standard suggestion of the environmental organization of IRAN for noise is shown. By the results of the contour map and this table, divide four the regions and in figure 5 the result is shown.

Table 4: Standard for noise values [7]

Night (10pm-7am) Unit in decibels	Day (7am-10pm) Unit in decibels	Type of region
45	55	Residential region
50	60	Residential - commercial region
55	65	commercial region
60	70	Residential-industry region
65	75	industry region

With comparison to the noise map from the noise exposure forecast modeling with the ICAO land use recommendations in Table 4, and knowing that in the airport we also have noise pollution from numerous vehicles and factories that may develop in the near future, should have a master plan for decreasing the noise of the airport, should do it first at the origin of it and then by barriers with a suitable plan for building near IKIA. In the next section, suggest some recommendations that may be used for the airport.

VIII.   LAND USE RECOMMENDATIONS

Land use management in the vicinity of IKIA is essential to avoid conflicts with existing and future surrounding communities as well as providing sufficient flexibility for the development of the airport. The International Organization for Standardization has established restrictive guidelines relating types of land use to airport sound level [8]. All land uses within the areas below 65 dB are considered to be compatible with airport operations. Residential land uses are generally incompatible with noise levels above 65dB. In some areas, residential land use may be permitted in the 65-70 dB with appropriate sound insulation measures implemented. Schools and other public facilities located between 65 and70 dB are generally incompatible without

sound insulation. Above 75 dB, schools, hospitals, nursing homes and places of worship are considered to be incompatible land uses.

Land use management measures used include both preventive and corrective techniques. Preventive land use management techniques seek to prevent the introduction of additional noise sensitive land uses within existing and future airport noise contours. Corrective land use management techniques seek to remedy existing and projected future unavoidable noise impacts in existing areas of incompatible land use. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities.

IX. SUGGESTION METHODS FOR CONTROLING NOISE IN THIS STUDY

The negative impact of aircraft noise, in particular around airports, is increasing. More and more people suffer not only from annoyance, but recent studies indicate that intermediate and high noise levels also contribute to physiological and psychological effects that in extreme cases can cause severe health problems. The aircraft industry has launched an ambitious plan for the next 15 years to reduce the noise emission levels from aircraft by as much as 20dB. Even if this goal can be reached, reduced noise emission levels for new aircraft will have little or no influence on the total noise situation around airports in future. This is due to a slow renewal rate for aircraft combined with an increase in passenger volume. In order to stay competitive and to cope with an increasing number of neighborhood complaints and noise-impact related constraints, airport owners will have to look for novel solutions to reduce noise emission levels. The International Civil Aviation Organization (ICAO) has defined a four-point "balanced approach" that includes:

Reduction of noise at source;
For improving this method airports authorities should develop and buy new aircrafts that have less noise such as boeing 757 instead of boeing 727 and etc.

Land-use planning;
For this method all the principals should be considered according to the contour map and the table above.

Noise-abatement operational procedures;
Noise is unwanted sound that is transmitted by vibration through air, walls, floors, or ceilings. In a home or office, there are three ways to control sound transmission _ Increase the mass of partitions _ Break the path of vibration and Cavity absorption. Increasing the mass of walls and other structures can present a problem in lightweight construction because the increased weight may not be structurally practical or aesthetically pleasing. It can also be more expensive.

X. CONCLUSION

The major innovation from the IKIA study is for noise management in the air-transport industry in TEHRAN - IRAN. The project addresses the new regulatory framework required to implement some approaches, and it addresses both the initial conditions and the sustaining parameters for this new paradigm. If successful, this new paradigm could assist in avoiding major environmental problems associated with growth in the air-transport industry, and assist in maintaining viability and vitality in this key sector of the European economy.

The IKIA study also is innovative in its approach to finding multi-dimensional solutions to this complex problem.

New ways of linking the disparate factors influencing behaviors of the air-transport players are also addressed. Airport fees can be linked to total noise impact; a combination of noise emission levels and number of people affected. By providing an economic incentive, airlines can be persuaded to choose low noise solutions in order to save operational costs. Such solutions may include changing to low noise emission aircraft, using low noise take-off and landing procedures within the constraints of the ATM, etc. A monitoring system may be implemented to yield accurate information about the actual per-event noise impact. Hence, innovations from the IKIA study will contribute to:

Reducing the negative noise impact around airports including harmful health effects

Improving the community response to airport operations Improving the quality of life of its citizens.

ACKNOWLEDGMENTS

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Artificial Neural Network Based Method for Location and Classification of Faults on a Transmission Lines

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Abstract- Transmission lines, among the other electrical power system components, suffer from unexpected failures due to various random causes. These failures interrupt the reliability of the operation of the power system. When unpredicted faults occur protective systems are required to prevent the propagation of these faults and safeguard the system against the abnormal operation resulting from them. The functions of these protective systems are to detect and classify faults as well as to determine the location of the faulty line as in the voltage and/or current line magnitudes Then after the protective relay sends a trip signal to a circuit breaker(s) in order to disconnect (isolate) the faulty line.

This paper presents the use of back-propagation (BP) neural network architecture as an alternative method for fault detection, classification and isolation in a transmission line system. The main goal is the implementation of complete scheme for distance protection of a transmission line system. In order to perform this, the distance protection task is subdivided into different neural networks for fault detection, fault identification (classification) as well as fault location in different zones. Three common faults were discussed; single phase to ground faults, double phase faults and Double phase to ground faults. The result provides a reliable and an attractive alternative approach for the development of a protection relaying system for the power transmission systems.

Index Terms- Transmission lines; fault detection; artificial neural network.

I. INTRODUCTION

An electric power system comprises of generation, transmission and distribution of electric energy. Transmission lines are used to transmit electric power to distant large load centers. The rapid growth of electric power systems over the past few decades has resulted in a large in- crease of the number of lines in operation and their total length. These lines are exposed to faults as a result of lightning, short circuits, faulty equipments, mis operation, human errors, overload, and aging. Many electrical faults manifest in mechanical damages, which must be repaired before returning the line to service. The restoration can be expedited if the fault location is either known or can be estimated with a reasonable accuracy [1].

Faults cause short to long term power outages for customers and may lead to significant losses especially for the manufacturing industr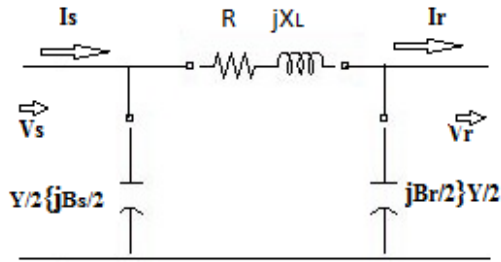y. Fast detecting, isolating, locating and repairing of these faults are critical in maintaining a reliable power system operation [2]. When a fault occurs on a transmission line, the voltage at the point of fault suddenly reduces to a low value. Fault location estimation is very important issue in power system engineering in order to clear faults quickly and restore power supply as soon as possible with minimum interruption. This is necessary for health of power equipment and satisfaction of customer. In the past, several methods have been used for estimating fault location with different techniques such as line impedance based numerical method, travelling wave methods and Fourier analysis [1].

This paper presents a method for detection and identification of the fault type and its zone in the line. Back propagation neural network approach is studied and implemented. Voltages and currents signals of the line are observed to perform these three tasks. The detailed coefficients of all phase current signals that are collected only at the sending end of a transmission line are selected as parameters for fault classification.

Basically, we can design and train the neural networks for solving particular problems which are difficult to solve by the human beings or the conventional computational algorithms [9]. The computational meaning of The training comes down to the adjustments of certain weights which are the key elements of the ANN. This is one of the key differences of the neural network approach to problem solving than conventional computational algorithms. This adjustment of the weights takes place when the neural network is presented with the input data records and the corresponding target values.
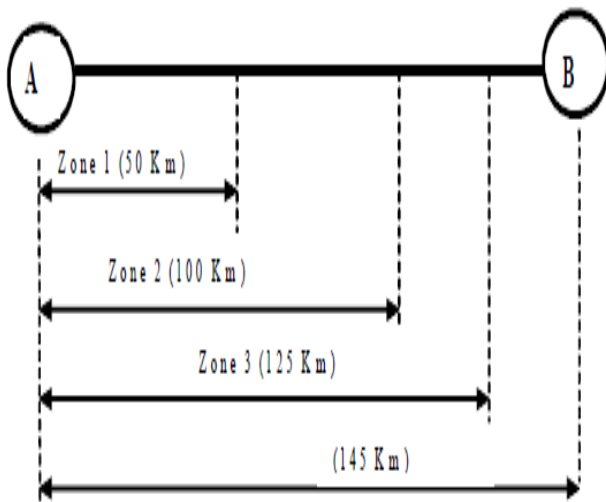
II. TRANSMISSION LINES MODEL

The commonly model used for AC overhead transmission lines is called pi model network and is shown in Fig.1. Where shunt admittance has been even divided into two shunt elements connecting to both ends of a pi equivalent network.
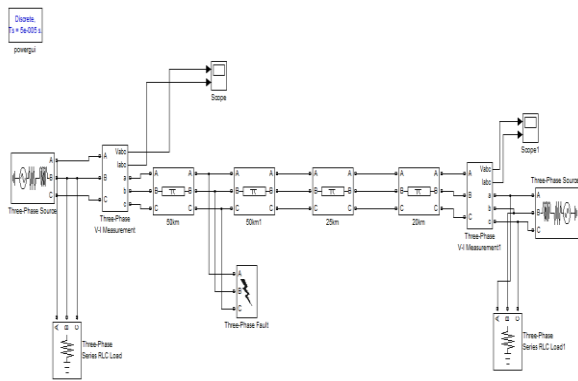
Fig. 1 Π-Network for a Transmission Line Model

A 110 kV transmission line system connects A with B (145 Km) is used to develop and implement the proposed architectures and algorithms for this problem. Fig. 2 shows a single-line diagram of the system used to train and test the neural networks. The system consists of two Substations and (145 Km) transmission line[6].
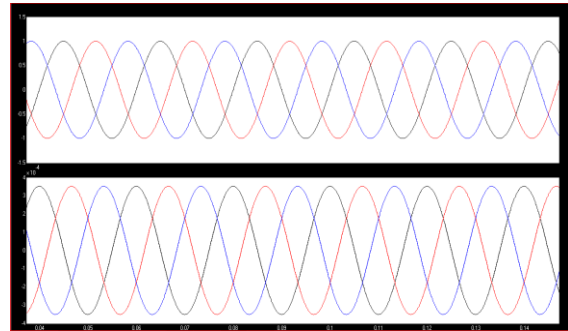

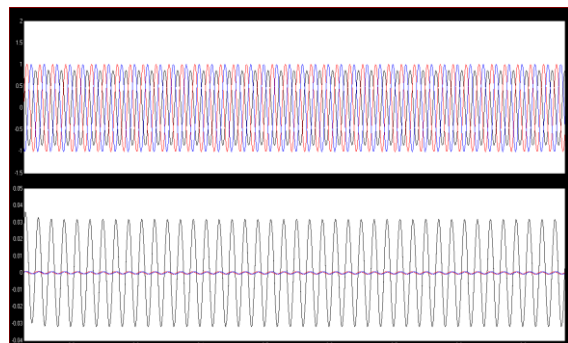
Fig.2. Single-line diagram of the system studied

Fig 3. Simulation model of single line diagram

The three-phase voltages and currents, V = [Va Vb Vc] T and I = [Ia Ib Ic] T [8] are measured at substation A in Fig. 2 (4) The simulations results shown in below presents three categories
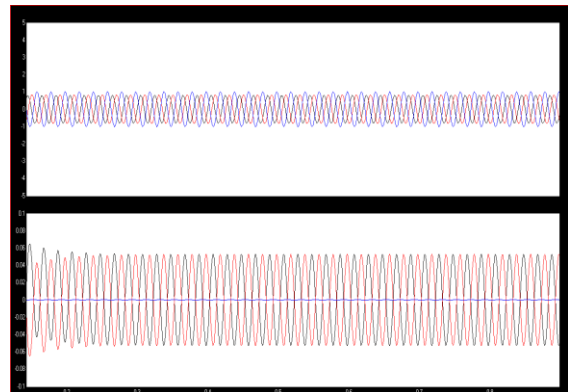
namely (i) phase to ground faults (ii) phase to phase faults and (iii) double-phase to ground faults. observing magnitude of waveforms in the simulations results three phase voltages and currents are tabulated in the Table 1
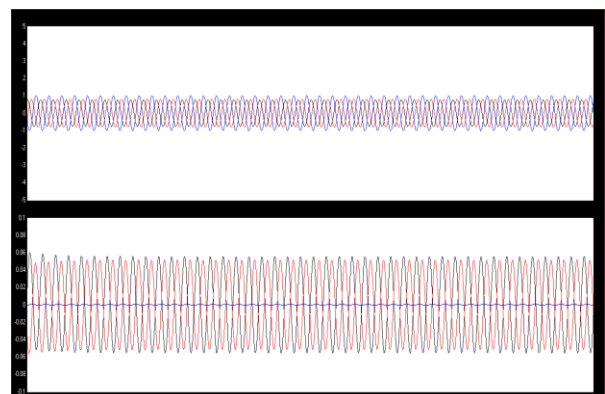

Fig.4. Simulation results for no fault

Fig.5.Simulation results for line to ground faults

Fig.6. Simulation results for line to line faults

Fig.7.Results for double line to ground faults

Case No.	Input Vector (P.U)						Fault Type
	Va	Vb	Vc	Ia	Ib	Ic	
1	0.997	0.991	0.9985	0.9978	0.9988	0.9984	No Fault
2	0.245	1.056	1.02	3.335	0.853	0.90	A to G
3	1.02	0.245	1.056	0.853	3.335	0.90	B to G
4	1.056	1.02	0.245	0.90	0.853	3.335	C to G
5	0.471	0.650	0.986	-1.23	1.23	0.983	A to B
6	0.986	0.471	0.650	0.984	-1.23	1.23	B to C
7	0.471	0.986	0.650	-1.23	0.984	1.23	A to C
8	0.507	0.507	1.12	7.187	7.855	0.985	A to B to G
9	1.12	0.507	0.507	0.985	7.187	7.855	B to C to G
10	0.507	1.12	0.507	7.187	0.985	7.855	A to C to G

Table.1 Three phase Voltage and Current per Unit Values .

III. BACK PROPAGATION NEURAL NETWORKS

Back Propagation was created by generalizing the Widrow-Hoff learning rule to multiple layer neural networks and nonlinear differentiable transfer functions. Input vectors and the corresponding target vectors are used to train a network until it can approximate a function, associate input vectors with specific output vectors. Neural networks with a sigmoid layer and a linear output layer are capable of approximating any function with a

finite number of discontinuities. Standard back propagation is a gradient descent algorithm, as is the Widrow-Hoff learning rule, in which the neural network weights are moved along the negative of the gradient of the performance function. The term back propagation refers to the manner in which the gradient is computed for nonlinear multilayer neural networks [3]

IV. ARTIFICIAL NEURAL NETWORK DESIGN

Artificial neural network (ANN) is made up of many computational processing elements called neurons or nodes These nodes operate in parallel and are connected together in topologies that are loosely modeled after biological neural system[1] The training of ANN is carried out to associate correct output responses to particular input pattern. The artificial neural network is trained so that application of a set of input produces the desired set of outputs. Training is accomplished by sequentially applying input vectors, while adjusting network weights according to pre-detained procedures. During the training process, the network weights gradually converge to values such that each input vector produces the desired output vector.

Transfer function in the ANN is an important key element to invoke the nonlinear relationships that maps the input(s) to the output(s). Without the transfer function the whole operation is linear and could be solved using linear algebra or similar methods. We consider the transfer function for the weighted sum S (lumped input) of the inputs for a successful network design. In the process of learning the neural network presented with pairs of input and output data then teaches how to produce the output when the corresponding input is presented. When learning is complete, the trained neural network, with the updated optimal weights, should be able to produce the output within desired accuracy corresponding to an input pattern.

A. DESIGN OF NEURAL NETWORKS FOR FAULT CLASSIFICATION

Current techniques for fault detection and diagnosis rely on experts and expert systems modeling using Classical techniques in the time or frequency domain. Neural network classifiers can learn and adapt themselves to different statistical distribution and non-linear mappings. The parallel structure of neural net-works permits 'INCIPIENT FAULT DETECTION' which is an indication of an increase in the lead time for detecting faults[4][6]

The design and development of the uses BP network as a fault classifier. The network designed here has six inputs (the three phase voltages and currents) and four outputs associated with the four fault categories. The outputs contain variables whose values are given as either 0 or I corresponding to the three phases and the ground (that is, A, B, C and G) and can be generalized to represent all the practical fault categories permutation involving combinations of phases.

Fault situation	A	B	C	G
A-G	1	0	0	1
B-G	0	1	0	1
C-G	0	0	1	1
A-B	1	1	0	0
B-C	0	1	1	0
C-A	1	0	1	0
A-B-G	1	1	0	1
B-C-G	0	1	1	1
C-A-G	1	0	1	1

TABLE 2.THE BP Classification Network TRUTH TABLE

A large number of networks were extensively studied. After an exhaustive search for the most suitable network size, the one with only one hidden layer and five hidden neurons was chosen to carry out the classification task. The activation function at input layer is linear (-1, 1) function while at hidden layer and output layer is logistic function. The proposed network as stated before has six inputs (the three phase voltages and currents) and four outputs. This network is illustrated in Figure 8
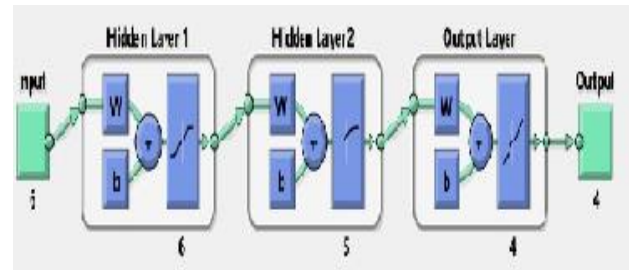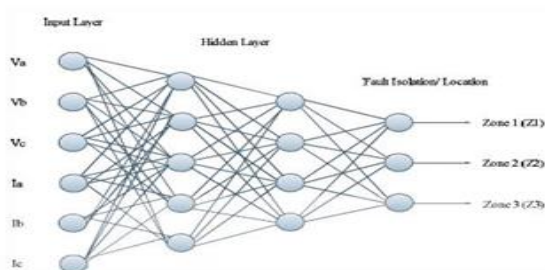

Fig.8.Neural Network architecture for fault classification

B. DESIGN OF NEURAL NETWORK FOR FAULT ISOLATION/LOCATION

The design and development of the detection neural network is followed in this section in order to choose the most suitable BP network as a fault isolator. The network is expected to identify the location of the fault by classifying the identified fault into one of the three fault zones, namely Z1, Z2 and Z3. In fig 3 each Π Transmission lines placed with certain distances and also particular per unit values. when fault occurred within the placed distance and with pu values. Then the proposed neural networks here should isolate the specific zone involved in the fault [7]. The desired truth table for the network training is shown in Table

TABLE 3
THE ISOLATION NETWORK DESIRED   RESPONSE

Fault location	Networks output		
	Z1	Z2	Z3
Zone 1	1	0	0
Zone 2	0	1	0
Zone 3	0	0	1

A large number of BP networks with different structures were studied and analyzed in order to obtain the simplest structure. The training includes some of the selected networks, namely structures, 6-5-5-3, 6-6-6-3, 6-7-6-3 and 6-5-4-3. It is found experimentally through trial and error that a BP network with two hidden layers provides the best training performance. The first hidden layer has 5 neurons and the second hidden layer has 4 neurons. The activation function at input layer is linear (-1, 1) function while at hidden layer and output layer is logistic function. This   network is shown below figure.9

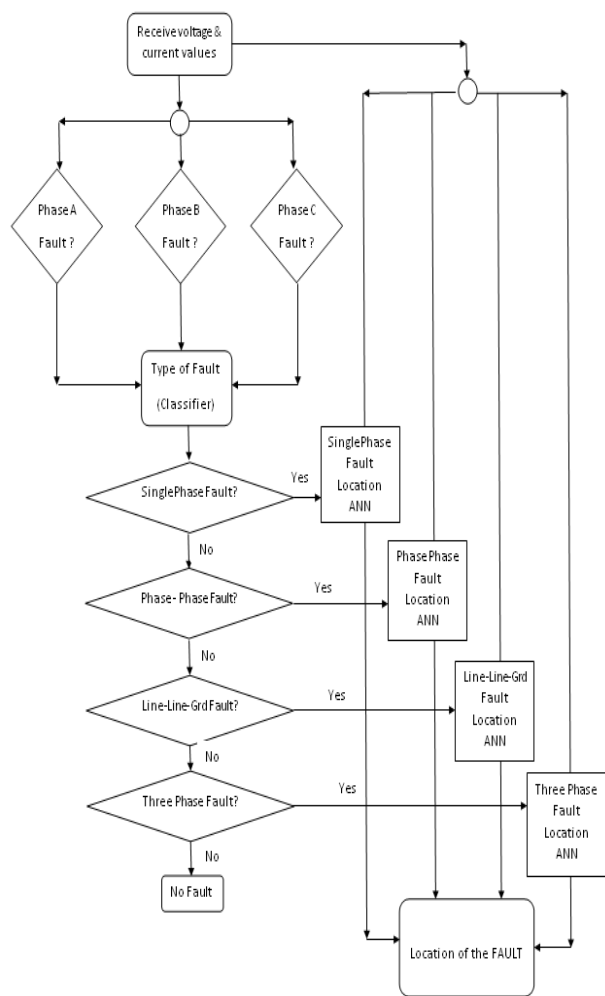**Fig.9. Neural network chosen for fault isolation**

Fig.10. Flowchart depicting the outline of the proposed scheme

V. CONCLUSION

This thesis has investigated the use of back-propagation (BP) neural network architecture as an alternative method for fault detection, classification and isolation in a transmission line system. It uses RMS values of phase voltage and phase current as inputs. Simulation models of the transmission line system are constructed and the generated information is then channeled using MATLAB software (Version 7) and accompanying Power System Block Set.

Three common faults were discussed single phase to ground faults, double phase faults and double phase to ground faults. Due to the flexibility of the neural networks which accept any real values (highly correlated or independent) as an input, resistant to errors in the training data and fast evaluation. The results obtained demonstrate that the performance of the back-propagation (BP) neural network architecture was highly satisfactory. Neural networks, in general, provide a reliable and an attractive alternative approach for the development of a protection relaying system for the power transmission systems.

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Compact Microstripline Phase Shifter Design for C band Frequency Range using RT Duroid 5870 Substrate

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Abstract- This paper presents design and implementation of compact microstripline phase shifter at C band frequency range using RT Duroid 5870 substrate. Phase shifters are key elements of beam-steering antennas which are very useful for Synthetic Aperture Radar (SAR) and microwave communication system. Phase shifters are used to control the main-beam of the phased array antenna. Microstripline phase shifter is used since it is simple to design and easy to fabricate. The main objective of this paper is to design and implement a phase shifter for four elements linear sub array for SAR application. This phase shifter is provided using different lengths for scan angle 0º to 135º. RT Duroid 5870 substrate is used for its lower insertion loss. The important mathematical calculations for finding the dimensions of all the individual component is done using MATLAB and then individual components are designed and simulated using Ansoft Designer (SV) and Sonnet Lite v13.35. The presented phase shifter is designed to operate in C band frequency range between 4 and 8 GHz and center frequency is 5.3 GHz , with low insertion loss and reflection coefficients. This proposed phase shifter is suitable for a modified class of feeding networks for phased antenna arrays.

Index Terms- Microstripline phase shifter, C band, RT Duroid 5870, phased array antenna, feeding networks.

I. INTRODUCTION

Microstrip phased array antennas have been very popular for their low profile, small size, light weight, low cost, high efficiency and easy to fabricate. Many phased array antenna applications require that the direction of the main-beam lobe be changed with time, or scanned. This is usually done by mechanically rotating a single antenna or an array with fixed phased to the element. However, mechanical scanning requires a positioning system that can be costly and scan too slowly. For this reason, electronic scanning antennas which are known as phased array antennas are used. It can sweep the direction of the beam by varying electronically the phase of the radiating element, thereby producing a moving pattern with no moving parts. Figure 1. illustrates a phased array antenna and it consists of a power distribution network, phase shifters and antenna elements.[1]

Phase shifters are key elements in electronically steered phased array radar and microwave communication systems. Phase shifters are two port devices providing a change in phase of the microwave signal with very low attenuation. Depending on the manufacturing method, phase shifters can be classified into the following categories; mechanical phase shifters, ferrite phase shifters, semiconductor device phase shifters and transmission line phase shifters.

Phase shifters are mainly used in phased array radars. Because radars use typically thousands of phase shifter device elements in their structure, phase shifter performance strongly affects the phased array radar performance and cost. Phase shifter design should cater to the important design parameters such as insertion loss, power handling capability, physical size and weight.

Since typical phased array radars have large numbers of phase shifter devices, the size and weight of the device is a major design criterion while designing a phase shifter. Microstripline phase shifters have advantages over other types of phase shifters like large phase change, low insertion loss and high power handling capability. Also planar designs can be easily integrated with other subsystems such as phased array radiating elements and monolithic circuits.[2][3]

New designs of microstripline phase shifters have been considered to reduce the device weight considerably and open up possibilities of designing electrically tunable compact phase shifter devices.
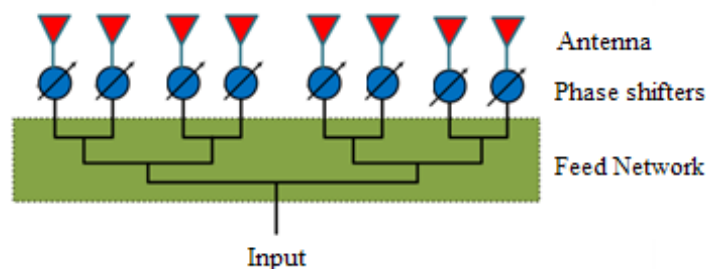

Figure 1: Phased array antenna[2]

II.   MICROSTRIPLINE PHASE SHIFTER

Among the various types of phase shifters, microstripline phase shifter type is selected for proposed system mainly because of its planar configuration. Planar designs can be easily fabricated using standard photolithography process and can be easily integrated with other microwave devices and MMICs. Design of microstripline width being one of the tasks of the device fabrication, it would be useful to understand the theory of microwave propagation on the microstripline configuration. The geometry and field lines of the microstripline configuration are shown in Figure 2. Conductor of width, W, is placed on the dielectric substrate of thickness, h, and dielectric constant, ε_r. Dielectric substrate is grounded by the brass mount. Microstripline thickness is negligible, ~ $15\mu m$ in our design, when compared to the width of microstripline. Unlike stripline design, in which dielectric fills both sides of the conductor, microstripline configuration only has the dielectric filled at the bottom. Because of this structure, only partial field lines are coupled with bottom ground plane through dielectric substrate and remaining are in the air region above the substrate. So instead of fields are pure TEM wave, they are characterized by hybrid TM-TE wave combination. In order to simplify the analysis, fields are considered to be quasi-TEM wave.[4]
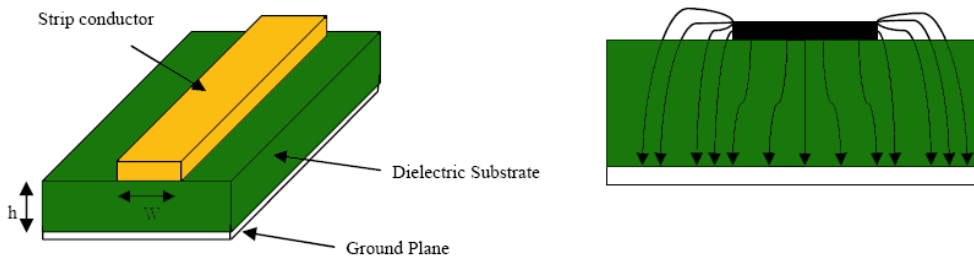

Figure 2: Microstripline geometry and EM field configuration in the microstrip on the dielectric substrate [4]

In this design, it can be shown that by varying the phase of the two transmissions, the radiation pattern is changed. The microstripline phase shifter model best describes the phase shifting process of this design. These phase shifters are similar to their attenuator equivalent where two SPDT switches are used to switch two line lengths, one of which is X degrees longer in electrical length than the other.[5]

For this phase shifter to be integrated into the feeding network of this antenna array which is used the same kind of substrate with the same height, and the input and output microstriplines must be in the same layer.
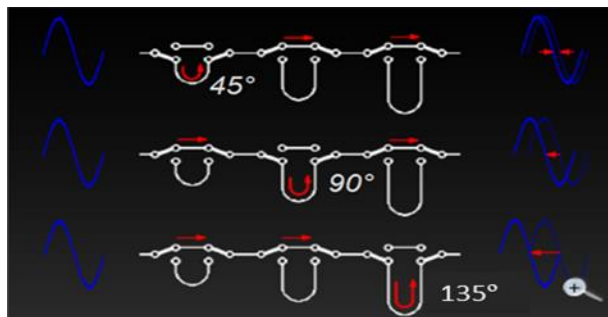

Figure 3: Microstripline phase shifter

III.   DESIGN STEPS OF MICROSTRIPLINE PHASE SHIFTER

A . The Length of the Microstripline Calculation

The selected parameters for the microstripline phase shifter design are as follows:

f = Operating frequency = 2.45GHz
ε_r = Dielectric Constant of the substrate
(here ε_r = 2.33 for RT Duroid 5870 substrate)
 h = substrate height = 1.5mm (59 mils)

In this schematic, the lower path has transmission length L, while the upper path has a transmission length L+ΔL. The path length L acts as a reference line as well as the reference phase. The additional length ΔL that gives the phase delay is determined by the equation given defined by:[6][8][9]

$$\Delta L = \frac{\Delta \varphi}{\beta}$$

$$\lambda_{air} = \frac{c}{f}$$

$$\lambda_g = \frac{\lambda_{air}}{\sqrt{\varepsilon_{eff}}}$$

$$\beta = \frac{2\pi}{\lambda_g}$$

Where, $\Delta\varphi$ is phase shift degree, c is the speed of light, f is operating frequency and ε_{eff} is effective dielectric constant

B. The Width of the Microstripline Calculation

$$\frac{W}{h} = \frac{8e^A}{e^{2A} - 2}, \qquad\qquad for A > 1.52$$

$$A = \frac{Z_0}{60}\left[\frac{\varepsilon_{eff} + 1}{2}\right]^{\frac{1}{2}} + \frac{\varepsilon_{eff} - 1}{\varepsilon_{eff} + 1}\left[0.23 + \frac{0.11}{\varepsilon_{eff}}\right]$$

$$\frac{W}{h} = \frac{2}{\pi}\left\{B - 1 - \ln(2B - 1) + \frac{\varepsilon_{eff} - 1}{2\varepsilon_{eff}}\left[\ln(B - 1) + 0.39 - \frac{0.61}{\varepsilon_{eff}}\right]\right\}, \qquad\qquad for A \leq 1.52$$

$$B = \frac{60\pi^2}{Z_0\sqrt{\varepsilon_{eff}}}$$

Where, W is width of the microstripline, h is the height of the substrate and Z_0 is the Input impedance. These equations are based on the work done by Hammerstad.[7]

C. The Insertion Loss of the Microstripline Calculation

The insertion loss provides information about the signal quality of the transmitted signal and the bandwidth of the interconnect. The total insertion loss is the sum of the conductor loss and dielectric loss. The insertion loss can be calculated by the following equations:

Conductor loss,

$$\alpha_c = \frac{R_s}{Z_0 W} Np/m$$

$$R_s = \sqrt{\frac{\omega\mu_0}{2\sigma}}$$

Where, α_c is conductor loss, Z_0 is input impedance and W is width of the microstripline.

