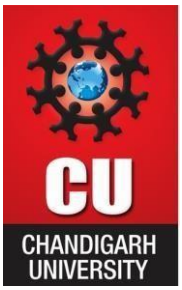

University Institute of Engineering

Department of Electronics & Communication Engineering

Experiment No. 5

Student Name: Priyanshu Mathur **UID:20BEC1073**
Branch: Electronics and Communication **Section/Group: A**
Semester: 7th **Date of Performance:25/09/2023**
Subject Name: Industrial Automation & Robotics **Code: 20ECA-446**

1. Aim of the practical: To design Articulated Robot in MATLAB Simulink.

2. Tool Used: MATLAB Simulink.

3. Theory:

An articulated robot is a type of robotic system characterized by rotary joints, similar to the joints found in the human arm. This design enables these robots to move with exceptional precision in a wide range of directions. Articulated robots are particularly prevalent in industrial settings and find application in diverse tasks such as assembly, welding, painting, packaging, and material handling.

Typically driven by electric motors, each joint of an articulated robot is independently controlled by a dedicated motor. The programming involves specifying the desired movement of the robot arm, following a predetermined path. The number of axes of motion in articulated robots can vary, ranging from as few as two to ten or more. The more axes a robot has, the greater its flexibility and range of motion.

Articulated robots play a crucial role in various industries:

- Automotive: In the automotive sector, articulated robots are employed for tasks like welding car bodies, painting vehicles, and assembling automotive components.

- Electronics: The electronics industry utilizes articulated robots for assembling electronic devices such as circuit boards and smartphones.

- Food and Beverage: Articulated robots are used in the food and beverage industry for tasks such as packaging products and handling food items.

- Pharmaceutical: Within the pharmaceutical sector, articulated robots find applications in packaging medications and performing medical procedures.

- Aerospace: The aerospace industry benefits from articulated robots in the assembly of aircraft and spacecraft.

This versatility and adaptability make articulated robots integral to a broad spectrum of industrial processes, enhancing efficiency and precision across different sectors.

4. Steps for experiment:

- Create a new Simulink model. To do this, click the File menu and select New > Model.
- Add the necessary blocks to the model. To do this, drag and drop blocks from the Library Browser onto the model canvas. The Library Browser can be found on the left-hand side of the Simulink window.
- Configure the blocks. To do this, double-click on a block to open its properties dialog box. In the properties dialog box, you can set the parameters of the block.
- Connect the blocks together. To do this, click on the output port of one block and drag it to the input port of another block.
- Add control logic to the model. To do this, you can use Simulink's built-in control blocks or you can write your own control code.
- Simulate the model. To do this, click the Simulate button. The simulation will run until you click the Stop button.

5. Program Screenshots:

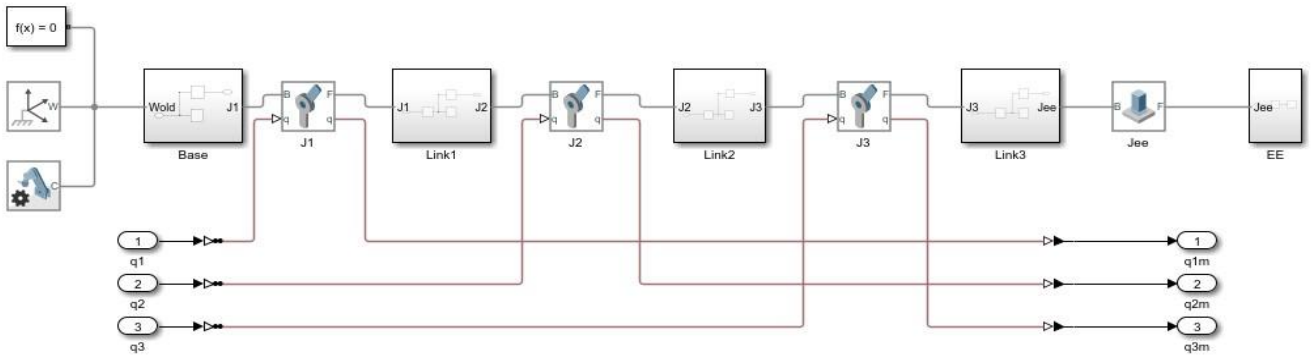

Figure: -5.1 Sub-Systems of Robo

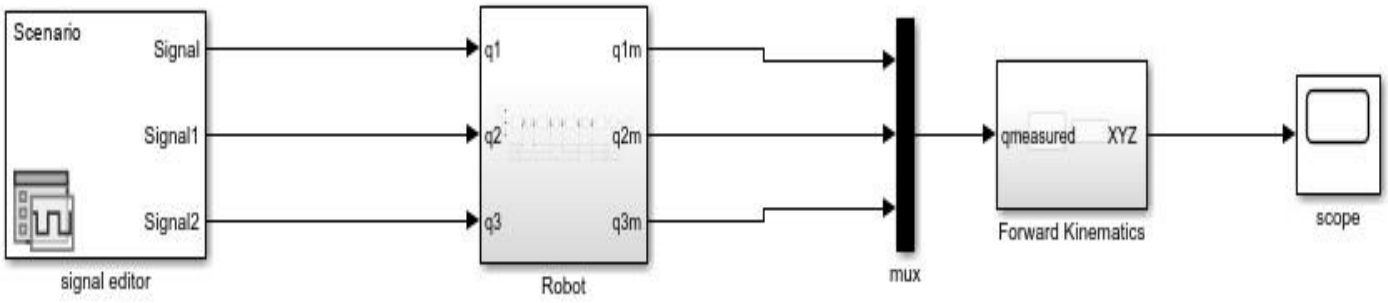

Figure 5.2 Giving signal through signal editor to system

6. Observations, Simulation/Output Screen Shots and Discussions:

```
[DOF3_RRR,ArmInfo]=importrobot('Exp1_5');
```

Figure 5.3: - Imports the Exp1_5 robot model into the MATLAB workspace.

