Humanoid robots with Artificial Intelligence

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Abstract- In this paper, We used the term artificial intelligence to make the robots which can think and act like human being. They can do most of the works that a human being can do. We have described How human robots can be made which will do everything we want but question is that they can be harmful for humans and all other living and non-living things or not? Yes they can be harmful for this planet, living and non-living things. To overcome this harmful effect we have used the term artificial intelligence which can make a robot with human feelings. By programming we can make this type of robots which can collect data automatically by understanding the human activities . If these type of robots have made which can do everything like human being then they can save a large no human beings. Where human can't reach there these type of robots can reach even there is not any fear of losing them. We can made millions of artificial robots. We can use these robots for our companies, business, transportation, delivery of things, as a photographer and many more purposes . The main thing is that we can make robotic army by using the artificial intelligence.

Keywords- Robots, Robotics ,Artificial Intelligence, Human Robot , Effect , Construction , Mcb design

I. INTRODUCTION

Robotics is the term used in artificial intelligence which deals with the study of creating intelligent, efficient and useful robots.

Robots are multifunctional, re-programmable, automatic industrial machines designed to do theworks that are Hazardous for human beings. Robotics is abranch of science andengineering that includes ,computer Science ,mechanical engineering, electrical engineering , electronics engineering and others. Robotics deals with the efficient design, construction, operation, and use of robots, as well as computer systems for controlling the Robots, sensory feedback, and information processing. This field overlaps with electronics, computer science, artificial intelligence, mechatronics, nano-technology and bioengineering.Robotics technology does a significant promise for improving industrial automation and production line Systems, operating complex surgical procedures, performing space and security missions, educate and entertain humans. Robots may be constructed to take on human form but most robots are machines designed to perform a task with no regard to how they look. Nowadays, Robotics is a rapid and Smartly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or militarily.

Robotics Technology will become very effective in the coming time. It will emit a very great and useful effect on every aspect of work and home. Robotics has the great probability to transform lives and work practices, raise efficiency and safety levels, provide enhanced levels of service and create jobs. Its impact will grow over time as will the interaction between robots and Humans.

Global investment in R&D in robotics research is growing at a very fast rate. A number of countries, such as U.S., China, South Korea, Japan, Singapore, India and European Countries have incorporated national strategic initiatives in robotics, as a part of their national plans.Europe leads in mobility for structured environments, including urban transportation. Europe also has significant programs in eldercare and home service robotics. Australia leads in commercial applications of field robotics, particularly in such areas as cargo handling and mining, as well as in the theory and application of localization and navigation.

The industry and military sectors were the earliest acceptors of robotic technologies. Now the falling prices, faster CPUs, improved safety and easier programming have put the robots within the reach of various sectors, and their ability to work with humans and perform new applications. Industries as diverse as retail, healthcare, food processing, mining, transportation and agriculture may see radical robotics few changes in coming years. In 2016, the robotics field experienced a dramatic shift towards consumer focused applications.

India is also witnessing a growing demand for robots in country for speed, safety, scale, and success in manufacturing, logistics, retail, healthcare, and defence sectors. Automotive industry, requires robots for example for assembling of various products, welding and paintingjobs , warehouses require robots to help humans to sort, pick, and package items; healthcare requires robots in the form of assistive and skill development technologies; and security sector requires robots to improve and strengthen surveillance systems such as border areas patrolling. Our Country also needs robots for searching and saving trapped humans during earthquakes. During 2004 – 2011, India witnessed significant growth in robotics companies in the country.

Robots can be work as:-

1. An automatic machine sweeper
2. In space
3. A machine removing mines in a war field
4. An automatic car toy for a child to play with
5. In military,
6. In Home delivery of products

7. In photography
8. In Researches etc.

II.   RELATED WORK

First use of the word "Robot and Robotics":
The word robot was firstly introduced by Czech writer Karel Capek in his play Rossum's Universal Robots (R.U.R), published in 1920. The play begins with a factory that makes artificial people known as robots.

The word "Robotics", was coined accidentally by the Russian-born, American scientist, Issac Asimov in 1940s .

The three laws of Robotics:
Firstly ,Issac Asimov proposed his three "Laws of Robotics", and he later added a "zeroth law".

✓ **Zeroth Law -** A robot is not allowed to injured humanity, or through inaction it allows humanity to come to harm.

✓ **First Law -** A robot shall not harm a human being, or by inaction it allows a human being to come to harm, unless it would violate the higher order law.

✓ **Second Law -** A robot should follow the orders given it by human beings, except when such orders give by humans would conflict with a higher order law.

✓ **Third Law -** A robot is allowed to protect its own existence as long as such protection would not conflict with a higher order law.

Robot Locomotion
Locomotion is the ability or method of moving a person or any entity from one place to another. The mechanism that makes a robot capable of moving in its environment is called as robot locomotion.