Dielectric loss,

$$\alpha_d = \frac{k_0\varepsilon_r(\varepsilon_{re} - 1)\tan\delta}{2(\varepsilon_r - 1)\sqrt{\varepsilon_{re}}}$$

$$k_0 = \frac{2\pi\pi}{c}$$

Where, α_d is dielectric loss, $\tan\delta$ is dielectric loss tangent and ε_{re} is effective dielectric constant.

Table I: Parameters of microstripline phase shifter

Parameters	Values
Substrate Material	RT Duroid 5870
Relative Permittivity of the substrate	2.33
Height of the substrate	1.5 mm (59 mils)
Frequency range	C band (4 – 8 GHz)
Operating frequency	5.3 GHz
Width of microstripline	4.6 mm
Length of microstripline	4.66 mm (45°) 9.33 mm (90°) 13.986 mm (135°)

IV.   SIMULATED RESULTS AND DISSICUSION

The physical parameters and insertion losses of the microstripline were obtained by using MWI 2014 calculator of Rogers Corporation. The designed parameters are utilized on Sonnet Lite software and Ansoft Designer (Student Version) for performance simulations.

A.   Insertion Loss

The insertion loss provides information about the signal quality of the transmitted signal and the bandwidth of the interconnect. Insertion loss is measured in unit of dB. The ratio of the amplitude of the signal at the end of the interconnect to the incident signal should be 1. In dB, a ratio of the amplitudes of 1 corresponds to 0 dB. As attenuation increases, the value of the insertion loss, in dB gets to be a larger, negative number. Insertion loss is the total of conductor loss and dielectric loss. The insertion loss is down to -3 dB as a measure of the bandwidth of the interconnect.[11] Figure 4. illustrates the comparison of the insertion losses on three different materials. From the figure, RT Duriod 5870 material has the lowest insertion loss and it is chosen for proposed system.
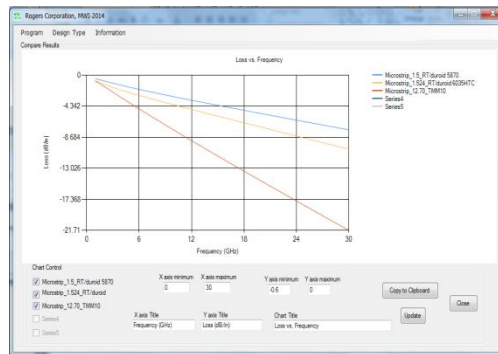

Figure 4: Comparison of the insertion losses on different materials

The necessary conductor loss and dielectric loss could be calculated using Rogers Corporation's MWI 2014 microstrip calculator. The relative permittivity and loss tangent, per Rogers Corporation, of the RT Duroid 5870 is 2.33 and 0.0012, respectively. For the first build, the substrate thickness is 59 mils or 1.5 mm and the thickness of the copper tape is 15.24 μm.
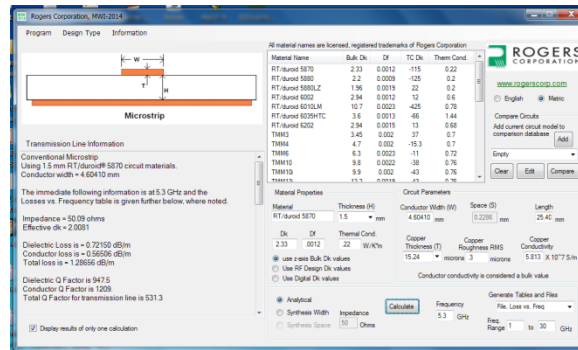

Figure 5: Insertion loss calculation using MWI 2014 calculator

The calculated insertion losses of the RT Duroid 5870 substrate is shown in Figure 6. Insertion losses were calculated for various frequency ranges. Insertion loss is the total of dielectric loss and conductor loss. From the figure, the insertion is about 1.3 dB/m at 5.3 GHz frequency. This value is good agreement for microstripline phase shifter design.
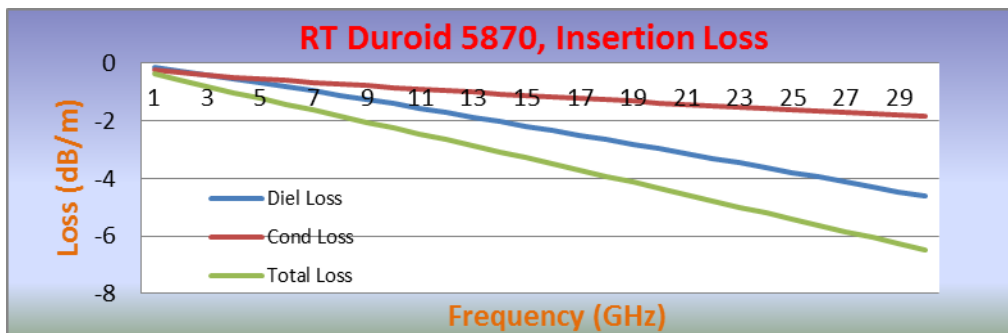

figure 6: Insertion loss of RT Duroid with various frequencies

B.   Impedance Matching (Return Loss)

The return loss provides information about the impedance match of the interconnect to a 50Ω system, while the insertion loss provides information about the signal quality of the transmitted signal and the bandwidth of the interconnect. The bandwidth, of course, is a rough indication of the highest data rate that can be transmitted through the interconnect. Return loss is measured in units of dB. This is a great source of confusion. A small amount of reflected amplitude, an indication of a good impedance match, would be a large, negative number in dB. An exceptionally well matched interconnect would have a return loss of -40 dB. If there is a 5Ω impedance mismatch somewhere in the system, out of 50Ω, the reflected signal amplitude would be about 5%. This corresponds to a return loss in dB of -25 dB. A marginally acceptable return loss, especially at high frequencies, is typically about -15 dB. An open, a really bad interconnect, would be 0 dB.
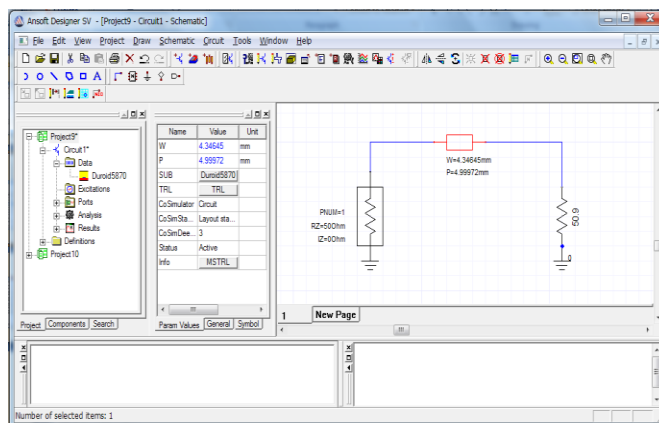

Figure 7: Impedance matching simulation set up on Ansoft Designer (SV)
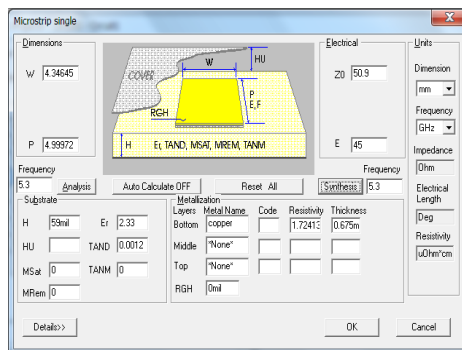

Figure 8 : Microstripline calculation on Ansoft Designer (SV)

The S11 parameter for the proposed phase shifter design was calculated and the simulated return loss results are shown in Figure 9. The value of return loss is -55.90 dB in this proposed phase shifter design. The achieved return loss value is small enough and frequency is very closed enough to the specified frequency band for 5.3 GHz. The value of return loss i.e. -55.90 dB shows that at the frequency point i.e. below the -10 dB region there is good impedance matching. A negative value of return loss shows that this microstripline phase shifter design had not many losses while transmitting the signals.
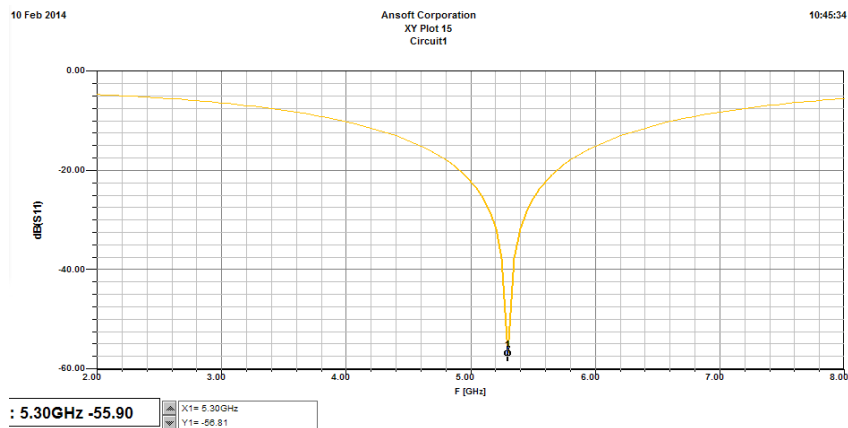

Figure 9 : Return loss of microstripline phase shifter

C.   Current Distribution

At first the important mathematical calculations for finding the dimensions of all the individual components is done using MATLAB and then the individual components are designed and simulated using Sonnet Lite. After getting good results all the individual components are combined on a single substrate to implement and simulate using Sonnet Lite. In this paper -45° phase shifter is simulated as an example. The phase shifter is implemented using the microstriplines and the length of the microstriplines are calculated using MATLAB. Optimum design is given below:
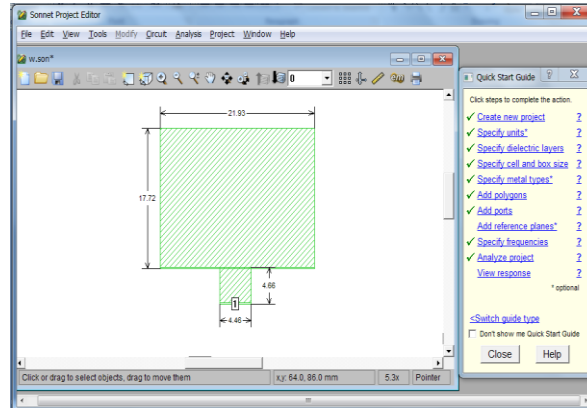

Figure 10: Patch and microstripline geometry for 45 degree phase shift

Figure 11. demonstrates the current distribution on the single patch element and microstripline phase shifter at operating frequency 5.3 GHz and figure shows simulated results of the -45° phase shift at 5.3 GHz frequency. The phase shift value is -44.83° and it is very close to the target value -45° phase shifting.
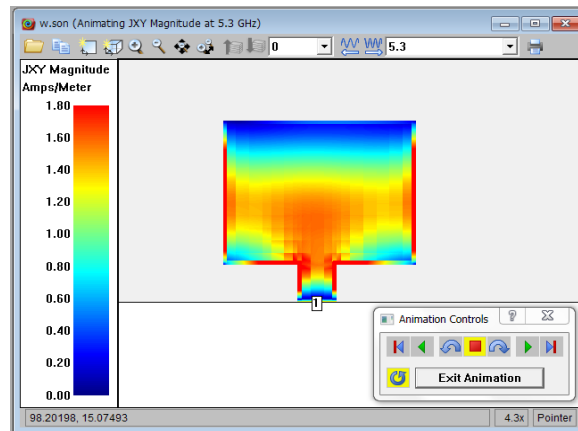

Figure 11: Current distribution at 5.3 GHz frequency
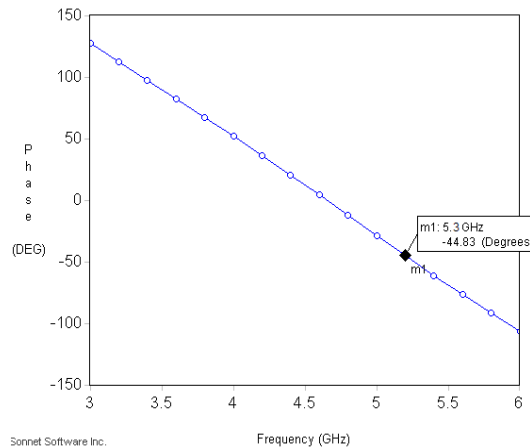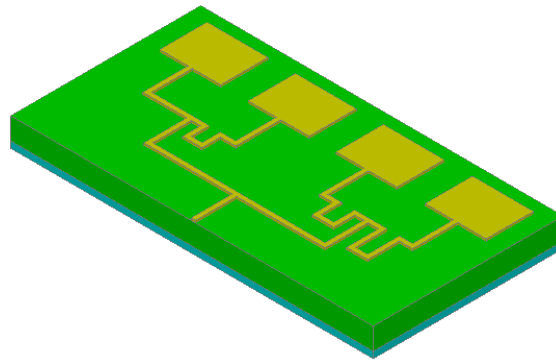

Figure 12: Phase shift degree at 5.3 GHz

Figure 13: Auto CAD model of four element sub array and microstripline phase shifter

V. CONCLUSION

This paper has been presented the design and performance analysis of Microstripline phase shifter for four elements sub array system for Synthetic Aperture Radar (SAR) application. Important physical dimensions were calculated in MATLAB and MWI calculator 2014. Sonnet Lite software and Ansoft Designer (SV) were used to implement the performance of the microstripline phase shifter. Four patch elements were arranged in linear array form for sub array of SAR antenna application. Four different length microstriplines were selected to achieve 0º, 45º, 90º and 135º phase shift angle. This proposed phase shifter model is cost effiective, high efficiency and impact design for the applications in C band (4-8 GHz) frequency range. The optimum design parameters (dielectric material=RT Duroid 5870, height of the substrate=1.5 mm, operating frequency=5.3 GHz) were used to achieve the compact array-feeder network and integrated phase shifter design on the same substrate material. It provides a insertion loss of 1.28 dB/m, -55.90 dB return loss and VSWR < 2 is achieved over the complete frequency band with linear polarization of antenna in the desired part of the beam.

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Implementing Multicast using TM and BSMA Algorithm

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Abstract- Many applications require to send the information from the source node to the destination node through the communication network. In order to support these applications, it is necessary to determine a path of minimal cost to connect the source node to the destination node. The TM algorithm and BSMA algorithm has been used in order to find the path that minimizes the total cost. The experimental results show that the algorithm can find optimal solution quickly.

I. INTRODUCTION

1.1 DEFINITION

The delivery of information or data to a group of destination computers simultaneously in the single transmission from the source node is known as multicasting.

The most common transport layer protocol to use multicast addressing is User datagram protocol (UDP). UDP is not reliable due to which messages may be lost or delivered out of order reliable multicast protocols such as pragmatic general multicast (PGM) have been developed to add loss detection and retransmission on top of IP multicast.

Amongst the three transmission methods supported by IP, multicasting is the method that is most practical for one-to-many delivery.IP unicasting sends a separate datagram to each recipient host and IP broadcasting sends a single datagram to all hosts on a single network segment (also known as subnet), even to those not interested in receiving it. IP multicast is widely used in enterprises, commercial stock exchanges.
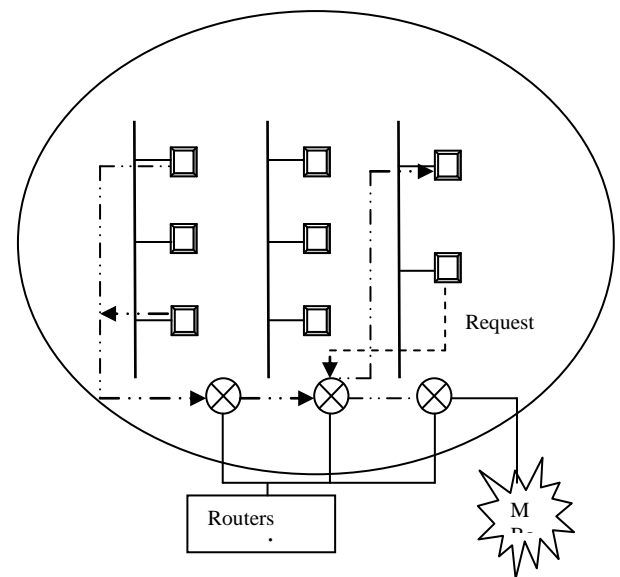
1.2 WORKING

The host and the router should be multicast enabled in order to support multicasting In an internetwork. Routers must support the Internet Group Membership Protocol (IGMP), multicast forwarding, and multicast routing protocols.

The source host sends multicast datagrams to a single Class D IP address, known as the group address. Any host that is interested in receiving the datagrams contacts a local router to join the multicast group and then receives all subsequent datagrams sent to that address.

Multicast routing protocol is used by the router to determine those subnets which includes at least one interested multicast group member and forward multicast datagram only to those subnets that have group members or a router that has downstream group members.TTL (time-to-live) value is included in the IP header of the multicast header to determine how far the routers can forward the multicast datagram.

1.3 ARCHITECTURE

The following figure shows how multicasting components fit in an internetwork.

The major components of multicast architecture are host,router,multicast address, multicast group and MBone.

The host that is configured to send the multicast data on multicast-enabled network can send datagrams to a single designated Class D IP address so that multiple hosts can receive the data and the one which is configured to receive the multicast data can use IGMP to join a multicast group and then listen for datagrams sent to the multicast address. Hosts can send and receive multicast data from anywhere on an intranet or the Internet.

The role of multicast router is to manage multicast group membership by processing IGMP requests to join or leave groups and forward multicast traffic to subnets of the internetwork that contain multicast group members.

IP addresses in the Class D range are reserved for IP multicasting. Class D addresses are in the range of 224.0.0.0 to 239.255.255.255.

Multicast group or the host group are the hosts listening for a specific IP Multicast address. Multicast group has no size limit. Multicast groups can be either transient or permanent. Permanent groups are assigned a well-known multicast address.
The MBone is the portion of the Internet that supports the forwarding of Internet-based IP multicast traffic.

II.   RELATED WORK

2.1 ANYCAST

Anycast is a communication technique between a single sender and nearest of several receivers of group. It exists in the contradistinction to multicast, communication between a single sender and multiple receivers, and unicast, communication between a single sender and a single receiver in a network.

It is a new networking paradigm supporting service–oriented addresses where an identical address can be assigned to multiple nodes providing a specific service. An anycast packet is delivered to one of these nodes with the same anycast address. Like a multicast address, a single anycast address is assigned to multiple nodes (called anycast membership), but unlike multicasting, only one member of the assigned anycast address communicates with the originator at a time.

Only three connection types are commonly known and used in Internet Protocol version four (IPv4) networks: unicast, multicast and broadcast. A fourth connection type, Anycast, was unknown until IPv6 made it a standard connection type. Anycast is not standardized in IPv4 but can be emulated. IPv4 Anycast addressing is a good solution to provide localization for services and servers so as to achieve robust nature, redundancy and resiliency.

The basic idea of Anycast is very simple: multiple servers, which share the same IP address, host the same service. The routing infrastructure sends IP packets to the nearest server. Better latency times, server load balancing, and improved security are the major benefits of employing Anycast in IPv4.

Anycast IPv4 implementations usually involve enabling routing on the server or setting up a static route at the router connected to the server. Tradeoffs are made according to the situation where Anycast is to be used.

Anycast packets can be dropped like any other kind of traffic. Packets are not specifically marked or tagged. Preferably only anyone anycast server receives a packet, but there is no guarantee. It is possible that the sequential packets from a client to anycast address are delivered to different servers. If servers are not synchronized incorrect data maybe sent back. The server that receives a specific packet is solely determined by the unicast routing protocol used in the domain. There is no special anycast routing table equivalent to a separate routing table for multicast traffic. Clients, servers, and routers require no special software/firmware. The only special configuration is needed on servers and routing infrastructure. Therefore, it does not negatively interfere with existing networks or services. Anycast just leverages the existing infrastructure.

2.2 UNICAST

The communication in which the piece of information is sent from one point to another point. There is only one sender and one receiver in this case. In unicast, the packet is sent from a single source to a specified destination. It is predominant form of transmission in LANs and within the internet. All LANs(Ethernet) and IP networks support the unicast transfer mode.

Certain network applications which are mass-distributed are too costly to be conducted with unicast transmission since each network connection consumes computing resources on the sending host and requires its own separate network bandwidth for transmission. Such applications include streaming media of many forms. Internet radio stations using unicast connections may have high bandwidth costs.

There are some standard unicast applications like smtp,ftp,telnet.

2.3 BROADCAST

It is the method which is used to simultaneously send the same message to multiple receivers.

In networking, broadcasting occurs when all the transmitted data packet is received by all the network devices.

A network address is reserved for sending the message to all the machines in the given network segment and that address is known as broadcast address. Ethernet as well as IPv4 use the broadcast address to indicate a broadcast packet. Broadcasting is limited to the LAN (local area network) systems. Internet protocol version 6(IPv6) uses multicasting rather than broadcasting in order to avoid the network interruption when services are requires by any one or two nodes.

Broadcasting is also used to perform a type of DOS (denial of service) attack known as smurf attack. The source IP-address along with the fake ping request is being sent by the attacker. All the replies are then faced by the victim computer and is ultimately flooded. Broadcasting is used in e-mail services and also used by the fax systems.

III.   TM ALGORITHM FOR SMALLEST DELAY

It was designed by Takahashi. H and Matsuyama. A .The algorithm finds a Steiner tree by incremental approach called Nearest Destination First (NDF). Initially, the nearest node to the source is found and least cost path between them is selected.

Then at each iteration the nearest unconnected destination to the partially constructed tree is found and added into tree. This process is repeated until all destination are included. We use this algorithm to find the minimum delay spanning tree.

BSMA

It is a source based routing algorithm named Bounded Shortest Multicast Algorithm (BSMA). For the construction of delay bounded minimum cost multicast trees.

Network Model & Problem Formulation

In a network model the set of node can be of following types:

1) Source Node: the node connecting to the source that sends out data stream.

2) Destination Node: the node connecting the destination that receives the data stream.

3) Relay Node: the intermediate node in the path between source to destination.

Two position real-valued function are defined on E:

Link Cost Function: (c: E -> R$^+$)

The cost of the link can be associated with utilization of link, the higher utilization is represented by a higher link cost.

Link Delay Function: (d: E -> R$^+$)

The link delay function deals with the delay and is given by the sum of the perceived queuing delay + transmission delay + propagation delay over the link.

The delay of the path is defined as the sum of link delay along the path.

Destination Delay- bound function or DDF: (δ: D -> R$^+$)

DDF assigns an upper bound to the delay along the path from source to destination in D. (i)Can be different from (j) for destination I not equal to j. If DDF assign the same upper bound delay to each destination, the upper bound I denoted by $\delta(i) = \Delta$.

A Delay bounded Minimum Steiner Tree (DMST) problem is defined as:

DMST Problem: given a graph G=(V,E) with a link-cost function , a link delay function a source S, a set of destination D, and a DDF, then construct a DMST spanning DU{S} such that the cost function of the tree is minimizing while DDF is satisfied.

BSMA Overview

BSMA is a source routing algorithm as it is assumes that the source node has complete information regarding all network link to construct a multicast tree. This can be possible by using any topology broadcast algorithms based on flooding.

It is based on the feasible search optimization method. This method minimizes he objective function constrained inside a feasible region. The feasible region R_b for the BSMA problem consists of the set of all delay bounded Steiner trees. BSMA starts with an initial tree T_0 ε R_b, and iteratively refines the tree for low cost while staying in the feasible region.

BSMA consists of Two major steps

Step 1- construct the initial tree T_0 which is a minimum delay Steiner tree with respect to the multicast source, using TM algorithm given above

Step 2- Iteratively refine T_0 for low cost.

Path Switching Algorithm:

    Input
    G (V, E) =graph
    S=Source Node
    D= Destination Node
    DB= delay bounds(destination node)

Type =cost function type for the tree, which can be utilization driven, to minimize the total link Cost or congestion driven, to minimize the maximal link cost.

  Output
    A delay bounded Steiner tree spanning D U{S}
    ProcedureMulticastTree(G (V, E),S , D, DB, Type)
{
    J $\leftarrow$ 0;
    T_j $\leftarrow$ minimum delay tree spanning D U{S} found using TM algorithm;
    Loop{
        if (Type== utilization driven)

P_h $\leftarrow$ an unmarked superedge in T_j with the highest cost among all unmarked superedges(not compared with marked superedges);

        Else
if(Type==congestion driven)

p_h $\leftarrow$ an unmarked superedge in T_j with the highest cost among all superedges(also compared with marked superedges);

if(p_h== Null)
        return;

Mark superedge p_h;
Remove p_h from tree T_j getting two T^1 and T^2 ;
Ps$\leftarrow$DelayBoundedShortestPath(G(V, E),S ,DB ,T^1 ,T^2);
        J$\leftarrow$ J+1;
        $T_j$$\leftarrow$$p_s$ U T^1 U T^2;
        If ($p_s \neq p_h$)
        Unmark all marked superedges;
        }
}

Evaluation of BSMA

The proposers of BSMA proved it always construct a delay bounded multicast tree, if such a tree exits and monotonically decrease the cost of delay bounded tree.

Considering a network of n nodes and denote by k the average number of the k-shortest paths constructed to obtain the delay bounded shortest path. It is shown that the expected time complexity of BSMA is $O(kn^3 log(n))$, and $O(kn^3)$ in a degree bounded network where the maximal degree is upper bounded.

3.1 PROBLEM STATEMENT

We consider the multicast routing problem with bandwidth and delay constraints from one source node to multi-destination nodes.

Figure 1

TM algorithm is applied. In this we assume that total delay should be less than 3.The path followed is A→B,A→E→C,A→D. Figure 2 is the solution and the total delay in this case is 2.

Figure 2

In order to lower the cost, BSMA algorithm is applied. The total cost required in the previous figure is 6.But in order to reduce the cost, the path is changed. The path will be as follows:- A→B, A→E→C, A→E→D. The total cost in this case is 5.Figure 3 is the solution.
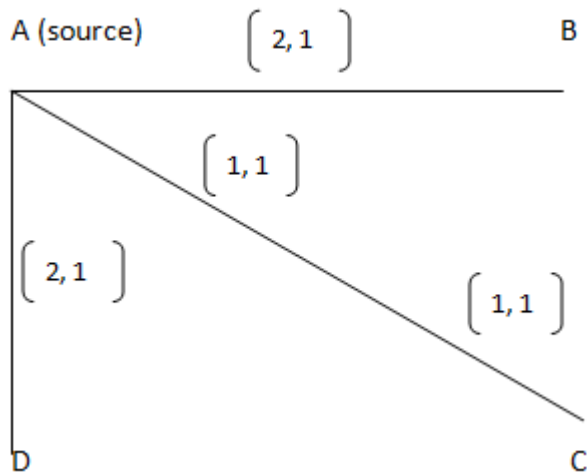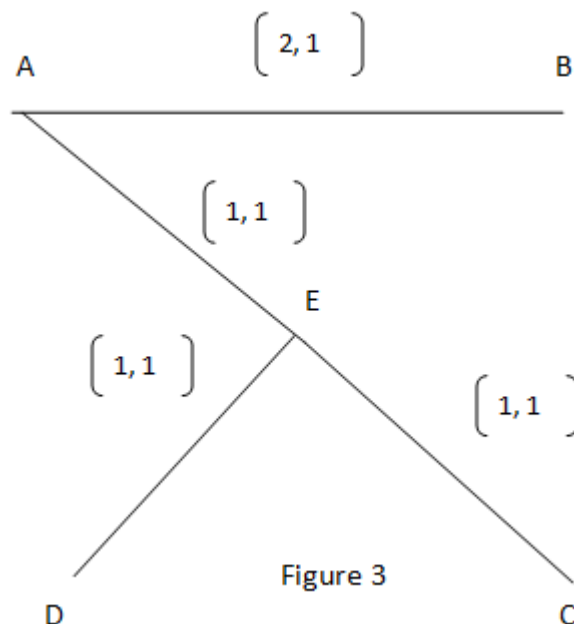

Figure 3

IV. SUMMARY

The T M algorithm reduces the original problem to a spanning tree problem by constructing a logical complete graph among the source node and the destination and destination nodes. The computation is easy and fast in most multicast source routing algorithm and policy routing can be easily integrated.

