Screenless Displays –The Emerging Computer Technology

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This paper discusses the advent of the screen less display which is an emerging new technology, and has become a good prospect in the near future for a wide range of applications. As per its name it implies that it deals with the display of several things without the use of screens using projector. It involves these 3 different working principles, The Visual image, Virtual retinal display and Synaptic interface. This paper mainly illustrates and demonstrates that how the screen less displays works and its applications in various fields of science and technology. This technology could bring about the revolution in the field of displays and monitors that are very costly, huge and are sometime proven difficult to manage the power, requirements and constraints. It is also one of the futuristic technological innovations.

Keywords- Foot, Hologram, Hand, LCD, Screen less, voice.

I. INTRODUCTION

Screen less display is the present rapid evolving technology in the field of the computer-enhanced science and technologies. Screen less display is going to be the one of the greatest technological development in the coming days [1]. Several patents are already made and still working on this new emerging technology which can and will change the whole spectacular view of the screen less displays. Screen less display technology has the main aim of displaying (or) transmitting the information without any help of the screen (or) the projector.

Screen less displays have become a new rage of development for the next GEN-X. Screen less videos describe systems for transmitting visual information from a video source without the use of the screen [2]. Screen less computing systems can be divided mainly into 3 groups:

- A Visual image
- A Retinal direct
- A Synaptic interface

II. BACKGROUND

A. Visual Image

Visual Image screen less display includes any screen less image that the eye can perceive as shown in figure 1 and 2. The most common example of Visual Image screen less display is a hologram.

Fig 1. Example of visual Image

B. Hologram

Holograms were used mostly in telecommunications as an alternative to screens. Holograms could be transmitted directly, or they could be stored in various storage (memory devices) devices (likeholo-discs) the storage device can be hooked up with a holo-projector in order to the stored image to be accessed [1].

Fig.2. Example of visual Image

Debatably, virtual reality goggles (which consist of two small screens but are nonetheless sufficiently different from traditional computer screens to be considered screen less) and heads-up display in jet fighters (which display images on the clear cockpit window) also are included in Visual Image category. In all of these cases, light is reflected off some intermediate object (hologram, LCD panel, or cockpit window) before it reaches the retina. In the case of LCD panels the light is refracted from the back of the panel, but is nonetheless a reflected source [3]. The new software and hardware will enable the user to, in effect; make design adjustments in the system to fit his or her particular needs, capabilities, and preferences. They will ultimately enable the system to do such things as adjusting to users' behaviors in dealing with interactive movable type.

C. Retinal Display

Virtual retinal display systems are a class of screen less displays in which images are projected directly onto the retina.

Fig.3. Retinal Display

They are different from the visual image systems because light is not reflected from some intermediate object onto the retina; but is projected directly onto the retina. Retinal Direct systems, once marketed, hold out the promise of extreme privacy when computing work is done in public places because most inquiring relies on viewing the same light as the person who is legitimately viewing the screen, and retinal direct systems send light only into the pupils of their intended viewer[6].

Fig.4. Synaptic Interface

D. Synaptic Interface

Synaptic Interface screen less videos do not use light at all. Visual information completely bypasses the eye and is Fig.4. Synaptic Interface Transmitted directly to the brain. While these systems have yet to be implemented in humans, success has been achieved in sampling usable video signals from the biological eyes of a living horseshoe crab through their optic nerves, and in sending video signals from electronic cameras into the creatures' brains using the same method as illustrated in figure 4 given in this paper.

II. THE WORKING PRINCIPLE

There are so many new emerging ways for the technological development of the working principle of the screen less displays [4] is found. Several softwareare merging for the GEN-X wonder view. Any computer system that can run the "Mudoc" software can present the text that has been set in interactive movable type. Most of the "Mudoc" that are consumed in the next few years will be consumed with conventional personal computers, e-book readers, and other kinds of display and projection devices that are now in use. Very soon it appears to be a very new kind of input/output system that will facilitate communication and interaction between the computer and the computer user. This new human/computer interface is the tele-reader terminal.

