Topics on Week(10)

## 1.Automated Guided Vehicle for Material Handling(remote control AGV, Magnetic tape AGV).

### Remote control AGV

A Remote Control Automated Guided Vehicle (AGV) is a mobile robot that follows a predetermined path or responds to commands remotely.

It typically incorporates sensors, navigation technology, and a control system.

Remote control allows operators to guide the AGV from a distance, making it versatile for various applications like material handling in warehouses or manufacturing environments.

Unlike fully autonomous AGVs, a remote control AGV can be operated manually by a human operator using a remote control device.

This provides flexibility in situations where human intervention or precise control is needed, allowing the operator to navigate the AGV remotely to perform specific tasks or respond to dynamic environments.

A Magnetic Tape AGV (Automated Guided Vehicle) is a robotic system designed for material handling and transportation tasks within a controlled environment. Here's a breakdown of how it works:

1. *Navigation*:The AGV follows a predetermined route marked by a magnetic tape affixed to the floor. This tape typically contains encoded information that guides the AGV along the desired path.

2. *Magnetic Sensors:* The AGV is equipped with magnetic sensors that detect the magnetic field generated by the tape. These sensors help the AGV stay on course and follow the designated route with precision.

3. *Control System:* The AGV's control system interprets the signals from the magnetic sensors, allowing the robot to make real-time adjustments to stay aligned with the magnetic tape.

4. *Tasks:* Magnetic Tape AGVs are commonly used for material handling tasks, such as transporting goods within a warehouse or production facility. They can autonomously navigate through the workspace, stopping at designated locations for loading, unloading, or other specified operations.

5. *Flexibility*:The magnetic tape provides a flexible and scalable navigation solution. Changes to the AGV's route can be easily implemented by adjusting or adding magnetic tape segments, offering adaptability to evolving operational needs.

These AGVs are known for their reliability, simplicity, and cost-effectiveness, making them suitable for various industries where repetitive material transport is required.

Anti collision robot

An anti-collision robot is a robotic system equipped with sensors and algorithms designed to detect and avoid obstacles in its environment. These robots are programmed to navigate safely, preventing collisions with objects or other robots. The sensors, such as cameras, ultrasonic sensors, or lidar, provide real-time data about the surroundings, allowing the robot to adjust its path or stop to avoid potential collisions. This technology is commonly used in various applications, including autonomous vehicles, drones, and industrial robots, to enhance safety and efficiency in their operations.

2.Use of MOBILE ROBOTICS in different industries.

HEALTHCARE

AGRICULTURE

FOOD INDUSTRY

MANUFACTURING

FACTORY FLOORS

MINING

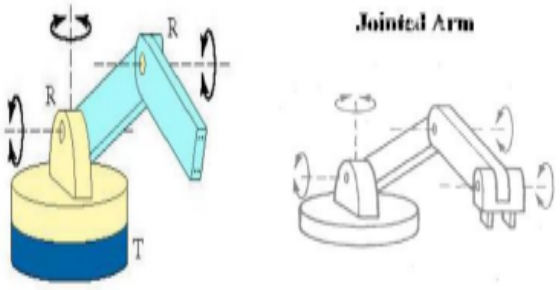
EDUCATION

MILITARY

SPACE

HOUSEHOLD

3.Joint co-ordinate system




The arm in these configuration robots looks almost like a human arm.

It gets three rotary joints and three wrist axes, which form into six degrees of freedoms.

As a result, it has the capability to be controlled at any adjustments in the work space.

These types of robots are used for performing several operations like spray painting, spot welding, arc welding, and more.

Advantages:

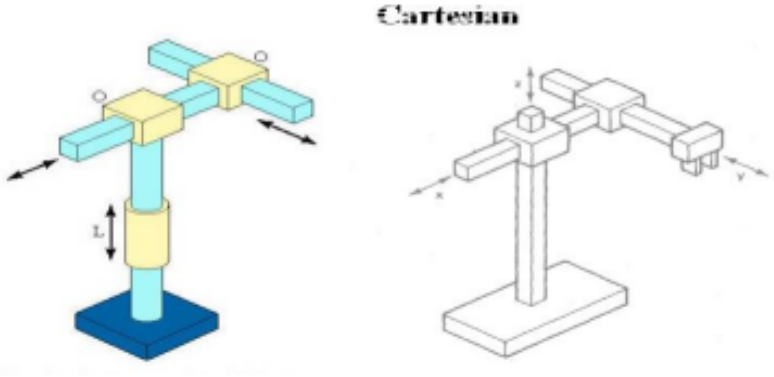
Increased flexibility,

Huge work volume,

Quick operation. Disadvantages:

Very expensive,

4.Rectangular co-ordinate system.




These robots are also called as XYZ robots, because it is equipped with three rotary joints for assembling XYZ axes.

The robots will process in a rectangular work space by means of this three joints movement.

It is capable of carrying high payloads with the help of its rigid structure. It is mainly integrated in some functions like pick and place, material handling, loading and unloading, and so on.

