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IT Kaleidoscope

Robotics & the Mechanical Beings

OUR TEAM

PROGRAM INCHARGE
Dr. Praveen Arora

FACULTY INCHARGE
Ms. Priyanka Gandhi

COORDINATOR & EDITOR
Ankit Singhal

CONTENT WRITERS
Ankit Singhal, Muskan Juneja, Aditi Jain, Sahil Kumar, Aditya Pandey, Sneha Kaushik, and Rohan Singh

DESIGNERS
Ankit Singhal, Sampada Verma, and Sahil Kumar

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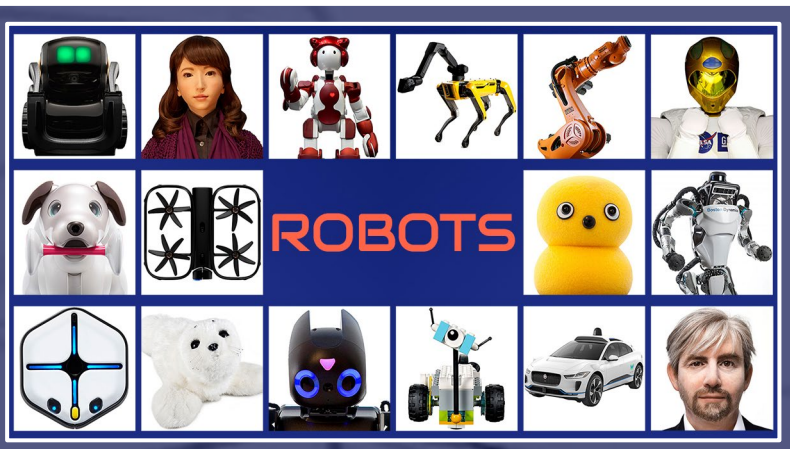
THEME: ROBOTICS AND MECHANICAL BEINGS

INTRODUCTION TO ROBOTICS

The word ***Robot*** originates from the word ***Robota*** which refers to work or labor. The first digitally handled robot was invented by George Devol. A robot is a machine that is used to perform various complicated actions. It is a machine that operates automatically and replaces human efforts by following commands and a set of instructions given to it to perform a certain job. They were initially built to perform repetitive and tedious jobs but now are used to do various other tasks too. Robots are the products of robotics.

Robotics is an interdisciplinary branch of engineering which consists of Electronics, Mechanical, Computer science, and Information science engineering. Robotics handles the construction, designing, and manufacturing of robots. This word was given by Isaac Asimov in 1940.

Robots come in different shapes and sizes to carry out tasks they are assigned and designed for. All robots differ in functionality and design.



There are five different types of robots.

1. ***Pre-programmed Robots***- Pre-programmed robots work in an environment that is controlled. They do simple and repetitive work. Their job is to perform tasks for a longer time, faster, and more efficiently than humans do.
2. ***Humanoid Robots***- Humanoid robots are the ones that look the same as humans and even behave like them. They also perform activities which are performed by humans like carrying objects, running. They are sometimes designed to look like humans having human faces and expressions
3. ***Autonomous Robots***- Autonomous, as the word suggests, is self-governing; autonomous robots are independent. They work independently and are designed to carry out tasks in the open as they do not require human directions. They are different because they use sensors to identify the objects around them.
4. ***Teleoperated Robots***- Teleoperated robots are semi-independent. They use a wireless network to permit human control from a safe distance. They are remote-controlled robots.
5. ***Augmenting Robots***- Augmenting robots either intensify capabilities that a human already has or replace the ones that a person may have lost.

There may be several types of robots performing different tasks but there are a few things that are common in all of them; they have a physical body, brain, There are various characteristics that are common in all the robots, like :

1. ***Appearance***- Robots have a body of their own. The mechanical parts of robots help them to move. If there is nobody then a robot is nothing, just a software program.
2. ***Brain***- The brain of robots helps them to receive information and perform commands.
3. *Sensors*- Sensors help robots to collect information and send it to the brain so that robots can follow the instructions given to them.
4. ***Program***- Robots only respond to the instructions which are given to them in the form of a program. These programs only tell the brain when any operation needs to be performed.

Robots require some special components to complete various tasks, these components include the ***Control system***, ***Actuators***, ***Sensors***, ***Power Supply***, *and* ***End effectors.***

As a result of their intelligence and ability to work without getting tired or bored, robots are used in various occupations that require repetitive work that requires accuracy and boredom-free work. Some of the jobs that use robots include:

- ***Manufacturing***
- ***Healthcare***
- ***Laboratory research***
- ***Earth and space exploration***
- ***To help in finding items and carrying them all over the warehouses.***

ADITI JAIN
(BCA 1ST YEAR 1ST SHIFT)

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Sector-5, Rohini, Delhi

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ARCHITECTURE AND WORKING OF ROBOTS

What is robot architecture?

The word robot architecture alludes to how a robot framework is divided into sub mechanical frameworks and how those sub mechanical frameworks are associated. Robot architectures are distinguished from other software architectures because of the different necessities of robotic frameworks.

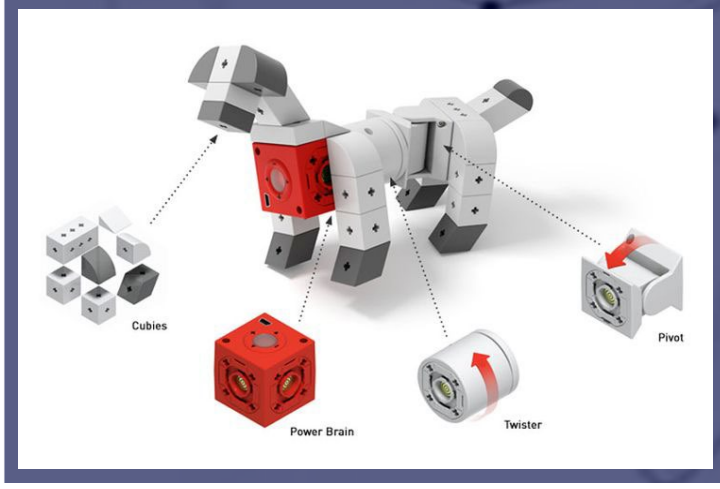
How do robots work?

