**Introduction to Robotics**

**Practical No: 1**

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**Aim:** Introduction to Robotics field and Hardware components.

**Tools:** Study using Keil Software & Porteous Software.

**Objective:** To study and Know about different robotics material available & use

**Theory:** Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots.

Basically, robots have their specific aim. As they manipulate the objects. For Example- by perceiving, picking, moving, modifying the physical properties of object.

As technology progresses, so too does the scope of what is considered robotics. In 2005, 90% of all robots could be found assembling cars in automotive factories. These robots consist mainly of mechanical arms tasked with welding or screwing on certain parts of a car. Today, we’re seeing an evolved and expanded definition of robotics that includes the development, creation and use of bots that explore Earth’s harshest conditions, robots that assist law-enforcement and even robots that assist in almost every facet of healthcare.

While the overall world of robotics is expanding, a robot has some consistent characteristics:

• Robots all consist of some sort of mechanical construction. The mechanical aspect of a robot helps it complete tasks in the environment for which it’s designed. For example, the Mars 2020 Rover’s wheels are individually motorized and made of titanium tubing that help it firmly grip the harsh terrain of the red planet.

• Robots need electrical components that control and power the machinery. Essentially, an electric current (a battery, for example) is needed to power a large majority of robots.

• Robots contain at least some level of computer programming. Without a set of code telling it what to do, a robot would just be another piece of simple machinery. Inserting a program into a robot gives it the ability to know when and how to carry out a task. The robotics industry is still relatively young, but has already made amazing strides. From the deepest depths of our oceans to the highest heights of outer space, robots can be found performing tasks that humans couldn’t dream of achieving.

**What are the Robots?**

Generally, robots are the artificial agents acting in the real-world environment.

**What is Robotics?**

Generally, Robotics is a branch of Artificial Intelligence. That is composed of Electrical, and Mechanical Engineering. Also, Computer Science for designing, construction, and application of robots.

Three Essential Elements Constitute a Robot:

• The robots interact with the physical world via sensors and actuators.

• Robots are usually autonomous or semi-autonomous. They can be powered by solar energy, electric, or by a battery.

• The robots are programmable. They work by following the instructions given by a computer. But for them to obey, a human had to inform the computer of the instructions to provide and when to execute them.

Some scientists say that a robot must be able to think and make decisions. Asking a robot to think would suggests that it has some level of artificial intelligence or robotic thinking.

**Aspects of Robotics:**

• The robots have mechanical construction, form, or shape designed to accomplish a

particular task.

• They have electrical components which power and control the machinery.

• They contain some level of computer program that determines what, when and how a robot does something.

**Components of a Robot:**

Robots are constructed with the following −

• Power Supply − The robots are powered by batteries, solar power, hydraulic, or pneumatic power sources.

• Actuators − They convert energy into movement.

• Electric motors (AC/DC) − They are required for rotational movement.

• Pneumatic Air Muscles − They contract almost 40% when air is sucked in them.

• Muscle Wires − They contract by 5% when electric current is passed through them.

• Piezo Motors and Ultrasonic Motors − Best for industrial robots.

• Sensors − They provide knowledge of real time information on the task environment. Robots are equipped with vision sensors to be to compute the depth in the environment. A tactile sensor imitates the mechanical properties of touch receptors of human fingertips.

**Hardware of Computer Vision System:**

This involves −

• Power supply

• Image acquisition device such as camera

• A processor

• A software

• A display device for monitoring the system

• Accessories such as camera stands, cables, and connectors

**Typical knowledgebase for the design and operation of robotics systems:**

• Dynamic system modelling and analysis

• Feedback control

• Sensors and signal conditioning

• Actuators (muscles) and power electronics

• Hardware/computer interfacing

• Computer programming

**Program:** NONE

**Observation:** Robotics is a branch of Artificial Intelligence. That is composed of Electrical, and Mechanical Engineering. Also, Computer Science for designing, construction, and application of robots. Robots are machines with complex design, appropriate programming and has some level of artificial intelligence or robotic thinking accompanied by sensors. Robots are constructed according to their purpose and work allotted. They can be in the size range of - extremely small to a ginormous robot. It requires power supply and technicians to maintain the wellbeing of robots.