- Advantages:

  Highly accurate & speed,

  Fewer cost,

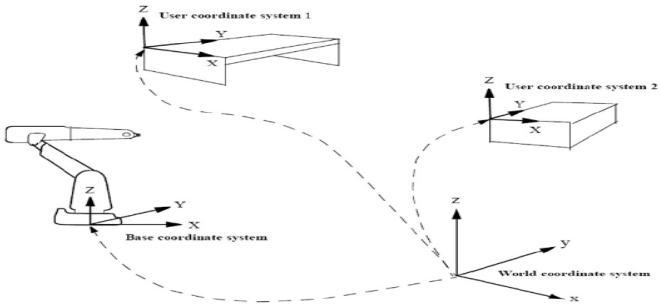
  High payloads.

- Disadvantages:

Less work envelope, and

Reduced flexibility.

5.User or object coordinate system




A robot can work with different fixtures or working surfaces having different positions and orientations.

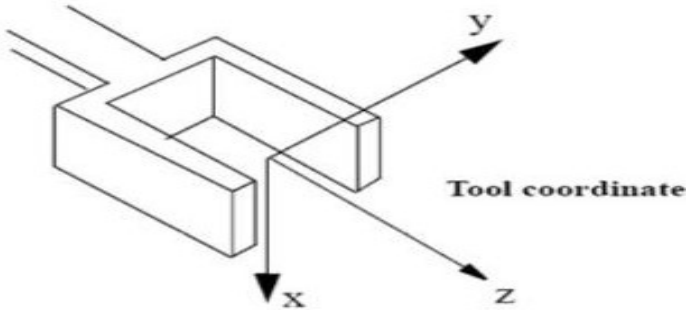
A user coordinate system can be defined for each fixture.

If all positions are stored in object coordinates, you will not need to reprogram if a fixture must be moved or turned.

By moving (translating or turning) the user coordinate system as much as the fixture has been translated or turned, all programmed positions will follow the fixture and no reprogramming will be required.

The user coordinate system is defined based on the world coordinate system.

6.Tool coordinate system.




The orientation of a tool at a programmed position is given by the orientation of the tool coordinate system.

The tool coordinate system refers to the wrist coordinate system, defined at the mounting flange on the wrist of the robot.

The tool mounted on the mounting flange of the robot often requires its own coordinate system to enable the definition of its TCP, which is the origin of the tool coordinate system .

The tool coordinate system can also be used to get appropriate motion directions when jogging the robot. If a tool is damaged or replaced, the tool coordinate system

7.Mechanical and Electrical Installation check of robot.

**Mechanical and Electrical Installation Check for Industrial Robot:**

1. **Safety Sensors Installation:**

   - Verify the proper installation of safety sensors on the robot.

   - Check the functionality of safety sensors and ensure they are in correct positions for optimal safety.

2. **Physical Grounding:**

   - Inspect the physical grounding of the robot and related peripheral devices (e.g., cable trays, fences, fixtures, electric boxes).

   - Ensure that all components are securely grounded to prevent electrical hazards.

3. **Electric Connections:**

   - Check the earthing cables, power cables, and pneumatic pipes for proper connections and security.

   - Verify the routing of cables and pipes to prevent tangling or interference with the robot's movements.

4. **Cable Trays and Fixtures:**

   - Inspect cable trays and fixtures to ensure they are securely installed and organized for optimal cable management.

   - Confirm that cables are appropriately routed through cable trays, avoiding any obstructions.

5. **Fences and Enclosures:**

   - Check the fencing and enclosures around the robot to ensure they are intact and in good condition for safety and security.

6. **Peripheral Devices:**

   - Inspect other peripheral devices (e.g., electric boxes) for proper installation and connections.

- Ensure that these devices are securely mounted and connected as needed for the robot's operation.

7. **General Mechanical Check:**

- Verify the robot's physical condition, looking for any signs of wear, damage, or misalignment.

- Check for any loose bolts, screws, or components that might affect the robot's performance.

## 8.Difference between AGV & AMR.

Q 10b) Distinguish AMR from AGV

| SL.No | AMR | AGV |
|---|---|---|
| 1 | AMR is an stands for Autonomous Mobile Robot. | AGV is an stands for Automated Guided Vehicle |
| 2 | They don't require any tracks for navigation. | They require wired or marked tracks for navigation |
| 3 | They move freely around obstacles. | They get stopped when come in contact with obstacles. |
| 4 | They travels around people more and highly safe. | They travels only in dedicated areas due to safety measures |
| 5 | Expansion of path is easily possible in AMRs. | Expansion of path is difficult in AGVs due to infrastructural changes. |
| 6 | AMR have no or little need of depots. | AGV are highly dependent on depots for movement. |
| 7 | They are highly flexible and agile. | They are less flexible and are not agile |



| | | |
|---|---|---|
| 8 | AMRs need simple software changes for their missions. | AGVs need complex changes in software and hardware too |
| 9 | It is less expensive than AGVs. | It is comparatively more expensive than AMRs |
| 10 | Example – Self-driving forklifts etc. | Example – Automated guided carts etc. |