Robots are machines with computer applications operating them. However, components of robots form two large groups: hardware and software.

HARDWARE

Major hardware components of a robot are very similar of a human beings:-

- Body structure
- Muscles system that provides mobility and stability to the body structure.
- Sensor framework that permits the robot to gather data from the surrounding environment to collaborate. Humanoid robots need a sensor to mirror the abilities of their partners.
- A source of power that activates the muscles and sensors.



- A brain-like system that helps the sensors process information and order muscles to react or perform some desired action.

Every human being has some unique attributes, such as intelligence and morality, but the list above covers it on the physical level.

A basic stereotypical robot has a flexible structure, some motors, a power unit, a system made from sensors, and a computer brain that governs all these elements. Robots are nothing but human-made versions, or we can say they are machines that replicate human and animal behavior.

SOFTWARE

Software governs the functioning of robots. In many cases, the robotic software has specific parameters that can be set. Without software, the robots are just a pile of junk.

It can be a build-in "hard-wired" solution that cannot be changed later. Primitive robots usually utilize this approach. The software can be upgraded remotely through the internet in more advanced solutions. Being able to update or upgrade the software remotely helps the developer from time to time.

They can introduce new features to improve the service, correct possible errors, and help fix bugs. The third type of software helps in minor or significant modifications or even makes it possible to develop software from scratch in the case of general-purpose robots.

They can introduce new features to improve the service, correct possible errors, and help fix bugs. The third type of software helps in minor or significant modifications or even makes it possible to develop software from scratch in the case of general-purpose robots.

Every unique robot has its unique working. Some of them are listed below:-

The most common robotic sense is the sense of movement — the robot's ability to monitor its motion using a laser on the lower part of the robot to enlighten the floor with a camera that estimates the distance and speed voyaged. This essential framework is used in PC mice.

Robotic automated vacuums utilize infrared light to recognize objects in their way, and photoelectric cells measure changes in light.

Obstacle avoiding robots have two primary sensors IR sensor, which is used for measuring distances. The ultrasonic sensor also measures the distance of a target object by emitting ultrasonic sound waves and converting the reflected sound into an electrical system.

SAHIL KUMAR
(BCA 1ST YEAR 1ST SHIFT)

jims
Sector-5, Rohini, Delhi

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ROBOTIC PROGRAMMING

Robots are programmed either by off-line programming or guiding to perform a specific activity. Most modern robots are programmed by directing a robot from point to point through multiple operation phases, with each point put away in the robotic control framework.

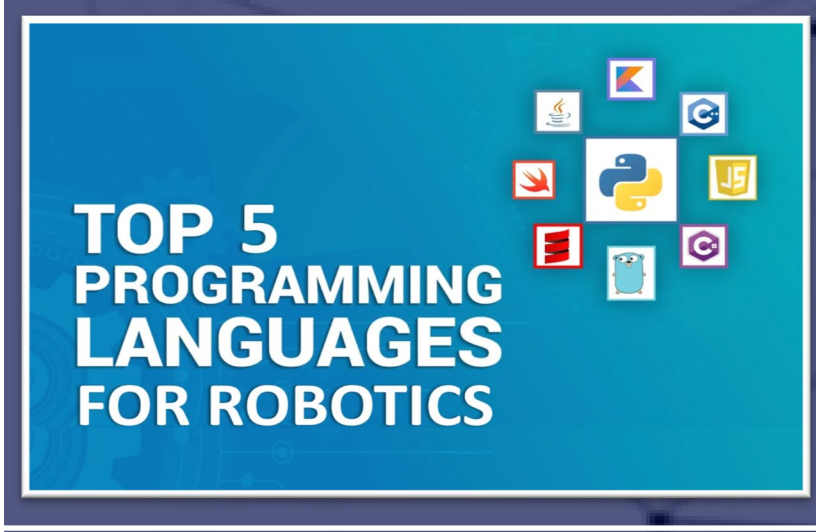
Robots get guidelines through computer commands, alluded to as manipulator(controller) level off-line programming. The utilization of off-line programming includes more significant level languages, in which objectives or tasks characterize robotic activities.

Robotic programmers should have information on various programming languages as changing from computers to robots isn't the smooth progress that numerous programmers/developers might think.

Different Types of Robot Programming Languages

Programming languages are intelligently affecting robot incorporation in modern machines. The sky is the limit for robotic industrial applications. Robotic programming assumes a crucial part in performing complex operations and specific functionalities. To begin programming in robotics, you should learn different languages to make a robot work. Even though robotics is a mind-boggling subject, learning these programming languages will assist you with planning a task to make a simple to-utilize interface.

There are around 1500+ programming languages that exist globally, utilized to learn and execute. Here are the top and most well-known programming languages in robotics.



1) *C/C++* :- Choosing to learn C and C++ is the best beginning for aspiring roboticists as it is a universally applicable programming language that contains basic, object-arranged, and conventional programming highlights.

Why is C++ the Best Programming Language for Robotics? C and C++ are highly developed programming languages. C++ permits connection with low-level equipment and continuous performance.

To ensure the best robot version, it will be wiser to utilize C++.

As robotics relies on continuous performance, C and C++ are ideal for roboticists.

Example: The default Simple Robot template project

```
#include "WPILib.h"

class RobotDemo : public SimpleRobot
{
public:
  RobotDemo(void)
  {
      //put initialization code here
  }
  void Autonomous(void)
  {
      //put autonomous code here
  }
  void OperatorControl(void)
  {
      //put teleop code here
  }
};
START ROBOT CLASS(RobotDemo);
```

2) *Python* :- Python is a significant-level programming language, and it assumes a critical part in building and testing robots. Python is a decent stage to robotize, instruct, and post-process robot programs. Many individuals pick this programming language to compose a script that computes, records and recreates a whole robot program rather than physically showing each assertion to a robot. This serves to rapidly test & envision arrangement in simulation and refine the program and its rationale.

