A review paper on deep study of Robotics and its application in an assortment of fields

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Abstract - Robots are much the same as a machine that can execute the activities precisely. It is programmable by the PC to complete complex activities. Mechanical autonomy is the crossing point of science, building and innovation that produces machines, called robots, that substitute for (or reproduce) human activities. Apply autonomy is the intersection of designing and science that incorporates mechanical building, electrical designing, software engineering likewise it is not any more a developing field as it has advanced such a great amount over the most recent 10 years and it is approaching a summit point .It is a consistently developing field and numerous roads have opened up in late past. The guarantee of apply autonomy is anything but difficult to depict yet difficult for the psyche to get a handle on. A robot is a mechanical or virtual canny operator that can perform errands naturally or with direction, ordinarily by controller. By and by a robot is generally an electro-mechanical machine that is guided by PC and electronic programming. Robots hold the guarantee of moving and changing materials without lifting a finger as PC program changes information. In any case, the dark spot stays wide with regards to Research mindfulness in the field of Robotics and Automation. At some point or another Robotics and robotization will discover its application in each aspect of human life. The progression in innovation would bring a day of robots ubiquity. They will before long sneak wherever from devices to clothes and to our own one of kind bodies. Thus it is the obligation of designing network to spread the information about the future degree and use of Robotics. It is generally utilized in vehicle ventures to perform task. Numerous parts of mechanical autonomy include man-made consciousness, which may incorporate human highlights like vision, contact or capacity to detect.

Keywords: Confluence, Research awareness, Omnipresence, Robota.

I. INTRODUCTION

In 1920, 'ROBOT' was first utilized by Czech, Karel Capek for counterfeit automata. The word 'Robot' is gotten from 'Robota' a Slavic language, which means constrained worker. In mid-twentieth century, in ventures development and lifting of substantial items utilized machines over people.

Robots were utilized for undertakings that were excessively messy, far off or risky for people. In 1961, Joseph F. Engelberger and George Devol built up the primary robot named 'The Unimate'. It was using pressurized water driven, programmable, 2 ton mechanical arm received for mechanized pass on throwing. In 1984, Engelberger had a concocted a robot in clinical applications and named 'Assistant' which was utilized to ship clinical types of gear around the medical clinic. In late 1960s, Scheinman from Stanford University built up the primary PC controlled electrically fueled robot arm-The Stanford arm. Stanford Research Institute the robot 'Shakey' with the utilization of man-made brainpower. It is furnished with a dream framework and knock sensors. It accumulate pictures of general condition and apply this to plan a course to client determined position. The MIT created 'Silver Arm' in 1974 to collect little parts with the utilization of criticism from contact and weight sensors. In 1981, Takeo Kanade built up the principal robot with implanted engines, the immediate drive automated arm.[1]

The apparent definition and working style of Robot does not know anyone; but as per visualization effects, we may introduce its working like: rotation of wheel, moving of arm, location displacement and its movement in all directions. The branch of computer science and Engineering, deal with root plan, its structure and its applications in various areas of physics, Mechanics, architecture design in civil engineering and many house hold devices.

II. ROBOT AND EMBEDDED SYTEM

Embedded system is nothing, but it's a combination of Electronics and Mechanical parts. It is basically designed to be performing in a specific Task in real Time with very high efficiency and performance. The major use of this system is in the field of medical Science, Consumer Electronic goods, Military Applications, scientific applications and many more.

Other words about Robots; which are theoretically opposite of embedded system, because they are equipped with sensors to perceive their environment and actuators to perform particular task with intelligent decisions. Although robot and embedded systems seems like two extremes of Engineering world, the gap between them is reducing.[2] As we know that fuzzy logic used in refrigerator and washing machine, that can sense the freezing temperature of a particular things and sense the dirty cloths timing with intelligent decisions. Similarly AC can sense the internal and external or outside temperature and accordingly may adjust the room temperature. These are termed as intelligent embedded systems.

III. TYPES OF ROBOTS

Currently, robots are doing their job in many of the dissimilar areas. Each and every area has the different working style and functionalities. The best way to split robot into a different types by their applications are as under:

a) **Pre-programmed Robots:** Pre-programmed Robots operate in a controlled environment where they do simple, monotonous tasks. Example- to weld a door on, to insert a certain part into the engine etc or its job is to perform take task longer faster than a human.

