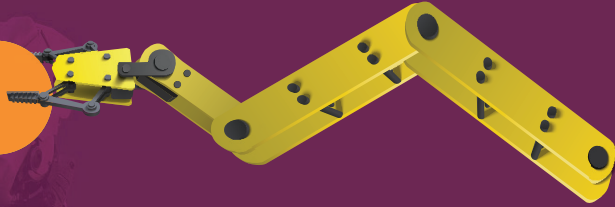


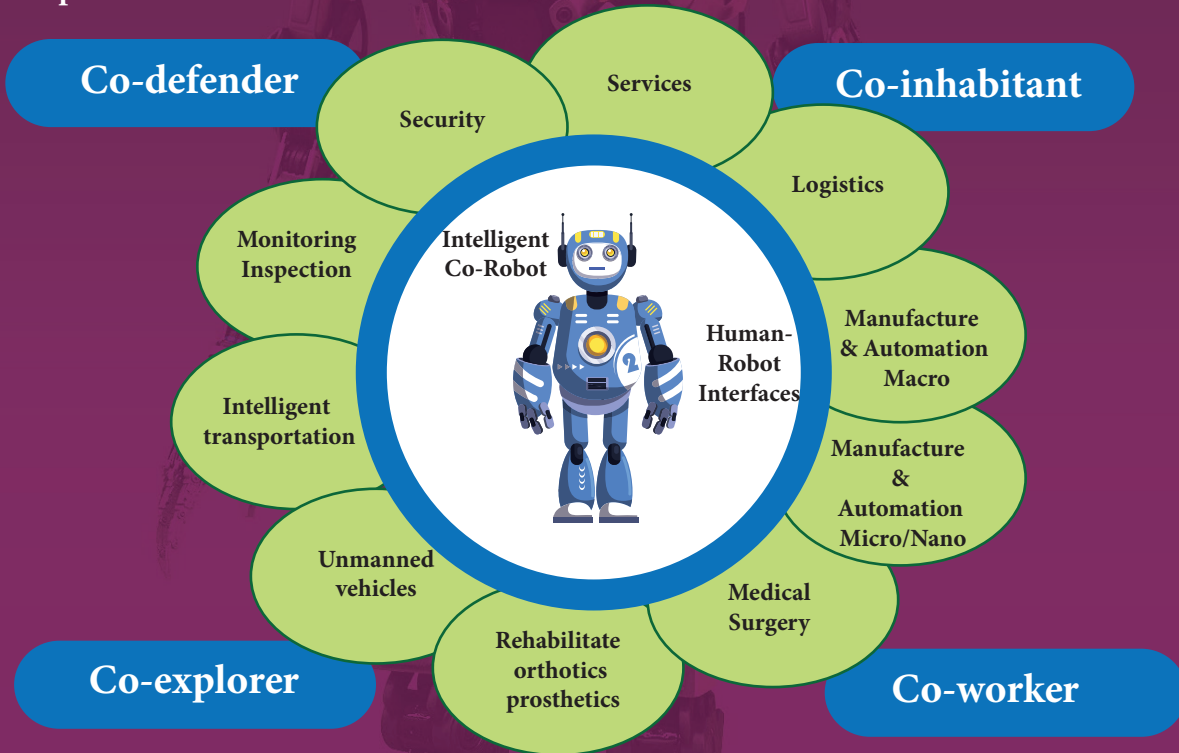


11.3 Robotics

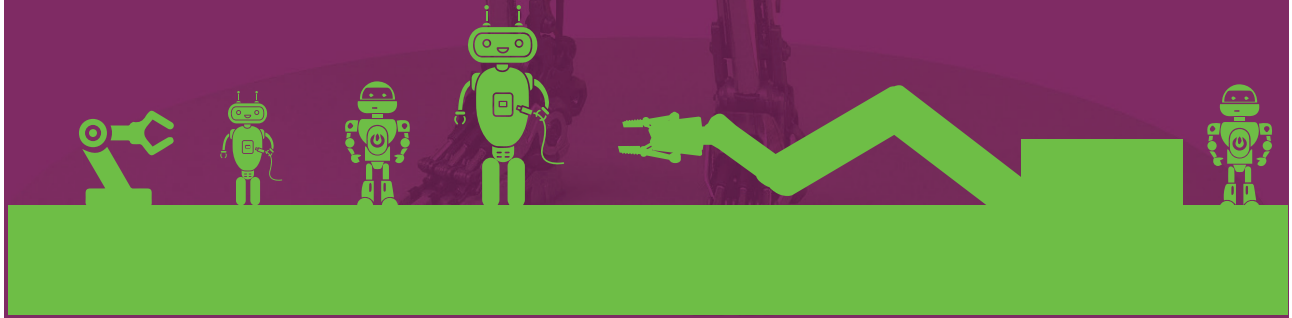


11.3.1 What is robotics?

Robotics is an integrated study of mechanical engineering, electronic engineering, computer engineering, and science. Robot is a mechanical device designed with electronic circuitry and programmed to perform a specific task. These automated machines are highly significant in this robotic era. They can take up the role of humans in certain dangerous environments that are hazardous to people like defusing bombs, finding survivors in unstable ruins, and exploring mines and shipwrecks.



