# ME 202M

Assignment on Robotics Lab
Lab Report

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**Aim:**
To pick a workpiece from a specified location and place it to its specified destination.

**Apparatus:**

- 6 DOF serial manipulator
- Software for controlling the robot arm

**Theory:**
Robotics is a subdomain of engineering which uses mechatronics to build machines capable of doing tasks .It involves construction and operation of robot and use of computer softwares to control them.

- A robot is a machine capable of performing complex tasks automatically. These machines are made to perform a task repeatedly with good accuracy and without human efforts. They are an application of mechatronics.
- Robotic arms are used in manufacturing automation in industries. They help in finishing the work faster and with more precision and less human intervention.
- We require a system of senors, microprocessors and actuators and information processing to build such machines.

COBOT is a derivative of "collaborative robot". They are intended to work alongside with humans in shared space.

- A COBOT is a small robot capable to be used anywhere in production process without taking too much space.
- They are simple to program with software.
- They are flexible with the kind of operations given . Mounted on a mobile workbench, they can easily perform new tasks at a different location.

A 6 DOF serial manipulator can move in all possible ways:  linear motion and rotation along x, y, z axes, within its workspace.The 6 joints extend from base to end effector.It has 6 degrees of freedom.They are the most common for pick and place applications.

- A robot is required when we want to do a task repeatedly with speed and precision.
- Applications:

1.  Robot arms are used in industrial automation.They can do welding, hammering,

turning etc. With much more ease.They give us accuracy, speed,high quality and work continuously.Industry 4.0 is making use of automated manufacturing enabled by robots.

2. They can be used in those locations which are hazardous for humans.
3. They can be used in military, manufacturing and even in households for material handling, processing etc.
4. They can be used in automobile industry, medicine industry and agriculture industry as well.

Methodology:

1. We place our workpiece at a location on the workbench within the workspace of the robot arm. This point is our P1. This is the location from where we pick the piece.
2. We control the robot arm to move its gripper to the location of P1 using movements along x, y, z axes or moving joints J1 to J6.
3. We store this location's coordinates as P1.
4. Take a point vertically above point P1 as our P2 and store its coordinates.
5. Place the workpiece at the new location to which we want the robot arm to take it.Similar to P1, we store the coordinates as P3.
6. Now take a point vertically above P3 as P4.
7. Now, take a rest position as our final position and record the point as P5. This is the position in which we stop after completion.
8. The above steps are to store the points.Now the actual path is different.
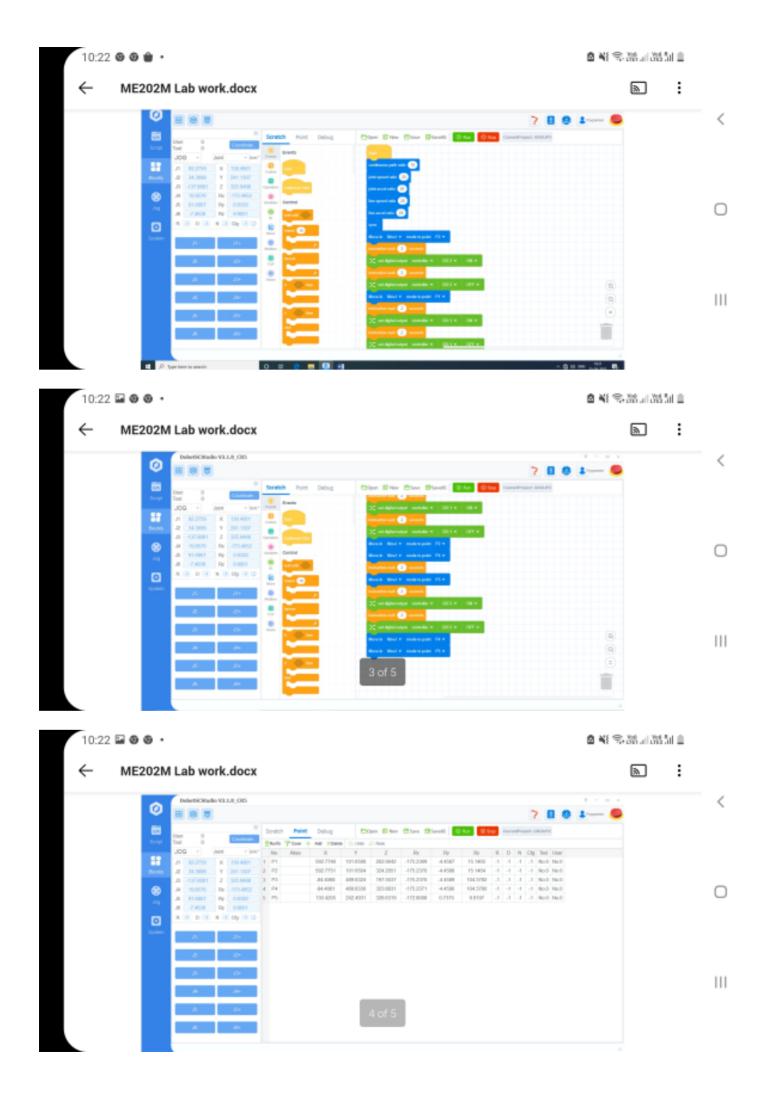9. So our robot arm works as follows:

    Move to  P2--> move down to P1-->grip the object-->go upwards to P2-->move to P4-->go down to P3-->drop the object-->move upwards to P4-->move to rest position P5

We write the code to follow this plan.
Set speed and acceleration for joint and linear movements.

10. The points P2 and P4 are required so that we don't scratch the workbench while the robot is carrying workpiece from location P1 to P3.

Result:

Conclusion:

1. We learnt how to operate a robot to follow a specific path and task.And how it can record the instructions and perform the task repeatedly.
2. Learnt how to write code to control the robot arm.
3. We observed working of a serial manipulator.