

What is Robotics

Robotics is an branch of engineering and science that involves the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing.

These technologies are used to develop machines that can substitute for humans and replicate human actions. Robots can be used in any situation and for any purpose, but today many are used in dangerous environments (including bomb detection and de-activation), manufacturing processes, or where humans cannot survive. Robots can take on any form but some are made to resemble humans in appearance. This is said to help in the acceptance of a robot in certain replicative behaviors usually performed by people. Such robots attempt to replicate walking, lifting, speech, cognition, and basically anything a human can do. Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics.

But what exactly is a robot?

As strange as it might seem, there really is no standard definition for a robot. However, there are some essential characteristics that a robot must have and this might help you to decide what is and what is not a robot. It will also help you to decide what features you will need to build into a machine before it can count as a robot.

A robot has these essential characteristics:

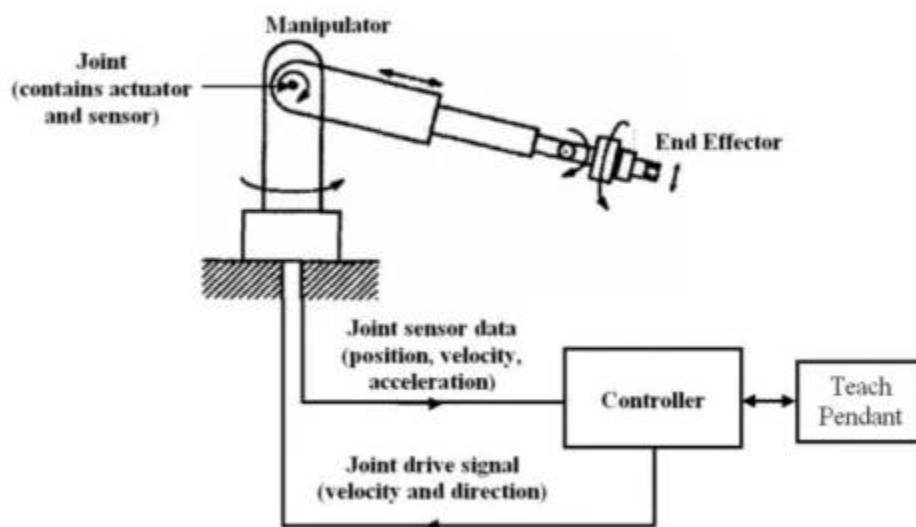
- **Sensing** First of all your robot would have to be able to sense its surroundings. It would do this in ways that are not similar to the way that you sense your surroundings. Giving your robot sensors: light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), and taste sensors (tongue) will give your robot awareness of its environment.
- **Movement** A robot needs to be able to move around its environment. Whether rolling on wheels, walking on legs or propelling by thrusters a robot needs to be able to move. To count as a robot either the whole robot moves, like the Sojourner or just parts of the robot moves, like the Canada Arm.
- **Energy** A robot needs to be able to power itself. A robot might be solar powered, electrically powered, battery powered. The way your robot gets its energy will depend on what your robot needs to do.
- **Intelligence** A robot needs some kind of "smarts." This is where programming enters the pictures. A programmer is the person who gives the robot its 'smarts.' The robot will have to have some way to receive the program so that it knows what it is to do.

Laws of Robotics:

- Law 0: A robot may not injure humanity or through inaction, allow humanity to come to harm
- Law 1: A robot may not injure a human being or through inaction, allow a human being to come to harm, unless this would violate a higher order law
- Law 2: A robot must obey orders given to it by human beings, except where such orders would conflict with a higher order law •
- Law 3: A robot must protect its own existence as long as such protection does not conflict with a higher order law

Key Components

Basic Components..



1. Manipulator:

Just like the human arm, the robot consists of what is called a manipulator having several joints and links.

2. End effector:

The base of the manipulator is fixed to base support and at its other free end, the End effector is attached.

The End effector is expected to perform tasks normally performed by the palm and finger arrangements of the human arm.

The Locomotion Device:

In the case of Human Beings, the power for the movement of the arm, the palm and fingers is provided by muscles. For the robot the power for the movement (locomotion) is provided by the motors. The motors used for providing locomotion in robots are of three types depending on the source of energy: Electric, Hydraulic or Pneumatic.

4. The Controller:

The digital computer (both the hardware and the software) acts as a controller to the robot. The controller functions in a manner analogous to the human brain. With the help of this controller, the robot can carry out the assigned tasks. The controller directs and controls the movement of the Manipulator and the End effector. In other words, the controller controls the robot.

5. The Sensors:

Without the data supplied by the sense organs, the brain would be incapable of intelligence. In other words, the controller (the computer) of the robot cannot do any meaningful task, if the robot is not with a component analogous to the sense organs of the human body. Thus, the fifth and the most important component of the robot is the set of sensors. Sensors are nothing but measuring instruments which measures quantities such as position, velocity, force, torque, proximity, temperature, etc.