A REVIEW ON SYSTEM OF ROBOTIC MACHINES

Vivek Kumar Choudhary[1], Manish Kumar Patel[2], Satish Kumar Kashyap[3],
Indrajeet[4], Tekram Choudhary[5]
Student Of Electronics & Telecommunications Engineering, Kirodimal Institute of Technology, Raigarh (C.G.)

ABSTRACT: Robotics is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing.
Keyword: feedback, information, transformer, Design, algorithm.

I. INTRODUCTION

Robotics can be described as the current pinnacle of technical development. Robotics is a confluence science using the continuing advancements of mechanical engineering, material science, sensor fabrication, manufacturing techniques, and advanced algorithms. The study and practice of robotics will expose a dabbler or professional to hundreds of different avenues of study. For some, the romanticism of robotics brings forth an almost magical curiosity of the world leading to creation of amazing machines. A journey of a lifetime awaits in robotics.(2) designed to do an extraordinary range of tasks. Typically when we think of robots we picture these big humanoid robots from sci-fi films like "Transformers" or the big robotic arms seen manufacturing cars on automated assembly lines. (3)This module gives students an introduction to robotics, covering the fundamentals of mechanical design, electronics and programming. The four lectures will include; an introduction to the applications of robotics and autonomous systems; a lecture on computer-aided mechanical design and prototyping techniques (such as 3D printing); a lecture describing the core electronic components (Sensors, actuators, drives, embedded microcontrollers); and a lecture explaining the key principles of programming. The lectures give the background to the extensive hands-on practical work using the excellent laboratories in the Faculty of Engineering. Students will learn the principles of 3D mechanical design, how to assemble basic electronic circuits, and then integrate the electronics, motors, etc. with the mechanical parts to construct a simple robot. Using a high level programming language, the robot will then be programmed to perform a range of simple tasks. As well as building their own robot in a team, students will also be able to see demonstrations of a very wide range of industrial and research robots within the Faculty.

II. CLASSIFICATION OF ROBOTICS

A. Classification by Degrees of Freedom:

A manipulator should have 6 degrees of freedom to manipulate an object freely in three dimensional spaces. From this point of view a robot may be a

- General purpose robot: if it possesses 6 degrees of freedom.
- Redundant robot: if it possesses more than 6 degrees of freedom. It provides more freedom to move around obstacles and operate in a tightly confined work space.
- Deficient robot: if it possesses less than 6 degrees of freedom.

B. Classification by Kinematic Structure:

According to kinematic structure robots can be classified as

- Serial Robot or Open- loop Manipulator: A robot is said to be a serial robot or an open-loop manipulator if its kinematic structure takes the form of an open-loop chain. Example: Adept-One Robot.
- Parallel Manipulator: if it is made up of a closed-loop chain. In general, a parallel manipulator has the advantages of higher stiffness, higher payload capacity, and lower inertia to the manipulation problem than a comparable serial manipulator, at the price of a smaller workspace and more complex mechanism
- Hybrid Manipulator: if it consists of both open and closed loop chains. Example: Fanuc S-900 W. Many industrial robots employ this type of robot construction.

III. TYPES OF ROBOTS BY APPLICATION

Nowadays, robots do a lot of different tasks in many fields and the number of jobs entrusted to robots is growing steadily. That's why in my opinion one of the best ways how to divide robots into types is a division by their application.

A. Industrial robots

Industrial robots are robots used in an industrial manufacturing environment. Usually these are articulated arms specifically developed for such applications as welding, material handling, painting and others. If we judge purely by application this type could also include some automated guided vehicles and other robots.

B. Domestic or household robots

Robots used at home. This type of robots includes many quite different devices such as robotic vacuum cleaners, robotic pool cleaners, sweepers, gutter cleaners and other robots that can do different chores. Also, some surveillance and telepresence robots could be regarded as household robots if used in that environment.

fig.1. domestic robots

C. Medical robots

Robots used in medicine and medical institutions. First and foremost - surgery robots. Also, some automated guided vehicles and maybe lifting aides.

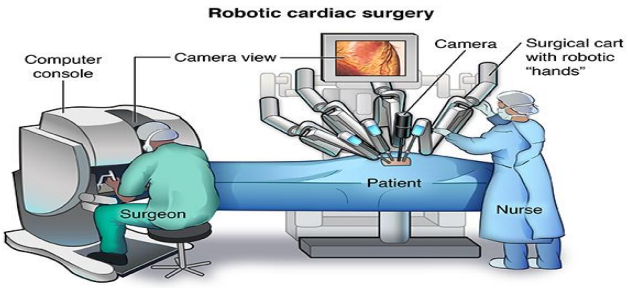

fig.2. robotic cardiac surgery

D. Service robots

Robots that don’ t fall into other types by usage. These could be different data gathering robots, robots made to show off technologies, robots used for research, etc.