Why Python is the Most Used Programming Language in Robotics?

- As compared to C, C++, and Java, you can compose fewer lines of code in Python.
- Learning python is a fundamental manual for making an independent, versatile robot utilizing well-known robotic programming systems.
- This language is utilized in the implanted framework, an essential part of the Robot working framework.
- The main focus of Python is usability, and less time is expected to program, like characterizing and projecting variable sorts.
- Whenever you are expected to carry out some fundamental usefulness, there are countless free libraries for it, and that implies you don't need to 'rehash an already solved problem.'

```
from robolink import *    # API to communicate with RoboDK
from robodk import *      # basic matrix operations

# Any interaction with RoboDK must be done through
# Robolink()
RL = Robolink()

# get the robot item:
robot = RL.Item('KUKA KR 6 R900 sixx')

# get the home target and the welding targets:
home = RL.Item('Home')
target = RL.Item('Target 1')
# get the pose of the target (4x4 matrix):
poseref = target.Pose()

# move the robot to home, then to the center:
robot.MoveJ(home)
robot.MoveJ(target)

# make an hexagon around the center:
for i in range(7):
ang = i*2*pi/6 #angle: 0, 60, 120, ...
posei = poseref*rotz(ang)*transl(200,0,0)*rotz(-ang)
robot.MoveL(posei)

# move back to the center, then home:
robot.MoveL(target)
robot.MoveJ(home)
```

3) Java :- To perform human-like tasks, robotics systems must be included with functions via programming languages. To enable robots with these functions' java language can be utilized as it offers a variety of APIs that are tailor made to the necessities of the advanced mechanics domain. Command and control recognizers correspondence frameworks and speech

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synthesizers can be built using the Java Speech API and the Java Media Framework can be used to receive and process visual images.

Why Java is the Most Used Programming Language in Robotics?

•Java contains all the high-level features needed in robotics industry especially when it comes to artificial intelligence. • Using java you can make proficient algorithms for AI search and neural algorithm language processing etc. • The java virtual machine deciphers the instructions at run time.

• Java allows programmers to utilize similar code on various machines on account of the java virtual machine. • It provides all the high-level features needed to deal with various aspects of robotics.

Example Code to create a robotics voice listener using a grammar format file:

```
import javax.speech.*;
import javax.speech.recognition.*;
// Create recognizer and allocate resources
Recognizer recognizer = Central.createRecognizer(null);
recognizer.allocate();
/* Add engine listener - to notify when speech engine
 * is stopped, started, etc.
 */
recognizer.addEngineListener(engineListener);
// Read-in grammar file
File gf = new FileReader(grammarFile);
RuleGrammar rules = recognizer.loadJSGF(gf);
/* Add result listener. VoiceListener then called when a
 *particular grammar word is recognized. The associated
 *event tag is passed to it
 */
rules.addResultListener(new VoiceListener());
// Tell recognizer to commit changes
recognizer.commitChanges();
// Request focus of microphone away for other apps.
recognizer.requestFocus();
// Start listening
recognizer.resume();
// Remember to catch exceptions
```

4) C#/.NET :- C#/.NET is Microsoft's exclusive language used to foster applications in Visual Studio. Examples include Netduino, ***FEZ Rhino***, and others. It gives aspiring programmers a strong establishment based on which they can branch out to various fields. C#/.NET is by and large utilized in port and socket level programming.

Why is C#/.Net the Most Used Programming Language in Robotics?

•C#/.NET permits utilizing numerous languages and has flat adaptability. •.NET establishes a bound together environment that permits robotic designers to make programs in C++, Java, or Virtual Basic. • All tools and IDEs have been pre-tested and are effectively accessible in the Microsoft Developer Network.

• Language reconciliation is consistent, as you can call methods from C# to ***VB.NET***

MyRobot.cs MyProject

FNL.MyRobot — Run()

```
// Access to standard .NET System
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

// Access to the public Robocode API
using Robocode;

// The namespace with your initials, in this case FNL is the initials
namespace FNL
{
    // The name of your robot is MyRobot, and the robot type is Robot
    class MyRobot : Robot
    {
        // The main method of your robot containing robot logic
        public override void Run()
        {
            // -- Initialization of the robot --

            // Here we turn the robot to point upwards, and move the gun 90 degrees
            TurnLeft(Heading - 90);
            TurnGunRight(90);

            // Infinite loop making sure this robot runs till the end of the battle round
            while (true)
            {
                // -- Commands that are repeated forever --

                // Move our robot 5000 pixels ahead
                Ahead(5000);

                // Turn the robot 90 degrees
                TurnRight(90);

                // Our robot will move along the borders of the battle field
                // by repeating the above two statements.
```

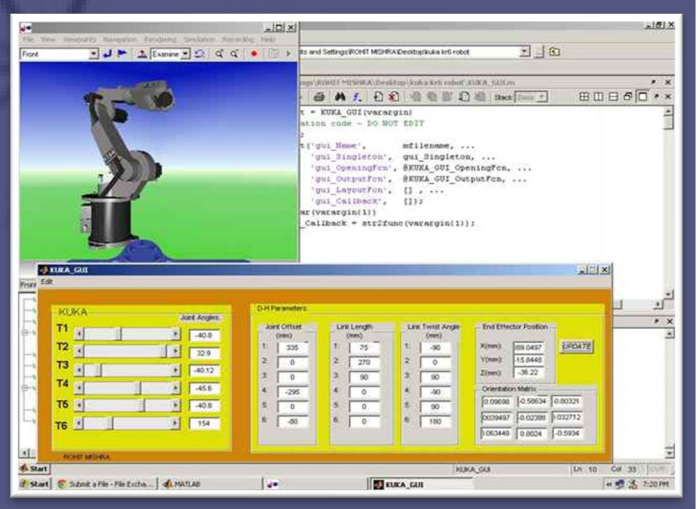
5) MATLAB :- Technically, ***MATLAB*** isn't a programming language; it is an apparatus(tool) to observe designing arrangements based on mathematics. Robotic engineers need to learn Like Octave, ***MATLAB*** and its open-source relatives are exceptionally well known for particular robotic designers dissecting information and creating control frameworks. Programming for a robot requires planning the controller that oversees robot conduct. Displaying and re-enactment became essential to see how the controller connects with the robot's current circumstance discernment, versatility, and cooperation.