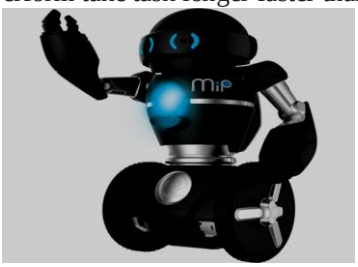

Fig: 1 Pre-programmed Robot

b) **Humanoid Robots:** Humanoid Robots are robots that look like mimic human behaviour. These robots usually perform human-like activities (like running, jumping and carrying objects), and are sometimes designed to look like us, even having human faces and expressions.[3]

Fig: 2 Humanoid Robots

c) **Autonomous Robots:** Autonomous robots operate independently of human operators. A truly autonomous robot is one that can perceive its environment, make decisions based on what it perceives and/or has been programmed to recognize and then actuate a movement or manipulation within that environment.[3]

Fig: 3 Autonomous Robots

d) **Teleported Robots:** Teleported Robots are mechanical bots controlled by humans. These robots usually work in extreme geographical conditions, weather, circumstances, etc. Examples of teleported robots are the human-controlled submarines used to fix underwater pipe leaks during the BP oil spill or drones used to detect landmines on a battlefield.

Fig 4: Teleported Robot

e) **Industrial Robot:** This type of Robot is the main use of industrial manufacturing atmosphere. Example: to lifting the material from source to destination, painting, welding and cleaning surface.[4]

Fig: 5 Industrial Robots

f) **Domestic or household Robot:** Domestic or we can say house hold robots consists of various different gears such as robotic pool cleaners, robotic sweepers, robotic vacuum cleaner and other house hold various tasks.

Fig: 6 Domestic or household Robot

g) Medical Robot: Medical robot are very much helpful in the field of healthcare operations. It can be developed to serve in a variety of roles within the medical environment. Robot can be used in the field of medical for the purpose of surgical treatment, physiotherapy, ultrasound testing, to check the physically or mentally condition of the patient, sterilization purpose or even meditation also. [6]

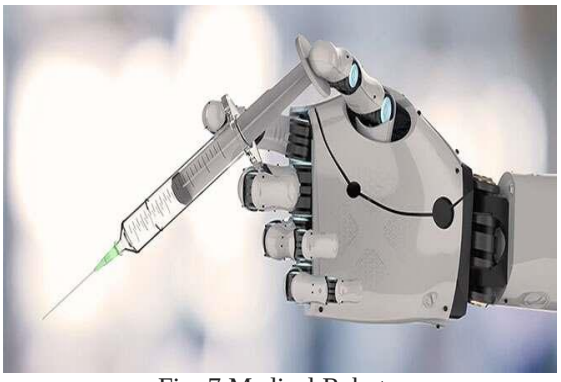

Fig: 7 Medical Robots

h) A. I. ROBOTS

AI robot is one of the most trending stuffs now. No matter which AI robot style, the shell design should be hard and pretty so that it will be durable and people will use it often. Artificial Intelligent Robot is widely used for educational purpose in the universities (**Eg.Robocup**) for the research and human Robot interaction. Many other uses of AI in animated movies, videos and advertising campaign for different movies and other filed.

Fig: 8 AI Robots

i) Under water Robot:

Submerged mechanical autonomy is a part of mechanical autonomy. Submerged robots or underwater robot can be self-governing, or they can be distantly worked. This is a developing science, which has gotten progressively well known with advancing innovation. There are numerous uses of submerged apply autonomy, for example, logical investigation, military use, and interests. Other than ability of swimming an submerged robot additionally has multi DOF controllers and end effectors on these arms of different sorts to perform submerged errands, for example, development, rescue, salvage and fix. They can likewise help in gathering things that are profoundly lowered inside the ocean, utilized by the military and researchers generally.[5]

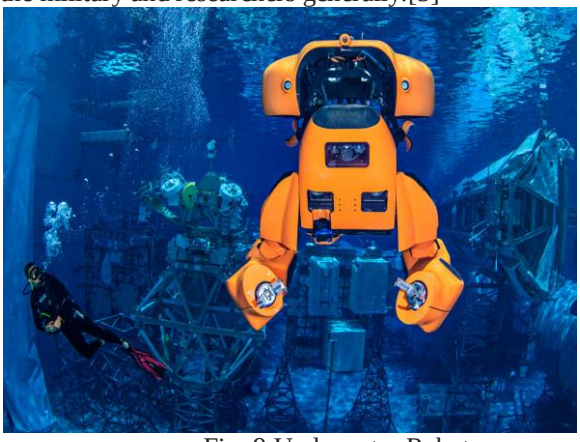

Fig: 9 Underwater Robot

IV. BASIC NEEDS OF ROBOTS

Robots are made up of 4 different components, each selected or designed based on robot architecture requirements, with 4 different components:

1. **Physical body:** For the robot to be in the physical world, it must acquire the physical body that obeys the laws of physics.
2. **Sensors:** To work properly they need its environment, it needs sensors to translate heat, vibration, or any property into electricity or to a signal that the controller can understand - electricity is very common.
3. **Controller or Controllers:** For the robot to be fully autonomous, it needs to be able to make decisions, and it needs to "think" the work of the controller, programmed by the controller engineers, and the controller making decisions.
4. **Actuators:** Finally, the robot needs actuators that can execute controllers' decisions, and in order to affect the robot's environment it needs to translate actuators or electrical energy into other forms of energy - so, again, controller signals are mostly electric.
5. **Brain:** Robot brains come in a wide variety of forms. In fact, some robots are built without brains and are controlled by people through remote control. For instance, basic chips can be used to operate individual parts of the robot, such as an arm or leg, with these individual parts working independently of the other parts. Furthermore, robots can be built with brains that are located far away from its body, such as in a computer.

   All things considered, the number one choice for robot brains is the microcontroller chip. When comparing the microprocessor chips found in computers and microcontroller chips, the chips found in computers dedicate their channels to high speed memory connectors, whereas microcontroller chips have a much larger variety of input and output ports.

These ports can connect to buttons, sensors, and other devices.[7]

V. ADVANTAGES OF ROBOTICS

- They work 24/7 with no sleep or other necessities.
- No need to spend millions on suits.
- Repetitive work can be done without making errors.
- Last-mile package and food order delivery
- Can work with accuracy up to nanometres.

VI. APPLICATION OF ROBOTICS

- **Outer Space Applications:** Robotics are used to explore the stars, planets etc by developing aircrafts. These are mainly known as Robotic spacecraft which is having no humans and is under telerobotic control.
- **Military Applications:** Military robots are remote controlled robots from transport to rescue and search and attack.
- **Cargo Carriers:** These are military robot used for transportation missions. It can be used for transportation of ammunition, weaponry, supplies or anything else.
- **Mine Clearance and IED Disposal:** These are usually remote controlled by an operator controlling from a safe distance. PackBot is an example which is a relatively lightweight robot used mainly to defuse Improvised Explosive Devices.
- **Armed Robots:** These robots can be armed with ammunitions for actions. Warrior X700 is an example in this category which can carry rapid fire weapons and looks like a small tank.
- **Landmine detectors in war zones:** Metal detectors are used to detect buried landmines.
- **Intelligence Home Applications:** Robotic Vacuum Cleaner It is an autonomous robotic vacuum cleaner used to clean the floor. Sonic Cleaning Tool: It is an ultrasonic cleaning tool, capable of removing dirt from most household objects through the power of ultrasonic waves. [8]

VII. FUTURE TRENDS IN ROBOTICS

1. **Increased Use of Autonomous Mobile Robots:** Autonomous Mobile Robots (AMRs) are the latest innovation that have been transforming traditional robot tasks through increased flexibility and diversified applications, including their unique ability to navigate in an uncontrolled environment with a higher level of understanding.[3]
2. **Expanded Use of Machine Vision:** Machine vision was thought of as primarily a technology for tasks like inspection and identification. Vision also is enabling advances in driverless cars, drones and even in shopping, with the advent of stores like Amazon Go.
3. **Continued Growth of Collaborative Robot Applications:** Collaborative robot applications are gaining in popularity and are often the entry point for new robotics users. Collaborative applications are encouraging more small and medium-sized companies to automate. [5]
4. **Self-Driving Cars:** Self-driving car (sometimes called an autonomous car or driverless car) is a vehicle that uses a combination of sensors, cameras, radar and artificial intelligence (AI) to travel between destinations without a human operator.

In coming future Robot is mainly capturing industries for loading, unloading, manufacturing of goods, testing, cleaning, packing, pharmaceutical industries for drug testing and stamping on testing materials, FMCG, defense, education etc.

VIII. CONCLUSION

Mechanical autonomy is quick going into the modern space, and numerous different utilities application it is nevertheless normal that a great deal of business and enterprise openings are opening up for individuals who wish to enter this developing and energizing field. It is clear from the above gave subtleties that the robots have demonstrated over and over that they can do the unimaginable. Man's short remain in this planet is affected by these machines made by the human cerebrum. Ideally in a couple of years these man-made machines or the alleged "Mind offspring of humankind" will discover its way along each stroll of human life.

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My name is Kritika, student of CGC Technical Campus, Jhanjeri, department of CSE. My current research focuses on "Robotics and the future trends in Robotics". I'm currently Devoting more time during this lockdown period to read the books, articles and to grab the knowledge in novel innovations.

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