IV. PARTS OF ROBOTICS MACHINE

A. Sensors

Sensors are what allow a robot to gather information about its environment. This information can be used to guide the robot's behavior. Some sensors are relatively familiar pieces of equipment. Cameras allow a robot to construct a visual representation of its environment. This allows the robot to judge attributes of the environment that can only be determined by vision, such as shape and color, as well as aid in determining other important qualities, such as the size and distance of objects. Microphones allow robots to detect sounds. Sensors such as buttons embedded in bumpers can allow the robot to determine when it has collided with an object or a wall. Some robots come equipped with thermometers and barometers to sense temperature and pressure. Other types of sensors are more complex, and give a robot more interesting capabilities.Robots equipped with LIght Detection And Ranging (LIDAR) sensors use lasers to construct three dimensional maps of their surroundings as they navigate through the world. Supersonic sensors are a cheaper way to accomplish a similar goal only using high frequency sound instead of lasers. Finally, some robots are equipped with specialized sensors such as accelerometers and magnetometers that allow the robot to sense its movement with respect to the Earth's gravity and magnetic

B. Effectors

The effectors are the parts of the robot that actually do the work. Effectors can be any sort of tool that you can mount on your robot and control with the robot's computer. Most of the time, the effectors are specific to the tasks that you want your robot to do. For example, in addition to some of the very common effectors listed below, the Mars rovers have tools like hammers, shovels, and a mass spectrometer to use in analyzing the soil of Mars. Obviously a mail-delivering robot would not need any of those.End-Effectors are the tools at the end of robotic arms and other robotic appendiges that directly interact with objects in the world. A "gripper" at the end of a robotic arm is a common end-effector. Others include spikes, lights, hammers,and screw-drivers. Medical robots have their own specialized effectors, such as tools for cutting in surgery and suturing incisions.Motors can be used for many of the moving parts of a robot, from joints on robotic limbs to wheels on robotic vehicles, to the flaps and propellors on a robotic airplane. Pneumatics and hydraulics are another way of moving parts of the robot, particularly where the robot needs a lot of strength to perform a particular task.Speakers can allow certain robots to talk to us or generate other sounds. Speech is, after all, a behavior intended to modify the environment, usually by conveying some sort of information to the people around us.

C. Control Systems (the "brains")

A robot's "control system" is that part of the robot that determines the robot's behavior.

A. Pre-Programmed Robots

The very simplest pre-programmed robot merely repeats the same operations over and over. Such a robot is either insensitive to changes in its environment or it can detect on very limited information about very limited parts of the environment. Such a robot will require little in the way of "controls" but it will perform properly only if the environment behaves in accord with the robot's pre-programmed actions. More complex robots are able to respond appropriately in environments that are much more complicated. Such a robot will have sensory apparatus that allow it to detect changing features of the environment and a range of behaviors that will allow it to respond to those changes. Whatever features of the robot enable it to adapt its behavior to its environment we will call the "control system." There are many different kinds of control systems used in robots. In this module, we will focus most of our attention on robots that have one of two different kinds of control systems (sometimes called "robotic architectures"):

V. ADVANTAGE OF ROBOT

You should know that the robots can perform the tasks which the humans find them dangerous , boring or difficult , They can do the work with constant speed and precision , and they continue and finish the work without feeling sick . Everybody should know that the robots can be programmed to perform a simple task , they repeat that task more times , the robots work in the factory with high degree of accuracy , and they work with constant velocity. You should know that

the robots help increase the number of manufactured products and decrease the production of defective goods , they can produce the same quality products during the production process , they do not get exhausted , and they work for a long period of time .

VI. DISADVANTAGE OF ROBOT

We must know that the industries prefer utilizing the robots than the human workers , So , the unemployment rate will increase , and many people who can not get work will become poorer while the company owners will get richer .We must know that the robots can work in the factory with limitations , The human do the tasks that require creativity , decision-making , adaptation , and job learning . Everybody must know that the robots can protect the human workers from some hazards , The robots can create other safety problems , and they can cause new dangers which must be taken in consideration .

VII. ROBOTIC MACHINE TENDING WORK

Robotic machine tending can provide manipulation and transport capabilities that are more complex than basic material handling processes. Machine tending robots are used to secure the product from a supply position, transport it to a machine, interact with the machine and then remove the finished part from the machine. Managing this process by robot minimizes incorrect product placement due to human error and increases speed and efficiency of production

VIII. BENEFITS OF ROBOTICS MACHINE TENDING

- Repeatable accuracy and improved quality of production (increases more than 25%)
- Minimizes human error & improves ergonomic conditions
- Short ROI & lower overhead cost compared to manual machine tending
- Robots can be mounted between 2 machines or overhead to save valuable floor space

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