There are many types of locomotion's:-
✓ Wheeled locomotion
✓ Legged locomotion
✓ Tracked slip/skid locomotion
✓ Combination of legged and wheeled locomotion

Legged locomotion
✓ It comes up with the variety of one, two, four, and six legs. If a robot has multiple legs then leg dimensions are required for locomotion.

✓ Legged locomotion consumes more power while doing jump, hop, walk, trot, climb up or down etc.

✓ It requires more number of motors for perform a movement. It is suited for rough as well as smooth field or surface where irregular or too smooth surface makes it consume more operational power. It is little difficult to implement because of stability issues.

The total number of possible gaits (a periodic sequence of release and lift events for each of the total legs) a robot can travel depending upon the number of robot legs.

If a robot has K legs, then the number of possible events is,
$$N = (2K - 1)!$$
In case of a two-legged robot (K=2), therefore the number of possible events is
$$N = (2K - 1)!$$
$$N = (2 \times 2 - 1)!$$
$$N = 3!$$
$$N = 6$$
Hence, there are six possible different events:-

1. Lifting the Right leg
2. Lifting the Left leg
3. Releasing the right leg
4. Releasing the left leg
5. Releasing both the legs together
6. Lifting both the legs together

In case of K=4 legs, there are 5040 possible events. Hence the complexity of robots is dependent on number of legs of robots. On increasing legs of a robot the complexity of robotic system increases.
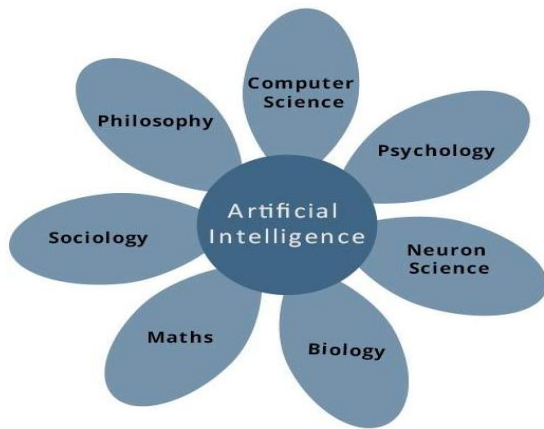
Artificial Intelligence
According to the founder of Artificial Intelligence, John McCarthy, Artificial Intelligence is "The engineering and science that developed intelligent machine, especially an intelligent computer programs".

It is a way of developing a computer, a computer-controlled robot, or software that think and act intelligently, in a similar manner the intelligent humans think .Artificial Intelligence is implemented by studying how human brain thinks and how humans decide and learn anything, and work while trying to solve a problem, and then how they are using the result of this study as a basis of developing intelligent systems and software.

What Contributes to Artificial Intelligence
Artificial intelligence is aengineering ,technology and science , based on disciplines such as Psychology, Computer Science, Biology, Mathematics and Engineering. A major thrust to artificial intelligence is the development of computer functions associated with human intelligence, such as learning, reasoning and problem solving.

Consider the different areas which contribute to artificial intelligence are:-

Artificial Intelligence in Robotics

With the invention of machines or computers, their capability to perform different tasks went on increasing exponentially. Humans have developed the power of computer systems in terms of diverse working domains, with increasing speed, and reducing size with respect to time.

Applications of Artificial Intelligence (AI)

o **Expert Systems -** There are various applications which integrate machine, special information and software to impart advising and reasoning. These systems provide explanation and advice to the users. It requires human experts to perform work efficiently.

o **Gaming -** AI plays major role in game playing. It plays important role in strategic games such as poker, chess, tic-tac-toe, etc. Using artificial intelligence the System or machine can think of large number of possible moves based on general knowledge which will be efficient or correct according to rules and instruction of that game.

o **Natural Language Processing -** Using natural language processing it is possible to interact with a computer that can understand natural language spoken by humans. It is very Important application by which machines or robots are being able to understand human languages and communicate with human being.

o **Vision systems -** These systems interpret, understand, and comprehend a visual input on the computer.

o **Intelligent Robots -** Robots are designed to perform the tasks given by a human according to their wish. They have sensors embedded to detect physical data from the outside environment such as heat, light, sound, pressure, etc. They have multiple sensors, efficient processors and large memory, to act intelligently. In addition, they are capable to learn from their mistakes and they can easily adapt to the new environment.