Visual Image is taken as a bitmap image manipulation and composition product. Bitmaps arenow can be manipulated independently; in the "Image Mode" or multiple bitmaps can be composited together in the "Object Mode" to create a "collage". The Visual Image can be created and Manipulate images of any size: the only limit consideration is the amount of memory resources your system has to utilize. A. Creating "Visual Catalog Files" with "Visual Image" gives you the ability to create files in the "EYE file format" for use in the "Visual Catalog program". Then these EYE files can be used to create catalogs of images in logical sub groupings: for an example, you can create a catalog file in the "EYE" format that lists all images of building materials (brick, concrete, stone, etc.). The File, Export Project command creates an EYE file that refers to all of the images that are currently loaded into the Visual Image. When you select this command, you are prompted to enter a filename for the EYE file that is to be created. If you have created any image earlier in Visual Image that are not yet saved to disk you will be asked if you wish to include those images in the EYE file and if so, you are prompted to store those images as bitmaps. The File, Exports Editor Command in Visual Image allows you to pack and choose those image files on disk that you wish to include in a catalog EYE file [5]. When you select File in Export Editor, a file browser appears from which you can choose the image files to include. Use this browser to select images to add to a project file for use in Visual Catalog.

B. Additional Software and Hardware Requirements

- To facilitate the interactivity
- To optimize the user's perceptual and cognitive capabilities
- To provide the most healthful visual environment for the user.
- Responding to a variety of user commands (using voice, hand, foot, or other signal methods)
- Providing blink cues or blinks responses
- Modifying output to compensate for changes in user's physiology or reaction time, etc. The new software and hardware will enable the user and the system tobetter exploit each other's capabilities and to function as a fully integrated team.

IV. VIRTUAL RETINAL DISPLAY STRUCTURE AND IMPLEMENTATION

A "Virtual Retinal Display" (VRD), also known as a retinal scan display (RSD), is a new display technology that draws a raster display (like a television) directly onto the retina of the user's eye. The user sees what appears to be a conventional display floating in space in front of them. Similar systems have been made by projecting a defocused image directly in front of the user's eye on a small "screen", normally in the form of large sunglasses. The user focuses their eyes on the background, where the screen appeared to be floating in front of him.

But some of the disadvantages of these systems are the limited area covered by the "screen", the high weight of the small televisions used to project the display, and the fact that the image would appear focused only if the user was focusing at a particular "depth" are needed to be taking care about. Limited brightness made them useful only in indoor settings as well. Only recently, a number of developments have made a true VRD system in practice. In particular, the development of high-brightness LEDs have made the displays bright enough to be used even during the day and adaptive optics have allowed systems to dynamically correct for irregularities in the eye (although this is not at all needed in all situations normally). The result is a high-resolution screen less display with excellent range of the colors and their brightness, far better than the best television technologies.

The "Virtual Retinal Display" VRD was invented at the University of Washington in the Human Interface Technology Lab in 1991. Most of this research into "Virtual Retinal Display" VRDs to date has been in combination with various virtual reality systems. In this role "Virtual Retinal Display" VRDs have the potential advantage of being much smaller than existing television-based systems. They share some of the same disadvantages however, requiring some sort of optics to send the image into the eye, typically similar to the sunglasses system used with previous technologies. It can be also used as part of a wearable computer system. More recently, there has been some interest in "Virtual Retinal Display" VRDs as a display system for portable devices such as cell phones, PDAs and various media players. In this role the device would be placed in front of the user, may be on a desk, and aimed in the general direction of the eyes. The system would then detect the eye using facial scanning techniques and keep the image in place using motion compensation. In this role the VRD offers unique advantages, being able to replicate a full-sized monitor on a small device. The most recent innovations in mobile computing have been based around touch screen technology [6].