In 1954, George Devol invented the first digitally operated programmable robot called Unimate. George Devol and Joseph Engelberger, the father of the modern robotics industry formed the world's first robot company in 1956. In 1961, Unimate, was operated in a General Motors automobile factory for moving car parts around in New Jersey.



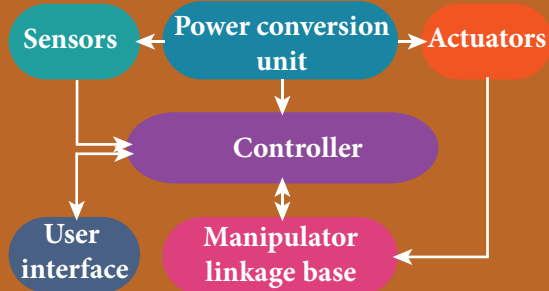
11.3.2 COMPONENTS OF ROBOTICS

The robotic system mainly consists of sensors, power supplies, control systems, manipulators and necessary software.

Most robots are composed of 3 main parts:

1. **The Controller** - also known as the "brain" which is run by a computer program. It gives commands for the moving parts to perform the job.
2. **Mechanical parts** - motors, pistons, grippers, wheels, and gears that make the robot move, grab, turn, and lift.
3. **Sensors** - to tell the robot about its surroundings. It helps to determine the sizes and shapes of the objects around, distance between the objects, and directions as well.

Key components



11.3.3 TYPES OF ROBOTS

HUMAN ROBOT

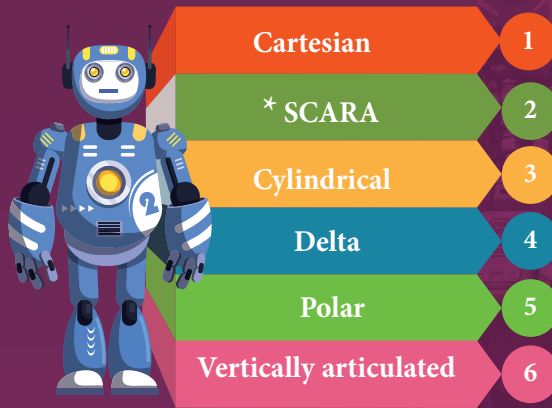
Certain robots are made to resemble humans in appearance and replicate the human activities like walking, lifting, and sensing, etc.



1. **Power conversion unit:** Robots are powered by batteries, solar power, and hydraulics.
2. **Actuators:** Converts energy into movement. The majority of the actuators produce rotational or linear motion.
3. **Electric motors:** They are used to actuate the parts of the robots like wheels, arms, fingers, legs, sensors, camera, weapon systems etc. Different types of electric motors are used. The most often used ones are AC motor, Brushed DC motor, Brushless DC motor, Geared DC motor, etc.
4. **Pneumatic Air Muscles:** They are devices that can contract and expand when air is pumped inside. It can replicate the function of a human muscle. They contract almost 40% when the air is sucked inside them.
5. **Muscle wires:** They are thin strands of wire made of shape memory alloys. They can contract by 5% when electric current is passed through them.
6. **Piezo Motors and Ultrasonic Motors:** Basically, we use it for industrial robots.
7. **Sensors:** Generally used in task environments as it provides information of real-time knowledge.
8. **Robot locomotion:** Provides the types of movements to a robot. The different types are
 - (a) Legged
 - (b) Wheeled
 - (c) Combination of Legged and Wheeled Locomotion
 - (d) Tracked slip/skid

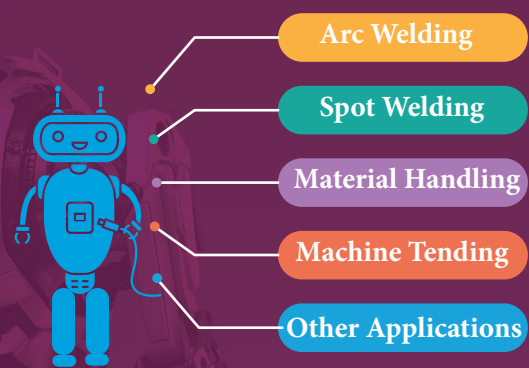
INDUSTRIAL ROBOTS

Six main types of industrial robots

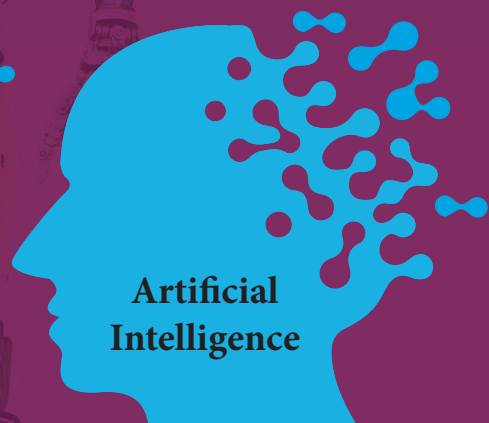


*Selective Compliance Assembly Robot Arm

Six-axis robots are ideal for



Artificial Intelligence



Artificial Intelligence

The aim of artificial intelligence is to bring in human like behaviour in robots. It works on

1. Face recognition
2. Providing response to player's actions in computer games
3. Taking decisions based on previous actions
4. To regulate the traffic by analyzing the density of traffic on roads.
5. Translate words from one language to another