Artificial Intelligence Research Areas

The working domain of artificial intelligence is huge in width and breadth. Therefore before proceeding, further considers the prospering and common research areas in the domain of artificial intelligence are:-

o **Expert System -** In artificial intelligence, expert systems are used for solving simple and complex problems by reasoning about knowledge, represented primarily by if-then rules rather than by conventional procedural code. In other words,An expert system is a computer system that uses the decision-making capability of a human expert.

o **Neural Networks -** Neural networks aresystem of interconnected neurons which exchange messages between each other. In machine learning artificial neural networks (ANNs) belongs to a family of model inspired by biological neural networks (the nervous system of animals, present inside a brain) and are used for approximate functions or estimate a large number of inputs which are generally unknown.

o **Robotics -** Robotics is a branch of Artificial Intelligence (AI), it is mainly composed of electrical engineering, mechanical engineering and computer science engineering for construction, designing and application of robots. Robotics is science of building or designing an application of robots. The aim of robotics is to design an efficient robot.

o **Fuzzy logic -** Fuzzy logic was introduced in 1965 as a proposal of fuzzy set theory. It is applied to various fields, from artificial intelligence to control theory. Fuzzy logic is a form of many-valued logic in which truth table values of variable may be real number between 0 and 1.

o **Natural Language Processing -** Natural language processing (NLP) is a method of communicating with an intelligent system by using a natural language such as English. The input and output of NLP system is speech and written text.

key components of robotics:-

o **Power Supply –** Thepower supply for working to the robot is provided by batteries, hydraulic, solar power, or other power sources.

o **Actuators -** Actuators are the energy conversion device that are used inside a robot. The major function of actuators is to convert energy into movement that causes robot to move .

o **Electric motors (DC/AC)-** Motors are electromechanical component that are used for converting electrical energy into its equivalent mechanical energy. In robots motors are used for providing rotational movement. So robots can move in rotation.

o **Sensors -** Sensors provide real time information fromenvironment to increase the ability of robots. Robots are equipped with tactile sensor. it copy the mechanical properties of touch receptors of human fingerprints and a vision sensor is used for computing the depth in the environment.

o **Controller -** Controller is a part of robot that give dimensions and control the all motion of the mechanical

system. It also receives an input from immediate environment through various sensors. The heart or main part of robot's controller is a microprocessor linked with the input/output and monitoring device. The command issued by the controller activates the motion control mechanism, consisting of various controller,sensors , actuators and amplifiers.

Types of Robot Sensors
There are different type of sensors that are available to choose from and the characteristics of sensors are used for determining the type of sensor to be used for particular application.

1) Light Sensor
Light sensor is a transducer used for detecting light and creates a voltage difference equivalent to the light intensity fall on a light sensor.The two main light sensors are used in robots that are **Photovoltaic cells and Photo resistor.** Some other kind of light sensors like phototransistors, phototubes are rarely used.

The type of light sensors used in robotics are:
Photo resistor - It is a type of resistor used for detecting the light in environment. In photo resistor, the resistance varies with change in intensity of light. The light falls on photo resistor is inversely proportional to the resistance of the photo resistor. In general photo resistor is also called as Light Dependent Resistor (LDR).

Photovoltaic Cells - Photovoltaic cells are energy conversion device used to convert solar radiation (light) into electrical energy. It is used if we plan to build a solar robot. Individually photovoltaic cells are considered as an energy source, an implementation combined with capacitors and transistors can convert this into a sensor.

2) Proximity Sensor
The proximity sensor can detect the presence of nearby object or entity without any physical contact with them. The working of a proximity sensor is very simple. In proximity sensor transmitter, transmits an electromagnetic radiation and receiver receives and analyses the return signal for interruptions. Therefore the amount of light receiver receives by surrounding, can be used for detecting the presence of nearby objects.

Consider the types of proximity sensors used in robotics are:-
Infrared (IR) Transceivers - In Infrared (IR) sensor LED transmit the beam of IR light and if it finds an obstacle then the light willreflected back which will captured by an IR receiver.

Ultrasonic Sensor - In ultrasonic sensors high frequency sound waves are generated by transmitter and the received

echo pulse suggests an object interruption.In general, ultrasonic sensors are used for distance measurements in robotic systems.

3) Sound Sensor
Sound sensors generally are microphones used to detect sounds and return voltage equivalent to the sound level. Using sound sensor a simple robot can be designed to navigate based on the sound receives. Sound sensors can also be used as noise cancelation sensors. These sensors will reduce or cancel the unwanted or non-useful voices. It will increase the efficiency of the robotic systems.

Implementation of sound sensors is difficult unlike light sensors because it generates a very small voltage difference which is amplified to generate measurable voltage change.

4) Temperature Sensor
Temperature sensors are used for sensing the change in environment temperature. It will also detect robotic system temperature. That will use to save the robots from destroy. It is based on the principle of change in voltage difference for a change in temperature. This change in voltage will provide the equivalent temperature value of the surrounding.

5) Acceleration Sensor
Acceleration sensor is used for measuring acceleration. An accelerometer is a device that can be used for measuring acceleration.

