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APPLICATION OF ARTIFICIAL INTELLIGENCE-ROBOTICS

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ABSTRACT

Artificial intelligence (AI), is a division of computer science that explores intelligent behavior, learning and adaptation in machines. Artificial intelligence is a young science and is still a fragmented collection of subfields. The field of robotics is closely related to Artificial intelligence. Robotics is the science and technology of robots, their design, manufacture, and application. Robots play an important role in day to day fields. The first truly modern robot, digitally operated, programmable, and teachable, was invented by George Devol in 1954 and was ultimately called the Unimate. This paper deals about the clear knowledge of artificial intelligence in robotics, how do robots work, their components, some types of robots, how robots interact with human, their properties and some of their uses**.**

INTRODUCTION:

Artificial intelligence, broadly defined, is concerned with intelligent behavior in artifacts. Intelligent behavior, in turn involves perception, reasoning, learning and acting in complex environments. The idea of automating tasks that currently require intelligent behavior is the basis for most research in the field of artificial intelligence. Another goal of AI is to understand this kind of behavior whether it occurs in machines or in humans or in animals. Thus, AI has both engineering and scientific goals.

The field of robotics is closely related to AI. Intelligence is required for robots to be able to handle such tasks as: Navigate, including the sub-problems of localization, mapping and motion planning, manipulate objects. Robots have become common in many industries. They are often given jobs that are considered dangerous to humans. Robots have proven effective in jobs that are very repetitive which may lead to mistakes or accidents due to a lapse in concentration and other jobs which humans may find degrading. The word robot can refer to both physical robots and virtual software agents.

ARTIFICIAL INTELLIGENCE IN ROBOTICS:

Robotics is the science and technology of robots, their design, manufacture, and application. Robotics requires a working knowledge of electronics, mechanics and software, and is usually accompanied by a large working knowledge of many subjects. A person working in the field is a roboticist. LAWS: A robot must obey orders given to it by human beings except where such orders would conflict with the First Law.

A robot must protect its own existence as long as such protection does not conflict with the First or Second Law. Zeroth Law: "A robot may not harm humanity, or, by inaction, allow humanity to come to harm"; the rest of the laws are modified sequentially to acknowledge this.

HOW ROBOTS WORK

"The inspiration for the design of a robot manipulator is the human arm, but with some differences. Robot arms also can be constructed so that they bend like an elephant trunk. Grippers, or end effectors, are designed to mimic the function and structure of the human hand. Many robots are equipped with special purpose grippers to grasp particular devices such as a rack of test tubes or an arc-welder. The joints of a robotic arm are usually driven by electric motors. In most robots, the gripper is moved from one position to another, changing its orientation. A computer calculates the joint angles needed to move the gripper to the desired position in a process known as inverse kinematics. Some multi-jointed arms are equipped with servo, or feedback, controllers that receive input from a computer. Each joint in the arm has a device to measure its angle and send that value to the controller. Controllers and associated computers also must process sensor information collected from cameras that locate objects to be grasped, or they must touch sensors on grippers that regulate the grasping force. Any robot designed to move in an unstructured or unknown environment will require multiple sensors and controls, such as ultrasonic or infrared sensors, to avoid obstacles.

COMPONENTS OF ROBOTS

Actuation: A robot leg, powered by Air Muscles. The actuator is the 'muscles' of a robot; the parts which convert stored energy into movement. By far the most popular actuators are electric motors, but there are many others, some of which are powered by electricity, while others use chemicals, or compressed air.

Air Muscles: The air muscle is a simple yet powerful device for providing a pulling force. When inflated with compressed air, it contracts by up to 40% of its original length. The key to its behaviour is the braiding visible around the outside, which forces the muscle to be either long and thin, or short and fat. Since it behaves in a very similar way to a biological muscle, it can be used to construct robots with a similar muscle/skeleton system to an animal. For example, the Shadow robot hand uses 40 air muscles to power its 24 joints.

Grippergrippers: Robots which must work in the real world require some way to manipulate objects; pick up, modify, destroy or otherwise have an effect. Thus the 'hands' of a robot are often referred to as end effectors, while the arm is referred to as a manipulator. Most robot arms have replacable effectors, each allowing them to perform some small range of tasks.

A common effector is the gripper. In its simplest manifestation it consists of just two fingers which can open and close to pick up and let go of a range of small objects.

Vacuum Grippers: Pick and place robots for electronic components and for large objects like car windscreens, will often use very simple vacuum grippers. These are very simple astrictive devices, but can hold very large loads provided the prehension surface is smooth enough to ensure suction

SOME TYPES OF ROBOTS:

Rolling Robots:

Segway in the Robot museum in Nagoya. For simplicity, most mobile robots have four wheels. However, some researchers have tried to create more complex wheeled robots, with only one or two wheels. Carnegie Mellon University researchers have developed a new type of mobile robot that balances on a ball instead of legs or wheels. "Ballbot" is a self-contained, battery-operated, omnidirectional robot that balances dynamically on a single urethane-coated metal sphere. It weighs 95 pounds and is the approximate height and width of a person. Because of its long, thin shape and ability to

maneuver in tight spaces, it has the potential to function better than current robots can in environments with people.

Walking Robots:

ICub robot, designed by the Robot Cub Consortium Walking is a difficult and dynamic problem to solve. Several robots have been made which can walk reliably on two legs; however none have yet been made which are as robust as a human. Typically, these robots can walk well on flat floors, and can occasionally walk up stairs.

HOW ROBOTS INTERACT WITH HUMAN:

Robots are to work effectively in homes and other non-industrial environments, the way they are instructed to perform their jobs, and especially how they will be told to stop will be of critical importance. The people who interact with them may have little or no training in robotics, and so any interface will need to be extremely intuitive. Science fiction authors also typically assume that robots will eventually communicate with humans by talking, gestures and facial expressions, rather than a command-line interface. Although speech would be the most natural way for the human to communicate, it is quite unnatural for the robot. It will be quite a while before robots interact as naturally as the fictional c3p0.

PROPERTIES OF A ROBOT:

It has some common properties, they are as follows,

- ✓ Is not 'natural' i.e. artificially created.
- ✓ Can sense its environment, and manipulate or interact with things in it.
- ✓ Has some degree of intelligence or ability to make choices based on the environment, often using automatic control or a preprogrammed sequence.
- ✓ Is programmable.
- ✓ Moves with one or more axes of rotation or translation.
- ✓ Makes dexterous coordinated movements.
- ✓ Appears to have intent or agency.

CONCLUSION:

Robot is a mechanical or virtual, artificial agent. It is usually an electromechanical system, which, by its appearance or movements, conveys a sense that it has intent or agency of its own. Jobs which a robot can do better than a human can increase productivity, accuracy, and endurance. Jobs which a human could do better than a robot also exists but it is desirable to remove the human for some reason. Here, robots free us from dirty, dangerous and dull tasks. Japan is the leader in using and producing robots in the world. In 1995, 700,000 robots were in use worldwide; over 500,000 of which were from Japan.

Artificial intelligence systems have many practical uses in business, from organizing operations to investing in stocks. Many of these applications are made up of networks similar to the neurons in a human brain, which are known to do extremely well in pattern recognition. AI required large amounts of commonsense knowledge, and that this had to be engineered one complicated concept at a time.

Providing solutions to real life problems through the production of artificial intelligence software or machines is the ultimate goal. Robot is a mechanical or virtual, artificial agent. It is usually an electromechanical system, which, by its appearance or movements, conveys a sense that it has intent or agency of its own. Jobs which a robot can do better than a human can increase productivity, accuracy, and endurance.

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