BSMA is a algorithm that is used to optimize and find the minimum of maximum cost of the multicast routing. it is a source based routing algorithm with low complexity.

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An Improved Algorithm for Fourier series Approximation Based Algorithm for Separating Touching Grain Kernels

S. B. Ghadge , Dr. S. D. Raut

Abstract- A proposed algorithm is using elliptic Fourier series approximation for separating touching grain kernels. Algorithm is based on boundary curvature values. The image acquisition inefficiency can be removed by using image pre-processing techniques and Fourier approximation smoothes the boundary contour which avoids the local pseudo-corners of kernel caused by the presence of rough boundaries. Nodal points separating the touching instances are determined after calculating curvature values along the boundary of kernels. Final nodal points are determined by evaluating the curvature along the boundary of image and selecting those which falls below threshold. With multiple nodal points, the segmentations lines are drawn using nearest-neighbor and critical radian distance difference [rad] of chain coded boundary point. The algorithm uses Breshenham algorithm for drawing segmentation lines. The algorithm appears to be robust enough to separate most of the multiple touching scenarios.

Index Terms- Fourier Series, Grain separation, Curvature analysis, nearest neighbour

I. INTRODUCTION

For millennia, the grains humans ate came straight from the stalk. That means they got a carbohydrate package rich in fiber, healthy fats, vitamins, minerals, plant enzymes, hormones. So determining grain type and quality is of great importance. Despite technological advances in the transportation and handling of grain, the analysis of quality attributes and grading of grain is still performed manually by skilled personnel (Lou, Jayas, & Symons, 1999). Manual analysis of grains is prone to many problems: (i) it is highly immanent and is affected by human factors and working conditions (Zhang, Jayas, & White, 2005); (ii) the rate of cleaning and recovery of salvages is limited; and (iii) human sense can easily be influenced by external factors (Francis, 1980) resulting in grading inconsistencies .

In this respect a machine vision system is needed for monitoring and handling grain operations. Machine vision is nothing but to extract useful information from digital images automatically. It implies that a system is needed to automatically cleaning and separation of grains which will be able to apply evaluation criteria consistently and objectively and without any tiredness.

Machine Vision systems are widely in use for applications like inspection of fruits (Shahin & Symons, 2003), vegetables (Schatzki et al., 1997) and grains (Liao, Paulsen, & Reid, 1994). Classification of grains like of wheat and barley using Machine

vision (F. Guevara-Hernandez and J. Gomez-Gil). Also by classification based on measurements of morphological, optical and textural features of various grain types (Samir Majumdar, 1997), (A. Douik, M. Abdellaoui, 2010), and for particular grains types such as wheat (Neuman, Sapirstein, Shwedyk, & Bushuk, 1987; Paliwal, Shashidhar, & Jayas, 1999, 2003), rice (Yao, Chen, & Guan, 2009,274e279 p.), corn (Paulsen, Wigger, Litchfied, & Sinclair, 1989), lentils (Shahin & Symons, 2003), and paddy (S. F. Lilhare, N G Bawane, 2012) has been reported. A number of studies have been conducted to classify grains based on their physical attributes (Paliwal et al., 2003, 1999).

Most of the previous feature extraction algorithms have been applied to grain kernel images that were presented to the imaging systems manually in a non-touching fashion. This is to avoid clusters of touching kernels that make the feature extraction procedure difficult. Despite the use of vibrating beds to present grain kernels in a monolayer, the presence of touching scenarios cannot be avoided (Crowe, Luo, Jayas, & Bulley, 1997). A study using a sample presentation system consisting of a vibratory feeder and a conveyor belt showed that about 90% of the kernels were presented as individual kernels (Crowe et al., 1997). Most of the touching grains were in groups of two whereas multiple touching kernels (a group of three or four) represented less than 4% of the total grains presented (Crowe et al., 1997).Zhang et al. (2005) demonstrated that the focus of algorithm development should be on separating two and three touching scenarios since multiple touching conditions can be eliminated using mechanical systems. Combining such a grain presentation device and using machine vision will, however, add extra cost to the development of the overall system. Different methods of separating touching kernels have been reported in literature. Automated separation of touching grains in digital images of thin sections by E.H. van den Berg, A.G.C.A. Meesters, J.A.M. Kenter, W. Schlager (2000). The new algorithm for separation detects the characteristic sharp wedges when grain sections touch and evaluates them for possible starting points of separation lines.

These include the use of morphological operations (Shatadal, Jayas, & Bulley, 1995), an ellipse-fitting algorithm (Zhang et al., 2005), a concavities based algorithm (Visen, Shashidhar, Paliwal, & Jayas, 2001), watershed segmentation (Wang & Paliwal, 2006) and a combined watershed and concavity algorithm (Zhong et al., 2009). However, these algorithms had certain drawbacks: (i) the morphological operations failed to correctly segment when groups of touching kernels formed relatively longer chains; (ii) the concavity algorithm was prone to oscillations and was only successful to separate a maximum of three touching kernels (Visen et al., 2001); (iii) the ellipse-fitting algorithm proposed by Zhang et al. (2005) was restricted to two touching kernel scenarios and its search for fitting ellipses was

time consuming; (iv) the watershed algorithm was prone to over segmentation and failed to segment elongated grains despite significant improvements by reconstructing internal markers through a series of morphological operations (Wang & Paliwal, 2006); and (v) the procedure which combined watershed and concavities algorithms was very lengthy. Hence, comprehensive and robust touching grain segmentation algorithms are still lacking. In this respect, an efficient separation algorithm based on the elliptic Fourier series approximation and the calculation of curvature values is proposed. The Fourier approximation ensures perfect smoothness such that all derivatives exist and are continuous. The corner locations are determined at points where abrupt changes in the local curvature value are detected. In an ideal situation, when the touching objects have smooth boundaries, all negative curvature values define corner points. However, if the kernels are broken or have rough boundaries, pseudo corner points may be detected. To avoid such pseudo corner points, a threshold curvature value has to be defined. In this study, a threshold value (.28, .3) avoided the surface roughness effects. The objective of this research, therefore, is to develop an algorithm that separates multiple touching grains kernels.
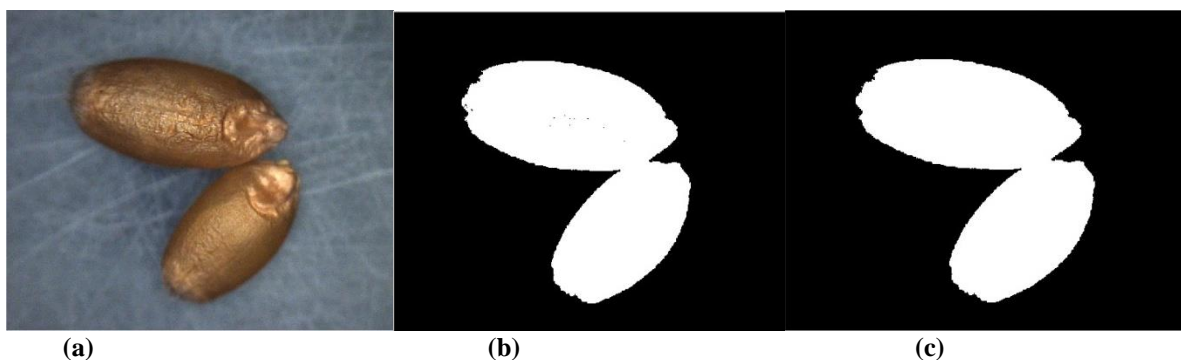
II. RESEARCH ELABORATION

2.1. Imaging and image processing:

Images are taken from Rapid-I machine under fluorescent light of 36 watts, of dimensions 800×600, width 800 pixels, height 600 pixels, horizontal resolution 96 dpi, vertical resolution 96 dpi, at bit depth of 24.

2.2. Grain samples:

The grain samples were obtained from wheat available in the market. Available sample is of type Gujarati No. 1. The wheat grains were manually placed in clusters of two, and three, and four grains. The pictures are taken after manually placing them in touching fashion.

2.3. Image pre-processing:

The sample image taken might have noise because of processing such image can be difficult and may not give desired output. So, image pre-processing techniques are applied for the same. First the RGB image is converted to HSV image. Output image is converted to binary image for easy processing depending upon the threshold. Boundaries are cleared. The image processing and boundary tracing is done in Matlab R2009b.

(a)   **(b)**   **(c)**

Fig 1. (a) Input image with 2 wheat grains (b) Binary image of input image (c) Pre-processed image from binary image.

2.4. Elliptic Fourier series approximation:

The Fourier approximation ensures perfect smoothness such that all derivatives exist and are continuous. Fourier descriptors refers to the utilization of Fourier analysis, primarily the Fourier series as a curve fitting technique, that can numerically describe the shape of irregular structures such as are commonly found in living organisms. The quantitative characterization of irregular forms is often the first step toward elucidation of the underlying biological processes, whether they are genetic, evolutionary, or functional. The elliptical Fourier method is primarily an analytical means to represent a curve as a function, and it makes use of geometry of a form only indirectly via approximation of the overall shape as an ellipse used to orient the representation, which then allows for a rotation, translocation, and redefinition of the initial point to remove coordinate-system dependency. Fourier approximation is represented as equation in of (x, y) point in the form of third variable (t). Based on discrete Fourier series approximation Fourier coefficients are calculated for chain-coded boundary contours. Chain code of is started from a pixel as a reference point and chain code completes when the reference point is reached (Mebatsion and Paliwal, 2011). The elliptic Fourier series approximation of closed contour projected on the x and y-axis can be defined as follows (Hiraoka & Kuramoto, 2004; Neto, Meyer, Jones, & Samal, 2006):

$$x_N(t) = A_0 + \sum_{n=1}^{N} a_n cos\left(\frac{2n\pi t}{T}\right) + b_n sin\left(\frac{2n\pi t}{T}\right)$$

(1)

$$y_N(t) = C_0 + \sum_{n=1}^{N} a_n cos\left(\frac{2n\pi t}{T}\right) + d_n sin\left(\frac{2n\pi t}{T}\right)$$

t is the step required to move a unit pixel along the closed contour, such that $t_{p\_1} < t < t_p$ for values of p within the range of $1 \le p \le K$. N is the number of Fourier harmonics and K is the total number of chain-coded points. A_0 and C_0 are coefficients corresponding to the frequency 0. If the contour between the (i-1)[th] and the ith chain-coded points is linearly interpolated and the length of the contour from the starting point to the pth point and the perimeter of the contour are denoted t_p and T, respectively, then

$$t_p = \sum_{i=1}^{p} \Delta t_i$$

(2)

T is the basic period of the chain code, which is the overall step to traverse the entire contour, T= t_k, where Δt_i is the distance between the (i-1) th and the ith points. The Kth point is equivalent to the starting point. If the x-coordinate of the pth point is denoted by x_p, then,

$$x_p = \sum_{i=1}^{p} \Delta x_i, \qquad \text{and}$$

$$y_p = \sum_{i=1}^{p} y,$$

$$(3)$$

where Δx_i and Δy_i are the distances along the x and y axes between (i-1) th and the ith point. Assuming linear interpolation between the neighbouring points, the elliptic Fourier coefficients in Eq. (1) of the nth harmonic (a_n; b_n; c_n and d_n) can be calculated using the following equations (Hiraoka & Kuramoto, 2004; Iwata, Niikura, Matsuura, Takano, & Ukai, 1998; Neto et al., 2006):

$$a_n = \frac{T}{2n^2\pi^2} \sum_{p=1}^{K} \frac{\Delta x_p}{\Delta t_p} \left(\cos\left(\frac{2n\pi t_p}{T}\right) - \cos\left(\frac{2n\pi t_{p-1}}{T}\right) \right)$$

$$b_n = \frac{T}{2n^2\pi^2} \sum_{p=1}^{K} \frac{\Delta x_p}{\Delta t_p} \left(\sin\left(\frac{2n\pi t_p}{T}\right) - \sin\left(\frac{2n\pi t_{p-1}}{T}\right) \right)$$

$$(4a)$$

$$c_n = \frac{T}{2n^2\pi^2} \sum_{p=1}^{K} \frac{\Delta y_p}{\Delta t_p} \left(\cos\left(\frac{2n\pi t_p}{T}\right) - \cos\left(\frac{2n\pi t_{p-1}}{T}\right) \right)$$

$$d_n = \frac{T}{2n^2\pi^2} \sum_{p=1}^{K} \frac{\Delta y_p}{\Delta t_p} \left(\sin\left(\frac{2n\pi t_p}{T}\right) - \sin\left(\frac{2n\pi t_{p-1}}{T}\right) \right)$$

$$(4b)$$

The number of harmonics required is estimated from average Fourier power spectrum. The Fourier power of a harmonic is proportional to the amplitude and provides a measure of the amount of shape information described by that harmonic. For the nth harmonic, the Fourier power is computed by the following equation (Costa et al., 2009):

$$Fourier\ power = \frac{\sum_{n=1}^{N}(a_n^2 + b_n^2 + c_n^2 + d_n^2)}{2}$$

$$(5)$$

In this case, the Fourier harmonics were truncated at the value N, at which the average cumulative power was 99.99% or more of the total average power, calculated with N_{max}, equal to half the number of boundary points.

2.5. Corner detection by analyzing the curvature:

Corner points are important features of an object for computer vision. Because corner points give more information about object and are descriptive primitives for shape representation and image interpretation (Asada & Brady, 1986). A corner can be defined as a point for which there are two dominant and different edge directions in a local neighbourhood of the point. Corner points have been defined in many ways by different researchers such as, local maxima (Abe et al., 1993), the point with largest "cornerity index" (Guru, Dinesh, & Nagabhushan, 2004), the point with k-cosine value (Rosenfeld & Johnston, 1973; Sun, 2008), and the point with maximum change of curvature (Freeman & Davis, 1977). However, corner points are not simply local maxima, high curvature or dominant points. They are points which change the features of shape. The detection of a corner is a function of the magnitude of the discontinuity, its abruptness, and the curved regions either side of it over where the mean curvature can be considered to be uniform and free of discontinuities (Masood & Sarfraz, 2007). The absolute value of the curvature is a measure of how sharply the curve bends. Curves that bend slowly, which are almost straight, will have small absolute curvature. The curvature function K(t) is the derivative of the orientation function $\emptyset(t)$, expressed as (Frette, zirnovsky, & Silin, 2009; Walton & Meek, 2001):

$$\emptyset(t) = \tan\left(\frac{dy(t)}{dx(t)}\right), k(t) = \frac{dx(t)d^2y(t) - d^2x(t)dy(t)}{(dx(t)^2 + dy(t)^2)^{\frac{3}{2}}}$$

$$(6)$$

where k(t) is the curvature, $dx(t)$, $dy(t)$ and $d^2x(t)$, $d^2y(t)$ are the first and the second derivatives of x and y with respect to t, respectively. Most healthy grains are generally convex and when convex objects are in contact, they form concave contour regions where the local curvature values are negative. Nodal points for multiple touching objects are determined from curvature values that fall below a certain threshold value (Freeman & Davis, 1977; Mebatsion and Paliwal, 2011).
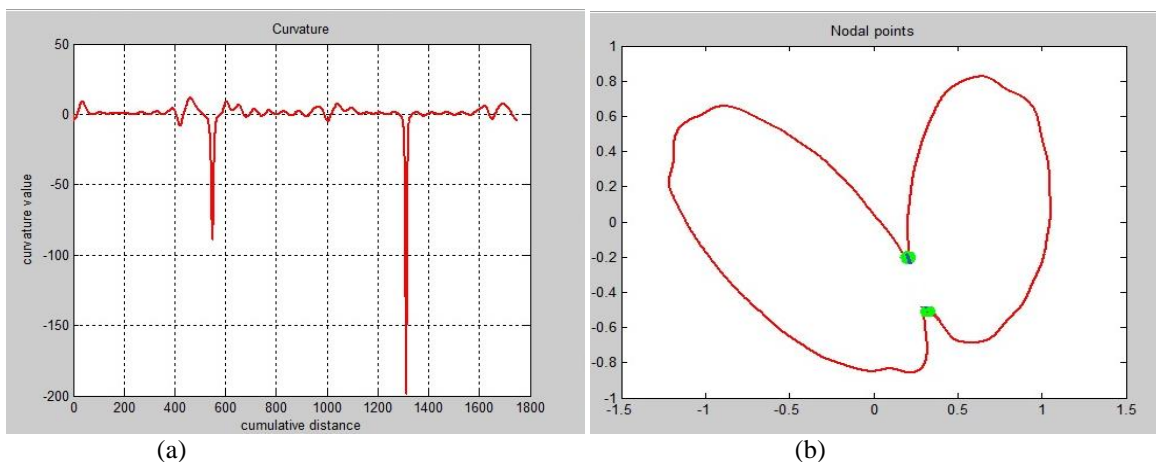
(a)

(b)

Fig.2 (a) The curvature value as a function of cumulative radial distance of multiple touching grains presented in Fig. 1. The corner points are quite easily identified having curvature values significantly different from that of the rest of the boundary points of the touching grain kernels. The critical curvature value of -50. (b) The nodal points (marked with green spot) used for separating multiple touching grains. The corresponding curvature value of the nodal point is presented in Fig. 2.

Fig. 2 (a) shows the curvature value as a function of cumulative distance of multiple touching grains. Based on the curvature values, the nodal points can accurately be defined on the elliptic Fourier series approximation curve depicted in Fig. 2 (b)

2.6. Determination of segmentation lines:

For determining segmentation lines Euclidian distance between each pair of points is calculated and arranged in ascending order. For joining pair *nearest-neighbour* algorithm is used. The first pair was taken to define the first segmentation line. The list of pairs was then automatically edited to remove any other pair containing any of the pixels forming the first pair. Subsequent segmentation lines were determined by repeating the procedure until all the node pairs were exhausted (Mebatsion and Paliwal, 2011; Visen et al., 2001). Nearest-neighbour criterion fails to separate touching grains where grains are slender in shape and have roughness (Mebatsion and Paliwal, 2011). This calls for the need to set additional requirements for the segmentation algorithm to be executed prior to the nearest-neighbour criterion. In this respect, a new algorithm that combines the nearest-neighbour algorithm and a radian critical distance difference is given by Paliwal (2010). The radial critical distance, L_s, is defined as the ratio of the radian measure of the perimeter of an elliptic Fourier approximation of a curve (the boundary of touching objects in this case) $(=2\pi)$ and the total number of potential nodes, n, defined as, $L_s = (2\pi/n)^{2/3}$. A one-pixel

(b) The nodal points (marked with green spot) used for separating multiple touching grains. The corresponding curvature value of the nodal point is presented in Fig. 2(a).

Fig. 3 Touching Grains with boundaries segmented.

thick flexible moving window (W_m) of length (L_s) is traced over a sub-segment from a "reference" node to the others. At each step the presence of a node point inside the moving window is examined. (H.K. Mebatsion*, J. Paliwal ; 2010). A list of "potential" node pairs is constructed from the reference node point and node points outside W_m; i.e., a node point inside W_m is ignored from being a potential node pair. The procedure is repeated for all node points. From the list of potential node pairs, the "true" node pairs are determined using nearest-neighbour criterion.

Fig. 4 A typical multiple kernel separation procedure for three grains: (a) original image showing multiple touching kernels; (b) Binary image (c) Pre-processed image (d) Fourier series approximation (red contours) of the boundary contours of touching kernels; (e) the curvature value as a function of cumulative radial distance where the nodal points are clearly identified; (f) separated kernels.

Fig. 5 A typical multiple kernel separation procedure for four grains: (a) original image showing multiple touching kernels; (b) Binary image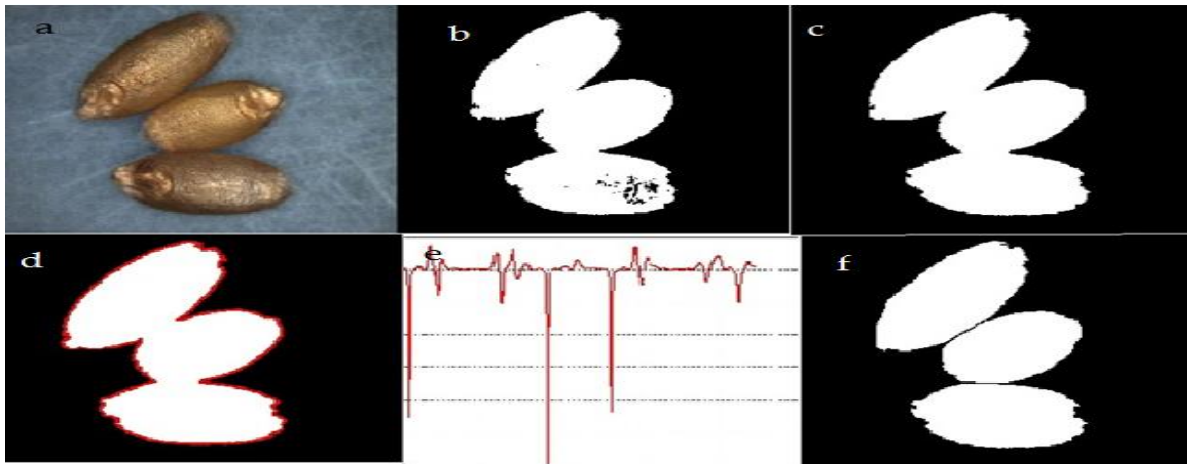 (c) Pre-processed image (d) Fourier series approximation (red contours) of the boundary contours of touching kernels; (e) the curvature value as a function of cumulative radial distance where the nodal points are clearly identified; (f) separated kernels.

III. RESULTS

The proposed algorithm is able to separate most of the instances of multiple touching wheat grains irrespective of their orientation. The Figs. 4 and 5 show the steps of separating multiple touching grain kernels. Because of rough shape of grains separation algorithms fail to separate the grain properly. But Fourier series approximation overcomes this limitation and algorithm able to separate kernels properly.

IV. CONCLUSION

An elliptic Fourier approximation based segmentation technique to separate various scenarios of touching kernels for multiple grains was implemented. The algorithm successfully separated most instances of touching kernels. Fourier approximation helps to smoothen the rough boundaries of grain kernels and separate the contours correctly.

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Overlapping Slicing with New Privacy Model

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Abstract- Today, world has growing concern on preserving privacy of census information. There is need of preserving privacy while publishing the data to research center or government agencies. There are various technique have been designed for privacy preserving data publishing such as generalization, bucketization and slicing.

Generalization technique losses considerable amount of information and do not apply for the high dimensional data where as bucketization does not prevent membership disclosure and does not apply for the data that do not have clear separation between quasi identifier and sensitive attribute whereas Slicing releases more attribute correlation and may result in data loss.

In this paper, extension is overlapping slicing which duplicates attribute in more than one column, this releases more attribute correlations. Hence increases privacy and utility of data, by achieving correlation among attributes.

Index Terms- Data Publishing, Data anonymization, Microdata, Privacy preserving, t closeness

I. INTRODUCTION

In recent years wide available personal data has made privacy preserving data mining issue an important one. Privacy is an important factor, while publishing the data to outside world. Many organisations such as Hospitals provides there maintained dataset to reaserch agencies for data analysis.

The data which is going to publish is called microdata which in the form of records. Microdata may contain information about individuals which may include census information such as Disease or salary.

Microdata is mainly divided into three categories such as; 1) explicit identifier: that can clearly identify about an individual, such as social security number, name, address. 2) Quasi identifier: the attribute whose value when taken together can potentially identify an individual such as name and address, name and phone number. 3) sensitive attribute: are the attributes which contains census information such as disease or salary of individuals. Sensitive attribute may provide more knowledge to intruder and may result in information disclosure risk.

II. DATA ANONYMIZATION

Data anonymization is the process of destroying tracks, or the electronic trail, on the data that would lead an eavesdropper to its origins. One of the mechanisms to safeguard personally identifiable information (PII) is to anonymize it. This means removing or obfuscating any identifying information about an individual in a dataset to ensure that it can't be disclosed, while also still allowing valid analysis of the dataset. If data is identifiable when it's collected, then it will still be identifiable when it is stored or analysed unless steps are taken to anonymize it. Anonymization can normally be attempted during collection, retention and disclosure, but any solution will be a balance between anonymity and dataset value, the goal being anonymity with minimal information loss.

There are various privacy models has been developed , such as k-anonymity, l-diversity and t-closeness, which are used with the Data anonymization technique.

Most techniques fall between providing privacy protection and allowing accurate scientific analysis. For example, generalizing an attribute where it's replaced by a less specific value such as age group instead of date of birth is good practice, but limits the level of analysis that can be performed.

III. INFORMATION DISCLOSURE RISK

While publishing very census information about individuals there is information disclosure risk, and data anonymization provides certain level disclosure risk protection. There are mainly three types of disclosure risks as follows:
1. Membership Disclosure
2. Identity Disclosures
3. Attribute Disclosure

Membership disclosure: When the data to be published is selected from a large population and selection criteria is sensitive then it is important to prevent an adversary from learning individuals records is present in database or not

Identity disclosure: The first is when an intruder can assign an identity to any record in the disclosed database. For example, the intruder would be able to determine that record number 7 in the disclosed database belongs to patient Alice Smith. This is called identity disclosure.

Attribute disclosure: Attribute disclosure identification is when an intruder learns something new about a patient in the database without knowing which specific record belongs to that patient. For example, if patients from a particular area in the emergency database had a certain test result, then an intruder does not need to know which record belongs to Alice Smith, if she lives in that particular area then the intruder will discover sensitive information about her. This is called attribute disclosure.

Overlapping slicing is reduces attribute disclosure risk, while achieving attribute disclosure risk there identity disclosure risk can obtain.

IV. T CLOSENESS: A PRIVACY MODEL

Privacy is measured by the information gain of intruder from revealed data. Information gain is nothing but knowledge discovered by the intruder. Before seeing or observing the data, the intruder has prior belief about data and after observing the data the intruder has knowledge about data and it is posterior belief. Information gain is calculated by measuring the difference between prior belief and posterior belief.

Information Gain=prior belief- posterior belief

An equivalence class is said to have t-closeness if the distance between the distribution of a sensitive attribute in this class and the distribution of the attribute in the whole table is no more than a threshold t. A table is said to have t-closeness if all equivalence classes have t-closeness.

The Earth Mover distance metric is used in order to quantify the distance between the two distributions. Earth Mover distance is used for both numerical and categorical data. Furthermore, the t-closeness approach tends to be more effective than many other privacy preserving data mining methods for the case of numeric attributes.

Example: First an observer has some prior belief $B0$ about an individual's sensitive attribute. Then, in a hypothetical step, the observer is given a completely generalized version of the data table where all attributes in a quasi-identifier are removed (or, equivalently, generalized to the most general values). The observer's belief is influenced by $\mathbf{Q}$, the distribution of the sensitive attribute value in the whole table, and changes to $B1$. Finally, the observer is given the released table. By knowing the quasi-identifier values of the individual, the observer is able to identify the equivalence class that the individual's record is in and learn the distribution $\mathbf{P}$ of sensitive attribute values in this class. The observer's belief changes to $B2$. We limit the gain from $B1$ to $B2$ by limiting the distance between $\mathbf{P}$ and $\mathbf{Q}$. Intuitively, if $\mathbf{P} = \mathbf{Q}$, then $B1$ and $B2$ should be the same. If $\mathbf{P}$ and $\mathbf{Q}$ are close, then $B1$ and $B2$ should be close as well, even if $B0$ may be very different from both $B1$ and $B2$.

$\mathbf{P}$ and $\mathbf{Q}$ to be close would also limit the amount of useful information that is released, as it limits information about the correlation between quasi identifier attributes and sensitive attributes. However, this is precisely what one needs to limit. If an observer gets too clear a picture of this correlation, then attribute disclosure occurs. The t parameter in t-closeness enables one to trade off between utility and privacy.

To measure the distance between two probabilistic distributions.
$\mathbf{P} = (p1, p2, ..., pm)$, $\mathbf{Q} = (q1, q2, ..., qm)$, two well-known distance measures are as follows.

1) Variational Distance:
$$D[P, Q] = \sum_{i=1}^{m} \frac{1}{2}|pi - qi|$$
$\quad\quad\quad\quad\quad\quad\quad\quad\quad$ . . . . . . (1)
2) And the Kullback-Leibler (KL) distance is defined as:
$$D[P, Q] = \sum_{i=1}^{m} pi \log \frac{P_i}{q_i} = H(P) - H(P,Q)$$
$\quad\quad\quad\quad\quad\quad\quad$ . . . . . . (2)

Where H(P) = $\sum_{i=1}^{m} p_i \log p_i$ is the entropy of P and H (P,Q) = $\sum_{i=1}^{m} p_i \log q_i$ is the cross entropy of P and Q

EMD(Earth Movers Distance)

The EMD is based on the minimal amount of work needed to transform one distribution to another by moving distribution mass between each other. Intuitively, one distribution is seen as a mass of earth spread in the space and the other as a collection of holes in the same space. EMD measures the least amount of work needed to fill the holes with earth. A unit of work corresponds to moving a unit of earth by a unit of ground distance. EMD can be formally defined using the well-studied transportation problem.