Why is ***MATLAB*** the Most Used Programming Language in Robotics?

• ***MATLAB*** is profoundly helpful in planning the whole robotic framework.

• It is broadly utilized in the robotics business as it is well established in the establishment and advancement of robots.• It is a simulation tool by which you can give your algorithm or plan . •Also, simulation assists engineers with refining the framework plan and wiping out mistakes before creating equipment models.

Example: Modelling and Simulation of Kuka kr6 robot.

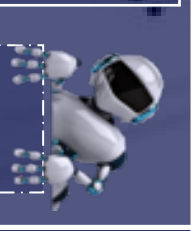


Which Is The Best One Among Them?

Learning these programming languages will assist you with fostering a robot or getting some work in the robotics business. In any case, learning C/C++ on a needed premise will help you as they are the best programming languages for robotics.

Many individuals feel that ***C*** and ***C++*** are quickly becoming obsolete in different enterprises, yet the use and prevalence of these languages are expanding. A few organizations pick ***C*** and ***C++*** to foster robots as they contain more instruments and library functions. These two languages are cordial, and designers can change line by line. However, learning these programming languages will assist you with fostering your coding abilities, and they can help you make a great Ultimate Intelligent bot.

ANKIT SINGHAL
(BCA 3rd YEAR 1st SHIFT)



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CURRENT IMPLEMENTATION OF ROBOTS IN VARIOUS SECTORS

Robots are the future of current technology. It is not much developed and not much widely implemented. But even today, it is used in various fields and sectors like health care, agriculture, military, etc.

1. Military: Currently. robots are being used in the military to perform multiple tasks. In the military, drones are used to capture and record instances of war and provide soldiers with real-time information. Apart from that, humanoids can also be used in place of humans in the military to avoid any kind of loss of life in wars. Though this measure has not been implemented yet, some countries are thinking of implementing this technology for their army.

2. Security: In some countries like the United States, robots are used as security guards to protect humans. Unlike human security guards, humanoids fear nothing. Therefore, they can prove to be extraordinarily exceptional in the field of security. The main advantage of using robots in the field of security is to avoid burglaries and armed robberies since in those cases, there will be no loss of lives. Also, in restricted areas or research fields, robots can help secure important and confidential information.

3. Healthcare: In the field of healthcare, robots have helped doctors to perform operations more precisely. Hence, the number of successful operations has increased. There is a robot known as 'the da Vinci robot' that can help surgeons to perform complex operations and surgeries related to sensitive areas like the heart, head, and neck more easily. During the pandemic, a robot nurse named Grace was also designed whose task was to look after Covid-19 patients.

4. Entertainment: Entertainment is a fast developing and widely evolving sector in today's world. Taking the help of Artificial Intelligence (AI), robots can be put to work to make human tasks easier. Robots can be assigned the task of managing behind the scenes since managing everything is a boring and repetitive task. So, to avoid this boredom, robots can be used in place of humans. Other than off-screen work, the robots can also be trained for stunts since doing a stunt is very dangerous. It would be less risky if we use a robot instead of stuntmen for performing stunts.

5. Manufacturing: In the manufacturing industries, robots have proved to be very useful. They help to increase productivity and at the same time, they reduce production costs. Robots can also collaborate with the workers of the industry to help them with the tasks that are repetitive to avoid boredom in employees. And since robots are faster, precise, and efficient, they can complete such boring and repetitive work with more precision and accuracy.

ADITYA PANDEY
(BCA 1ST YEAR 1ST SHIFT)

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Humanoid History & Predictions

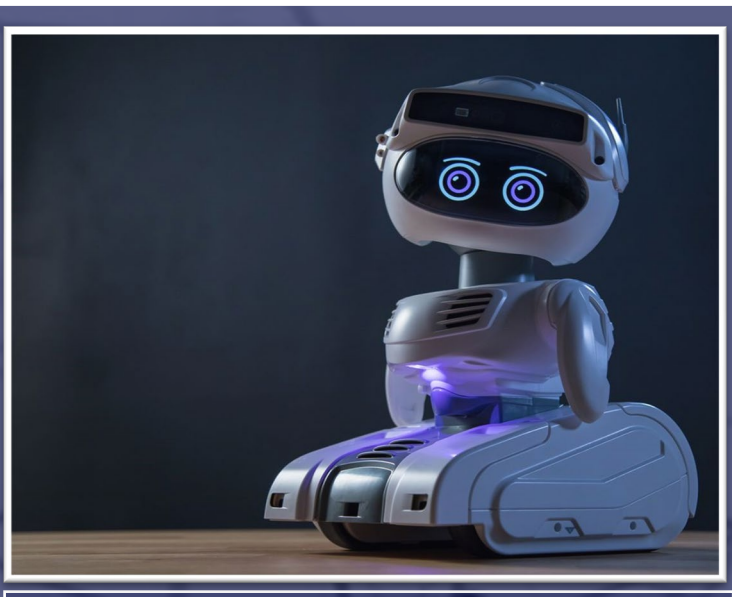
HUMANOID HISTORY

None of the creations of humanity inspire us more with admiration than Humanoids Robots.

The invention of the first robot dates back to more than 500 years ago when Leonardo da Vinci created one in 1495. He invented a mechanical knight which was capable of imitating human moments such as sitting and standing, moving hands and neck, and lifting the visor of the helmet just to prove that there was no one inside.

The following functional robots were created in 1774 by a Swiss watchmaker, Pierre Jaquet-Droz. Three automated dolls, a musician, a writer, and an artist still working in the museum of art and history in Neuchatel. The gynoid robot plays the organ by flipping the keys with fingers and imitating breathing, one robot child draws four images while the other writes text up to 40 characters.

