International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 07, 2020
ISSN: 1475-7192

INTRODUCTION AND IMPORTANCE OF ROBOTICS

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Abstract:

What is a robot? "a reprogrammable, multi-functional manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks" is the definition of an industrial robot given by the robot industries association (ria). The scientific field of robotics focuses on the creation, application, and maintenance of mechanical robots in technology and engineering. The field of robotics is the fusion of science, engineering, and design that produces robots—machines that mimic or replace human behaviour. Pop culture has long piqued the interest of robotics in r2-d2 from the prime optimus. E-wall. Humanoid robot designs generally sound like parodies of the genuine thing. Perhaps they are still more progressive than we realize. With time robots have been gaining structural and intellectual capacities, which does not rule out the potential of an r2-d2 like gadget in the future. In the automotive industry, 90% of all robots were used in the production of cars in 2005. The main element of these robots is mechanical arms used to screw or solder other car parts. As of right now, the field of robotics has expanded and grown to include the development, production, and implementation of robots that can operate in the most difficult environments on earth, assist law enforcement, and even assist in nearly every aspect of healthcare. Even though the automotive industry is still in its infancy, amazing progress has already been made. From the deepest depths of space to the lowest seas, robots are seen accomplishing feats that humans could never imagine. The idea of robotics in the modern world will be addressed in this paper. In the fields of manufacturing and science, robotics is one of the most well-known divisions. Here, engineers work consistently to create robots that can perform specific tasks and produce the right results. As technology advances, every engineer hopes to have a robot with zero errors, but this is becoming increasingly impossible to attain. We can consider it, but 0% still doesn't mean that there won't be any errors—rather, it means that you will always receive the right response to every question.

Keywords: Robotics, robots, artificial intelligence, motors, work integrated learning

Introduction:

Father of robotics: joseph f Engel Berger

A specialized field of engineering and science termed robotics covers computer science, electronics engineering, mechanical engineering, and other related fields. This area of study covers information processing, sensory feedback, robot control, and design. In the upcoming years, these technologies will take the place of people and human activity. Although these robots can be employed for any task, they are being deployed in sensitive situations for tasks like bomb detection and deactivation. Although robots can take on any shape, many of them look human. The area of engineering known as robotics focuses on the creation, manufacturing, control, and design of robots. For the past 45 years, robotics research has also looked for ways to meet the technological demands of applied robotics. The complexity of application areas and their evolution have shaped research themes in the field of robotics. The early 1960s saw the introduction of industrial robots into factories to replace human operators in risky and hazardous tasks, driven by human needs. Multiple other fields, such as electrical, control, software, information, electronics, telecommunication, computer, mechatronics, materials, and biomedical engineering, are also related to and overlap with robotic development. Stem (science, technology, engineering, and mathematics) applies robotics as a teaching tool as well. While some robots need human input to function, others can do so on their own. Also, robots perform more than half of the labor in the automotive industry. Like humans, intelligent industrial robots should be able to sense their surroundings rapidly, reason and make decisions, and react to tasks and unforeseen events. To put it another way, they require a quick, multi-layer connection to move from knowledge to acting alone without assistance from humans.

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There are five major primary areas of robotics

1). Operator interface
2). Mobility or locomotion
3). Manipulator & effectors
4). Programming
5). Sensing & perception

History of robotics:

According to its history, the word robot, which means "forced labour," is Czech It was originally used in a play written by the same-nationality author Karel Capek exactly one century ago. Aristotle and his theories regarding "automated tools," henry ford, Leonardo da Vinci and his mechanical knight, and Isaac Asimov must all be mentioned when discussing the history of robotics. The base of useful robotics was developed in 1948 by Norbert wiener, who developed the principles of cybernetics. Robots with complete autonomy first emerged in the latter part of the 20th century. The unimate, the first robot to be controlled digitally and programmed, was installed in 1961 to stack and remove hot metal parts from a die-casting machine. Early in the 1950s, Louisville, Kentucky-based inventor George c. DeVol invented the first robots as we know them today. He created and received a patent for "unimate," a reprogrammable manipulator from "universal automation." he tried unsuccessfully to sell his product in the industry for the next ten years. A lot of industries and fields use robots extensively: manufacturing, assembly, packing and packaging, mining, transportation, space and earth exploration, surgery, weaponry, laboratory research, safety, and mass production of industrial and consumer goods.

Some relevant historical data would be the following:

Unimate – developed in 1961.
Elsie (electro-light-sensitive internal-external) the first mobile robot in history is called electro-light-sensitive internal-external, or else. Its technical prowess remained severely restricted. In reality, it was an externally and internally stabilized electromechanical robot that was sensitive to light.
Stanford research institute. Shakey- developed be Stanford research institute in1972
Mars-rover platform that combined stereo cameras, a laser telemetry device, proximity sensors, and a mechanical arm. Nasa developed it to explore difficult or uncharted territory.
Sri's cart
1921
the term "robot" was first used by Czech author Karel Capek in his drama r.u.r. (Rossum's universal robots).
1926
Metropolis, directed by fritz lang, is released. The movie's female robot "maria" is the first robot to appear on a silver screen.
1961
At MIT, Heinrich Ernst created the mh-1, a mechanical hand-controlled by a computer.
Description of the component:
Power source: the most popular type of power source right now is lead-acid batteries. There are many kinds of batteries that can be used to power robots. One type is lead-acid batteries, which are safer and last longer than silver-cadmium batteries but are currently much more expensive, heavy, and take up less space.
Possible sources of power could be:
Compressed gas pneumatic
Solar power means turning the energy from the sun into electricity.
Hydraulics (water)
Flywheels store energy
Using anaerobic decomposition to break down organic waste
The nuke
Actuation: the "muscles" of robots are their actuators, which are the parts that turn saved energy into motion.
Electric motors: electric motors power the great majority of robots; portable robots typically use brushed and brushless dc motors, while industrial robots and cnc machines use ac motors.
Linear actuators:
Different kinds of linear actuators have faster direction changes and move in and out rather than spinning, especially when very large forces are required, as in industrial robotics.