Let $\mathbf{P} = (p1, p2, ...pm)$, $\mathbf{Q} = (q1, q2, ...qm)$, and dij be the ground distance between element i of $\mathbf{P}$ and element j of $\mathbf{Q}$. We want to find a flow F = [fij] where fij is the flow of mass from element i of $\mathbf{P}$ to element j of $\mathbf{Q}$ that minimizes the overall work:

$$Work(P,Q,F) = \sum_{i=1}^{m} \sum_{j=1}^{m} d_{ij} f_{ij}$$
. . . . . . (3)

subject to the following constraints:

$$f_{ij} \geq 0 \quad\quad\quad\quad\quad\quad 1 \leq i \leq m, 1 \leq j \leq m \ . . . (i)$$
$$p_i - \sum_{j=1}^{m} fij_0 + \sum_{j=1}^{m} fij = q_i \quad\quad 1 \leq I \leq m . . . (ii)$$
$$\sum_{i=1}^{m} \sum_{j=1}^{m} fij = \sum_{i=1}^{m} pi = \sum_{i=1}^{m} qi = 1 \quad\quad . . . (iii)$$

These three constraints guarantee that $\mathbf{P}$ is transformed to $\mathbf{Q}$ by the mass flow F. Once the transportation problem is solved, the EMD is defined to be the total work,i.e.,

$$D[P,Q] = WORK (P,Q,F) = \sum_{i=1}^{m} \sum_{j=1}^{m} d_{ij} f_{ij} \ . . . . (4)$$

Earth mover distance is used to calculate the distance between two distributions. EMD is used for both numerical data and the categorical data.

EMD for Numerical Data: Numerical data are in order that's why order distance is calculated for the numerical data. For categorical data, equal distance and hierarchical distance is need to calculate.

Let the attribute domains are $\{d_1,d_2, . .,d_m\}$ where d_i is the i_{th} smallest value. For numerical data the order distance between two values is calculated by number of values between them

Order list $(v_i,v_j)=|i-j|/(m-1)$ $\quad\quad\quad\quad$ . . . . . . (5)

Ordered distance is measured by metrics. It is nonnegative and use triangle inequality and symmetry property. To calculate the ordered distance there is need to consider flows that transport distribution mass between adjacent elements, because any transportation between two more distance need to consider flows that transport distribution mass between adjacent elements, because any transportation between two more distance distant elements can be equivalently decomposed into several transportations between adjacent elements. Based on this observation, minimal work can be achieved by satisfying all elements of Q sequentially

EMD for Categorical Data: For categorical attribute we need to consider two distance measure, first is Equal distance which is ground distance between any two categorical attribute is defined to be 1. It iseasy to verify that this is a metric. As the distance between any two values is 1, for each point that $pi - qi > 0$, one just needs to move the extra to some other points. Thus we have the following formula:

$$D[P,Q] = \frac{1}{2}\sum_{i=1}^{m} |pi - qi| = \sum_{p_i \geq q_i}(pi - qi) = -\sum_{p_i < q_i}(p_i - q_i) \ldots \ldots (6)$$

V. LITERATURE SURVEY

L. Sweeney.,(2002) has proved that elimination of sensitive attributes from microdata is not sufficient to preserving privacy. There are a few solutions proposed in the literature to protect against the information linkage.

L. Swenny and samarati has proposed privacy model called K anonymity which is used with generalization. K anonymity require that each record should be indistinguishable at least k-1 record from other record. K anonymity was the first privacy model used to anonymize data. K anonymity protects against identity disclosure but does not work with attribute disclosure. K anonymity has problem against homogeneity attack and background knowledge attack.

A.Macchanavajjabala has introduced L diversity in 2006, In which each equivalence class has at least l well-represented sensitive values. L diversity is used in 2007 by N. Koudas, D. Shrivastava, and used with bucketization and slicing. Bucketization does not protect for membership disclosure risk and it doesn't not differentiate between quasi identifier and sensitive attribute.

T. Li and N. Li. In 2009 has emerged new approach i.e. the tradeoff between privacy and utility in data publishing.

In 2012 slicing technique has been proposed for data anonymization which works for high dimensional data, and also protect from membership disclosure risk. Due to high attribute correlation privacy violation may happen in slicing techniques . Data slicing can also be used to prevent membership disclosure and is efficient for high dimensional data and preserves better data utility. T closeness a new privacy measure is proposed by N. Li in 2007. In 2007 N. Li , T Li has proved that t closeness can be used with anonymization techniques. k-anonymity prevents identity disclosure but not attribute disclosure To solve that problem l-diversity requires that each eq. class has at least l values for each sensitive attribute But l-diversity has some limitations t-closeness requires that the distribution of a sensitive attribute in any equivalent class is close to the distribution of a sensitive attribute in the overall table.

VI. OVERLAPPING SLICING

Problem statement: Privacy preserving data publishing is an issue now days**.** While data get published to any agencies, there is risk of information disclosure. While reducing information disclosure risk there is loss of data utility. Slicing may fail to achieve data privacy and utility because during attribute partitioning sensitive attribute is grouped into single column Hence there is less correlation between attributes, and l diversity may does not work for attribute disclosure risk.

Proposed technique: The proposed technique is overlapping slicing in which attributes are duplicated in more than one column and easy to achieve more correlation between attribute. Overlapping slicing partitions attribute both horizontally and vertically. In vertical partitioning more correlated attributed are taken into one group and uncorrelated attributed are grouped separately. In horizontal partitioning tuple are grouped to form buckets, after grouping tuples values of column are randomly permuted. Overlapping slicing works in three main steps:

1. Attribute partitioning
2. Tuple partitioning
3. Column generalization

Attribute partitioning : In attribute partitioning, correlation of the attribute are measured to form there group. To measure the correlation mean square contingency coefficient is used. Mean square coefficient is achieved by following formula:

$$\emptyset^2(A_1, A_2) = \frac{1}{\min\{d_1,d_2\}-1} \sum_{i=1}^{d_1} \sum_{j=1}^{d_2} \frac{(f_{ij}-f_i f_j)^2}{f_i \cdot f_j} \quad \ldots \ldots (7)$$

Given two attributes A1 and A2 with domains {v_{11}, v_{12}, ..., v_{1d1}} and {v_{21}, v_{22}, ..., v_{2d2}}, respectively. Their domain sizes are thus d1 and d2, respectively. The mean-square contingency coefficient between A1 and A2 is defined as:

Here, fi· and f·j are the fraction of occurrences of v_{1i} and v_{2j} in the data, respectively. f_{ij} is the fraction of co-occurrences of v_{1i} and v_{2j} in the data. Therefore, f_i· and f·j are the marginal totals of f_{ij} : f_i· $= \sum_{j=1}^{d=2} f_{ij}$ and f·j $= \sum_{i=1}^{d=1} f_{ij}$. It can be shown that $0 \leq \varphi^2(A1,A2) \leq 1$.

Attribute clustering: Having computed the correlations for each pair of attributes, we use clustering to partition attributes into columns. We use k mediod for clustering. In algorithm each attributes is taken as point in clustering space. The distance between two attributes in the clustering space is defined as $d(A1,A2) = 1 - \varphi2(A1,A2)$, which is in between of 0 and 1. Partition around k mediod algorithm is used for clustering.

Algorithm Partitioning Around Medoid (PAM)
Initialize: randomly select *k* of the *n* data points as the medoid
1. Associate each data point to the closest medoid.
2. For each medoid *m*
1. For each non-medoid data point *o*
1. Swap *m* and *o* and compute the total cost of the configuration
3. Select the configuration with the lowest cost
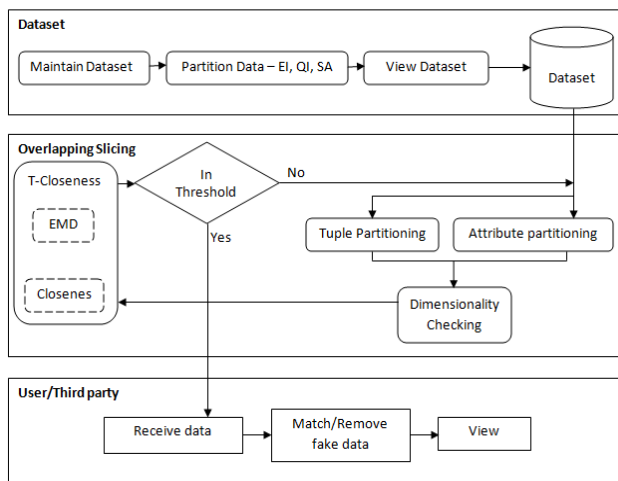4. Repeat steps 2 to 4 until there is no change in the medoid.

Tuple partitioning: In this step tuples are grouped to form bucket. Mondrian algorithm is used for tuple partitioning.

Algorithm tuple-partition(T, t)
1. Q = {T}; SB =$^{\emptyset}$.

2. while Q is not empty
3. remove the first bucket B from Q; Q = Q − {B}.
4. split B into two buckets B1 and B2, as in Mondrian.
5. if t closeness-check(T, Q ∪ {B1,B2} ∪ SB, t)
6. Q = Q ∪ {B1,B2}.
7. else SB = SB ∪ {B}.
8. return SB

Figure 1 gives the description of the tuple-partition algorithm. The algorithm maintains two data structures: (1) a queue of buckets Q and (2) a set of sliced buckets SB. Initially, Q contains only one bucket which includes all tuples and SB is empty (line 1). In each iteration (line 2 to line 7), the algorithm removes a bucket from Q and splits the bucket into two buckets (the split criteria is described in Mondrian [17]). If the sliced table after the split satisfies ℓ-diversity (line 5), then the algorithm puts the two buckets at the end of the queue Q (for more splits, line 6). Otherwise, we cannot split the bucket anymore and the algorithm puts the bucket into SB (line 7). When Q becomes empty, we have computed the sliced table. The set of sliced buckets is SB (line 8).

Fig1 Block diagram for overlapping slicing

Architecture of Overlapping slicing:

Architecture of the overlapping slicing as shown in figure. In first phase maintain dataset in the form of tables and records. Attributes are classified into three main categories i.e. Explicit identifier, quasi identifier and sensitive attributes.

In second step overlapping slicing is performed on the data set i.e. vertical and horizontal portioning is performed on the dataset. During tuple partioning t closeness privacy model is used to check achieved privacy of data. T closeness calculates the EMD of data to achieve privacy.After performing partitioning dimensionality of data is checked by using dimensionality check algorithm. After completion of overlapping slicing , we provide fake tuples to hide the original tuple.

VII. EXPECTED RESULT

We evaluate the effectiveness of overlapping slicing in preserving data utility and protecting against attribute disclosure, identity disclosure and membership disclosure as compared to generalization, bucketization and slicing.

Data set

Some preprocessing steps must be applied on the anonymized data before it can be used for workload tasks. First, the anonymized table computed through generalization contains generalized values, which need to be transformed to some form that can be understood by the classification algorithm. Second, the anonymized table computed by bucketization or slicing contains multiple columns, the linking between which is broken. We need to process such data before workload experiments can run on the data.

Handling generalized values: In this step, we map the generalized values (set/interval) to data points. the Mondrian algorithm assumes a total order on the domain values of each attribute and each generalized value is a sub-sequence of the total-ordered domain values. There are several approaches to handle generalized values. The first approach is to replace a generalized value with the mean value of the generalized set. For example, the class 9th, 10th and 11th replaced by 10th. The second approach is to replace a generalized value by its lower bound and upper bound. In this approach, each attribute is replaced by two attributes, doubling the total number of attributes. For example, the Education attribute is replaced by two attributes Lower-Education and Upper Education; for the generalized Education level {9th, 10th,11th}, the Lower-Education value would be 9th and the Upper-Education value would be 11th. We use the second approach in our experiments. Handling bucketized/sliced data. In both bucketization and slicing, attributes are partitioned into two or more columns. For a bucket that contains k tuples and c columns, we generate k tuples as follows. We first randomly permutated the values in each column. Then, we generate the ith ($1 \le i \le k$) tuple by linking the i-th value in each column. We apply this procedure to all buckets and generate all of the tuples from the bucketized/sliced table. This procedure generates the linking between the two columns in a random fashion.

Table 1 contains the record of original microdata table in which Name is explicite identifier which removed in first step. Age, gender, and zipcode are quasi identifier and remaining two diseases and occupation are the sensitive attribute.

Table 2 is overlapped slicing table in which explicit identifier Name is removed from table and qusi identifier are grouped together with one sensitive attribute and another group of sensitive attribute. The value of sensitive attribute is randomly permuted to achieve more privacy. Sensitive attributes are partitioned with both attribute therefore more attribute correlation is achieved and utility of data is increased.

TABLE I
ORIGINAL MICRODATA TABLE

Name	Gender	Age	Zipcode	Disease	Occupation
A	M	22	410505	FLU	Student
D	F	22	410905	FLU	Student
E	F	35	410702	Bronchitis	Service
N	F	50	410208	Cancer	Retire
Y	M	59	410507	Bronchitis	Business
Z	M	67	410906	Cancer	Retire
P	M	62	410305	BP	Business
H	F	63	410308	BP	business

Expected Result Set

TABLE II
OVERLAPPED SLICED TABLE(PROPOSED SYSTEM)

(Age, gender, Disease)	(Zipcode, Disease, occupation)
22,M,flu	410505,flu,Student
22,F,flu	410905, flu, Student
35, F, bronchitis	410702,bronchitis, Service
50,F,cancer	410208,cancer, Retire
59, M, bronchitis	410507,bronchitis, Business
67, M, cancer	410906, cancer, Retire
62, M, BP	410305, BP, Business
63, F, BP	410308, BP, business

VIII. CONCLUSION

Anonymization technique is powerful method for privacy preserving of published data. This paper presents a new anonymization method that is overlapping slicing with new privacy model i.e. t closeness for privacy preserving and data publishing. This method overcomes the limitations of slicing and preserves better utility while protecting against privacy threats. Overlapping slicing that how slicing is used to prevent attribute disclosures.

The general methodology of this work is before data anonymization one can analyze the data characteristics in data anonymization. The basic idea is one can easily design better anonymization techniques when we know the data perfectly. Finally, we have some advantages of overlapping slicing comparing with generalization and bucketization and slicing. Overlapping slicing is a promising technique for handling high dimensional data. By increasing the correlation among data privacy is preserved.

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A Review on Distributed System Security using Elliptic Curve Cryptography

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Abstract- Most of the security architecture uses public key cryptosystems for authentication and to secure the communication that takes place on distributes sites. Now a day's identity based cryptography and certificate-less public key cryptography are used for enhancing the security. Certificate-less based cryptography has reduced the certificate necessity for key distribution and reducing the problem of key escrow that arise in identity based cryptography. A review based on identity based and certificate-less based is carried out to show that how they are beneficial in future for enhancing distributed system security using Elliptic curve cryptography.

Index Terms- Certificate-less based cryptography, Elliptic curve cryptography; Identity based cryptography, Public key cryptosystems.

I. INTRODUCTION

Distributed system works as a single system for users even if it is a collection of multiple systems where multiple types or varieties of hardware and software communicate to achieve a goal to perform multiple tasks using some communication over network. This communication involves message passing, sharing resources in a transparent and scalable way.

As communication takes place among geographically distributed sites, therefore authentication is necessary. Resources are also shared and therefore authorization and access policies are required. For secure communication of messages we need some cryptographic algorithms and as now Elliptic curve cryptography is a recent technique for this which is mostly used in two forms as identity based and certificateless based for key agreement.

This paper is divided into four sections. Elliptic curve cryptography in Section II. Section III presents a survey of related work with respect to distributed system. Section IV is the conclusion.

II. ELLIPTIC CURVE CRYPTOGRAPHY

Elliptic curve cryptography has been derived from elliptic curve which are in non singular form used for cryptography and has some basic properties. A group is said to be abelian when it includes operation, denoted by •, which is associated with each ordered pair (x, y) of elements in G an element (x • y) in G, as shown in Table below:-

Property	Description
Closure	If x and y belong to G, then x • y is also in G.
Associative	x • (y • z) = (x • y) • z for all x, y, z in G.
Identity element	x • e = e • x = x for all e in G .
Inverse element	There exist an element x' in G such that x • x' = x' • x = e.
Commutative	x•y= y•x for all x, y in G.

Table I. Properties of Abelian group

Number of public key ciphers are based on the use of an abelian group.An abelian group used with an operation of • using two elements that denote x·y which satisfies the group property and the commutative property too.

Miller [53] and Koblitz[52] proposed Elliptic curves in cryptography in 1985 and their research proved that it can be used for security services such as authentication, confidentiality, key exchange, data integrity and more. By 1987, elliptic curves were being implemented in cryptosystems. An improvement over the discrete log method does not directly use the finite fields or groups but rather the elliptic curves defined over them. Elliptic curves allow the encryption of message units to be implemented utilizing simple rational expressions which provides a high level of security.

Elliptic curve cryptography is based on binary and primary field where we use it for key generation, encryption and decryption depending on the curve. It is an asymmetric key cryptography as different key is used for generating public key and private key. The public key is open to all but the private key is kept secret. ECC uses mathematical approach as compared to DH, RSA, ElGamal, and DSA. ECC is also used for digital signatures and key agreement. Today as more and more internet is used and for more security the large key size requirement is the necessity and at present RSA is using 1024 bit key size but it is not so sufficient for future use whereas the same level of security can be achieved from ECC using 160 bit key also which provide us the advantages [56][55] such as   small key size, Absence of sub exponential time algorithm, less bandwidth, Faster implementation, Low computation cost, High speed, Low power consumption, Suitable for small scale size, Overloading is decreased.

For elliptic curve the dependency is on the domain parameters and the finite field Fp or F^{2m} can be selected. The security of ECC depends on the DLP problem i.e. Discrete Logarithm Problem, If P and Q are two points on any elliptic curve so that Q=kP,then it is easy to obtain Q when we know k and P but hard to know k even if we know P and Q as k should be large .this k is the DLP of Q to the base p and law of multiplication is used. If suppose P and Q is known then also at least square root of the number of the points on average to find k and if the field size if f^{2m} then at least $2^{(m/2)}$ points must be guessed to crack this.[13].Two method that are used for solving DLP are square root method and Silver-pohlig-Hellman, to avoid this use a large prime so that the facto also include large prime which will very exponentially, that why ECC provide a high level of security and RSA security is depended on the difficulty of factoring large numbers and it takes sub exponential amount to break.NIST had recommended that 1024 bits are sufficient for use until 2010.[57]

III. ELLIPTIC CURVE CRYPTOGRAPHY BASED APPROACHES

1. Identity Based Cryptography

In [3] Tate pairing is used for authentication and authorization of GSI. Use of non–interaction secret sharing protocol and one round tripartite DH protocol is done to propose PKG security infrastructure. ID based security infrastructure is compared with public key infrastructure and presented.

ID based authenticated multigroup keys agreement scheme is presented in [5] which use bilinear pairings. The users having different trust domains requires authentication and ID Based scheme provides mutual authentication for this using the shared password authentication mechanism for generating one time password for every session. The demerit of hash function compulsion in pairings based authentication protocol is been avoided using ID based authenticated multigroup keys agreement scheme and it is beneficial for large scale distributed and dynamic grid resources.

For efficient key management and moderate security a new scheme ID based proxy signature scheme is presented in [7].The ID based proxy signature scheme uses bilinear pairings. The proposed methodology is observed to be closely related to Diffie-Hellman of the random oracle model.

For secure resource allocation and to authenticate identities of grid members public key infrastructure (PKI) is used. For better security in grid security architecture Identity based cryptography is proposed in [9] which uses customized identity based key agreement protocol. This protocol provides more security and supports the delegation services and single sign on in GSI.

In grid computing security is an important issue .For more security user authentication scheme is developed in [16] which provides strong mutual authentication for user and server and requires only one way hash function and server private key.

Several issues related to Identity based using Tate pairing and Weil pairing has been discussed to increase the efficiency of the protocols. Authenticated key agreement (AK) protocol and AK with key confirmation (AKC) protocols is developed in [17] doing some changes in smart's AK protocol. This protocol

avoids the key escrow of trust authority which issue private key and increase the benefits that is forward secrecy property.

A new protocol is presented in [18] using signature scheme based on bilinear pairings is identity based authenticated key agreement protocol which increases the efficiency and security of the two party authentications.

Proxy signature is being discussed today for much application such as distributed system and grid computing and some identity based proxy signature scheme are presented in concurrent years but they are not so efficient when we talk about security and computation. A more secure identity based strong designated verifier proxy signature (ID-SDVPS) based on elliptic curve bilinear pairings in [19] for more security is presented. The proposed scheme is suitable where more security and less computational cost requirement is such as in grid computing.

In [20] for scalar multiplication a new algorithm is proposed which is faster and based on Tate pairings using the elliptic curve over F_{2m}. By this technique speed is being improved and this is evaluated comparing it to RSA.

Paring based cryptosystems is mainly based on identity based encryption which provides security in improved way. Tate pairing in [21] is used to show the operations using the different co-ordinates of elliptic curve to improve the performance of pairings.

Bilinear maps based on wail pairings is used and a new identity based encryption is discussed in [23] using the random oracle model security and their applications for system which required security.

In [25] a new Hierarchical identity based encryption (HIBE) is presented which provide full security in random oracle model based on bilinear pairings.

Based on bilinear pairings where only two bilinear map computations is required for cipher text, HIBE is proposed in [26] which provide efficiency and short cipher text with secure public key and fully secure in random oracle model and also limited delegation is supported.

Without using random oracle model a new anonymous hierarchical identity based encryption is developed in [27] which reduce the computation cost as no dependency on the depth of hierarchy. The scheme is based on composite bilinear group which acquires selective-ID security.

Use of Identity based cryptography is discussed in [28] for Grid security architecture to improve the computational power and scalability.

Extensive use of public key certificates for long term and short term in PKI is replaced using IBC in [29].IBC provides more security, lightweight in grid with simple way when compared with conventional PKI.

For identity based cryptography a distributed (PKG) is proposed in [30] to overcome the problem of key escrow using the bilinear pairings and proved under the random oracle model and analysis is also done.

Using the property of identity based cryptography a new concept is developed in [31] that is dynamic key infrastructure for grid which introduce the concept of master public key to compute per session key by any user.

For cloud security a new architecture is discussed in [33] using the combination of Identity based encryption and identity

based signatures with an authentication protocol providing efficiency and reducing the computational cost.

Different properties of pairing are discussed in [34] when used in cryptography and to compare the pairings and the easy way of pairing to be used to design in the cryptographic schemes in grid architecture.

Using the concept of identity based cryptography a new method of generating public keys is presented in [35] that is identity based secret public keys using random strings which provides more security against online passwords guessing and other attacks when compared with RSA or DH. The protocol also allow secure establishment of TLS channels with allow passwords.

X.509 certificates and PKI are mostly used for grid authentication but include some demerits such as low anti-attack capability with poor efficiency. To improve this identity based cryptography is discussed in [37] for secure end efficient grid authentication without using random oracles and the proposed method is used to create private keys.

In[48] Enhanced Identity based cryptography(EIBC) for key management is discussed and is based on identity based cryptography which provide an easy way to manage keys and increasing the efficiency providing high level of security for smart grid networks.

2. Certificateless Based Cryptography

Some application of bilinear pairings are: - (i) signatures scheme (ii) pairing based encryption schemes or others are presented. A Certificateless signature based scheme is proposed in [6] which uses bilinear pairing. It does not involve pairing computation, also certificateless proxy signature scheme is proposed and both schemes are analyzed from point of security.

In [11] certificateless protocol for authentication and key agreement (CL-AK) is proposed for grid computing. Some benefits proved of the proposed protocol are: - efficiency, forward secrecy, known key secrecy and no key control.

In open network data encryption is mostly used and for this purpose RSA and DH are used mostly, but it is not much suitable for large number of bits.

To overcome the problem of RSA and Diffie Hellman. ECC is used in [12] for encryption /decryption of a text message by transforming the message on the elliptic curve over GF (p) using the point Pm(x, y).

Certificate-less public key cryptography avoids key escrow problem of identity based cryptography and more security in grid security infrastructure .In this without pairings the certificateless is proposed [36] which eliminates the type-I attack.

For authentication of identity, identity based cryptography uses certificates which increases overhead. to reduce this overhead a new scheme is proposed in [38].This scheme is certificateless based on elliptic curves named Elliptic curve based certificateless signatures for identity based encryption(ECCSI) which has some advantages such as low computation and low bandwidth.

With the use of certificateless public key cryptography use of certificates has been tried to removed in[45] to generate private and public key for the user.

In [46] a new certificateless public key encryption (CLPKE) is developed which is bilinear free and proved under random oracle model. This encryption scheme is more secure against ciphertext attack, key replacement attack and more.

Certificateless key agreement is mostly done using the bilinear pairings which increases the computational cost but here a new authenticated key protocol is used in[47] which is based on certificateless and does not require bilinear pairings which reduce the cost and provide more efficiency.

A new secure and efficient certificateless two party authenticated key agreement protocols (CTAKA) is proposed in [49]. The protocol is secure against Type-I and Type-II attacks. Pairing is not used which reduces the computational cost with no requirement of interaction between the communicating parties.

To avoid the key escrow problem of identity based, certificateless key agreement is used which improve the performance as discussed in [50].

Using bilinear parings certificateless authenticate key agreement protocol is revised in [51] which is also proved secure under random oracle model.

Construction of certificateless key agreement protocol is done in [58] from the certificateless key encapsulation which provide more security from Type-I and Type-II attacks in the CK model.

A new key generation technique is discussed in [59] for private key and public key using certificateless public key cryptography which can produce multiple public keys for a single private key increasing the security.

Certificateless public key cryptography has the combined features of identity based and PKI and a new certificateless two party key agreement protocol has been proposed in [60] two show that it is more practical when compared with others.

Pairing free protocols has been developed in [61] to show that they are more secure in random oracle model using elliptic curves with certificateless key agreement protocol.

In any open network key agreement is an important process which should be authenticated to avoid active attacks and for this Simulatable certificateless two party protocol has been discussed in [62].

3. Others

Elliptic curve cryptography is the best algorithm for solving the elliptic curve discrete logarithm problem used in [1] when compared to RSA, with small parameters and providing more security with the small key size. Some benefits of ECC are:

(i) Key exchange (ii) key generation (iii) digital signature.

In [2] a new scheme named ECGSC is proposed based upon ECDSA and Generalized Signcryption. Confidentiality, Non-repudiation and Unforgeability are proven based on Random Oracle Model.ECGSC increases the security with low computational cost with 78%.

For secure digital images an efficient symmetric encryption is proposed in [4] which reduces the disadvantages of system performance, security and small key space problem and based on cyclic elliptic curve and chaotic system. With eight 32bit registers it converts the 256 bit plain image into 256 bit of cipher image generating pseudorandom bit sequence for round keys. This scheme increases the security of the images and fast encryption is done as compared to others.

Security in wireless channels requires: - (i) encryption (ii) authentication (iii) authorization. When communicating over

public network as web some factor to be considered are privacy and anonymity .In [8] ECC is used to extend onion routing for dynamic token exchange.ECC provides better results in terms of memory, smaller key size, faster computation, bandwidth savings, low power consumption and faster computation as compared to Rascals the performance of both ECC and RSA has been compared

Some security threats and attacks in grid networks are: - eavesdropping, impersonation and message modification etc. Robust and efficient authentication protocol is presented in[10] using ECC to enhance the security in grid networks which also allow mutual authentication and session key agreement increasing the security such as session key security and known key security.

Password Authenticated Key Exchange (PAKE) protocol is being proposed in [14] with ECC approach. The proposed protocol is implemented in two steps:

(I)An auxiliary mechanism (ECC version of PAKE) is proposed

(ii)Extend the mechanism to a multilayer consensus model.

The benefits of the proposed protocol is that hash function is reduced to one and password shared id being utilized in home area network controller for smart grid and only 12 packets is required to exchange which reduce the delay by one and a half.

In [15] pairing based cryptography is presented using some application of bilinear pairings which provide some mechanism for trust delegation and confidentiality for grid computing.

The problem of poor scalability in GSI architecture due to GSI authentication arising when using the security protocols. In [22] to improve the scalability problem a new authentication framework using bilinear pairings is presented which help to minimize the frequent communications.

For grid application a new authentication is discussed in [24] where passwords are used to authenticate the users supporting mutual authentication, delegation without certificates.
In [32] RSA and ECC are compared where ECC is used now days as an alternative solution increasing scalability, efficiency and performance in GSI.

Use of elliptic curve in elliptic curve cryptography helps to reduce the modular exponentiation .based on this a new method is introduced in [39] which offers private credentials .this helps to reduce property sharing resistance. Unforgeability etc.

A relationship between mathematics and cryptography is discussed in [40] related to the context of elliptic curve which intractable when we talk about complexity. In these biometric signatures is presented which provide high speed and high security.

A discussion about elliptic curve cryptography is done in [41] with a comparison of RSA that how it can be used in network security .Benefits of ECC when compared to RSA is that is provide high speed and more security with smaller keys.
In [42] elliptic curve is applied and a new pairing method is introduced which is pairing based remote authentication. In this method no requirement of password of the login user and they can change their password when they want. Increasing the flexibility of the authentication scheme.

Using elliptic curve cryptography a new access control scheme is proposed in [43] to reduce the security problems as compared to public key-based access control.

To secure elliptic curve cryptosystems, new algorithm is presented fractional width-want is presented in [44] to resist some attacks as side channel attacks. The algorithm reduces the computation cost at lowest.

