Define automation

It is the introduction of automatic equipment in a manufacturing process by electronically or mechanical by the replace of ~~mechan~~ man power.

Types of automation

(I) Fixed automation system
(II) Programmable automation system
(III) Flexible Automation system
(IV) Integrated automation system

Fixed Automation system :-

→ The production equipment is fixed with a fixed set of operations or tasks & there are rarely any changes to these operations. Fixed Automation system is usually used in continuous flow processes like conveyers & mass production

Programmable automation

→ The sequence of operation & machine & tool configuration can be change by electronic controls.

Flexible automation

→ This automation is guided or managed by computer, the code is given to computer to the respective task.

Integrated Automation system

It is a set of independent machines processes & data, CAD, CAM, computer controlled tools & machine, robots, cranes & conveyors are all integrated using complex scheduling & production control.

Need for Automation

1 - To increases production rate & labour Productivity

2 - To reduce labour cost

3 - To counter the labour shortage

4 - To improve worker safety

5 - To improve the product quality

6 - To reduce manufacturing lead time

7 - To overcome the problem which cannot be done manually.

Defining a Robot

An automatically controlled, reprogrammable multipurpose manipulator programmable in 03 or more axes, which can be either fixed in place & mobile for use in industrial automation application

Application of Robot :-

→ Robot is also use for welding & material handling in industry
→ For Assembly & Inspection
→ It works in hazardous environment
→ It works in underwater, space & remote location
→ It also do function in medical application
→ Machine loading & unloading is also done by robot.
→ Some Agricultural & Defense application robot is involved there.

Robot anatomy :-

→ The anatomy of robot is also known as structure of robot, the anatomy of industrial robots deals with the assembly of wrist, arm & body
Following are key fact about robot anatomy

END EFFECTOR :-

A hand of a robot is considered as end effectors. The grippers & tool are the 02 significant types of end effector, The grippers are use to pick & place an object, while the tools

are used to carry out operation like spray painting, spot welding.

ROBOT JOINTS :-

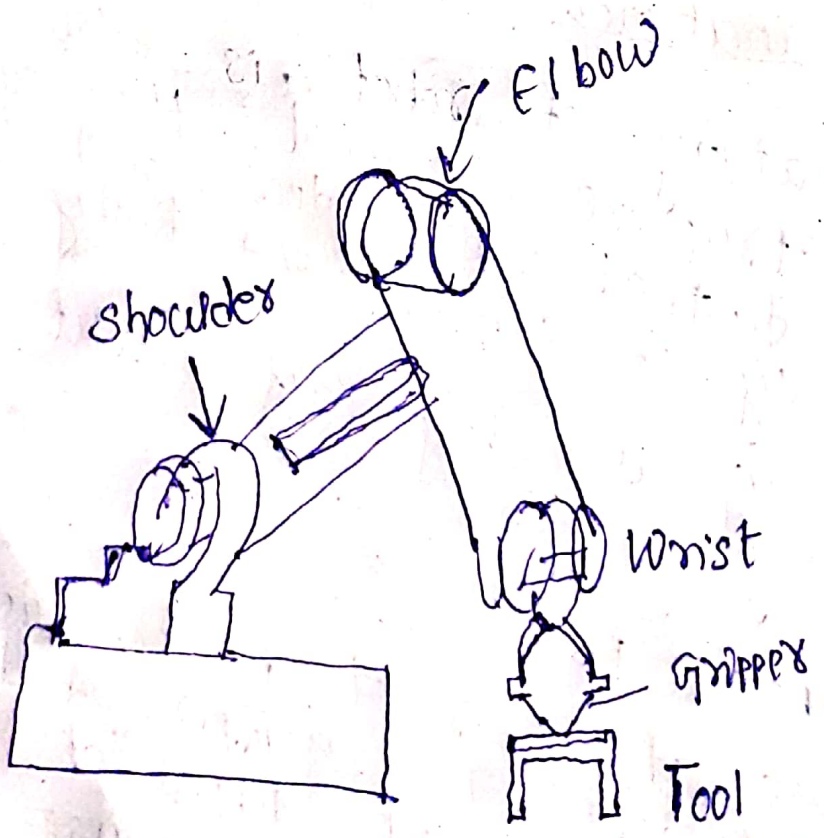
The joints in an industrial robot are helpful to perform sliding & rotating movement of a component

Manipulator :-

It is developed by integration of links & joint. In the body & arm, it is applied for moving the tools in the work volume.