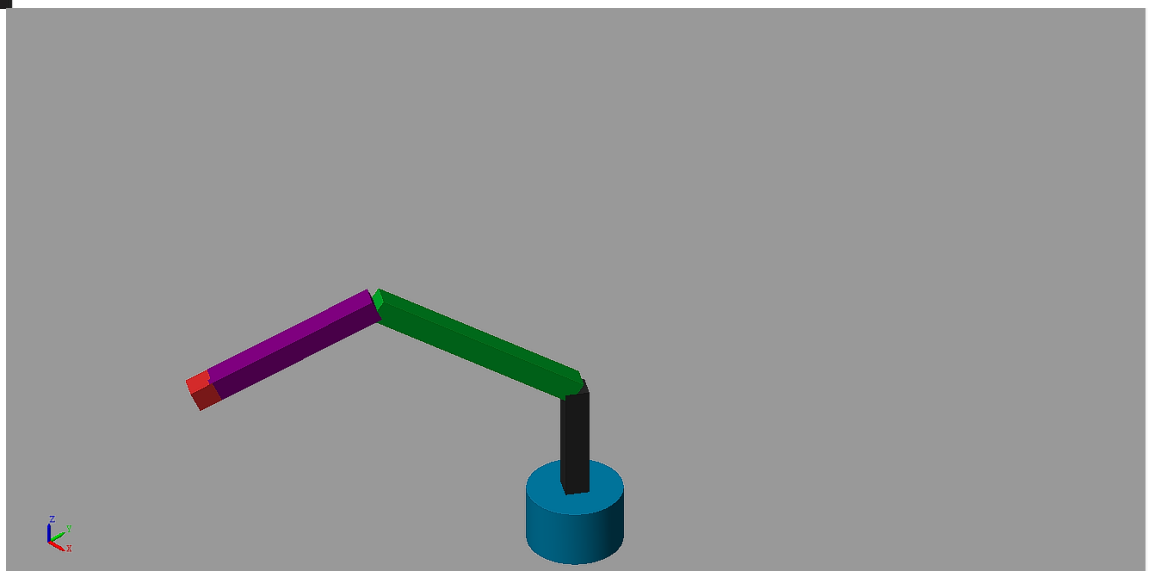

Figure 5.4: - Mechanics Explorer Window result

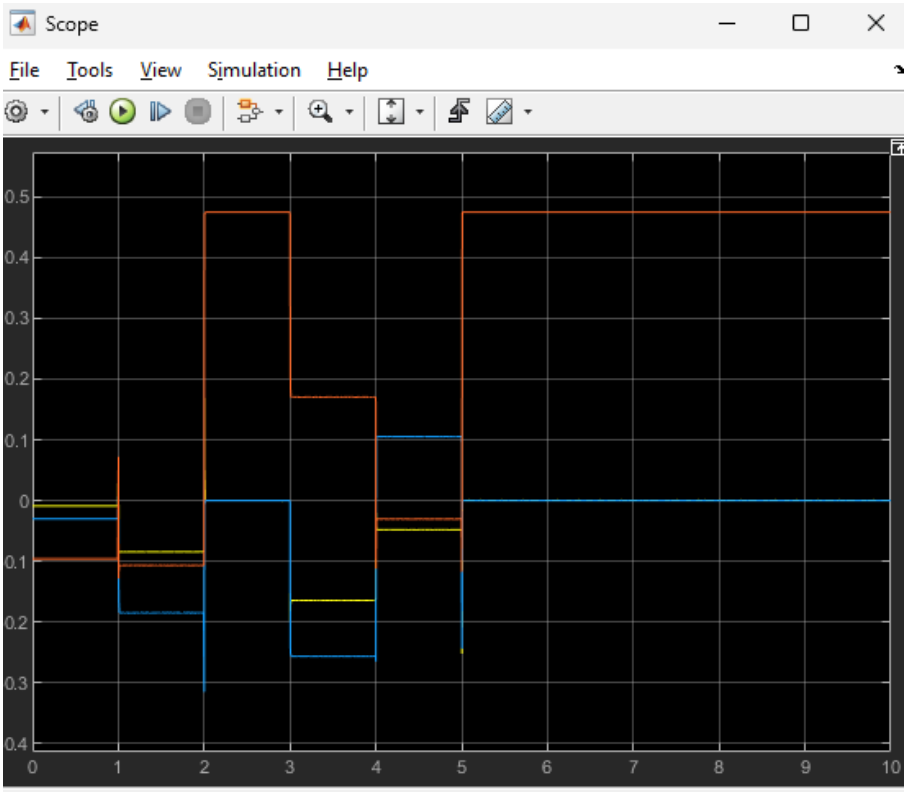

Figure 5.5: - Scope Graph of movement

University Institute of Engineering

Department of Electronics & Communication Engineering

7. Additional Creative Inputs (If Any):

Learning outcomes (What I have learnt):

1. Learn to simulate on Simulink.
2. Learnt to use different functions of Simulink Library.
3. Learnt about Articulated Robot.

Evaluation Grid (To be filled by Faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet completion including writing learning objectives/Outcomes. (To be submitted at the end of the day)		10
2.	Viva Result		8
3.	Student Engagement in Simulation/Demonstration/Performance and Controls		12
	Signature of Faculty (with Date):	**Total Marks Obtained:**	