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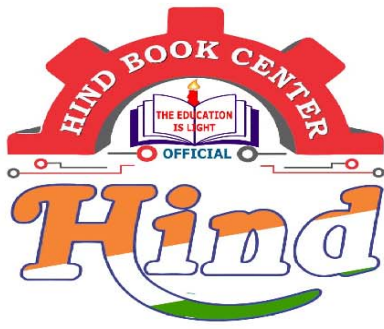
By Gunjen sir

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MECHATRONICS And ROBOTICS :-

Mechatronics :-

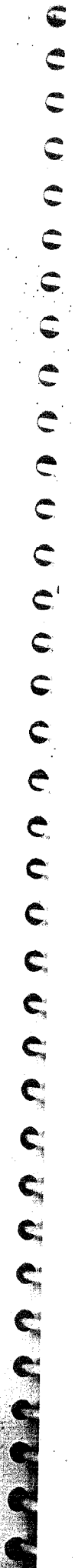
- Microprocessor & Microcontrollers,
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Control Systems :-

- Mathematical modeling of physical systems,
- Control signals.
- Controllability and observability.

Robotics :-

- Robot classification
- Robot specification, notation,
- Direct & inverse kinematics
- Homogeneous coordinates &
- Arm equation of four axis SCARA Robot



* Robotics *

* Introduction :-

- Origin of the word 'robot' can be traced in the Czech word 'roboty' which means "forced or compulsory labour".
- The "official" definition of an industrial robot is provided by the Robotics Industries Association (RIA), formerly the Robotics Institute of America (RIA):-

↖ KAREL ČAPEK
↖ sci-fi writer

↖ multifunctional.

↖ multifunctional, manipulator designed to move materials, parts, tools, or special devices through variable programmed motions for the performance of a variety of tasks".

Manipulator → Robot arm.

• IS CRANE a ROBOT?

↖ although crane also has a manipulator but it is always controlled by human operator.

crane → Manual handling system.

End effector → Gripper → attached to the last joint of robotic arm used for holding or grasping an object.

* Indian Scenario :-

1> NETRA → (flying) Surveillance Robot, UAV → Unmanned aerial vehicle.
↖ Network Traffic analysis
Developed by DRDO
↖ "CAIR" (Lab)
Centre for Artificial Intelligence & Robotics.

NETRA Robot can intercept voice traffic signals and identify the device using words such as bomb, blast etc in real time response.

* Asimov's three laws of Robotics :-

- First law (Human safety) :-
 - A robot may not injure a human being or through inaction, allow a human to be harmed.
 - Second law (Robots are slaves) :-
 - A robot must obey orders given it by human beings, except where such orders would conflict with the first law.
 - Third law (Robot survival) :-
 - A robot must protect its own existence as long as such protection does not conflict with the first or second law.
- It is interesting to note that in the real world, industrial robots obey laws that are the opposite of the ones stated above. A robot may injure a human, it may not obey humans and it also may not protect its own existence.

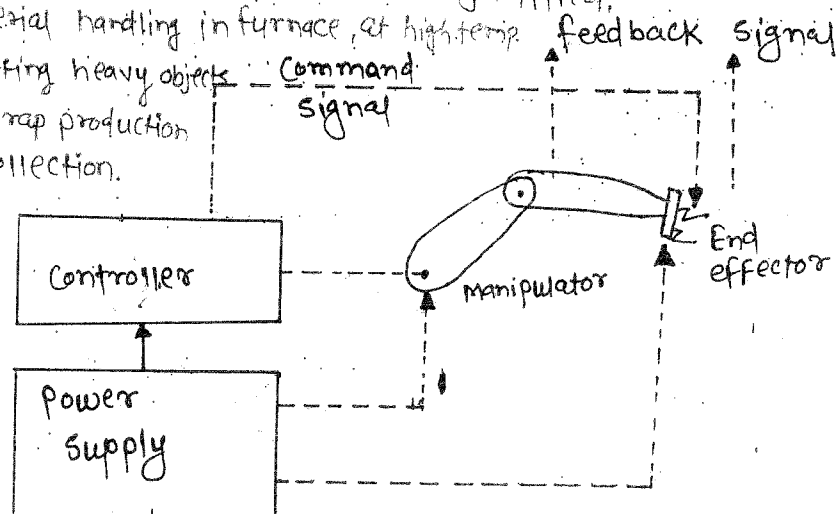
* 4D's of Robotics :-

- If one of 4D's exist then use of Robot is justified.

- D - Dangerous → Material handling in furnace, at high temp
- D - Difficult task - lifting heavy objects
- D - Dull operation - scrap production
- D - Dirty → Garbage collection.

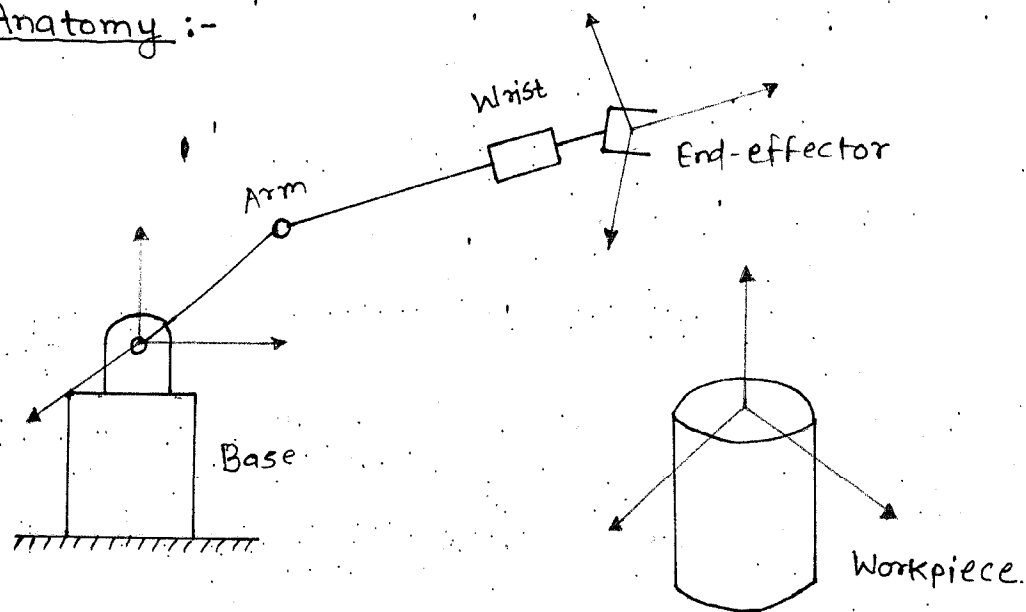
Components.

1. Manipulator
2. End effector
3. Actuator & sensor
4. Power supply.
5. Controller.



8. Which of the following is not among the five basic parts of a robot.
- a) peripheral tools
 - b) End effectors
 - c) controller
 - d) actuator and sensor.

* Robot Anatomy :-



- Robot anatomy is concerned with the physical construction of the body, arm and wrist of the machine.
- The robot ^{body} is attached to the base and the arm assembly is attached to the body.
- At the end of the arm is the wrist. The wrist consists of a number of components that allow it to be oriented in a variety of positions.
- Relative movements b/w the various components of the body, arm, and wrist are provided by a series of joints.
- The body, arm & wrist assembly is sometimes \rightarrow either rotary or sliding motion, called as manipulator.