IV. CONCLUSION

Use of identity based and certificateless based key agreement using elliptic curve cryptography are today's most important techniques used to increase the distributed system security and this techniques has replaced the traditional PKI, it has reduced the more consumption of power bandwidth ,less costs and small key size providing more security. Certificateless based public key cryptography has eliminated the need of certificate required for key distribution. No key escrow problem that occurs in ID based, Partial private key is generated so no breaching of private key, Increased efficiency, Reduced cost, Use of the technology is simple. When requirement of short term private key generation ID based is suitable but when long term is required use of certificate-less is better option. With or without bilinear pairing certificateless and ID based is used as it is required. Comparison of these are given in table II.

Features	Public key cryptography	Identity based cryptography	Certificateless based cryptography
Private key creation	By the use of certificates	Using the trusted authority	Partial private key is generated using KGC and other is generated by the user.
Public Key generation	By the use of certificates	Using the user's identity	No public key certificate is used
Trust	Trust problems is there	Trust management takes place	Updation of trust in after every session
Authenticity	Certificate demonstrates the authentication of identifying information	Public key is generated before generation of private key so trusted authority need not to authenticate	Partial key is generated so no requirement of authenticity
Identity based	Yes	Yes	No

Table II Comparison among PKI,ID based, Certificateless based.

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SmartX Virtuality: A Smarter way to Interact Virtually with Physical Objects

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Abstract- The paper presents a new approach to interact with real world objects from a distance. This approach is guided with a purpose to modify the attributes of the real world objects and establish communication between multiple such objects using gesture control. The user is required to point the camera of a smartphone at the physical object, the object gets recognized automatically and a graphical user interface (GUI) is mapped onto the smartphone screen. This GUI furbishes the user with multifarious choices to alter the properties of that object. The paper attempts to elucidate the implementation of the system, the functionalities it has to offer and the aspects that make it better than the previous systems.

Index Terms- Augmented Reality, GUI, Smart object, Smart phone
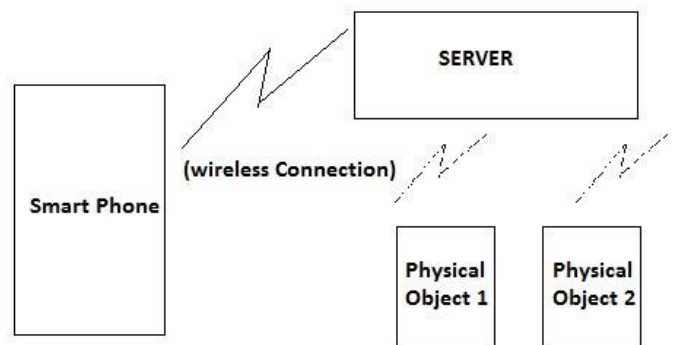
I. INTRODUCTION

In today's smart-phone governed world, people do not take their eyes off the phone screen. This paper explores an approach where controlling real life objects require minimal visual attention. People can control the attributes of a physical object and the relationship between multiple physical objects using gestures [1]. The method developed is an embodiment of augmented reality technology [2] and smart objects. It has a server at its heart and this server establishes wireless communication between the physical objects and smart phone. The system devised has been named SmartX Virtuality (SXV). SXV is compatible even on low-end phones. It is an affordable system. It works well even on android SDK 2.2. The method devised is an attempt at closer integration of the physical and virtual worlds.

II. IMPLEMENTATION

SXV incorporates augmented reality into everyday objects [3] seamlessly. It gives the user a platform to contemplate and control real world objects using an augmented reality based depiction of the object on the phone screen. The concept involves a smart phone connected to a server and this server is connected to the physical objects. The server has the primary task of tying together the system (see Figure1). The instance an action is executed at either of the two ends, data is sent to the server informing it of the action being performed. It is then the server's responsibility to comprehend the data and forward it to the respective interface. The smart phone captures the image of a real world object. Using digital image processing, the object is
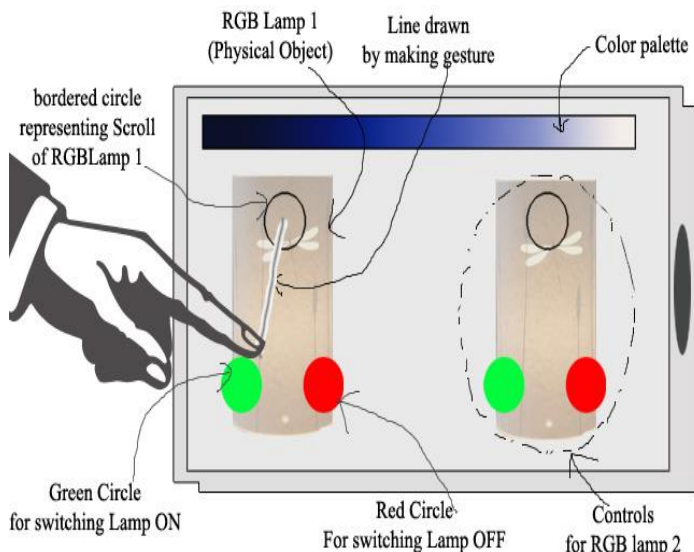
detected by the phone and a wireless connection is established to the server and further to the real world object. The moment the connection is made, a virtual representation of the objects pops-up on the smart phone screen. This representation is laced with multiple functionalities using a graphical user interface based on augmented reality. Once the GUI appears, modification of attributes can be done using gestures.

Figure 1: Block Diagram of the SMARTX VIRTUALITY system with the server interconnecting the smart phone and the smart objects
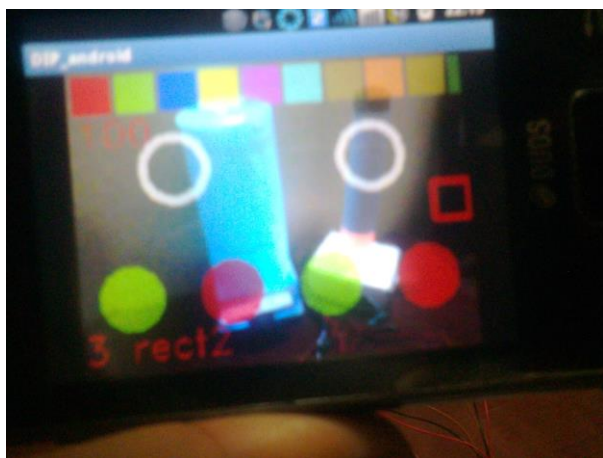
The heart of the Server is microcontroller MSP430G2553 from Texas Instruments [4] which is used to process the input instructions coming from Smartphone. After getting input bytes from smartphone, the Server finds out which object needs to be connected to Server and what property of it needs to be changed. The communication established between server and physical objects can be either by Bluetooth or by RF and communication between server and Smartphone is only using Bluetooth.

Some hardware implementations of this concept include an RGB lamp system. The user needs to have a view of RGB lamp through the camera of smartphone and the GUI for the lamp appears (see figure 3) on the screen. This GUI enables the user to change the colours of the lamp, turn the lamp on/off, control the physical scroll of the lamp and even connect scroll to multiple lamps. A line drawn to a specific colour in the colour palette from the bordered circle (see figure 2) will change the colour of the RGB lamp to that colour. A line to the green circle turns on the lamp. Similarly, a line to the Red circle turns it off. Each lamp also has a scroll attached to it so that the control remains manual as well. To increase the flexibility of the system there is a choice of both automatic and manual control. In case of presence of two lamps, a line is drawn on screen can interconnect them (see figure 3). The scrolls can be exchanged such that scroll 1 directs the behaviour of lamp 2 and scroll 2 of lamp 1.

Figure 2: Sketch to illustrate RGB lamp system seen through the smartphone screen

Another implementation of this system involves controlling the ceiling fans, tube lights and several electrical devices in a room. One needs to see the switchboard through the camera of smartphone. The switchboard is recognized by the Smartphone and the corresponding virtual buttons pop on the screen. By using gestures, drawing lines on the screen, the user can regulate the appliances in a room. The switches can be turned on/off from a distance with a simple swipe on the screen. Even the operational functionality of the switch board can be turned off such that if the user manually tries to operate the switches no appliance is affected. User can even swap the functionalities of the buttons such that the button which was earlier used to operate ceiling fan is now controlling tube light and vise versa.

Figure 3: Interaction of two RGB Lamps

III. ENHANCED FEATURES

The system developed uses Texas Instruments MSP430G2553 ultra low power microcontroller as its server. This ensures that the server caters to more than one type of object at the same time. SXV has a wide ranging operability. From

Android SDK version 2.2 to above, it works on all versions. There is no requirement of high-end, costly smart phones for the system to function. This makes the system affordable and accessible to all. The concept uses digital image processing to detect as well as connect to the real world object. There is no obfuscation regarding selecting of objects. Selection is purely automatic and based on digital image processing. And once the object is detected all possible alterable attributes are displayed on the screen. The properties are modified not by clicking but by gestures so the user can afford to be minimally visually attentive.

IV. RELATED WORK

Augmented Reality technology provides for a digitally enhanced view of the real world [5]. Augmented Reality products furnished by the likes of Layar [5], Wikitude [6] and Junaio [7] enable the user to work on smart phones, tablets and wearable electronics. Enhancement in the domain of Digital Image processing and processing capacity of mobile phones [8] has made possible the current progress in this sphere. The project on I/O bulbs [13] investigates the existing connection between physical objects to directly map digital information onto them. Internet-0[13] is another technology developed to address the issue of connecting inexpensive and small device. The Reality Editor [12] is a system developed by the Fluid Interfaces Group that allows reprogramming of the real-world object's behavior by associating the object with a virtual object using a visually interactive GUI. The Smart-Its technology [11] is another such concept which delivers an embedded computing and communication platform to augment everyday objects. It is proved that a much better interface is provided when a real-time image interacts intuitively through the screen using augmented reality [9]. Augmented interfaces are employed to regulate smart objects in a home-use scenario [10]. These ideas have been incorporated and further developed in the SXV system. The SXV approach requires minimum space in the phone memory and minimal consumption of energy. Also, most commercial applications utilize internet to network smart objects while SXV explores the use of Bluetooth or RF so that the application functions on low-end smart phones as well.

V. CONCLUSION

SmartX Virtuality gives a simple means to interact with physical objects. More objects, whose attributes are modifiable, can be accommodated on the server and controlled. It fuses the real and virtual worlds together.

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Implementation of Image Authentication using Watermarking with Biometric Application

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Abstract- This paper presents a secure watermarking scheme that inserts biometric data into images found in forms of identification. Putting biometric data deals privacy related issues. Here we present a software approach to implement such type of idea or giving a basic platform to implement it onto the further high level. Our process is the combination of two techniques: watermarking and biometric application. Watermarking is used for data security and biometric deals with unique identification. The paper is implementation of such type of approaches to fulfill the requirement of security and authentication. The basic concepts, implementation method, watermark insertion, watermark extraction process are given below. We take an image as an example to more understand the process . the summarized table with the performance parameters are also given.

Index Terms- watermark, biometric symbol like fingerprint, scanners, image sensor, comes sensor, mixed signal circuit.

I. INTRODUCTION

Watermarking is finding more and more support as a possible solution for the protection of intellectual property rights. A watermarking algorithm operates in many domains. The watermarking are of two types Visible and Invisible Watermarking. The use of both the techniques are depends upon particular application. Now for fulfilling the present requirement we can use some advanced technique like Data Encryption Standards (DES) and Advanced Encryption Standards (AES). The invisible watermarking with biometric application is described here.

A biometric is a measurement of a biological characteristic such as fingerprint, digital signature, iris pattern, retina image, face or hand geometry; or a behavioural characteristic such as voice, or signature. Biometric technology uses these characteristics to identify individuals automatically. Different biometrics will be more suitable for different applications. Biometric technology identifies individuals automatically by using their biological or behavioural characteristics. It has a number of current and potential applications relating to national security and law enforcement.

II. MOTIVATION AND PROPOSED WORK

There are lot of ideas were implemented in the field of image security. But they are not too appropriate to fulfil all the requirements. We have a very nice and reliable method of security is encryption. But it is not appropriate for image security. We know that encryption changes the whole form of the data and converted it into some different form. In other words we can say that there is total conversion of the host data. The encryption is suitable for the data security because in the case of data we don't have any attention to make the original form instead we are interested to make it secure and vulnerable for theft so we choose encryption process. But when we are dealing with the image then our prime attention is to maintain the original data same as the host one. Because the images are the combination of the pixels arranged in the proper manner so when we apply the encryption algorithm on the images then the pattern will be changed and the original information contains on the image is not properly maintained. Hence we can say that for the data security we can apply the image encryption algorithm where we don't mean about the original shape and physical characteristics but for the images we employing the watermarking to maintain the watermark image same as the host image. When we considering the images then we have to maintain the image in proper sequence rearrangement of the image is somewhat difficult process. So to avoid this difficulty we use watermarking instead of encryption in which there is no intermediate conversion. For providing the unique authentication we are using the biometric applications as the keys which having some unique features to avoid the possibilities of data retrieving by unauthorised party.

III. IMPLEMENTATION PROCESS

The process has following three steps:

1. Watermark insertion
2. Watermark extraction
3. Watermark ASCII

3.1 WATERMARK INSERTION PROCESS

It is also called the encoding step in which we insert the watermark data into the host one in the form of biometric application for the security purpose. The attractive feature of the watermarking is that the host data is in the same form there is no intermediate conversion between them. Now after applying the watermark algorithm on to the host image we get the watermarked image which is the combination of the host image and the watermarking data (biometric data) but the we cannot differentiate the original image and the watermarked image they seems to be similar. The block diagram of the watermark insertion process is shown in fig 1. To more understand the

functioning the watermark steps for insertion and watermark flow chart is shown in fig 3 and fig 5 respectively.

3.2 WATERMARK EXTRACTION:

In the watermark extraction process we have to recovered the   original image from the watermarked image in other words we have to extract the watermark biometric data if it is recovered same as the original one then the process is successfully completed on we get the matched output . If there is any mismatches then it is not possible to extract the original signal the original data and the watermarked data are stored in two different file   Format to differentiate them easily. We apply the public key to the watermarked image and after applying the watermark extraction algorithm we got the original image. The block diagram steps and flow chart for the watermark extraction process are shown in fig 1, fig 3 and fig 5 respectively.
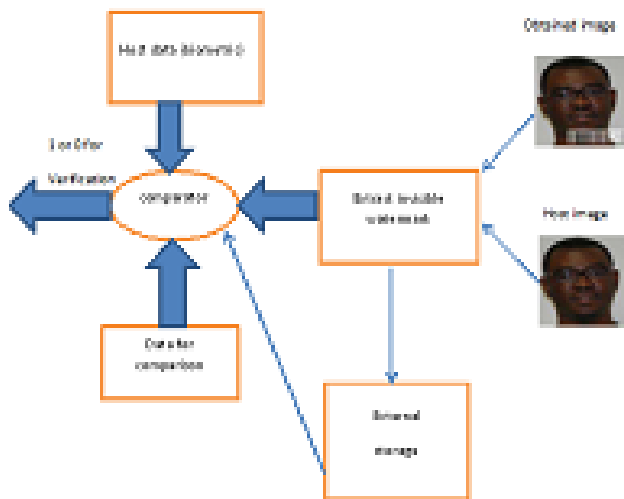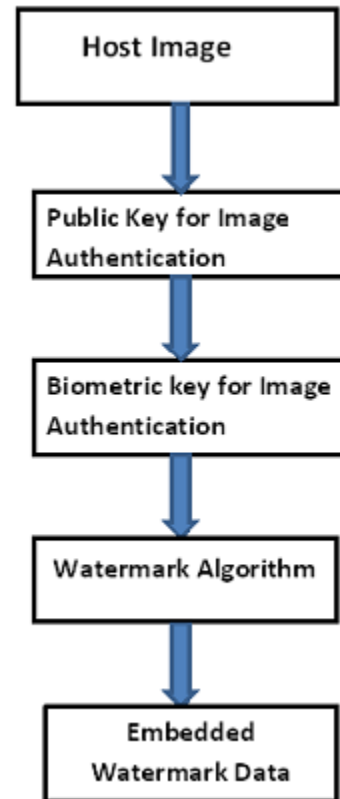

Fig 1: watermark insertion process

Fig 2: watermark extraction process

Fig 3: steps in watermark insertion process

IV.   RESULT AND DISCUSSION

We are dealing with two methods the watermarking and the biometric applications for   high level of security and authentication. This can be implemented by using MATLAB. To more understand the method we are considering an example of taking an image which has to be watermarked. Now a host image is shown in fig in which we are applying the watermarking algorithm using biometric key. The combined watermarked image with the biometric application is obtained. Image security and authentication both are provided. The biometric data provides us the uniform key which is added to the host data in such a way that the watermark should be transparent to users. We are using the invisible watermarking; no one can differentiate between the host image and the watermark image. They seem to be very similar we cannot differentiate them. It is the type of invisible watermarking in which we are using a fingerprint as a biometric key. When we extract the watermark then we get the fingerprint as the extracted key. The input image sail.png is applying with several biometric keys the various results are shown in fig. the various biometric keys are like fingerprints , hand signature and iris scans.

Fig 4: steps in watermark extraction process

V. CONCLUSION

The implementation of the proposed work is very simple and does not need any complex programming. There are many advantages like it provides us very reliable and secure approach for image security and authentication .It is a very unique method because it uses the biometric application as a main watermark key and as we know that the biometric symbols have the unique property because information which is transmitted is must accessed by the person having the unique identification (biometric key), The insertion and extraction of the keys are also very easy. The main feature of the proposed algorithm is that it is a very robust approach for image security the images/data are resistive and immune to noise .The insertion of the watermark data into the host data are provided in such a manner that the watermark should be transparent to us. We cannot see it but if someone want to access the watermark restrict its operation or any change.

The watermark can be scrambled through a well-known PN-sequence.. We can use AES and DES algorithms to make the keys more secure. The keys can be mixed into the host data by following the various algorithms. We can achieve high level security by using critical biometric symbols like DNA, BLOOD GROUPS, and SKIN TISSUES etc.
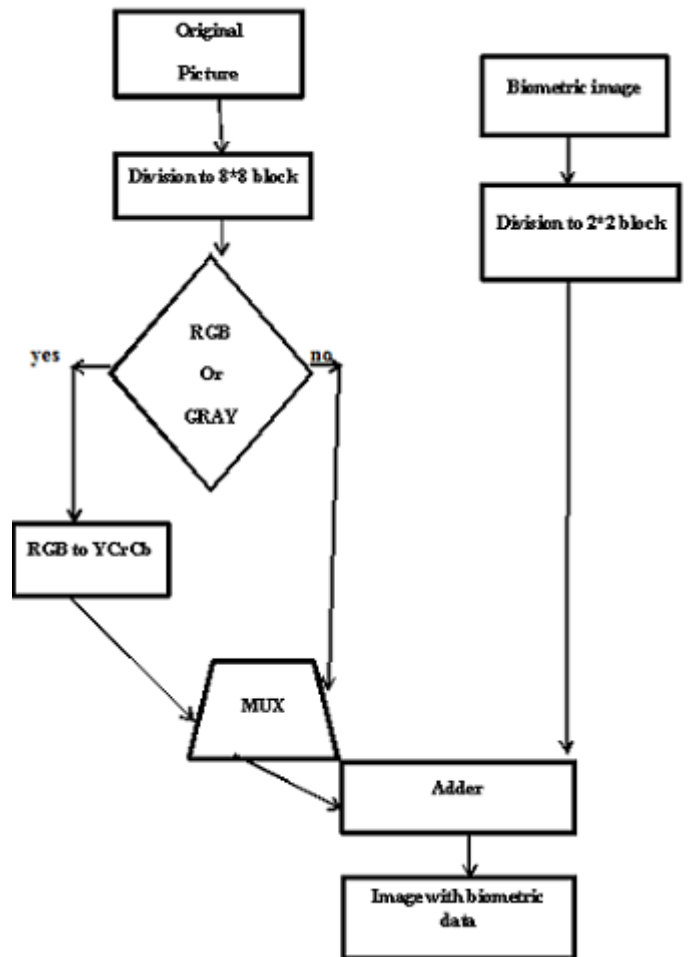

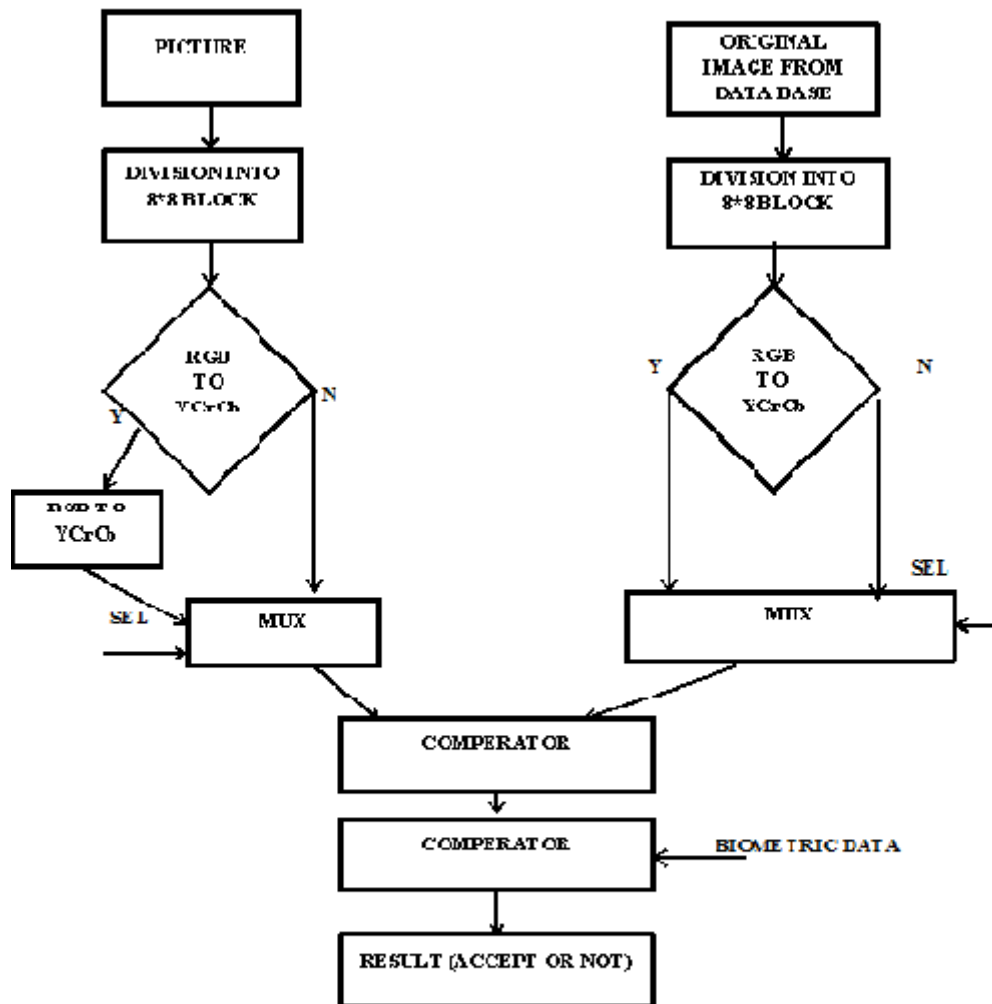**Fig 5: flow chart for invisible watermarking insertion algorithm**

Fig 6: invisible watermarking extraction process

Figure (a)

Figure (c)

Figure (b)

Figure (d)

Fig 7: (a) original image, (b) fingerprint biometric key, (c) watermarked image, (d) extracted key
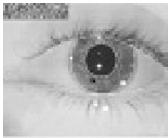

Figure (a)

Figure (c)

Figure (b)

Figure (d)

Fig 8: (a) original image, (b) iris biometric key, (c) watermarked key, (d) extracted biometric key

Figure (a)

Figure (c)

Figure (b)

Figure (d)

Fig 9: (a) original image, (b) signature biometric key, (c) watermarked image, (d) extracted key

Table 1- Experiment with "Sail.Png" Original Image

S.NO.	PARAMETERS	BIOMETRIC FINGERPRINT KEY	BIOMETRIC IRIS KEY	BIOMETRIC SIGNATURE KEY
1.	ROBUSTNESS	GOOD	GOOD	GOOD
2.	AUTHENTICATION	EXCELENT	EXCELENT	EXCELENT
3.	UNIQUENESS	OPTIMUM	OPTIMUM	OPTIMUM
4.	CLARITY	VERY GOOD	VERY GOOD	VERY GOOD
5.	TRANSPERANCY	VERY GOOD	VERY GOOD	VERY GOOD

6.	SECURITY	GOOD	GOOD	GOOD
7.	GEOMETRIC DISTORTION	NO	NO	NO
8.	TRANSFERABLE	NO	NO	NO

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Swarm Intelligence based Gene Classification

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Abstract- The classification of genes is quite important in the understanding of gene regulation. The genes are grouped into transcription units for the purpose of construction and regulation of gene expression and synthesis of proteins. This knowledge further contributes as essential information for the process of drug design and to determine the protein functions of newly sequenced genomes. It is possible to use the diverse biological information across multiple genomes as an input to the classification problem. The purpose of this work is to show that Particle Swarm Optimization may improve the results of classification as compared to other algorithms. To validate the approach E.Coli complete genome is taken as the benchmark genome.

Index Terms- Classification, Drug Design, Protein Synthesis, Particle Swarm Optimization, Transcription Units.

General Terms- Algorithms.

I. INTRODUCTION

The developments in Bio-technological studies, have led to the design and development of large number of computer algorithms for bio-synthesis. Amongst which Gene synthesis constitutes of a major portion of research. The genomic era has opened up opportunities for analysis of complete gene organization, especially in bacteria. These have led to interesting conclusions about tendencies of genes and related functions. Data clustering is the process of grouping together similar multi-dimensional data into number of clusters or bins. Clustering algorithms have been applied to a wide range of problems, of which Gene analysis or Computational Biology form a considerable part.

The availability of complete genome sequences give rise to the need for more computational methods for discovering the regulation and synthesis of genomes. Classifying genes into different clusters or groups can thus enhance the knowledge of gene function. The approach takes into account several data sources including gene co-ordinates, regulatory control signals etc. Knowledge of gene organization is becoming increasingly important in the search for novel antibacterial targets and for understanding the processes involved in bacterial pathogenesis. Altogether, these facts point to the critical need for gene classification in targeted organisms.

Based on the sequence and annotations of the *E. coli* genome, the common features shared among pairs of adjacent genes within operons are analyzed against pairs of adjacent genes positioned at the boundaries of transcription units, but transcribed in the same direction. Their differences in terms of distances between genes, measured in base pairs, and in terms of functional relationships are evaluated. It is also shown that such differences can be used to develop a method to cluster genes in the whole genome sequence. This method might help the identification of transcription unit boundaries in other prokaryotic genomes.

In this paper, an approach based on Swarm Intelligence is presented to classify genes from target genome. The next section contains the survey of the similar work done before. Section III comprises of the proposed system description, followed by Datasets used, Results and Conclusions.

II. LITERATURE REVIEW

Several computational methods have been devised to cluster genes and group into a few general categories [9]. The first one being clustering by detecting Promoters and Transcription Terminators. A transcription unit can be identified if the promoter and the terminator genes of a gene sequence are identified [9]. Several algorithms have been developed to predict rho-independent transcription terminators [2, 3] efficient prokaryotic promoter-searching algorithm is not available as yet, even for the model organism E.coli [3].

The drawbacks of the method mentioned above can be overcome by the next method Construction of Hidden Markov Model (HMM). This method was reported to classify 60% of known genes in E.coli [4]. However, this method is difficult to apply in organisms where promoters and terminators are not as well characterized. The third method Probabilistic Machine Learning Approach using Variety of Data, estimates the probability of any consecutive sequence of genes on the same strand to be in a transcription unit and yielded 67% accuracy in E.coli [5]. With the generation of a large amount of gene expression data, co-expression pattern has been used as a tool to improve gene classification [6].

Bockhorst et al. [7] developed a Bayesian network approach to cluster and showed the method was able to predict 78% of E.coli transcription units with 10% false positives. However, these methods again are only applicable to organisms in which vast amounts of experimental data are available. The fourth category of methods proposed using artificial intelligence and genetic algorithms. This method was reported to have a maximum of 88% accuracy in identification of adjacent gene pairs to be in a transcription unit and found 75% of known transcription units in E.coli. This method has opened the possibility of transcription unit identification in bacterial genomes other than E.Coli.

III. DOMAIN CONCEPTS

Transcription Units

Transcription units are genetic regulatory system found in the organisms in which genes for functionally related proteins is clustered along a DNA. This feature allows protein synthesis to be controlled and coordinated in response to the needs of the cell. By generating proteins only as and when required, operons allows the cells to conserve energy. The part of the chromosome containing genes under consideration can be categorized into two regions: one that includes structural genes (i.e. genes that code for protein structure) and other is the regulatory region. This overall unit is known as an operon.

The gene pairs can be categorized as (i) WO (Within Operon) pair and (ii) TUB(Transcription Unit Border) pair. Adjacent genes that fall into the same transcription unit can be termed as WO gene pair. Whereas, the gene pair that lies at the borders of the transcription units are termed as TUB pairs.
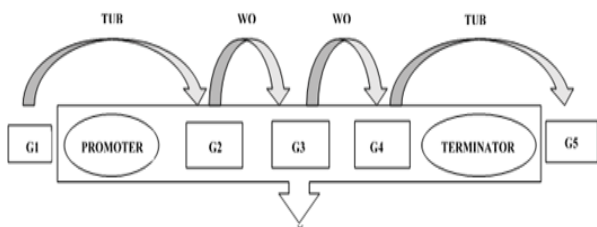

Figure 1. WO and TUB gene Pairs

Features for Gene Classification

Five properties were originally considered for the prediction of operons: (i) the intergenic distance, (ii) the metabolic pathway, (iii) the COG gene function, (iv) the operon length.