The first digitally controlled anthropomorphic humanoid robot (having human characteristics),



WABOT 1, was created at Waseda University, in Tokyo.

The second version of the robot introduced in 1980, ***WABOT 2***, was able to play piano, read notes and play melodies of medium complexity. ***ASIMO***, the successor of the ***WABOT***, presented in 2000, remained the most perfect humanoid robot in the world developed by Honda for a long time. This humanoid robot could recognize objects, gesture sounds, and faces, and talk and interact with people as well. Capable of autonomous navigation, ***ASIMO*** was created to become a multifunctional mobile assistant. The last version of ***ASIMO*** was introduced in 2014. But as of now, the project is closed. With the advent of the 21st century, began a real boom in robotics including humanoid 'bots. In 2002, SONY introduced the ***SONY DREAM ROBOT***, which was able to walk on stairs, bypass obstacles and even get up when falling

The robot has no special abilities but can talk in Japanese and sign language as well as imitate human movements..

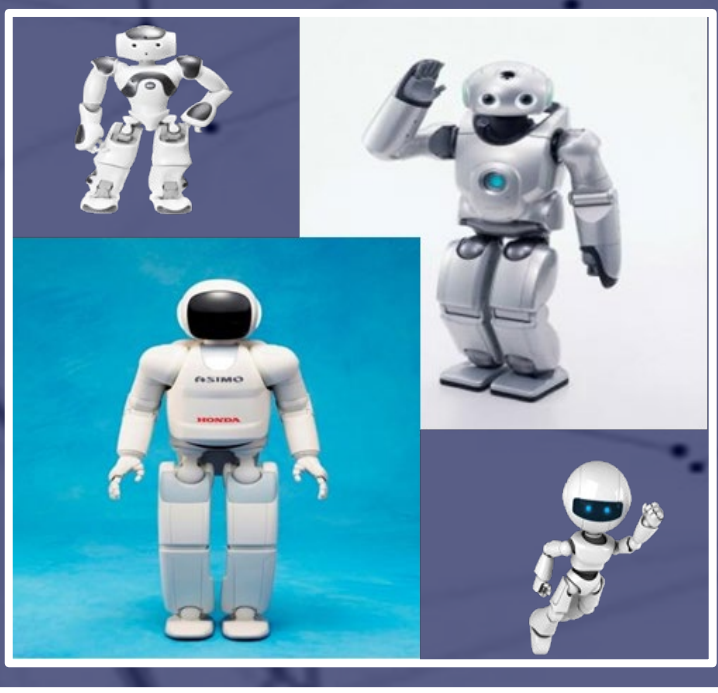
The biggest breakthrough in the Humanoid and Robotics industry came through in 2015 was the robot ***Sophia*** brought by the company Hanson Robotics. Sophia has become almost legendary, she was attributed to a developed intellect. The humanoid robot travels all around the world and even handles her social media.

The breakthrough of 2016 was the first robot with tactile feedback, the underwater bot ***OceanOne.*** It transmits the sensation of objects back to the operator so that it can lift fragile vases from shipwrecks from the ocean floor. The OceanOne is equipped with bimanual arms, stereoscopic visions, and eight control motors with sensors. This was just the beginning of the new era, in 2004, the University of Osaka, presented the humanoid ***ACTROID*** with realistic silicone skin.

The robot was able to recognize and process speech, answer questions and respond to touch. In 2006, the Aldebaran Robotics in France introduced an autonomous programmable humanoid '***NAO***', with open source code which became a research platform for institutes.

In 2009, the Italian Institute of Technology introduced the ***ICUB*** open-source robot to explore the possibilities of AI as well as any other experiments with humanoids in general.

In 2017, the most useful humanoid was demonstrated by ***PAL*** Robotics, named ***Talos*** that is capable of not only exploring the surface like many other devices but also performing precise and complex tasks.



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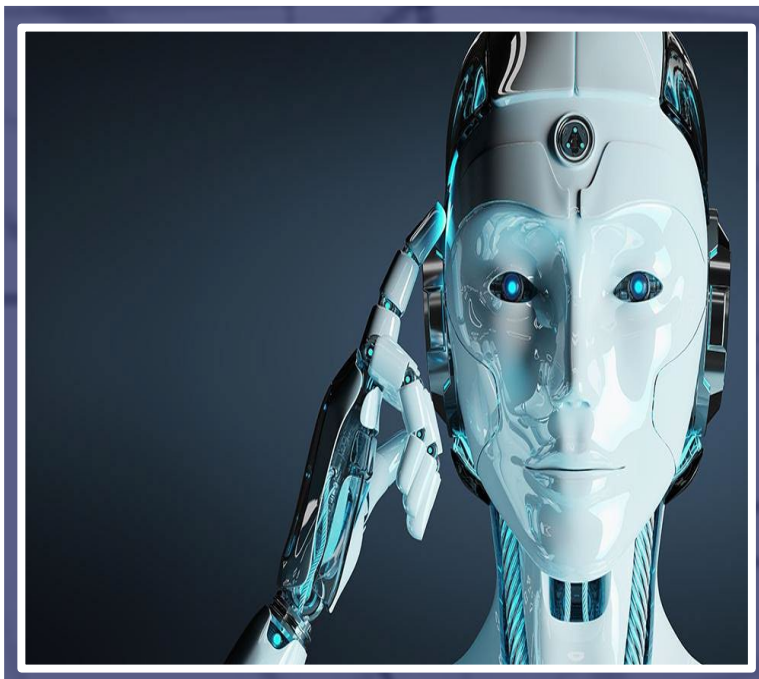
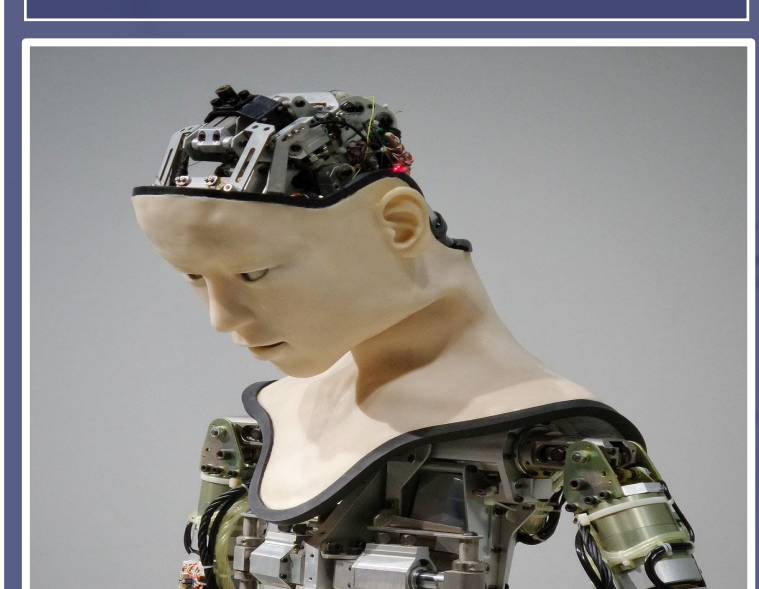