The future of mobile devices is from touch less to screen less. By 2020 the mobile phone as we know it today will disappear and something very different will take its place with the current pace of the technological evolution. Instead of touching a present touch-screen, we will be interacting with a technology directly through our senses, through technology embedded in what he is calling "Internet Glasses". Voice was always organized in sessions with a beginning and an end. Today we have threads, i.e. when a thread is started it never ends and we have many continuing in parallel. Can you think of your email, RSS feeds, Twitter, etc. So this is how our brain works. The hone of tomorrow will be tele-coupling and related machines and future will be bypassing the screens and the keyboards altogether as in figure 6. These two key technologies will be laser based displays, which display images directly onto our retinas and brain wave sensing implants as shown in figure5.

This will help and allow technology to integrate with our 'reality vision' much more seamlessly. We are on the verge of a hardware revolution that will make this all possible, as well as the cloud-based information streaming that will enable the user interface to become a reality as shown in figure 9 and 10.

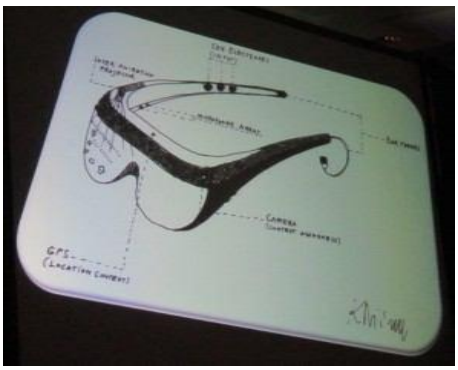

Fig.5. Virtual Retinal Display

V. APPLICATIONS OF THE SCREENLESS DISPLAY

The main focus currently on use of the screen less display are for the development of the mobile phones that are mainly used by the old and blind people as shown in figure 7. This type of invention of the screen less displays was first done on the mobile phone named "OWASYS 2CC". This model was very useful for the old, blind, and even for the people having with the less vision power.Screen less displays technology is also implemented for the development of the screen less laptops which is a better idea than the present available technology. A laptop without an LCD can be a very useful portable solution to a mass of the people when it is connected to CRT or fixed LCD monitors. Laptops without screens would also be a green solution, giving value to donated CRT.

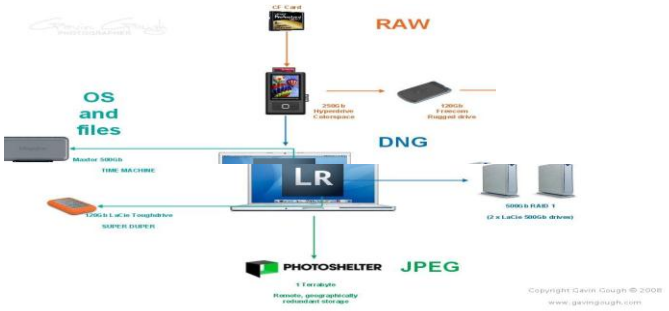

Fig. 6. System Architecture

What if Screen less display technology is also implemented for the development of the screen less laptops? A laptop without an LCD can be a very useful portable solution when connected to a CRT or fixed LCD monitors. Theses Laptops without screens will also be a green solution, giving value to donated Cathode Ray Tube (CRT) monitors that would

otherwise be heading for landfills. Portability means that volunteers, who don't always have the time to travel to people's homes, can now more easily maintain this computer.

Fig.7. Application applied to mobile Technology

These displays are also widely applicable in the field of the hologram projection. A hologram projection is an output of a technological innovation that truly helps in touch less holographic interfaces. In fact, hologram projection projects all 3D images of so high quality that it feels as if one can even touch them. However, holographic projection is still to achieve mass acceptance as until now, conventional holograms, which offer 3D images.

Fig.8. Example view of holographic Projection

Latest laser technology are also being implementing the special technique of the screen less display through the presence of the several "3D scope animation" or the screen provides the advantage of being combined with the "Laser Valve Video Projector" that helps in projecting the video images by the use of the laser light instead of the "Xenon Arc lamps" as depicted in figure 8. Present laser technologies have given an edge over the other available technologies as the LVP gives the projector an excellent depth in the focus. The Screen less display's major working principle can also be implemented in the emerging of the new screen less Televisions.Can you imagine that watching the TV picture that seems to be magically appearing in the thin air? The picture will just float on in front of the viewer and this would be a latest emerging technology in the future as depicted in figure 9.