Kinematics

It concerns with the assembling of robot links & joint. It also illustrate the robot motions.



Robotic Arm

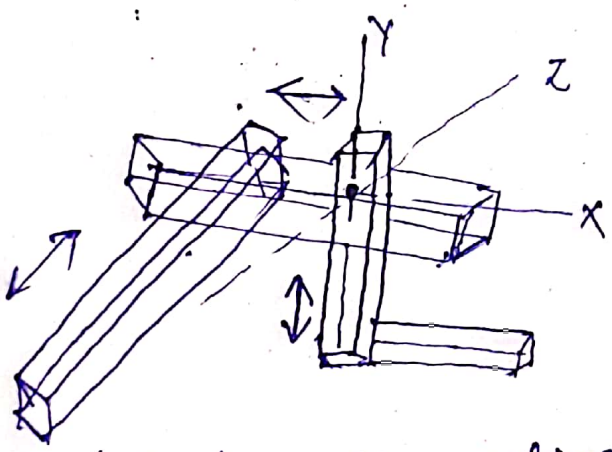
Robot configuration

The various joint provide the robot with capability to move its arm within a spherical shape, the rotary & linear movement it is also design there.

Robot configuration

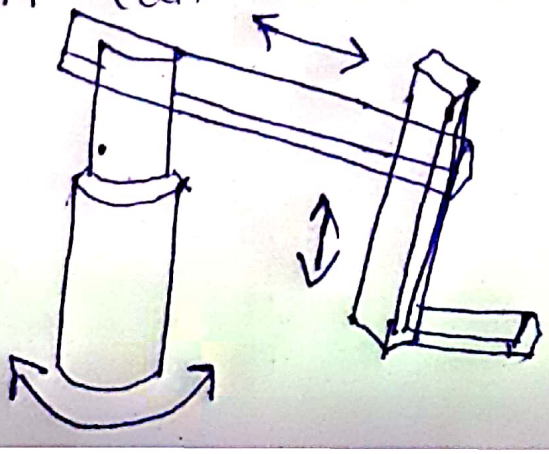
(1) Rectangular configuration :-

→ This uses 03 moving direction x, y, z axis, relative to one another., this is also called cartesian configuration.



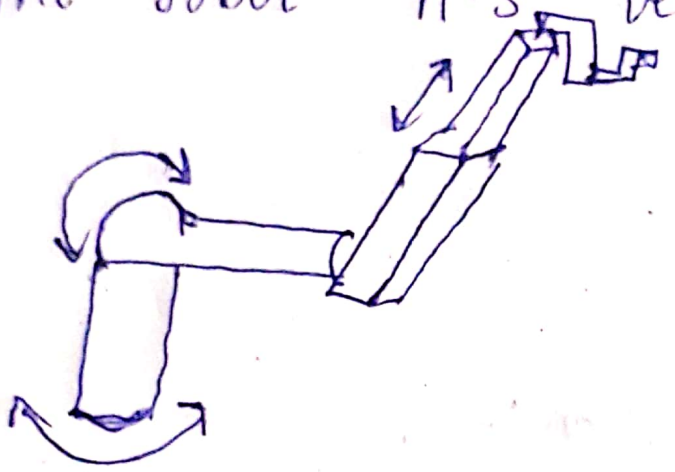
(2) Cylindrical configuration

These uses a vertical column & slide that can be moved up & down along the column. The robot arm is attached to the slide so that it can moved radially to column



(3) Spherical configuration

It uses telescopic arm that can be raised or lowered about a horizontal pivot point. The pivot joint is mounted on a rotating base to gives the robot it's vertical movement



spherical