HUMANOID PREDICTIONS

In 2014, the robot ***Aiko Chihira*** from Toshiba got a job. It was created to work at the information stand in the Tokyo shopping center where it helps customers to navigate in the store.

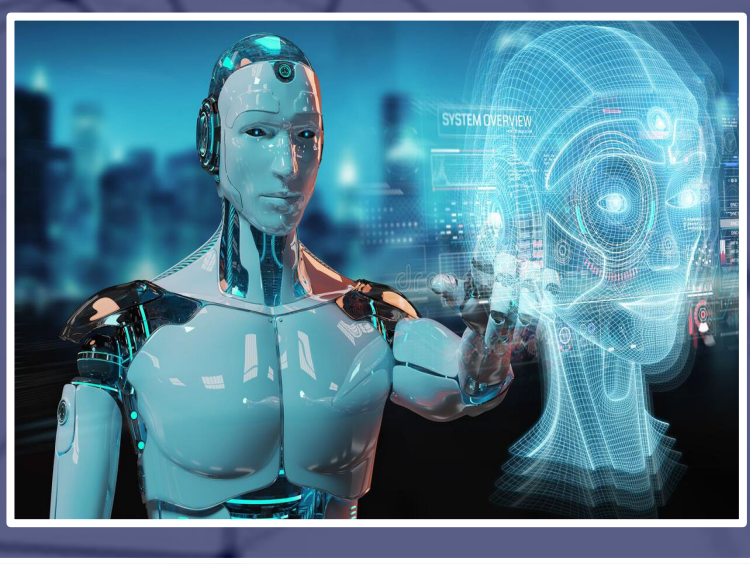
Engineers and computer scientists all across the world are working on ways to make humanoids more observant and dexterous. The humanoid robotic industry throughout the world is constantly innovating, combining artificial intelligence, vision, and other sensory technologies. Robots in newer generations are easier to set up and program than their predecessors.



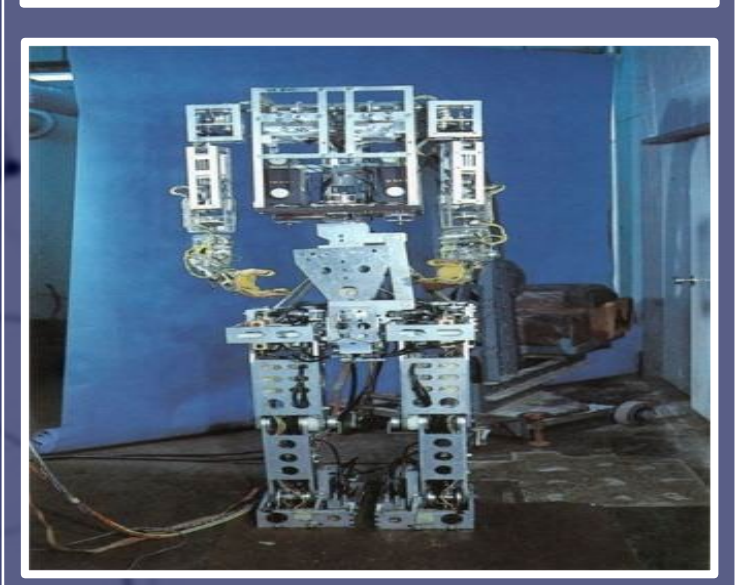
In 2021, prominent discoveries include high-tech ocean robots that investigate the world beneath the seas; Saul, a robot that fires UV rays at the Ebola virus to eradicate it; and an AI-controlled therapy robot that assists caretakers and patients in communicating more efficiently, reducing stress.

Boston Dynamics CEO Marc Raibert has stated that his long-term goal is to create robots with functional levels of performance comparable to or greater than people and animals." I don't mean that they have to work in the same manner as humans and animals do, or that they have to look the same, but merely at the level of performance in terms of being able to move around in the world and use their hands", he said. While robot employees have already been an important part of production and manufacturing, researchers at MIT and BMW have been working on a novel algorithm to assist robots to predict and respond to people nearby, such as in a vehicle assembly line. Whereas assembly robots may be overly cautious and pause too soon or too frequently when a human crosses their path, the "partial trajectory" algorithm allows the system to forecast movements for nearby humans and thus only pause when necessary.

The simulations that are currently undertaken could serve as the foundation for future human-robot programming.



Being able to predict human movements more accurately is only the first step; the system might be improved over time to assist robots to detect additional human actions and gestures, resulting in a more seamless relationship. Whatever the future holds, it won't be long until you're interacting with robots daily.



ROHAN SINGH
(BCA 1ST YEAR 1ST SHIFT)

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IMPLEMENTATION OF HUMANOIDS

Humanoid robot development progresses regularly. Previously, humanoid robots were exclusively utilized in domestic settings and for entertainment. However, with technological advancements, the humanoid robot may now be used in a variety of disciplines, including healthcare, sports, space exploration, construction and manufacturing, education, etc.