However, the gene length ratio and the operon length are not as suitable for operon prediction as the other three features. Thus the intergenic distance, the metabolic pathway, and the COG gene function are generally selected to predict operons. The intergenic distance property not only plays an important role in the initial step, but also yields good prediction results [20]. This property can be used to universally predict operons in bacterial genomes with a completed chromosomal sequence.

Intergenic Distance:

This property is defined as the distance (in bp i.e. base pairs) between two ORF's (Open Reading Frames). A drawback with intergenic distance is the fact that every species has different spacing. Also, some highly expressed operons are exceptions to this rule, which can also lead to correct identification of transcription units.

$$\text{Distance} = \text{Gene}_2\_\text{start} - (\text{Gene}_1\_\text{end} + 1) \qquad (1)$$

Functional Relationship:

Operon contains genes that are often functionally related. The Clusters of Orthologous Groups (COG) and Metabolic Pathway are the most representative of the functional relationship category. The proteins that are produced are often present in the same pathway, or are a part of the same complex. Improved clustering is expected when incorporating this knowledge into the process.

Transcription Unit Length:

The length of a transcription unit is given by the number of genes within that unit. If it contains of just one single gene, then it is known as a singleton unit.

IV. IMPLEMENTATION DETAILS

4.1 Calculation of Pair Score

The properties used in this study are the intergenic distance, the metabolic pathway, and the COG gene function. The fitness values of the three properties are calculated based on the log-likelihood method as shown below.

Intergenic distance:

As shown, the equation given below is used to calculate the pair-score of intergenic distance [20].

$$\text{LLProperty}(gene_i, gene_j) = \ln\left(\frac{\frac{N_{WO}(Property)}{TN_{WO}}}{\frac{N_{TUB}(Property)}{TN_{TUB}}}\right) \qquad (2)$$

Where, $N_{WO}(property)$ and $N_{TUB}(property)$ correspond to the number of WO and TUB pairs in the interval distance (10, 20, 30…). TN_{WO} and TN_{TUB} are the total pair numbers within WO and TUB, respectively.

Metabolic pathways:

The pathway pair-score is only taken into account when the two adjacent genes have the same pathway. Equation mentioned above is used to calculate the pathway pair-score.

COG gene function:

Equation mentioned above along with the following equation are used to calculate the COG pair-score [1].

$$\text{LLCOGd}(gene_i, gene_j) = \ln\left(\frac{1 - \frac{N_{WO}(COG)}{TN_{WO}}}{1 - \frac{N_{TUB}(COG)}{TN_{TUB}}}\right) \qquad (3)$$

where $\text{LL}_{COGd}(gene_i, gene_j)$ represents the pair-score of adjacent genes with a different COG gene function.

Fitness Calculation

Calculation of operon fitness value

While the pair-scores of each particle are calculated based on the metabolic pathway and the COG function, the fitness value of the operon in BPSO is calculated by multiplying the pair-score average with the gene number in the same operon.

Calculation of particle fitness value

Finally, the fitness value of a particle is calculated as the sum of the fitness values from all putative operons in the particle.

Particle Updating

Each particle is updated through an individual best ($pbest_i$), a global best ($gbest$) value, as well as other parameters. The $pbest_i$ value represents the position of the ith particle with the highest fitness value at a given iteration, and $gbest$ represents the best position of all $pbest$ particles.
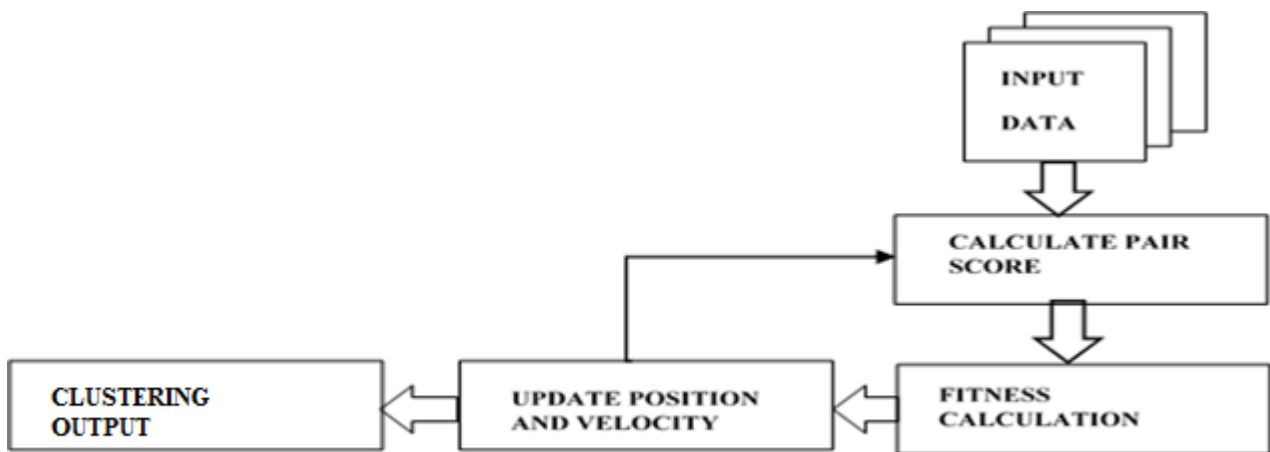
Figure 2: Block Diagram

V. PARTICLE SWARM OPTIMIZATION

Particle swarm optimization (PSO) is a population-based stochastic optimization technique developed by Kennedy and Eberhart in 1995 [4]. PSO has been developed through simulation of the social behavior of organisms, such as the social behavior observed of birds in a flock or fish in a school.

It describes an automatically evolving system. In PSO, each single solution is known as particle in the search space. Each particle uses their memory and knowledge gained by the swarm as a whole to find the optimal solution. The fitness value of each particle is evaluated by an optimized fitness function, and the particle velocity directs the movement of the particles.

Each particle adjusts its position according to its own experience during movement. In addition, each particle also searches for the optimal solution in a search space based on the experience of a neighboring particle, thus making use of the best position encountered by itself and its neighbor.

The entire process is reiterated a predefined number of times or until a minimum error is achieved. PSO has been successfully employed to many application areas; it obtains better results quickly and has a lower cost compared to other methods. However, PSO is not suitable for optimization problems in a discrete feature space. Hence, Kenney and Eberhart developed binary PSO (BPSO) to overcome this problem [20].

The basic elements of PSO are briefly introduced below:

(i) *Population:* A swarm (population) consists of N particles.

(ii) *Particle position, x_i:* Each candidate solution can be represented by a D-dimensional vector; the ith particle can be described as $x_i = (x_{i1}, x_{i2}, \ldots, x_{iD})$, where x_{iD} is the position of the ith particle with respect to the Dth dimension.

(iii) *Particle velocity, v_i:* The velocity of the ith particle is represented by $v_i = (v_{i1}, v_{i2}, \ldots, v_{iD})$, where v_{iD} is the velocity of the ith particle with respect to the Dth dimension. In addition, the velocity of a particle is limited within $[V_{min}, V_{max}]^D$.

(iv) *Inertia weight, w:* The inertia weight is used to control the impact of the previous velocity of a particle on the current velocity.

(v) *Individual best, $pbest_i$:* $pbest_i$ is the position of the ith particle with the highest fitness value at a given iteration.

(vi) *Global best, gbest:* The best position of all pbest particles is called global best.

(vii) *Stopping criteria:* The process is stopped after the maximum allowed number of iterations is reached.

In the PSO algorithm, each particle represents a candidate solution to the problem, and a swarm consists of N particles moving around a D-dimension search space until the computational limitations are reached.

VI. RESULTS AND DISCUSSION

Data set Preparation

The entire microbial genome data were downloaded from the GenBank database (http://www.ncbi.nlm.nih.gov/). The related genomic information contains the gene name, the gene ID, the position, the strand, and the product. The experimental operon data set of the E. coli genome was obtained from RegulonDB (http://regulondb.ccg.unam.mx/) [1], which contains highly reliable data of validated experimental operons of the E. coli genome. The metabolic pathway and COG data of the genomes were obtained from KEGG (http://www.genome.ad.jp/kegg/pathway.html) and NCBI (http://www.ncbi.nlm.nih.gov/COG/), respectively.

Result Set

The result set shows the error values for the clustering on various metabolic pathway datasets. The table shows the minimum amount of error value occurs if PSO algorithm is applied.

Table 2. Cluster Results

Dataset	Dimensions	Instances	Err. value
Metabolic Pathway data(Directed)	24	53414	1.813E-5
Metabolic Pathway data(Undirected)	29	65554	1.362E-4

VII.   CONCLUSION

The analysis of gene data is gaining increasing importance. This study proposes a method to identify operons at complete genome level. The gene features like Intergenic distance, Metabolic pathways, gene clusters of orthologous groups make feasible input parameters for identification process. This identification can be very valuable contribution for various genetic applications.

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The Clustering in Large Databases using Clustering Huge Data Sets (CLHDS) Algorithm

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Abstract- Clustering is the unsupervised classification of patterns (data items) into groups (clusters).Clustering in data mining is very useful to discover distribution patterns in the underlying data. Today, the term "a large dataset" refers to hundreds of terabytes or even petabytes of data. This type of datasets are too difficult to for a clusters. It is typical of scientific investigations to have two phases: the data generation phase, and the data analysis phase. The data generation phase is usually the result of running a large simulation or the collection of data from experiments. It is desirable to design an ant colony optimization algorithm (ACO)[6][4][5] that is not required to solve any hard sub problem but can give nearly optimal solutions for data clustering. The proposed method can obtain optimal solutions quicker via differently favorable strategy. In this paper, we present a new data clustering method for data mining in large databases. Our simulation results show that the proposed Clustering huge datasets(CLHDS) method performs better than the Fast SOM combines K-means approach (FSOM+K-means) and Genetic K-Means Algorithm (GKA,K-Medoids algorithm.

Index Terms- Clusters、datamining、CLHDS、k-means

I. INTRODUCTION

Cluster analysis is the process of finding groups of object in such a way that the objects of a group are similar (or related) to one another and different from (or unrelated to) the objects of the other groups. The clustering problem[1] has been addressed in many contexts and by researchers in many disciplines; this reflects its broad appeal and usefulness as one of the steps in exploratory data analysis. Therefore given a set of data points(each with a set of attributes) with a similarity measures among them, we try to find out the groups or clusters such that 1)Data points in same cluster are similar to each other and 2) Data points in different clusters are very different from each other. Clustering approaches [1] aim at partitioning a set of data points in classes such that points that belong to the same class are more alike than points that belong to different classes. These classes are called clusters and their number may be reassigned or can be a parameter to be determined by the algorithm. Cluster analysis is used in wide variety of areas such as psychology, social sciences, biology, pattern recognition, information retrieval, machine learning and data mining etc. There exist applications of clustering in such diverse fields as business, pattern recognition, communications, biology, astrophysics and many others. Clustering methods are mainly suitable for the investigation of interrelationships between samples to make a preliminary assessment of the sample

structure. Clustering techniques are required because it is very difficult for humans to intuitively understand data in a high-dimensional space. The major clustering methods can be classified into five categories: Hierarchical, Partitioning, Density-based, Grid-based, Model-based methods.

Euclidian or manhattan distance measures are most commonly used in clustering algorithms to determine clusters. Algorithms which are based on these measures generally find spherical shape clusters with similar size and density. Typical clustering algorithms work nicely on relatively smaller data sets. But huge data sets may contain millions of data objects[4]. If we cluster on a sub set of huge data sets, it may result in biased results. Most of the algorithms require user to input values for certain parameters for cluster analysis. Outliers or missing, unknown, or erroneous data are common in most real world applications. Clustering algorithms are susceptible to such data and may lead to clusters of poor quality.

$d(p,q)=\sqrt{(p_1-p_1)^2+(p_2-q_2)^2+\ldots+(p_n-q_n)^2}$ (Euclidean distance)[6]

$d(p,q)=(\mid p_1-p_1\mid+\mid p_2-q_2\mid+\ldots+\mid p_n-q_n\mid)$ (Manhattan distance)[6]

Where d(p,q) is distance between two points **p** and **q** as the length of the line segment **pq.**

Prototype-based partitional clustering algorithms can be divided into two classes: crisp clustering where each data point belongs to only one cluster, and fuzzy clustering where every data point belongs to every cluster to a certain degree . Fuzzy clustering algorithms can deal with overlapping cluster boundaries. Partitional algorithms are dynamic, and points can move from one cluster to another. They can incorporate knowledge regarding the shape or size of clusters by using appropriate prototypes and distance measures. Most partitional[6] approaches utilize the alternating optimization techniques, whose iterative nature makes them sensitive to initialization and susceptible to local minima. Two other major drawbacks of the partitional approach are the difficulty in determining the number of clusters, and the sensitivity to noise and outliers.

The k-means algorithm is a centroid based portioning technique. The k-means algorithm attempts to classify the given data sets or observations into k clusters. The k-medoids is a representative object-based technique. The partitioning method performs based on the principle of minimizing the sum of the dissimilarities between each object and its corresponding reference point.

Partitioning Around Medoids (PAM) is more robust than k-means in the presence of noise and outliers. It is efficient for small data sets but does not scale well for large data sets.

Hierarchical clustering is static, and points committed to a given cluster in the early stages cannot move to a different cluster.

Hierarchical clustering does not partition data into a particular cluster in a single step. Instead, there is a series of portioning which may run from a single cluster containing all objects to n clusters each containing a single object. Hierarchical clustering is subdivided into two categories: Agglomerative, divisive methods.

Clustering can be generally defined as the following problem. Given N points in d dimensional feature space, find interesting groups of points. Many algorithms assume that the number of clusters, k, is known a priori and find the k clusters that minimize some error metric[10]. CLHDS can work for comparatively huge databases then PAM[1]. Like PAM, CLHDS also tries to find k representative objects which are placed at the center in the cluster. This can be achieved internally by taking into account data subsets of fixed size, therefore the overall computation time and space requirements become linear in the total number of objects instead of quadratic. On the other hand, PAM consumes $O(n^2)$ memory as the collection of all a pair-wise distances between objects is required to be stored. Therefore PAM and CLARA are not suitable for larger values of n. To overcome this problem CLHDS does not compute the entire dissimilarity matrix at a time. CLHDS only computes the actual measurements(n*p data matrix).

Clustering of objects is performed in two steps in CLHDS. Initially, it picks an example from the set of objects and divides it into k clusters, using the same approach as in PAM. The two parts of algorithm are- BORN and SWAP. The CLHDS has also been applied with success to other combinatorial optimization problems such as the scheduling, partitioning, coloring, telecommunications networks, vehicle routing problem, Traveling Salesman Problem (TSP)[6].

II. DEFINITIONS FOR CLUSTERING PROBLEM

A clustering C means partitioning a data set into a set of clusters Ci, $i = 1,…, H$. A widely adopted definition of optimal clustering is a partitioning that minimizes distances within and maximizes distances between clusters. Within- and between-clusters distances can be defined in several ways; is widely utilized with SOM (Self-Organizing Feature Map). In addition, the k-means error criterion is based on it. In order to evaluate the proposed method, we define the time cost for clustering as follows,

$$T_a = \sum \frac{(T_s - T_e)}{r_n}$$

where Ta represents the time cost for clustering, rn denotes the number of runs, Ts is the initial time for clustering, Te represents the terminate time of clustering.

III. ANT COLONY OPTIMIZATION (ACO)

The ant colony optimization technique has emerged recently as a novel meta-heuristic belongs to the class of problem-solving strategies derived from natural (other categories include neural networks[5], simulated annealing, and evolutionary algorithms) system where low level interactions between single agents (i.e.,artificial ants) result in a complex behavior of the whole ant colony. Ant system optimization algorithms[3] have been inspired by colonies of real ants, which deposit a chemical substance (called pheromone) on the ground. It was found that the medium used to communicate information among individuals regarding paths, and used to decide where to go, consists of pheromone trails. A moving ant lays some pheromone (in varying quantities) on the ground, thus making the path by a trail of this substance. While an isolated ant moves essentially at random, an ant encountering a previously laid trail can detect it and decide with high probability to follow it, thus reinforcing the trail with its own pheromone. The collective behavior where that emerges is a form of autocatalytic behavior where the more the ants following a trail, the more attractive that trail becomes for being followed.

Given a set of n cities and a set of distances between them, the Traveling Salesman Problem (TSP) is the problem of finding a minimum length closed path (a tour), which visits every city exactly once. We call dij the length of the path between cities i and j. An instance of the TSP is given by a graph (N, E), where N is the set of cities and E is the set of edges between cities (a fully connected graph in the Euclidean TSP). The process is thus characterized by a positive feedback loop, where the probability with which an ant choose a path increases with the number of ants that previously chose the same path.

IV. CLUSTERING HUGE DATA SETS

In this paper, CLHDS can work for comparatively huge databases then PAM. Like PAM, CLHDS also tries to find k representative objects which are placed at the center in the cluster. Therefore PAM and CLARA are not suitable for larger values of n, to overcome this problem CLHDS does not compute the entire dissimilarity matrix at a time. CLHDS only computes the actual measurements (n*p data matrix).CLHDS algorithm has two parts are – BORN and SWAP[6].

BORN: In BORN, successive medoids are selected to get the Smallest possible average distance between the objects of given sample and its most similar representative objects.

SWAP: In SWAP, an attempt is made to reduce the average distance by replacing representative objects. After that every object which is not belonging to the sample is assigned to the nearest medoid. This produces a clustering of all objects.

The quality of clustering is defined by the average distance between each object and its medoid. This procedure is repeated five times and clustering with the lowest average distance is retained for further analysis. The final average distance, the average and the maximum distance to each medoid are calculated in the same way as in PAM for all objects. Also, the ratio of the maximum distance of the medoid to the maximum distance of the medoid to another medoid. This ratio gives information on the tightness of a cluster. A small value (0.2) indicates a very tight cluster, while a value>1 indicates a weak cluster.

The CLHDS algorithm can be formally given as
INPUT

D= { T_1,T_2,……..T_n} //set of elements
A   //Adjacency matrix

K   // number of desired clusters.
OUTPUT
K   // set of clusters

The k-means algorithm[6] attempts to classify the given Data sets or observations into k clusters. The k mean algorithm is iterative in nature. Let $x_1, x_2, \ldots, x_n$ are data points and each data point will be assigned to one and only one cluster. It will use as Euclidian distance for dissimilarity measure. The iterative method is repeated until the function does not converge.
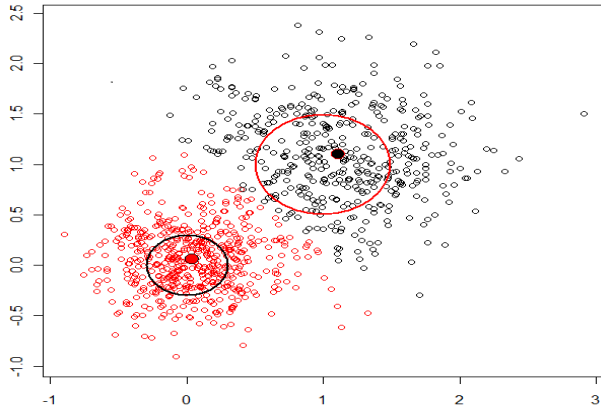

Fig : 1. Clustering using K-means

Above figure shows that k-means arbitrarily choose two objects as the two initial clusters centers, where cluster centers are marked by a " o ". Each object is distributed to a cluster based on the cluster center to which it is nearest.

Recall that our problem is to cluster data sets that are too large to fit into memory. One solution to this problem is to divide the original data set into smaller pieces which will fit into memory, cluster them, and obtain an approximation to each piece of data. Once this is done, the approximations can be gathered into one system and then clustered. A more formal description of the method follows:

A matrix M can be divided into ks disjoint sections such that:

M= [M1M2 . . . Mks],

where each section Mj is n ×kd. The partitioning of M is assumed to be virtual or arbitrary (e.g. only the data for one section is in memory at a given time), and the ordering of the columns of M is assumed to be unimportant, Once a section Mj is available, an approximation to Mj can be constructed:

Mj ≈ CjZj ,

Each column of Zj has at most kz nonzeroes. The centroids in each Cj are obtained through some kind of clustering algorithm.

Once an approximate representation is available for each section of data, they can be assembled into the approximate low memory factored representation of the entire data set M:

M ≈ CMZM,

Where

CM = [C1 C2 . . . Cks] (an n × kskc matrix)

4.1 Clustering using Object-Based Technique

In this method we pic actual objects to represent cluster instead of taking the mean value of the objects in cluster as a

reference point. Then every remaining object is clustered with the representative object to which it is the most similar. The partitioning method performs based on the principle of minimizing the sum of the dissimilarities between each object and its corresponding reference point. CLHDS is handles outliers well because an object with an extremely large value may substantially distort the distribution of data.

CLARA[1] has a fixed sample at each stage of the search, CLHDS picks a sample with some randomness in each step of the search. The clustering process can be viewed as a search through a graph, where each node is a potential solution. Two nodes are neighbors if their sets differ by only one object. Each node can be assigned a cost that is defined by the total dissimilarity between every object and the medoid of its cluster. At each step, PAM examines all of the neighbors of the current node in its search for a minimum cost solution. The current node is then replaced by the neighbor with the largest descent in value. Because LARA works on a sample of nodes at the beginning of a search of the entire data sets[6], CLARANS[1] also work like as CLARA but it can search step by step entire data set. CLHDS dynamically draws a random sample of neighbors in each step of search. The number of neighbors to be randomly sampled is restricted by a user specified parameter.

CLHDS does not confine the search to a localized area. If a better neighbor is found(i.e., having a lower error), CLHDS moves to the neighbor's node and the process starts again; otherwise, the current clustering produces a local minimum. If local minimum is found, CLHDS starts with the new randomly selected nodes in search for a new local minimum. Once a user-specified number of local minimum(i.e., having the lowest cost).

The following points are weakness of k-means algorithm
  – Need to specify *k,* the *number* of clusters, in advance
  – Unable to handle noisy data and *outliers*
  – Not suitable to discover clusters with *non-convex shapes*

These problems are overcomes the CLHDS method.

The following points are weakness of CLARA[6] method, these problems also overcome in this paper.
  – Efficiency depends on the sample size.
  – A good clustering based on samples will not necessarily represent a good clustering of the whole data set if the sample is biased.
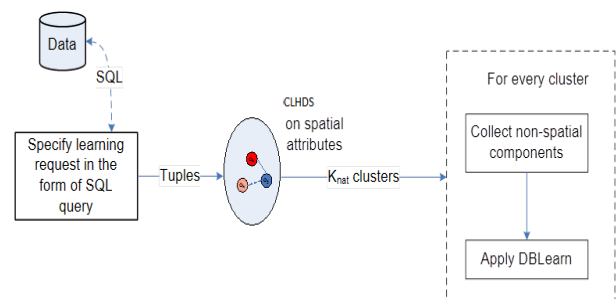

Fig: 2. Find non-spatial clusters using CLHDS

V. CONCLUSIONS

In this paper, we propose a clustering algorithm called Clustering Huge Data sets (CLHDS) with different favor for other data clustering In this paper, we present a new data clustering method for data mining in large databases. CLHDS does not confine the search to a localized area. If a better neighbor is found(i.e., having a lower error), CLHDS moves to the neighbor's node and the process starts again; otherwise, the current clustering produces a local minimum. Through experiments, we show that CLHDS efficiently finds accurate clusters in large high dimensional datasets[7] than k-means, PAM, CLARA.

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Joint Sentiment-Topic Detection from Text Document

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Abstract- Automated tools are used to detect subjective information like attitudes, opinions and feelings. Such process is called as sentiment analysis. The Joint Sentiment-Detection (JST) model is the probabilistic model which is extension of Latent Dirichlet Allocation (LDA) model that detects sentiment and topic simultaneously from text. Supervised approaches to sentiment classification often fail to produce satisfactory results when applied to other domains while the JST model is weakly supervised in nature where supervision only comes from domain independent sentiment lexicon. Thus, makes JST model portable to other domains. The proposed system incorporates a small amount of domain independent prior knowledge which is sentiment lexicon to further improve the sentiment classification accuracy. It also carry out experiments and evaluates the model performance on different datasets.

Index Terms- Joint sentiment-topic (JST) model, Latent Dirichlet Allocation (LDA), semi-supervised approach, sentiment analysis.

I.   INTRODUCTION

Companies and consumers have the greater impact of opinion reach resources like online reviews and social networks compared to traditional media. The demand of gleaning insights into such vast amount of user-generated data, work on developing new algorithms for automated sentiment analysis has bloomed in the past few years.

Sentiment classification is the major task of sentiment analysis. A large portion of work concentrates on classifying a sentiment-bearing document according to its sentiment polarity, i.e. either positive or negative as a binary classification like [1], [2], [3], [9]. Most of this work rely on labeled corpora where documents are labeled as positive, negative prior to the training. In real world applications such labeled corpora may not be easily available. Also, sentiment classification models trained in one domain might not work well when moving to another domain. Furthermore, topic/feature detection and sentiment classification are mostly performed separately. But sentiments are context dependent, so that sentiment expressions can be quite different for different topics or domains. For instance, when appearing under different topics within movie review data, the adjective "complicated" may have negative sentiment orientation as "complicated role" in one topic, and positive orientation as "complicated plot" in another topic. This suggests that modeling sentiment and topic simultaneously may help find better feature representations for sentiment classification. Therefore, these

problems motivated the need of using weakly supervised or unsupervised approaches for domain-independent sentiment classification.

Sentiment and topic of sentiment are simultaneously detected from text at document level by Joint Sentiment-Topic (JST) which is weakly supervised in nature. A mechanism is introduced to incorporate prior information about the sentiment lexicons into model learning by modifying the Dirichlet priors of the topic-word distributions. . This model extends the topic model latent dirichlet allocation (LDA) [6] by adding sentiment layer. It is different from other sentiment-topic model in that: 1) It is weakly supervised. 2) It can detect topics and sentiment simultaneously. Unlike supervised approaches to sentiment classification, which often fail to produce satisfactory performance when applied to other domains, the weakly-supervised nature of JST makes it highly portable to other domains, as will be verified by the experimental results on datasets from different domains.

II.   RELATED WORK

A. Sentiment Classification

Standard machine learning techniques such as support vector machines (SVMs) and Naive Bayes (NB) classifiers are used for sentiment classification approaches. These approaches are corpus-based, in which a domain-specific classifier is trained with labeled training data. The work in [3] employed machine learning techniques including SVMs, NB and Maximum Entropy to determine whether the sentiment expressed in a movie review was "thumbs up'' or "thumbs down". In subsequent work [4], they further improved sentiment classification accuracy on the movie review dataset using a cascaded approach. The work [2], [3], [4] only focus on sentiment classification in one domain while the work in [5] addresses the issue of cross-domain sentiment classification. Four strategies have been explored for customizing sentiment classifiers to new domains [5] like small number of labeled examples can be used as training set or it can combine labeled data with large amount of unlabeled data from target domain. All the above work has some similar limitations: 1) the mixture of topics is ignored while doing sentiment classification, 2) They consider supervised learning approach by using labeled corpora for training which is not suitable for cross-domain work.
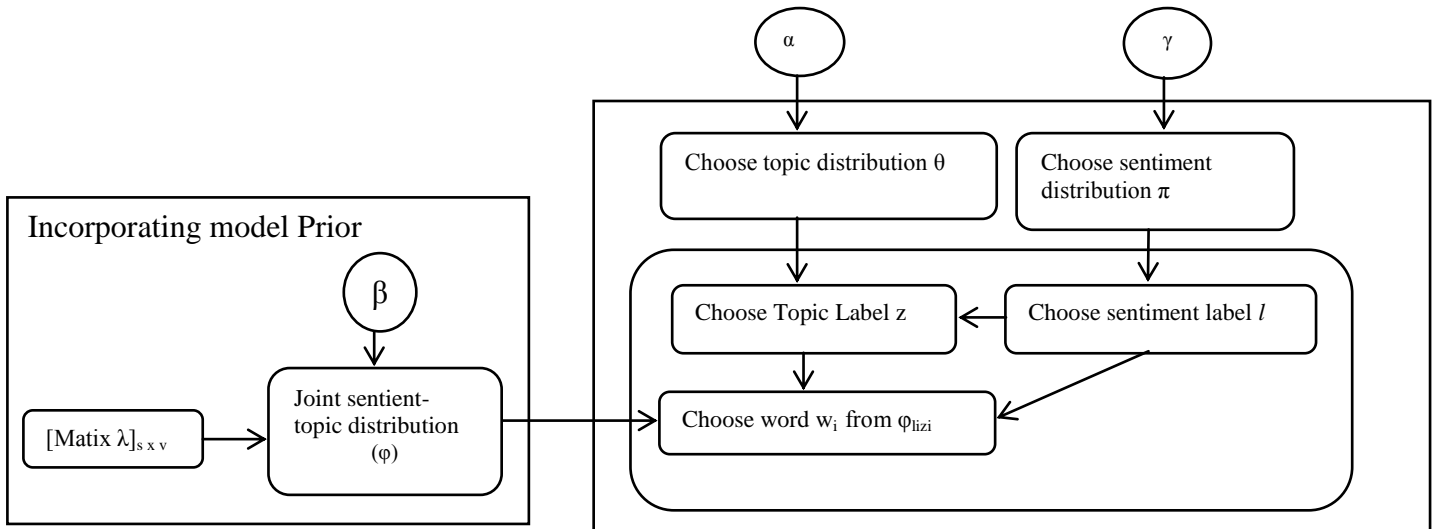
Figure 1: Block Diagram of JST Model

B. Sentiment Topic Model

The work related to jointly determine sentiment and topic simultaneously from text is relatively sparse. Most closely related to our work is [7], [8], [9].]. Topic-sentiment model (TSM) [7] models the mixture of topics and sentiments simultaneously from web-blogs. TSM is based on the probabilistic latent semantic indexing (pLSI). It finds the latent topics in a Weblog collection, sentiments and the subtopics in the results of query. If the word is common English then it samples a word from background component model. Else, a word is sampled from a topical model or sentiment model. Thus, the word generation for sentiment is independent of topic. While in JST, a word is drawn from the joint distribution of sentiment and topic label. To obtain the sentiment coverage, TSM performs postprocessing. JST gives the document sentiment by using probability distribution of sentiment label for a given document.