The two type of forces which effects an accelerometer is:-
1. **Static Force -** It is the frictional force between two objects. This is an gravitational force. By measuring this force we can determine how much robot will tilting. This measurement will be useful in balancing the robot or for determining whether robot is moving on a flat surface or uphill.
2. **Dynamic Force -** It is the amount of acceleration required to move an object. Measurement of dynamic force using an accelerometer gives the velocity or speed at which the robot is moving.

Accelerometer comes in different configuration. You have to always use the one which is most appropriate for your robot. Some factors need to be assumed before selecting accelerometer is:
1. Sensitivity
2. Bandwidth
3. Output type(Analog or Digital)
4. Number of Axis (1,2 or 3)

Robotics hardware designing using Eagle Software
This software is Easily Applicable for Graphical Layout Editor (EAGLE) used for PCB designing. To design an

electronic circuit scheme and layout on Printed Circuit Board (PCB) eagle software is appropriate to used.

Eagle is a PCB design software which consists of a PCB editor, a schematic editor and an auto router module. This software provides wide variety of library components, but library editor is also provided for design new parts or modify the existing parts.

Microcontroller in Robotics

Microcontroller is the advanced or latest version of microprocessors. It contains on chip central processing unit (CPU), Read only memory (ROM), Random access memory (RAM), input/output unit and interrupts controller etc.

Thereforea microcontroller is used for high speed signal processing operation inside an embedded system. It acts as major component used in designing of an embedded system.

Basic components of Microcontroller

o **Arithmetic and Logic unit (ALU) -** ALU inside a microcontroller used to perform the arithmetic and logic operations. It performs the logical operations on the data stored inside a register. It also returns the result of these operations.

o **Accumulator –** AnAccumulator is register inside which the intermediate arithmetic and logical operation data is stored.

o **Working registers -** Registers are the storage device used to store the data inside a microcontroller in different address locations.

o **Program counter -** Program counter is used for counting the number of program executed inside a microcontroller.

o **Stack pointer -** Stack pointer act as a pointer to the certain address. It is a register used to store the address of the last program request made by the processor inside a stack.

o **Clock circuit -** Clock circuit is used for generate the clock pulse required as a reference signal for the microcontroller.

o **Interrupt circuit -** Interrupt circuit is used for generating the interrupt signal when the higher priority process required to be served first on basis of priority by microcontroller.

o **Internal ROM -** Internal ROM is read only memory used to store the information in embedded system. It acts as a main memory for storing the instruction and data inside a microcontroller.

o **I/O ports -** I/O ports are used for connecting input devices like sensor, keyboard etc with input ports and output devices like LCD, buzzer etc with output ports available in microcontroller.

After completion of board layout it is run to generate PDF. The PDF generated is used for taking the printout of above layout on Over Head Projector sheet (known as OHP sheets) or a wax paper for designing a PCB board.

Liquid Crystal Display (LCD)

Liquid Crystal Display (LCD) is an electronic device, which is frequently used in many applications for displaying the information in a text or image format. The LCD is used for displaying the alphanumeric character on its screen. The LCD display is consists of 8-data lines and 3-control lines which are used for interfacing the LCD display with 8051 microcontroller.

After completion of board layout it is run to generate PDF. The PDF generated is used for taking the printout of above layout on Over Head Projector sheet (known as OHP sheets) or a wax paper for designing a PCB board.

Designing of PCB (Printed Circuit Board)

Printed circuit board connects electrical components using etched copper pathways and it also provides mechanical strength to the robotic circuit. PCBs are composed of organic and inorganic dielectric materials with many layers.

The eagle software is used for generating the layout of the circuit. In PCB copper tracks are used on a conducting sheet. The pre-defined tracks reduce the wiring therefore reduce the faults arising due to lose connections.

Materials required in PCB designing:

1. Laser Printer
2. Over Head Projector (OHP) sheets or a wax paper.
3. Electric Iron
4. Two Plastic Trays
5. Steel wool
6. PCB/ Copper board
7. Black permanent marker
8. Drill machine
9. Etching solution (Ferric Chloride)

So by using above material combination the electronic Hardware required for robots is designed.

III.   CONCLUSIONS

We can make millions of robots that will act like human beings. Where is fear of loosing of human being there these robots will be present like In a building suffering from fire , in military, in home delivery of products, in factories ,in moles, in markets, in homes , in hospitals, in industries ,in space , to reach on other planets. We will make robots based on artificial intelligence which will follow the human being to be perfectly be like human beings i.e. think and act like human beings. These robots will be able to understand the feelings of human beings. These robots will not have any harmful effects because it will understandable like human feelings. There are more

application areas of robots.by using robots we can grow very fast. Human beings will do the works which are looking risky for robots i.e. works in which robots may produce harmful effects.

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