The following sections go through the various applications of humanoid robots in various fields:

- ***Entertainment*:**

Humanoid robots are becoming increasingly popular as entertainment devices. Humanoid robots are excellent communicators with a human, facial expression, hand gestures, and other non-verbal communication. Humanoid robots are being developed for use in a variety of applications of entertainment. One of the instances is ***SDR-4X*** which is a humanoid robot. It has the potential to avoid walking on an imbalanced surface. ***SDR-4X*** has capabilities like Dancing and A Cappella Chorus performances and also it can learn and recognize the user's faces and names, as well as interact with them using a synthetic voice.

- ***Agriculture***

Agriculture must become more strong and more efficient as the world's population grows.

Humanoids are expected to assist in milking, farming, and other tasks soon. Ecorobotix, Naio Technologies, Energid Citrus Picking System, Agrobot E-Series, and Blue River LettuceBot2 are just a few of them. These robots mainly perform tasks like Land Management, Crop Production and Harvesting, Taking Care of Farm and Livestock Animals, Maintaining and Repairing Infrastructure, etc.

- ***Military-industrial complex*:**

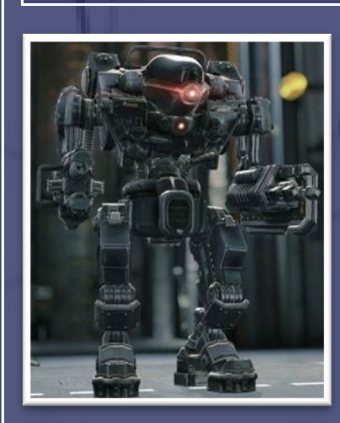
Humanoids will soon be deployed to work in hostile environments that are inaccessible to human soldiers. These humanoids will also aid in precisely accessing difficult situations, allowing for better strategizing of approaches. Currently, there are two most popular humanoid robots that are used by the military: **Guardbot** and **Dogo**. **Guardbot** is a surveillance robot that can move on any terrain, including snow, sand, and dirt. This surveillance robot is capable of swimming as well as moving on any terrain. And ***DOGO*** is a tactical combat robot with a 9mm Glock handgun that was designed to serve as a watchdog for soldiers in the field. The most intriguing aspect about ***DOGO*** is that it weighs only 26 pounds and can be carried by a fully armed commando in one hand.

- ***Healthcare*:**

Humanoid robots have human-like characteristics, such as the ability to walk on two legs and communicate with people. It can be used to provide a service like in a hospital to help nurses and patients in their activities, as well as assisting others in need, to communicate with people in the hospital from distance by using a remote site. As a result, the nurse's ability to communicate with the robot has become the nurse's avatar. Talk to the patient and learn about his or her needs. For the sake of patience, a humanoid robot assists patients who are unable to help themselves. It is inconvenient to relocate. The patient can also converse with the robot, and consider the robot as a separate existing user.

There are two types of humanoid robots that have been specifically designed to assist youngsters with autism. ***IROMEC*** and ***KASPAR*** are the two humanoid robots. Both these humanoid robots teach social interaction and communication skills to children with autism.

in one hand.



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THEME: ROBOTICS AND MECHANICAL BEINGS

■ ***Home applications*:**

People nowadays are preoccupied with their jobs and frequently leave their homes empty. As a result, they require someone to look after their home while they are away. As a result, Japanese researchers devised a system that allows users to manage one or more humanoid robots in their homes remotely using a mobile phone or the internet. This allows users to better understand the conditions at the robot's location. While the house is empty, users can pre-define some areas in the house and delegate specific activities to the robot, allowing the humanoid robot to move to those spots and do duties based on the user's requirements.

■ ***Space*:**

Another domain into has begun to delve is space applications. The researchers began investigating the suitability of a humanoid robot in the workplace to enter space. The scientists have a goal to create humanoid robots that can take the place of humans in the workplace. Space exploration in the future will have humanoid robots that look like humans. The most popular **Robonaut2** humanoid is a new generation of humanoid robots. It became the first humanoid robot to travel to the International Space Station. The main purpose of Robonaut2 is to work alongside human astronauts. It can turn on a switch, use a tool, and grab both hard and soft objects. Robonaut2 assists astronauts in a variety of ways.

■ *Education*: Aside from the aforementioned applications, several researchers have begun to focus on teaching. Robotics, a Korean robot maker, has produced a humanoid robot dubbed **Bioloid**. Bioloid is a hobbyist and educational robot kit designed to work as a teaching assistant and provides students with an interactive learning environment. Bioloid, the educational robot, makes a positive impression on kids and can hold their attention in class.

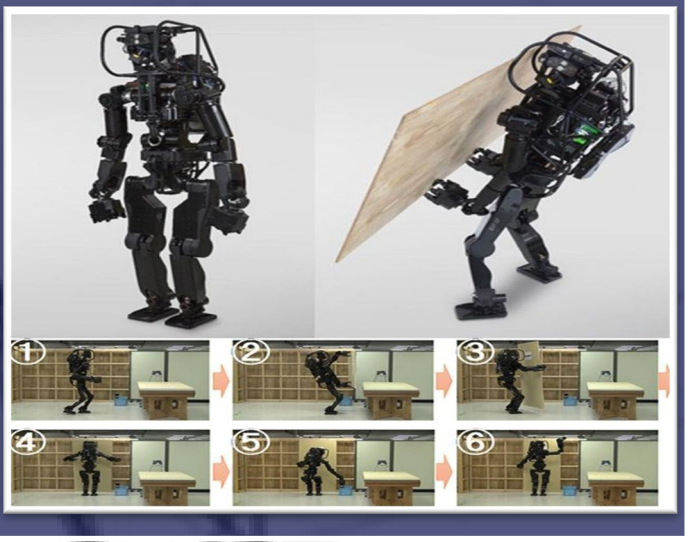
■ ***Sports*:** Sport is another essential human activity. As a result, experts are looking into the idea of a humanoid robot participating in sports. In the RoboCup soccer competition, fast and flexible walking is an important characteristic of a humanoid robot. The biggest difficulty in doing so is the uncertainty. To address this issue, the researcher suggested a new fuzzy-logic control technique. For this reason, ***EFuRIO***, a humanoid robot, was created. It can stand, walk, turn, and kick in its current iteration (third generation).