Fig.10. Virtual screens

Figure9. Magical display in air

VI. ADVANTAGES AND DISADVANTAGES OF THE TECHNOLOGY

ADVANTAGES:

Low power requirements- there are only six diodes required and a few of watts to deliver images to the user's eyes [3].

Higher resolution images- The pixels in the images are projected by the diodes can be made smaller than is possible with any CRT or flat panel display, so higher resolution can be achievable. With retinal projectors, the only limitation in the resolution of visual images will be the resolving power of the users' eyes that depends on individual.

Greater portability- The combination of diodes, lenses, and processing components in a retinal projector system will weigh less.

Wider angle of view- Retinal projectors will be able to provide a wider field of view than is possible with display screens are currently used

More accurate color- By modulating light sources to vary the intensity of red, green, and blue light, retinal projectors can provide a wider range of colors – and more fully saturated colors – than any other display technology.

Greater brightness and better contrast- Retinal projectors can provide higher levels of contrast and brightness than any other display system.

Ability to present 3D images- With their capability of presenting high definition image-pairs, retinal projectors can deliver the most highly realistic stereoscopic movies and still pictorial images to their users.

Ability to present far-point images- The human visual system is known as a far-point system. With today's desktop and laptop computers users must employ their near-point

vision. The excessive use of our near-point vision in using computers, reading, sewing, playing video games, etc., is making myopia which is a very common impediment. The use of the far-point images that can be provided by retinal projector systems can reduce the incidence of myopia and, hence, the growing need for and use of eyeglasses see figure 10.

Lower costs- The present cost of retinal projector systems are high. Nevertheless, there are no hard-to-overcome manufacturing problems in mass-producing and low-cost components, so inexpensive systems will soon become available in the market. Environmental and disposal costs of these tiny delivery devices will also be minimal because of the toxic elements such as lead, phosphorus, arsenic, cadmium, and mercury are not used in their manufacture [4].

DISADVANTAGES:

- The primary disadvantage of this technology is that Virtual retinal display (VRD) is not yet available in the significant number.
- Prototypes and special experimental models are now being built, but their cost per unit is very high.
- This VRD technology is still going under progress and Development.

VI. FUTURE ENHANCEMENTS

For the future development of this emerging new technology, Several researches are being conducted and the several renowned IT sector companies present in the world are handling over the project of screen less displays.

- Microsoft in 2001 has begun the work on an idea for an Interactive table that mixes both the physical and the Virtual worlds.
- Multi touch is a human computer interaction technique and the hardwiredevices that implement it, will allow users to compute without conventional input devices.
- CUBIT is being developed for the future use of the multi Touch use of the program.
- Development of the enhancement of the micro vision also gives the improved and the futuristic view of the screen less displays. This technology of the micro vision is the very much useful in the Artificial Retinal Display properties.
- Japanese scientists have invented the “pair of intelligent Glasses” that remembers where people last saw their keys, Handbags, iPod, and mobile phones.
- Smart Google is developing the compact video camera which will film everything the wearer looks at the information, what the viewer wants will be directly being seen in through the glasses where there is no screen or projector is present.
- Laboratories are working under progress on the electron beam lithography which includes the advanced enhancement of the futuristic screen less display.
- Adobe systems are also working on it for the development and deployment cross platform of the several applications which are to be viewed without the actual screen.

VII. CONCLUSION

The paper has elaborately discussed the screen less displays that are one of the most emerging computer technologies and have become a very new exciting rage for the upcoming generations as a field of the futuristic technology. Due to the ability of having several advantages of it which is involved in the making, designingand coding of the screen less, this needs plenty of knowledge as process for the development is still under the improvement and modification. May be in the near future the world might be dominated with the screen less display technologies and this will enriches the world of the technological empowerment in the field of the computer science and technology. Screen less displays promises the cost effective aspect and also brighter future in the computer technology.

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