Series elastic actuators:

In order to provide reliable force control, series elastic actuation (sea) works by purposefully adding elasticity between the motor actuator and the load. Air muscles: air muscles, also referred to as pneumatic artificial muscles, are unique tubes that swell (usually by 42%) when air is compressed inside of them. Some robot applications use them. Wire muscles: muscle wire, sometimes referred to as shape memory alloy, nitinol, or flexinol wire, is a substance that, when exposed to electricity, contracts (by less than 5%). They've been employed in a few tiny robot applications. Electroactive polymers: artificial partition membranes, or epams, are plastic materials that exhibit a significant electrical contraction capacity of up to 380%. These materials have found application in the arms and facial muscles of humanoid robots, as well as in enabling novel robots to walk, swim, fly, and hover.

Piezo motors: piezo motors and ultrasonic motors are modern substitutes for dc motors. These operate on a radically different premise.

Sensing: robots can use sensors to get information about certain measurements in the surroundings or about parts inside the robot. Robots need to do this in order to do their jobs and respond properly to changes in their environment.

Vision: the field of study and technology that lets computers see is called computer vision. Computer vision is the field of science that looks into the ideas behind computer systems that can read images and figure out what they mean. Video sequences or camera views are just two of the different types of picture data that can be sent. Computer vision systems are dependent on image sensors that identify electromagnetic radiation, usually manifested as infrared or visible light. Solid-state physics is used in the design of the sensors.

Other:

Other popular sensors used in robotics include sonar, radar, and lidar.
Lidar: by shining a laser on a target and using a sensor to measure the reflected light, a lidar can determine how far away something is from you. (basically, related to distance measurement).
Sonar: to navigate, communicate, or detect objects on or beneath the water's surface, sonar uses sound propagation.
Radar: radar measures an object's distance, angle, or velocity using radio waves.

Working of robots:

Robots use electricity for three purposes: motion (via motors), sensing (heat, sound, position, and energy status are measured via electrical signals), and operation (to activate and carry out basic tasks, robots require a certain amount of electrical energy to run their motors and sensors).

Electrical components power and operate the machinery in robots. To move the tracker treads on the robot with caterpillar tracks, for instance, some sort of power would be required. That energy takes the shape of electricity, which must leave the battery and enter a basic electrical circuit through a wire. Most gasoline-powered devices, such as cars, have batteries because even those that run primarily on gasoline still need an electric current to initiate combustion.

Result & conclusion:

There are numerous uses for robots. For example, it stimulates the economy because companies must be productive in order to compete in their industry. Consequently, having robots makes business owners more competitive because they can complete tasks more quickly and effectively than humans. For example, a robot can build and assemble an automobile. This article had enough details about robot systems and gadgets. It seems like everyone wants robots more and more as the world becomes more tech-savvy. A lot of businesses hire engineers who work night and day to make robots as quickly as possible. A market forms quickly when prices are high and people want to buy things. So, we should keep looking for robots and other technologies that can help us make the world more technologically advanced even though there aren't enough people to do the work. Since robots can now perform every task performed by humans and are displacing human labor in all fields and aspects, we must develop the necessary skills to ensure that no one can use a robot to take your place. Since a robot is a creation of man, it cannot replace a generation that will become fully automated and experience the ultimate level of technological advancement. One of the main outcomes of this education has been the development of an authenticated tool that quantifies the growth of innovation and its forces. The will package can grow based on the tool's results, which will enhance student training and provide support for skill expansion. It will also be help respond to students' occupational literacy, self-awareness, and authorization for their development.

Future scope:

Future automation and robotics will likely be used by teachers, explorers, assistants, colleagues, and surgeons. Robotics' capabilities will only grow as engineers and scientists work to develop and advance this technology. Robots are already a commonplace aspect of life in many ways.

Advantages of robotics which will help in building the future world:

1). In certain circumstances, they can offer higher levels of consistency, quality, productivity, and efficiency.
2). Because they can be precisely even to fractions of an inch, they are especially useful in the production of microelectronics.
3). Robots can work in environments that humans find dangerous, like those with dangerous materials or high radiation levels.
4). Certain robots possess actuators and sensors that beat human capabilities.
5). Unlike humans, robots are never bored.
They can continue using them up until any mechanical problems arise.
6). They perform high quality works.
7). They impart more accurate and precise results, which makes them especially useful of work in the production of microelectronics.
8). They can perform tasks with constant speed, without taking breaks, holidays or being sick, even without getting board. We can use the continuously till any mechanical problem arises.
9). They are able to deliver great quality of work in much less time.
10). They can reach the extreme environment like space, deep ocean, peak mountains, deep of earth etc., where exploration by human seems impossible.
11). They can work in very harsh environment conditions like extreme temperature, radiation zones, dangerous chemicals etc.
12). They don’t have physical and emotional needs like human beings.
13). Certain robots possess actuators and sensors that beat human capabilities.

Since robots can now perform many tasks performed by humans and are displacing human labour in nearly all fields, we must be very careful so as to not let the antagonists take advantages of the field. We must also work on our strengths and abilities so as to use robotics for betterment of our life and not let the field take over all of human tasks to render humans irrelevant.

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