■ *Construction and industry*:

It is critical to replace humans with humanoid robots for dangerous work on the construction site. Construction machinery and equipment, for example, play a significant role in a variety of duties on the job site. Humans are frequently exposed to hazards while working machinery and equipment. If a humanoid robot can operate machinery and equipment while being controlled from a remote location, the problem of risky jobs will be solved. In a disaster scene, where construction equipment is necessary to transport away some large and heavy objects, a humanoid robot also performs a vital role. Working in a disaster site is perilous for a human operator. ***HRP-1*** is one of the humanoid robots created by researchers in Japan that makes use of teleportation to use the proxy drives of construction machinery like lift trucks. The remote computer can control this humanoid robot. Handling and carrying large goods is not possible for the humanoid robot.

***Conclusion*:**

Humanoid robots have begun to be used in a variety of industries as technology has advanced in recent years, as stated above. **All of the produced robots, however, are still in the research phase and will not be used in the actual world.** Humanoid robots will provide us with better quality and more pleasant living if the obstacles we confront are overcome.



SNEHA KAUSHIK
(BCA 1st YEAR 1st SHIFT)

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Sector-5, Rohini, Delhi

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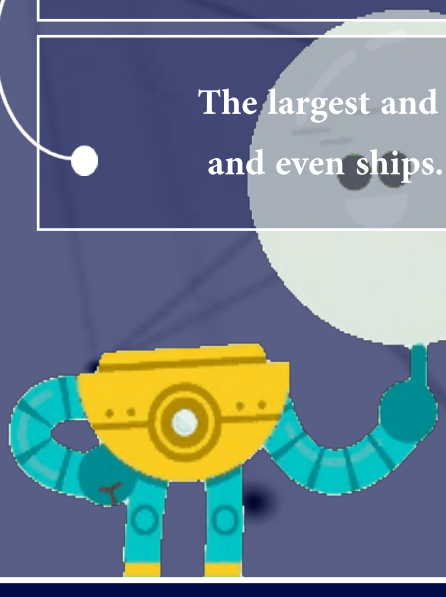
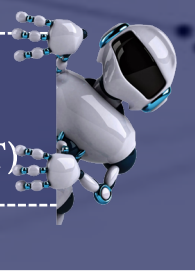
FUN FACTS

- Crude robots have helped in defusing various bombs for around 40 years. This eliminates the risk of humans being involved in bomb diffusion processes.
- Over one million industrial robots are already being used in industries, reducing manual work and interestingly, more than half of them are in Japan.
- There were automatons, which were machines driven by water, air or clockwork before the modern robots operated by electricity or computers.
- There is a robot named Clocky that would help you wake up and get out of bed as it is a robot alarm clock that keeps running away from you until you get out of bed to switch it off.
- The most amazing gift that someone could give to a kid in the 1980s was a programmable robot. It either comes ready or can be assembled according to the owner. While the robotic toys that today's kids want are far more sophisticated.
- After years of research, it is predicted by researchers that within 20 years, robots might reach the intelligence level of humans. They might become as smart as humans.
- There is a humanoid named Sophia who is the first-ever robot to get the citizenship of a country. She has even sung in huge concerts.
- The largest and strongest robot in the world is "Titan" which can carry huge loads such as engine blocks, aircraft parts and even ships.



MUSKAN JUNEJA
(BCA 2nd YEAR 2nd SHIFT)



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FACULTY COORDINATOR

Dr. Praveen Arora
(Program Incharge)

Ms. Priyanka Gandhi
(Faculty Incharge)

COORDINATOR & EDITOR

Ankit Singhal
(BCA 3rd Year 1st Shift)

DESIGNERS

Ankit Singhal
(BCA 3rd Year 1st Shift)

Sampada Verma
(BCA 2nd Year 2nd Shift)

Sahil Kumar
(BCA 1st Year 1st Shift)

CONTENT WRITERS

Ankit Singhal
(BCA 3rd Year 1st Shift)

Muskan Juneja
(BCA 2nd Year 2nd Shift)

Aditi Jain
(BCA 1st Year 1st Shift)

Sahil Kumar
(BCA 1st Year 1st Shift)

Aditya Pandey
(BCA 1st Year 1st Shift)

Sneha Kaushik
(BCA 1st Year 1st Shift)

Rohan Singh
(BCA 1st Year 1st Shift)

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Recent Innovations In IT Sector

- Researchers have developed a 46-inch woven display with smart sensors, energy harvesting and storage integrated directly into the fabric.

- University of Cincinnati aerospace engineering professor Daniel Cuppoletti uses an anechoic chamber covered in sound-absorbing panels to study engine and propeller noise in drones and flying cars.

- Two researchers with the Center for Digital Technology and Management, Technical University of Munich, have developed a haptic feedback sleeve and goggle system that allows blind people to partially "see" with the skin on their arm.

- Researchers are developing a new technology that uses hand gestures to carry out commands on computers.

- Gulf countries are investing heavily in artificial intelligence as they seek to move away from their reliance on fossil fuels.

- Aerospace engineers and entrepreneurs across the world are working on new air vehicles—in an industry called advanced air mobility.

- Research from Stanford Computational Imaging Lab confronts the fact that current augmented and virtual reality displays only show 2D images to each of the viewer's eyes instead of 3D—or holographic—images like we see in the real world.

- Australian researchers have developed disruptive technology allowing autonomous vehicles to track running pedestrians hidden behind buildings, and cyclists obscured by larger cars, trucks, and buses.

- Two Virginia Tech Researchers discover a potential method to convert food waste into batteries.

- Ankit Singhal (BCA 3rd Year 1st Shift)