The Multi-Grain Latent Dirichlet Allocation (MG-LDA) [8] is more appropriate to build topics in which a customer provide a rating for each aspect that is customer will annotate every sentence and phrase in a review as being relevant to some aspect. Each word is generated from either a global topic or a local topic. The model uses a topic model in that it assigns words to a set of induced topics, each of which may represent one particular aspect. The limitation of MG-LDA is that it does not considers the associations between sentiments and topics.

The MG-LDA model is extended to Multi-Aspect Sentiment [MAS] model [9]. The model extracts the ratable aspects of an object and cluster them into coherent topics. Then model uses various techniques to classify and aggregate sentiment over each of these aspects. Thus limitation of MG-LDA is overcome by MAS. It differs from JST in that it is a supervised model because it requires that every aspect should be rated which may not be possible in real world applications. While JST is a weakly supervised model which only requires minimum prior information.

III.   TECHNICAL DETAILS

A. Joint Sentiment-Topic Model

JST model is the extension of existing LDA framework which has three hierarchical layers, where topics are associated with documents, and words are associated with topics. JST [10] introduces fourth layer to the LDA model called sentiment layer in order to consider sentiment of the document. Hence, JST becomes four-layer model, where sentiment labels are associated with documents, under which topics are associated with sentiment labels and words are associated with both sentiment labels and topics. The graphical model of JST is given in figure 1.

Consider a corpus with a collection of D documents denoted by C = $\{d_1, d_2, d_3..., d_D\}$, each document in the corpus is a sequence of N_d words denoted by d = $(w_1, w2, ... w_{nd})$, and each word in the document is an item from a vocabulary index with V distinct terms denoted by $\{1, 2.... V\}$. S be the number of distinct sentiment labels, and T be the total number of topics. The procedure for generating a word w_i in document d under JST can be given as: 1) Choose a sentiment label l from the per-document sentiment distribution π_d. 2) Choose a topic from the topic distribution $\theta_{d,l}$, where $\theta_{d,l}$ is conditioned on the sampled sentiment label l. Each document is associated with S topic distributions, each of which corresponds to a sentiment label l with the same number of topics. Thus, JST model can predict the sentiment associated with the extracted topics. 3) Draw a word from the per-corpus word distribution conditioned on both topic and sentiment label.

The graphical model of JST approach as shown in figure 1 can be defined as follows:

1) For every l (sentiment label) ϵ $\{1...., S\}$
   - For every topic j ϵ $\{1...., T\}$, draw φ_{lj} ~ Dir $(\lambda_l \times \beta^T_{lj})$.
2) For every document d, choose a distribution π_d ~ Dir(γ).
3) For every l ϵ $\{1.... S\}$ under document d, choose a distribution $\theta_{d,l}$ ~ Dir (α).
4) For every word w_i in document d
   - choose l_i ~ Mult (π_d),
   - choose z_i ~ Mult ($\theta_{d,ll}$),

- choose a word w_i from φ_{lizi} which is a multinomial distribution over words conditioned on both sentiment label l_i and topic z_i.

The hyperparameters α and β in JST is the number of times topic j associated with sentiment label l is sampled from a document and the number of times words sampled from topic j are associated with sentiment label l, respectively. The hyperparameter γ is number of times sentiment label l sampled from a document before any word from the corpus is observed. π is per-document sentiment distribution, θ is per-document sentiment label specific topic distribution, and φ is per corpus joint sentiment-topic word distribution .

B. Incorporating Model Priors

JST model is the extension of LDA model in which additional dependency link of φ on the matrix λ of size S X V is used to encode word prior sentiment information into the JST model. A transformation matrix λ modifies the Dirichlet priors β of size S X T X V , so that the word prior sentiment polarity can be captured.

The process of incorporating prior knowledge into the JST model is as follows: first, λ is initialized with all the elements equal to 1. For every sentiment label $l \; \epsilon \; \{1…..S\}$ and every word $w \; \epsilon \; \{1…..V \}$ in the corpus vocabulary, if word w is also available in the sentiment lexicons used, the element λ_{lw} is updated as follows:

$$\lambda llw = \begin{cases} 1, & if \; S(w) = 1 \\ 0, & otherwise. \end{cases}$$

where $S(w)$ is the function which returns the prior sentiment label of w found in a sentiment lexicon (neutral, positive, or negative). Suppose, a word 'Bad' have polarity negative which is from vocabulary with index i. The corresponding row vector of $λ$ is given by [1, 0, 0] which corresponds to negative, positive, neutral prior polarity. Now, for each topic $j \; \epsilon \; \{1,…,T\}$, multiply λ_{li} with β_{lji}. Here, the value of β_{lnegji} is retained only and β_{lposji} and β_{lneuji} becomes 0.

C. Model Inference

To obtain the distributions of π, ө, and γ, first estimate the posterior distribution over z and l, i.e., the assignment of word tokens to topics and sentiment labels for a corpus. The sampling distribution for a word given remaining topics and sentiment labels is given by, $P(z_t=j, l_t=k| \; α,β,γ)$. All words in the collection except for the word at location 't' in document D are given by z^{-t} and l^{-t} which are vectors of assignment of topics and sentiment labels.

The joint probability of the words, topics and sentiment label assignments can be given by

$$P(w, z, l)=P(w|z, l) \; P(z, l) = P(w|z, l)P(z|l) \; P(l) \qquad (1)$$

To estimate the posterior distribution by sampling the variables z_t and l_t , the process of Gibbs sampling is used. Let, the superscript -t denote a quantity that excludes word from t^{th} position. By marginalizing out random variables φ, θ and π , the conditional posterior for variables of interest z_t and l_t is given as

$$P(z(t) = j, l(t) = k|w, z(-t), l(-t), α, β, γ) \quad α$$
$$\left(\frac{N(k,j,wt)-t+\beta}{N(k,j)-t+V\beta} \cdot \frac{N(d,k,j)-t+\alpha(k,j)}{N(d,k)-t+\sum_j \alpha(k,j)} \cdot \frac{N(d,k)-t+\gamma}{N(d)-t+S\gamma} \right) \qquad (2)$$

Samples obtained from the Gibbs sampling are used to approximate the per-corpus sentiment-topic word distribution which can be given as:

$$\varphi(k, j, i) = \frac{N(k,j,wt)+\beta}{N(k,j)+V\beta} \qquad (3)$$

The approximate per-document topic distribution specific to the sentiment label can be given as:

$$\theta(d, k, j) = \frac{N(d,k,j)+\alpha(k,j)}{N(d,k)+\sum_j \alpha(k,j)} \qquad (4)$$

And the approximate per-document sentiment distribution can be given as

$$\pi(d, k) = \frac{N(d,k)+\gamma}{N(d)+S\gamma} \qquad (5)$$

D. Algorithm

Algorithm : Procedure of Gibbs sampling for JST model.
Input: corpus, α, β, γ
    Output : sentiment and topic label assignment for all word tokens in the corpus.
1: Initialize S X T X V matrix **Φ** , D X S X T matrix **Θ**,
   D X S matrix **Π** .
2: for i = 1 to maximum Gibbs sampling iterations do
3:   for all documents d = [1, D] do
4:      for all terms t = [1, N_d] do
5:         Exclude term t associated with topic label z
and sentiment label l from variables N_d , $N_{d,k}$, $N_{d,k,j}$ $N_k j$
and $N_{k,j,i}$;
         Sample a new sentiment-topic pair $\tilde{l}$ and $\tilde{z}$
            using above equation 2;
7:      Update variables N_d , $N_{d,k}$, $N_{d,k,j}$ $N_k j$ and $N_{k,j,i}$
       using the new sentiment label $\tilde{l}$ and topic label $\tilde{z}$;
8:     end for
9:   end for
10: for every 25 iterations do
11:    Using Maximum Likelihood Estimation
 Update hyperparameter α;
12: end for
13: for every 100 iterations do
14:    Update matrices **Θ, Φ,** and **Π** with new
     Sampling results;
15: end for
16: end for

E. Hyperparameter setting and Classifying Document Sentiment

In the JST model implementation, set the symmetric prior β = 0:01, the symmetric prior γ = (0:05 X L) / S, where L is the average document length, S the is total number of sentiment labels. The asymmetric prior α is learned directly from data using maximum-likelihood estimation [11] and updated every 25 iterations during the Gibbs sampling procedure.

F. Classifying Document Sentiment

The document sentiment is classified as the probability of a sentiment label given a document $P(l/d)$. Experiments only consider the probability of positive and negative labels for a given document, while the neutral label probability is ignored. A document d is classified as a positive if the probability of a positive sentiment label $P(l_{pos}/d)$ is greater than its probability of negative sentiment label $P(l_{neg}/d)$, and vice versa.

I. RESULTS AND DISCUSSION

A. Data sets

Two easily available data sets, movie review (MR) data set (http://www.cs.cornell.edu/people/pabo/movie-review-data) and Multi-domain sentiment (MDS) data set http://www.cs.jhu.edu/~mdredze/datasets/sentiment/index2.html are used in the experiments. The MR data set contains 1,000 positive and 1,000 negative movie reviews with average of 30 sentences each document. MDS data set is crawled from Amazon.com which includes reviews of four different products. Both data sets are first preprocessed in which punctuation, non-alphabet characters, numbers and stop words are removed. Two subjectivity lexicons, appraisal lexicon (http://lingcog.iit.edu/arc/appraisal_lexicon_2007b.tar.gz) and MPQA lexicon (http://www.cs.pitt.edu/mpqa/) are combined and incorporated as model prior information. Stemming is performed on both data sets and both lexicons in the preprocessing. The two lexicons used in work are fully domain independent and do not bear any supervised information related to the MR and MDS data set.

B. Performance Analysis

1) Sentiment Classification Results versus Different Number of Topics

As JST models sentiment and topic mixtures simultaneously, it is therefore worth exploring how the sentiment classification and topic extraction tasks affect/benefit each other and in addition, the model behave with different topic number settings on different data sets when prior information is incorporated. Modeling sentiment and topics simultaneously help to improve sentiment classification. For the cases where a single topic performs the best , it is observed that the drop in sentiment classification accuracy by additionally modeling mixtures of topics is only marginal, but it is able to extract sentiment-oriented topics in addition to document-level sentiment detection.

2) Topic Extraction

Manually examining the data reveals that the terms that seem not convey sentiments under the topic in fact appear in the context of expressing positive sentiments.

II. CONCLUSIONS

JST model detects sentiment and topic simultaneously from a text at document level in a weakly supervised fashion. Only sentiment prior knowledge is incorporated which is independent of the domain. For general domain sentiment classification, by incorporating a small amount of domain independent prior knowledge, JST model achieves either better or comparable performance compared to existing semi-supervised approaches without using labeled documents. Thus, JST is flexible in the sentiment classification task. Weakly supervised nature of JST makes it highly portable to other domains. Moreover, the topics and topic sentiments detected by JST are indeed coherent and informative.

In future, incremental learning of the JST parameters can be done when facing with new data. Also, the modification of the JST model can be achieved by incorporating other supervised information into JST model learning, such as some known topic knowledge for certain product reviews or document labels derived automatically from the user supplied review ratings.

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Time Based Re-ranking for Web Image Search

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Abstract- Search re-ranking is considered as a best way to improve retrieval precision. This paper addresses two common problems in search. The top-ranked results for such queries may not contain relevant image to the user's search result, and fresh and relevant pages may not get high ranks because when we retrieve and rank, images occur mostly based on the visit count of the link. We introduce a new ranking method named Meta rankers, which is based on Time, Download and also View. We invoked ranking based on time count of each visit of the image. Image redundancy is still a problem area concerned. We proposed Image check algorithm, which is used to eliminate the redundancy of an image. In this image check algorithm, it compares the color value of every single expected and actual pixel and avoids the repetition of the same image. Therefore, it provide better and most engaging and diverse search results.

Index Terms- image check algorithm, image re-ranking, non redundant image, time based re-ranking.

I. INTRODUCTION

The sheer amount of Web pages and the exponential growth of the Web suggest that users are becoming more and more dependent on the search engines' ranking methods to discover information relevant to their needs. Typically, users expect to find such information in the top-ranked results, and more often than not they only look at the document snippets in the first few result pages and then they give up or reformulate the query. This can introduce a significant bias to their information finding process and calls for ranking methods that take into account not only the overall page quality and relevance to the query, but also the match with the users' real search intent when they formulate the query. Generally, most photo images stored on the Web have lots of tags added with user's subjective judgments not by the importance of them. So, in tagged Web image retrieval, they have become the cause of precision rate decrease on simple matching of tags to a given query. A common practice to improve search performance is to re-rank the visual documents returned from a search engine using a larger and richer set of features. The ultimate goal is to seek consensus from various features for reordering the documents and boosting the retrieval precision. In previous works for image search Re-ranking suffers

from the unreliability of the assumptions under which the initial text-based image search result is employed in the Re-ranking Process. The existing web image search engines, including Bing, Google, and Yahoo!, retrieve and rank images mostly based on the visit count of the images. Image redundancy is still a problem area concerned. Current ranking system provides doesn't exact search result because rank is based on visit count alone once person open the image if it even irrelevant visit count get incremented.

In this paper we propose a novel algorithm named ImageCheck algorithm. ImageCheck compares the color value of every single expected and actual pixel and also proposes a new ranking method named Meta ranker that take advantages on time download and also view. We invoked ranking based on time count of visit of the image, we employ a number of images from the initial search result as the prototypes that serve to visually represent the query and that are subsequently used to construct Meta ranker. By applying Meta ranker to an image from the initial result, re-ranking scores are generated, which are then aggregated using a linear model to produce the final relevance score and the new rank position for an image in the re-ranked search result.

II. RELATED WORK

In [17], Mayuri D. Joshi proposed a ranking method named active re-rankers gives a brief overview of various image retrieval and re-ranking techniques. Starting with the introduction to existing system the paper proceeds through the core architecture of image harvesting and retrieval system to the different Re-ranking techniques. Rasiwasia et al. [3] mapped visual features to a universal concept dictionary for image retrieval. Attributes [4] with semantic meanings were used for object detection [5], [6], [7], object recognition [8], [10], face recognition [9], [11], [12], image search [10], [13], [14], action recognition [15], and 3D object retrieval [16]. Lampert et al. [5] predefined a set of attributes on an animal database and detected target objects based on a combination of human-specified attributes instead of training images. Sharmanska et al. [6] augmented this representation with additional dimensions and

allowed a smooth transition between zero-shot learning, unsupervised training and supervised training. Parikh and Grauman [9] proposed relative attributes to indicate the strength of an attribute in an image with respect to other images. Parkash and Parikh [10] used attributes to guide active learning. In order to detect objects of many categories or even unseen categories, instead of building a new detector for each category, Farhadi et al. [7] learned part and attribute detectors which were shared across categories and modelled the correlation

In [1], Ting Yao proposed Multi-modal graph based and circular re-ranking techniques proposed in recent years capture more than one feature of image for more accurate re-ranking results. These methods do not always compete but can complement each other.

In [18], Liu *et al*. proposed a re-ranking paradigm by issuing query to multiple online search engines. Based on visual word representation, both salient and concurrent patterns are respectively mined to initialize a graph model for random walk based re-ranking. Different from self- and crowd-re-ranking, example-based re-ranking relies on a few query examples provided by users for model learning. In [20], classifiers are learnt by treating query examples as positive training samples while randomly picking pseudo-negative samples from the bottom of initial ranked list. The classifiers which capture the visual distribution of positive and negative samples are then exploited for re-ranking. In another work by Liu *et al*. [19], query examples are utilized to identify relevant and irrelevant visual concepts, which are in turn employed to discover the rank relationship between any two documents using mutual information for correcting ranking of document pairs.

In short, while these approaches focus on the mining of recurrent patterns from different means, such as by random walk [21], external knowledge [19], and classifier learning [20], the interaction among modalities is not exploited for re-ranking. Our work in this paper contributes by studying not only mining patterns (or consensus) through random walk, but also how the consensus can be more reliably estimated by exploring modality interaction.

III. PROPOSED SYSTEM

We introduced a novel algorithm named, ImageCheck Algorithm and new ranking method named Meta ranker. This ImageCheck algorithm is used to eliminate the redundancy of an image; it compares the color value of every single expected and actual pixel and image size. The Meta ranker is used to re-rank the web search images based on the total time taken by the image, number of visits count and number of download counts.

A. ImageCheck Algorithm
This ImageCheck algorithm is used to eliminate the redundancy of an image; the working principle of an ImageCheck algorithm

is- When the user uploads an image, the image data's like the color value of every single pixel and image size are pre-processed and stored in a dataset, then images and datasets are stored in a database.

Each time when user tries to upload an image its compares the new image dataset with all dataset in database. If any one of the dataset matches with new image dataset, then the image is not allowed to store in database.

Algorithm: ImageCheck

1:   upload image (i)
2:   [img]← fetch array (i size, pixel, color)
3:   Check images in uploaded files
4:   if i=0 then
5:           assign img_id []
6:   allow upload and increment i
7:   end if
8:   While i>=i do
9:           Compare [img]
10:          If new-img_id [] ==img_id [] then
11:                  Does not allow upload
12:          Else
13:                  allow upload
14:                  assign img_id []
15:                  increment i
16:          end if
17: end while
18: end

In this algorithm, 'i' represent an image [img] represents the dataset. In First step when the user upload an image it fetch the image color value of every single pixel and size and stored in [img]. The Next step, if there is no image is present in the database then the default 'i' value is Zero. Then image is uploaded and assigned its image id []. Next time a new image is uploaded it compares the new image dataset with existing dataset by using image id. If both images are not same then the image is allowed to store in a database, else it will not allow to upload and shows an alert message.

B. The Meta Ranker method
The Meta ranker is used to re-rank the images based on
- Time count
- Visit count
- Download count

When the image is opened it starts to count the total time taken till the image is closed and also count the no of views and downloads of a particular image. The re-ranking is occurred based on total time taken, which image has higher time is

displayed top of the search results. If more than an image have same time count then the visit count is considered and re-ranking is occurred similarly when both the time and visit count same for more than one image then download count is taken and re-ranking done. Hence we get the relevant search results on the top list.

IV. RESULTS AND DISCUSSION

In this session we briefly discuss about to exprement result in fig(1) it shows the time variation of the exixting and proposed search results. The red line indicate the proposed time based Re-ranking system Where as the blue line indicate the existing systems Where the search reranking is done by the visit count of an image.

Fig 1: Time variation of the existing and proposed search results.

In Existing visit count based re-ranking system the result retrieval time varies each time the exact result retrieval time got increased Whereas In time based Re-ranking at initial search it took few nano seconds to retrieve the exact results but after re-ranking the standard time is maintained to retrieve the exact search results and also the results occurred within very few seconds.

V. CONCLUSION

Users expect to find necessary information in the top-ranked results. Current ranking system doesn't provides exact search result because rank is based on visit count alone, once person open the image if it even irrelevant visit count get incremented. In proposed model we use time based ranking it is basically how long user views the image will be taken for the ranking and also ranking based on no of visit for each image and download count of each image so that exact search result is retrieved and also eliminate image redundancy problem by ImageCheck algorithm.

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Color Image Compression using Hybrid Wavelet Transform with Haar as Base Transform

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Abstract- This paper proposes color image compression method using hybrid wavelet transform and compares it with results obtained using hybrid transform and multi-resolution analysis. Haar wavelet is widely used in image compression. So here Haar transform is selected as base transform and combined with non-sinusoidal transforms like Slant, Walsh and Kekre transform. Hybrid Haar wavelet transforms is generated using Kekre's hybrid wavelet generation algorithm. Different sizes of component transforms are used to generate hybrid wavelet transform. Haar (32x32)-Slant (8x8) gives less error as compared to Haar-Walsh and Haar-Kekre Hybrid wavelet. Performance of hybrid wavelet is compared with hybrid transform and multi-resolution by varying the size of component transforms. Mean Absolute Error (MAE) and Average Fractional Change in Pixel Value (AFCPV) are used to compare visual quality of an image. Structural Similarity Index (SSIM) of Haar-Slant hybrid wavelet is computed on 16x16 blocked images and compared with its hybrid transform and multi-resolution analysis. Least RMSE value obtained at compression ratio 32 by Haar-Slant hybrid wavelet with size 32-8 is 10.53. Mean absolute error is 7.32 in Haar-Slant hybrid wavelet with component size 16-16. Least AFCPV is 0.344 with component size 32-8 for the same.

Index Terms- Haar Transform, Hybrid wavelet transform, Multi-resolution analysis, Structural Similarity Index

I. INTRODUCTION

Advanced technology has increased the demand of using the information in the form of images and videos. Managing this huge amount of image and video data is essential. Storage space, bandwidth requirement and transmission time are key factors that get affected due to use of this multimedia data. One way to make use of these factors effectively is reducing the amount of information being transmitted or processed. Compression of digital images plays a vital role in this context. Effective compression methods are used to obtain good quality images. An effective compression method is one which extracts characteristic features of an image and neglects redundant and irrelevant information.

Transform based image coding is one of the popular image compression method. Transform when applied on images; change the image pixels to frequency domain coefficients. Desirable property of transforms is that most of the image energy is concentrated only in few significant transform coefficients. Retaining these significant coefficients and eliminating remaining coefficients results in image compression. Discrete Cosine Transform (DCT) [2] and wavelet transform are commonly used transform methods for image compression. They are used in JPEG and JPEG 2000 respectively. Recent advancements in this area show that transform based coding combined with other compression method results in better performance. In literature, transform based coding is added with vector quantization methods or neural networks or any other lossless coding method. Such methods are hybrid methods as they combine properties of two different methods.

In this paper, hybrid wavelet transform based image compression has been proposed. As the name suggests, it combines characteristics of two different transforms to produce better results.

II. REVIEW OF LITERATURE

Wavelet based image compression has gained more popularity over DCT based image compression because of its high energy compaction property. Haar wavelets are simplest wavelets and have been widely used for compression. Haar transform is a simple, orthonormal transform proposed by Alfred Haar in 1910 [3]. It serves as a prototype for wavelet transform [4]. It allows us to encode the information according to level of details. Modified fast Haar wavelet transform (MFHWT) has been discussed by Chang P. et al. [5]. It uses one dimensional approach and FHT is used to find N/2 detail coefficients at each level for a signal of length N. Extension of this work has been proposed by Anuj Bharadwaj and Rashid Ali [6]. It works for 2D images with the addition of considering the detail coefficients for N/2 elements at each level. Haar wavelet decomposes the image into different frequency sub bands. In the technique proposed by Shridhar et al. [7] scalar quantization and DPCM is applied on image which is decomposed into different frequency sub bands. Multilevel 2-D Haar wavelet transform is used for image compression in [8] by Ch. Samson and V.U.K. Sastry. Haar wavelet using singular value decomposition has been proposed by Zunera Idrees [9]. Apart from Haar transform, 2-D wavelet transform combined with other lossy or lossless compression method also has been widely used for image compression. Medical image compression using different wavelets like Daubechies, Coeflits, Haar and biorthogonal transform is proposed by Krishna Kumar et al.[10]. Compression based on five modulus method in JPEG has been proposed by Firas A. Jassim [11]. In this method,

image is divided into 8x8 block size and value of each pixel in block is converted in multiples of five. It makes pixels in the image matrix correlated. Hence finding uncorrelated pixels is major task. Then pixel values are divided by 5 to reduce them into lesser values. It reduces the variation between pixel values. Inverse five modulus method is applied to reconstruct the image. CPU time and space taken to reconstruct the image is more in this case. To obtain better compression ratio, wavelet based methods are combined with classical methods of image coding. Hybrid compression method using discrete wavelet transform and Discrete Cosine Transform is proposed by Elharar et al. [12]. This compression algorithm is based on hybrid technique implementing a four dimensional transform combining the discrete wavelet transform and DCT. Wavelet based simple image compression method is proposed in [13]. In this method wavelet transform is generated from existing orthogonal transform [14]. It gives acceptable image quality of image. Further to save computational overhead column transform can be used in place of full transform.

Compression using hybrid wavelet is proposed by Dr. Kekre [15]. Two different orthogonal component transforms are combined to generate hybrid wavelet using algorithm proposed by H.B. Kekre and Tanuja Sarode [16]. Error between original and reconstructed image reduces drastically due to use of hybrid wavelet. It helps to achieve high compression ratio.

This paper proposes hybrid wavelet transform based color image compression and compares its performance with Multi-resolution hybrid wavelet and Hybrid Transform. Along with RMSE as conventional objective error measurement criteria, Mean Absolute Error (MAE) and Average Fractional Change in Pixel Value (AFCPV) are use to measure performance of different hybrid wavelet transforms.

<div align="center">III.   PROPOSED METHOD</div>

Hybrid wavelet is generated using Kronecker product of two component matrices as Kronecker product reduces computations considerably. Kronecker product of two matrices is given as

$$A_p \otimes B_q = a_{ij} [B_q] \tag{1}$$

A and B are component transforms of size pxp and qxq respectively. Individual element of matrix A is represented as a_{ij}. This full Kronecker product gives only global features of an image after transformation. It is the limiting case of hybrid wavelet transform and is called Hybrid transform. To include local features, Kronecker product with individual row of B_q is taken. It is given as

$$T_{AB} = \begin{pmatrix} A_p \otimes B_q\ (1) \\ I_p \otimes B_q\ (2) \\ I_p \otimes B_q\ (3) \\ . \\ . \\ . \\ I_p \otimes B_q\ (n) \end{pmatrix} \tag{2}$$

First p rows of transformation matrix T_{AB} gives global features. Here pxp identity matrix is used to translate rows of second transform matrix B. It gives local features of image. To focus on multi resolution analysis of wavelet transform semi global properties are included. Above matrix is modified as

$$T_{AB} = \begin{pmatrix} A_p \otimes B_q \ (0{:}i_1) \\ I_{r0} \otimes \ (A_{p/r0} \otimes B_q \ (i_1+1{:}i_2)) \\ I_{r1} \otimes \ (\ A_{p/r1} \otimes B_q \ (i_2+1{:}i_3)) \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ I_{rn\text{-}1} \otimes \ (\ A_{p/rn\text{-}1} \otimes B_q \ (i_{n\text{-}2}+1{:}i_{n\text{-}1})) \\ I_p \otimes \ (B_q(i_n{:}q)) \end{pmatrix} \quad (3)$$

Global
Semi global 1
Semi global 2
.
.
.
.
Semi global n
Local

Using eq. (2) hybrid wavelet transform is applied on individual plane of color image. From transformed coefficients high energy coefficients are retained and remaining is discarded. Image is reconstructed using inverse transform and respective compression ratio is calculated. Error in original image and compressed image is calculated. Compression ratio is varied and error is computed for various compression ratios. Similar procedure is adopted using hybrid transform matrix given by eq. (1) and multi-resolution analysis given by eq. (3).

IV. ERROR MEASUREMENT PARAMETERS

In many compression methods, root mean square error (RMSE) and PSNR are used to measure the performance of that compression method. But these parameters have been proven to be inconsistent with human eye perception as they estimate the perceived error. Hence along with RMSE, Mean Absolute error, Average Fractional Change in Pixel Value and Structural Similarity Index (SSIM) are used to analyze the performance of compression method.
Formulas for computation of these parameters are as below:

$$RMSE = \sqrt{\frac{\sum_{i=1}^{i=p} \sum_{j=1}^{j=q} (x_{ij}-y_{ij})^2}{p*q}} \quad (4)$$

$$MAE = \frac{\sum_{i=1}^{i=p} \sum_{j=1}^{j=q} (|x_{ij}-y_{ij}|)}{p*q} \quad (5)$$

$$AFCPV = \frac{\sum_{i=1}^{i=p} \sum_{j=1}^{j=q} (|x_{ij}-y_{ij}|)/x_{ij}}{p*q} \quad (6)$$

In above equations, x_{ij} is original image, y_{ij} is reconstructed image, p= number of rows and q= number of columns.

$$SSIM \ (x,y) = (2\mu_x\mu_y+c_1) \ (2\sigma_{xy}+c_2) \ / \ (\mu_x^2+\mu_y^2+c_1) \ (\sigma_x^2+\sigma_y^2+c_2) \quad (7)$$

Here, c_1 and c_2 are constants given by $c_1=(k_1L)^2$ and $c_2=(k_2L)^2$, where $k_1=0.01$, $k_2=0.03$ by default and $L=2^8-1=255$. μ_x is average of image x,
μ_y is average of image y,
σ_{xy} is covariance of x and y,
σ_x^2 and σ_y^2 are variance of image x and y respectively.
SSIM considers image degradation as perceived change in structural information.

V. RESULTS AND DISCUSSIONS

Figure 1 shows test images of various classes used for experimentation. All images are color bitmap images of different classes with size 256x256.
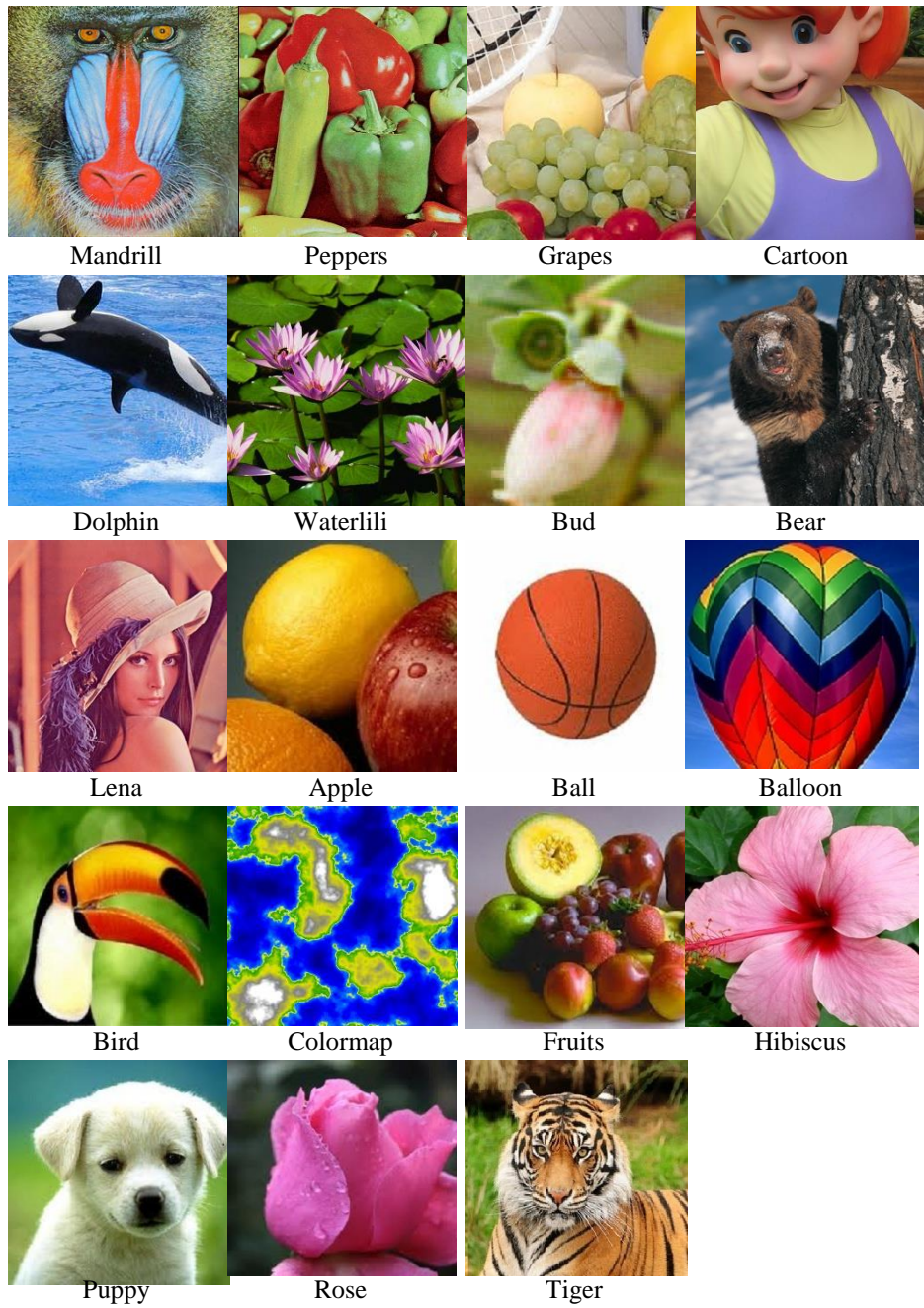
Figure 1 Set of Colour Images used for Experimental Purpose

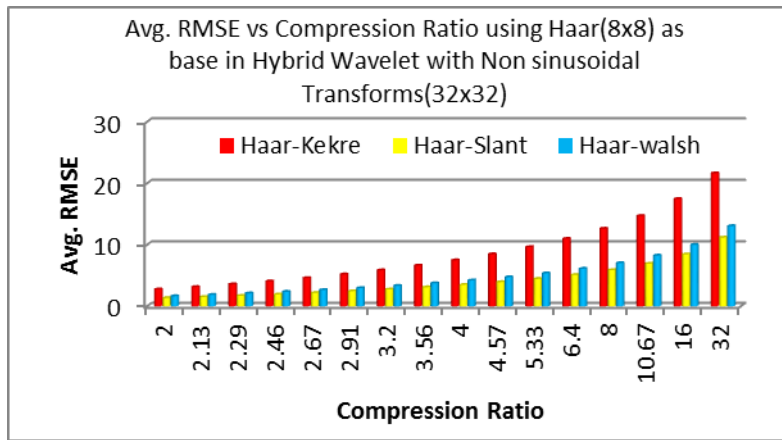Figure 2 shows RMSE at various compression ratios in hybrid Haar wavelet transform.

Figure 2 Average RMSE against compression Ratio using different Non sinusoidal transforms as Local components of size 32x32 with Haar Transform as Base Transform of size 8x8

Haar transform is used as base transform and it is combined with non sinusoidal transforms like Kekre Transform, Slant Transform and Walsh Transform. Base transform size is selected as 8x8 and local component size 32x32 is selected. RMSE of three hybrid wavelet transforms is compared. It has been observed that Haar-Slant hybrid wavelet gives less RMSE than other two. At compression ratio 32, RMSE 11.18 is obtained in Haar-Slant hybrid wavelet transform. With increases in compression ratio RMSE increases. Haar-Kekre transform shows higher error.

Figure 3 shows RMSE in Haar-Slant hybrid wavelet for different sizes of Haar and Slant pair. In graph, 8-32 means Haar transform size is 8x8 and Slant transform size is 32x32. Size 16-16 and 32-8 of Haar-Slant hybrid wavelet give almost equal RMSE for compression ratio above 16. For lower compression ratios, 32-8 Haar-Slant gives lower error.

Figure 3 Average RMSE against compression Ratio using Haar-Slant Hybrid Wavelet Transform with Variation in Component Transform Size

Figure 4 shows Average RMSE versus compression ratio for multi-resolution analysis of Haar-Slant hybrid wavelet. In this case also 16-16 and 32-8 size gives equal performance.

Figure 4 Average RMSE against compression Ratio using Haar-Slant Multi-Resolution Hybrid Wavelet Transform with Variation in Component Transform Size

RMSE in Haar-Slant hybrid transform is compared in Figure 5. Hybrid transform is generated using full Kronecker product of two component transforms as given in eq. 1. Component transform size is varied and respective RMSE values are observed.
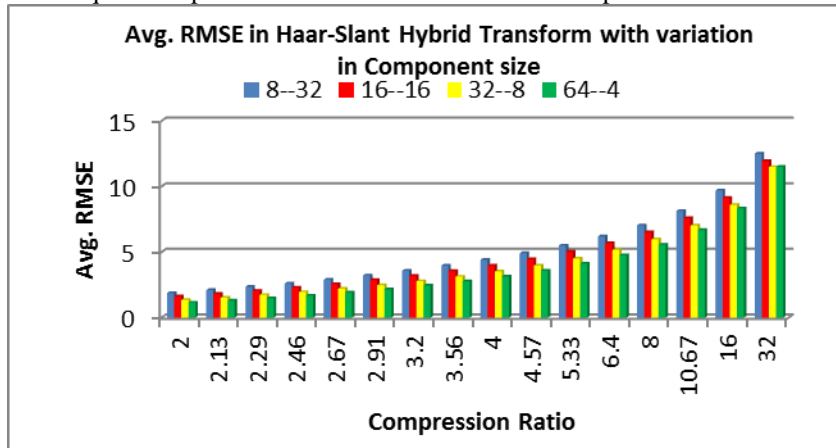

Figure 5 Average RMSE against compression Ratio using Haar-Slant Hybrid Transform with Variation in Component Transform Size

For all compression ratios, 64-4 size proves to be better in hybrid transform. It clearly indicates that larger the size of Haar transform i.e. base transform less is the RMSE. Figure 6 compares performance of hybrid wavelet; Multi-resolution hybrid wavelet and hybrid transform using RMSE. It shows that component transform Haar of size 32x32 and Slant 8x8 in hybrid wavelet gives lower RMSE than other possible size combinations of this pair in hybrid transform and multi-resolution hybrid wavelet transform.

Figure 6 Comparison of RMSE against Compression Ratio in Different Cases of Haar- Slant Hybrid Wavelet Transform using Variation in Component Transforms Size

Figure 7 compares the performance of Haar-Slant hybrid wavelet using MAE as an error metric. MAE gives absolute difference between pixel values and hence is better objective error measurement criteria than RMSE.
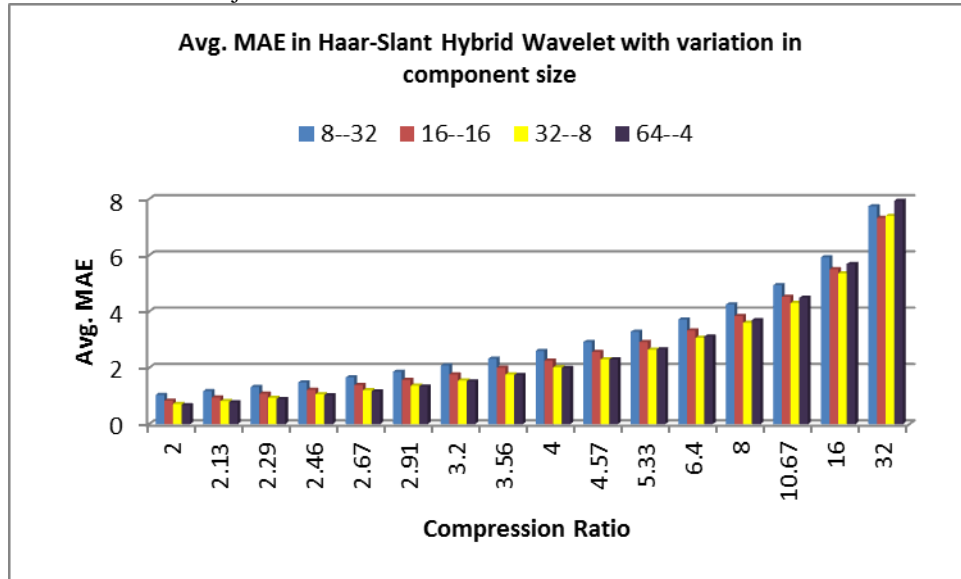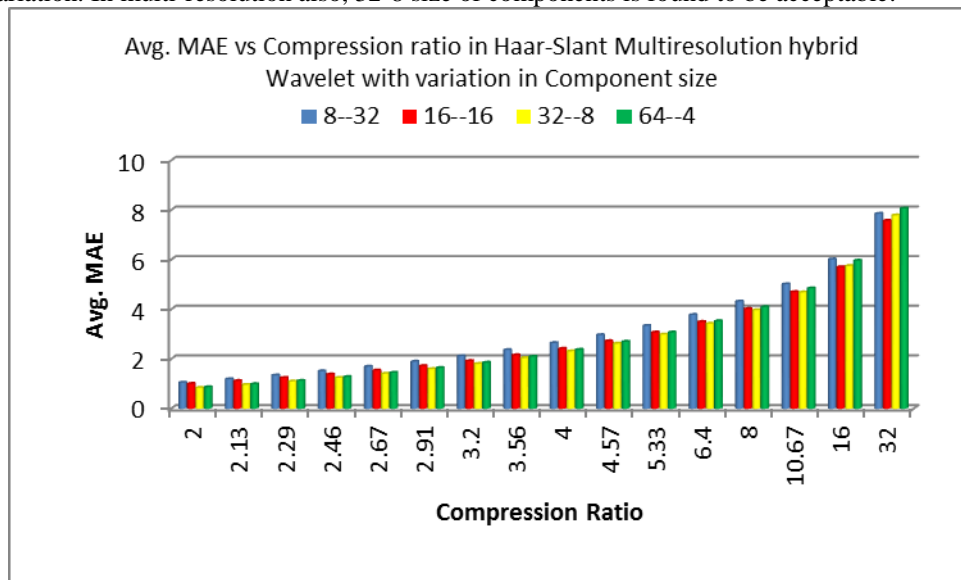

Figure 7 Average MAE against compression Ratio using Haar-Slant Hybrid Wavelet Transform with Variation in Component Transform Size

As shown in figure 7, possible size combinations of component transforms have been tried. And 32-8 has been observed to be more acceptable combination as it produces less MAE. Figure 8 gives performance comparison of multi-resolution hybrid wavelet transform with size variation. In multi-resolution also, 32-8 size of components is found to be acceptable.

Figure 8 Average MAE against compression Ratio using Haar-Slant Multi-Resolution Hybrid Wavelet Transform with Variation in Component Transform Size

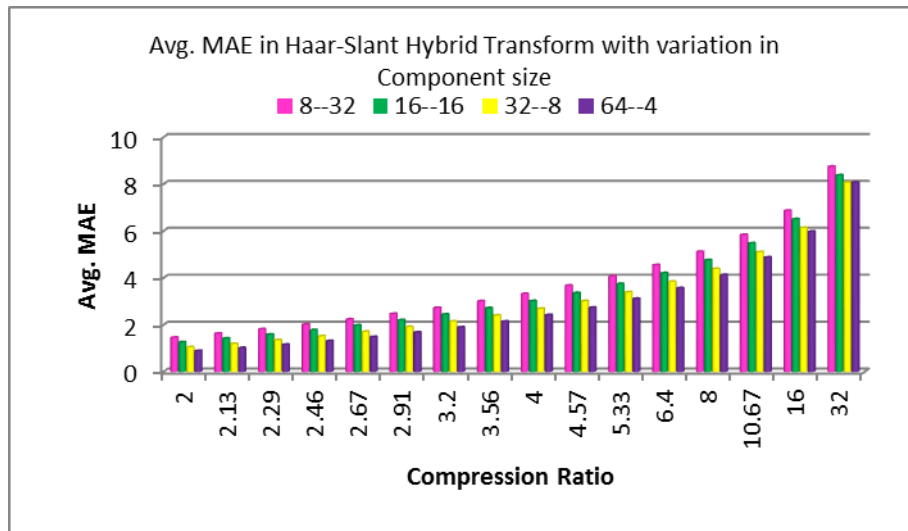Figure 9 plots MAE vs. compression ratio in Haar-Slant Hybrid transform.

Figure 9 Average MAE against compression Ratio using Haar-Slant Hybrid Transform with Variation in Component Transform Size
Like RMSE, when 64x64 Haar and 4x4 Slant is used to generate hybrid transform, less MAE is obtained.
Figure 10 shows overall comparison of mean absolute error in three cases of Haar-Slant hybrid wavelet transform.
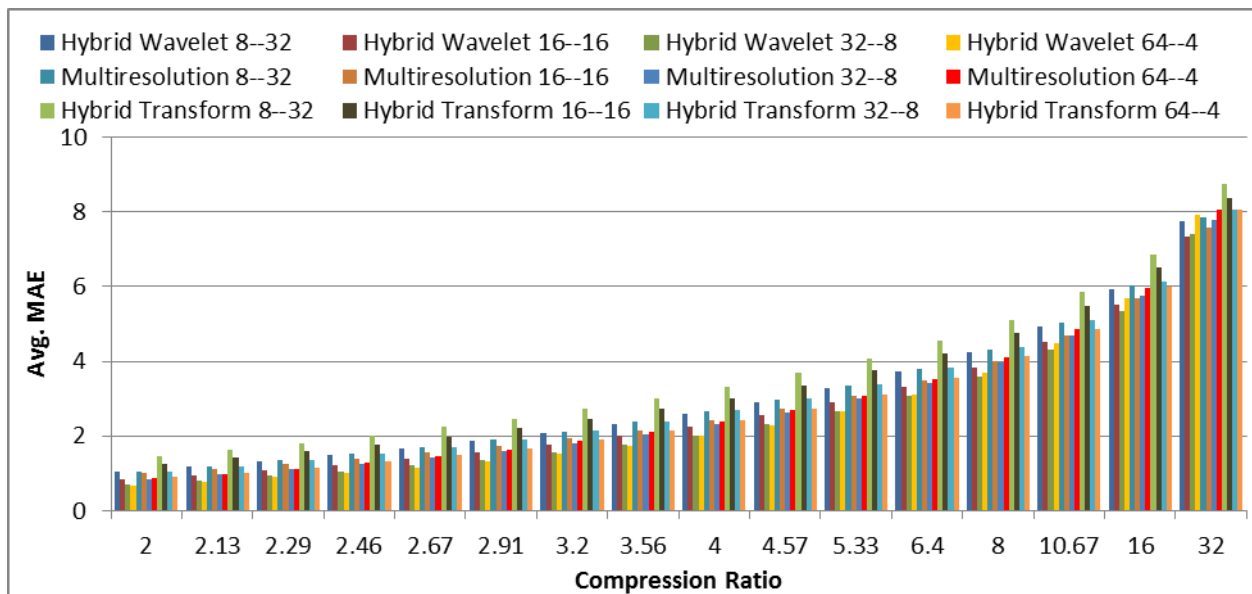

Figure 10 Comparison of MAE against Compression Ratio in Different Cases of Hybrid Wavelet Transform using Variation in
Component Transforms Size

It follows similar pattern of results like RMSE vs. compression ratio shown in figure 6. Hybrid wavelet generated using component transforms 32x32 Haar and 8x8 Slant gives lower MAE. Figure 11 and 12 shows performance of Haar-Slant hybrid wavelet and its multi-resolution analysis using AFCPV as an error measurement criterion. It is a fractional change in pixel values. Therefore it gives more perceptibility than MAE.
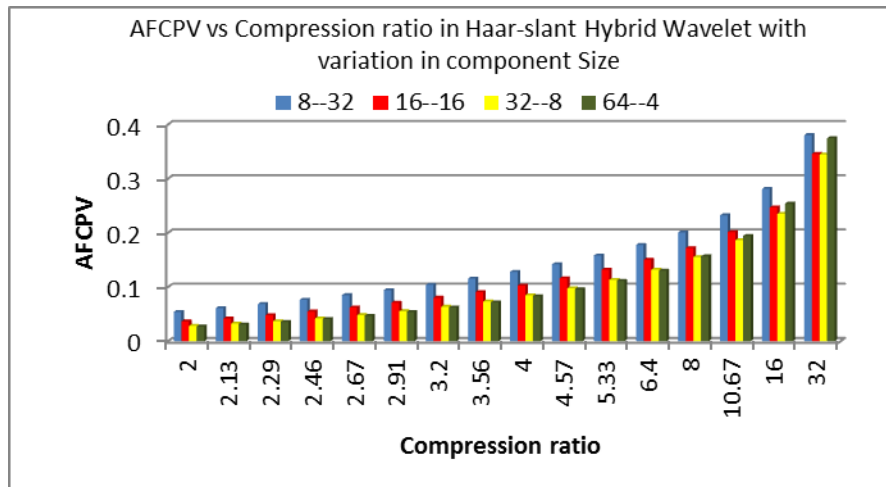
Figure 11 AFCPV against compression Ratio using Haar-Slant Hybrid Wavelet Transform with Variation in Component Transform Size

In both cases, this metric also shows similar error pattern like MAE. 32-8 component size is giving low value of AFCPV than any other component sizes of respective transform.
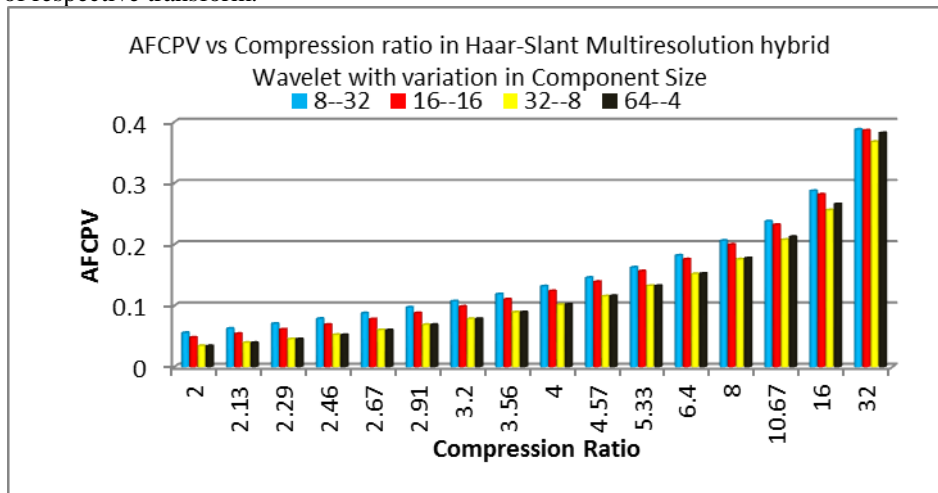

Figure 12 AFCPV against compression Ratio using Haar-Slant Multi-Resolution Hybrid Wavelet Transform with Variation in Component Transform Size

AFCPV in hybrid transform is plotted in Figure 13. Best size combination in Haar-Slant hybrid transform is 64-4 as depicted in figure.
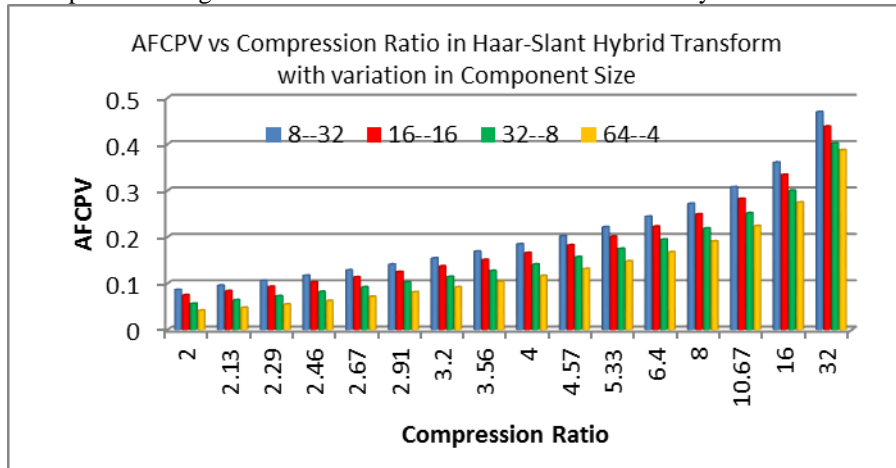

Figure 13 AFCPV against compression Ratio using Haar-Slant Hybrid Transform with Variation in Component Transform Size
Figure 14 shows comparison of Hybrid wavelet, hybrid transform and multi-resolution hybrid transform in terms of AFCPV. In all three cases, bi-resolution hybrid wavelet proves to be better than hybrid transform and multi-resolution analysis. It means that,

inclusion of global and semi-global features of an image leads to increased error in compression. Lowest AFCPV 0.3456 is obtained by 32-8 pair of Haar-Slant hybrid wavelet transform.
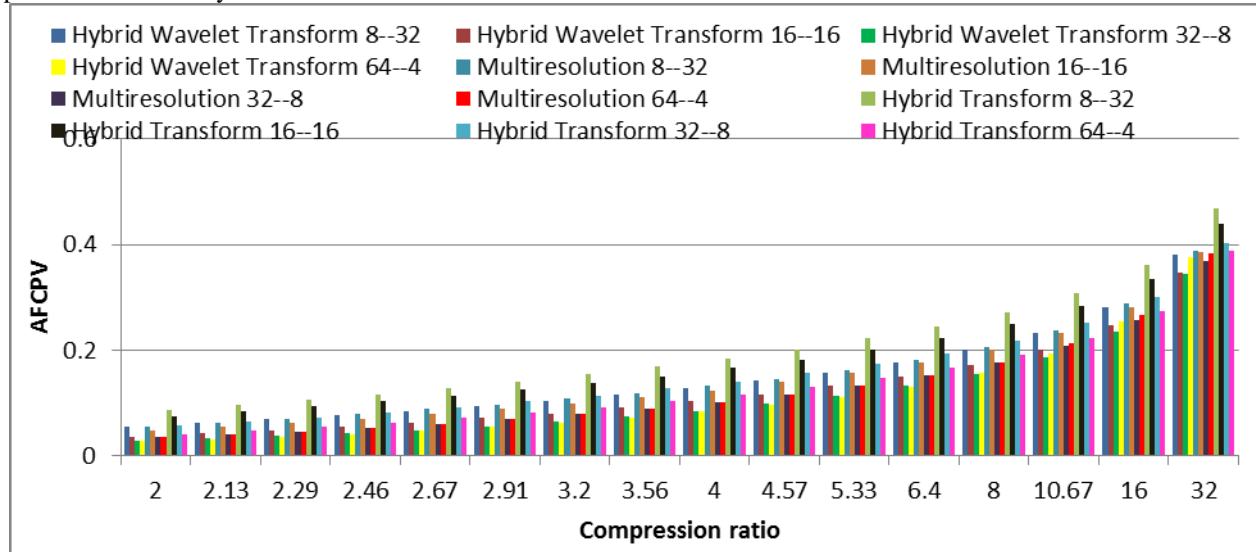

Figure 14 Comparison of AFCPV against Compression Ratio in Different Cases of Haar-Slant Hybrid Wavelet Transform using Variation in Component Transforms Size

Till now we have analyzed the performance of different cases of Hybrid Haar wavelet by varying the local component transform with Haar transform and then size of components has also been varied. RMSE estimates the perceived error. It is not consistent with human eye perception. Hence Structural Similarity Index between original image and reconstructed image is calculated on blocked image.
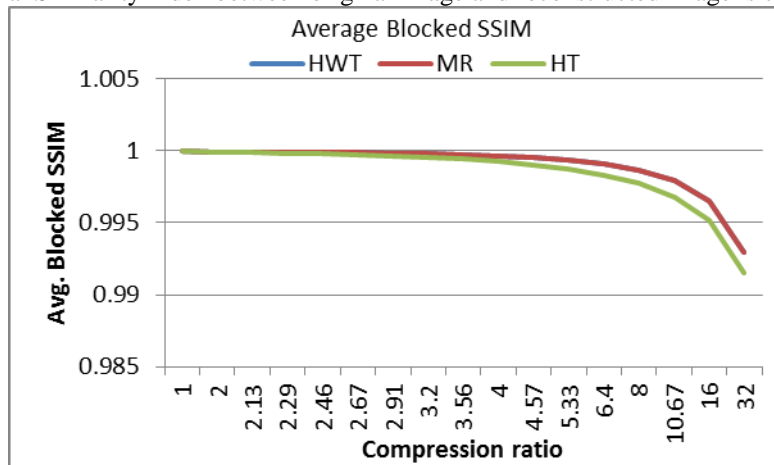

Figure 15 Average Blocked SSIM plotted against Compression ratio in Haar-Slant wavelet, its Multi-resolution analysis and Hybrid Transform.

Graph considers Haar-Slant hybrid wavelet, its multi-resolution analysis and hybrid transform for comparing their performances. SSIM equal to 1 indicates both images are equal. As SSIM gives perceived change in structural information of an image, it gives better perception of image to human visual system. From fig. 15 it has been observed that lower compression ratios up to 2.29 SSIM is almost equal to 1. Further it slightly decreases with increase in compression ratio. At compression ratio 32 SSIM is 0.992 indicating good quality of compressed image. For HWT and MR values of SSIM are equal and overlap in the graph. Hence we can say that both these methods perform equally.

a) Reconstructed 'Lena' image using component transform Haar 32x32, Slant 8x8 at compression ratio 32		
Hybrid wavelet	Multi-Resolution	Hybrid Transform

AFCPV= 0.104	AFCPV= 0.111	AFCPV= 0.117
b) Reconstructed 'Lena' image using component transform Haar 32x32, Walsh 8x8 at compression ratio 32		
Hybrid wavelet	Multi-Resolution	Hybrid Transform
AFCPV= 0.113	AFCPV= 0.123	AFCPV= 0.126
c) Reconstructed 'Lena' image using component transform Haar 32x32, Kekre 8x8 at compression ratio 32		
Hybrid wavelet	Multi-Resolution	Hybrid Transform
AFCPV= 0.131	AFCPV= 0.137	AFCPV= 0.142

Figure 16 Reconstructed Lena Image using Different Hybrid Haar Wavelet Transforms
a)   Haar-Slant b) Haar-Walsh c) Haar-Kekre

VI.   CONCLUSION

In this paper color image compression using Hybrid Wavelet Transform, its multi-resolution analysis and Hybrid transform is proposed. Two different transforms are used to generate hybrid wavelet transform. Haar transform which is simplest transform is chosen as base transform. It contributes to global features of an image. Non sinusoidal transforms like Walsh transform, Kekre transform and Slant transform are selected as local components. Among three hybrid wavelet transforms i.e. Haar-Walsh, Haar-Slant and Haar-Kekre, Haar-Slant gives less RMSE. Hence various size combinations of Haar-Slant are tried and best size is selected. It is observed to be 32-8 except compression ratio 32. As RMSE does not give clear idea about perceptual quality of image, Mean Absolute Error and Average Fractional Change in Pixel Value are the two more parameters used to analyze the quality of compressed image. Haar (32x32)-Slant (8x8) hybrid wavelet give lower value of MAE and AFCPV than other possible size pairs in hybrid transform and multi-resolution analysis. SSIM considers image degradation as perceived change in structural information hence give quality assessment similar to human visual system. Blocked SSIM is calculated as 0.992 at compression ratio 32 in hybrid wavelet and multi resolution analysis which is closest to one indicating better image quality.

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[i] In the context of performance assessment, Harlen (2008) has cited Pine et al. (2006) study in USA who had observed that there exist no correlation between performance of an individual on different items testing the same skill but in differing contexts. In order to assess fifth grade students, they used several hands-on performance tasks, such as, 'paper towel'- finding which type of towel would hold more water, 'Spring'- investigating length of the spring when different weights were hung on it, but found no correlation for an individual student's scores.

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