University Institute of Engineering

Department of Electronics & Communication Engineering

Experiment No. :- 2

Student Name: Priyanshu Mathur
UID: 20BEC1073
Branch: Electronics and Communication
Section/Group: A
Semester: 7th
Date of Performance: 18/08/23
Subject Name: Automation & Robotics
Subject Code: 20ECA-446

1. Aim of the practical: Simulate two-dimensional movement of robotics arm by using Reverse kinematics

2. Tool Used: MATLAB

3. Theory:

Robotic arms are mechanical tools created to carry out tasks by imitating the motions and capabilities of a human arm. They find applications across industries such as manufacturing, automation, and research.

Reverse Kinematics: - Reverse Kinematics pertains to computing the angles of a robotic arm's joints based on provided position and orientation data. In simpler terms, when given the position and orientation of a robotic arm, the goal is to determine the angles of its individual joint components.

4. Steps for experiment/practical:

Step 1: Open MATLAB

Step 2: Create a script file and Simulink file.

Step 3: - Add joints as per requirement.

Step 4: - Calculate joint angles using Reverse Kinematics.

Step 5: - Visualize Arm Movement

Step 6: - Set Simulation Parameters

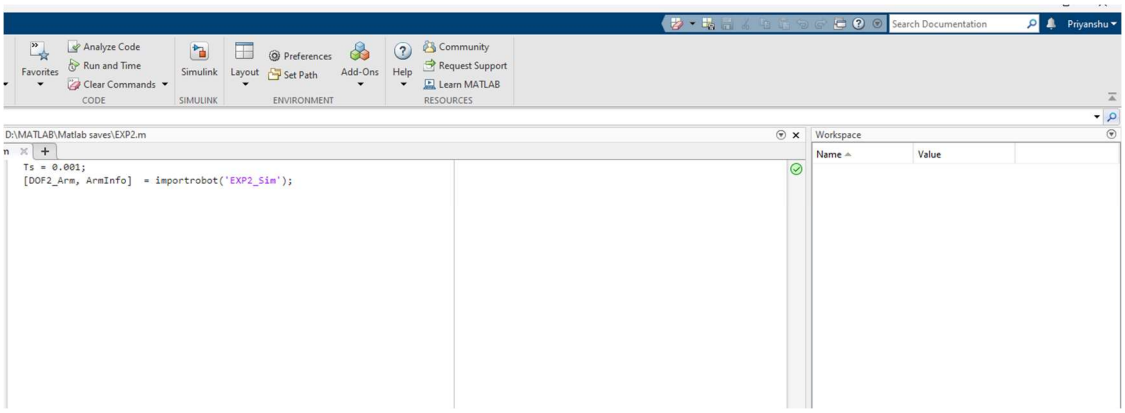
Step 7: - Run the Simulation

5. Program Code and Simulation Output:

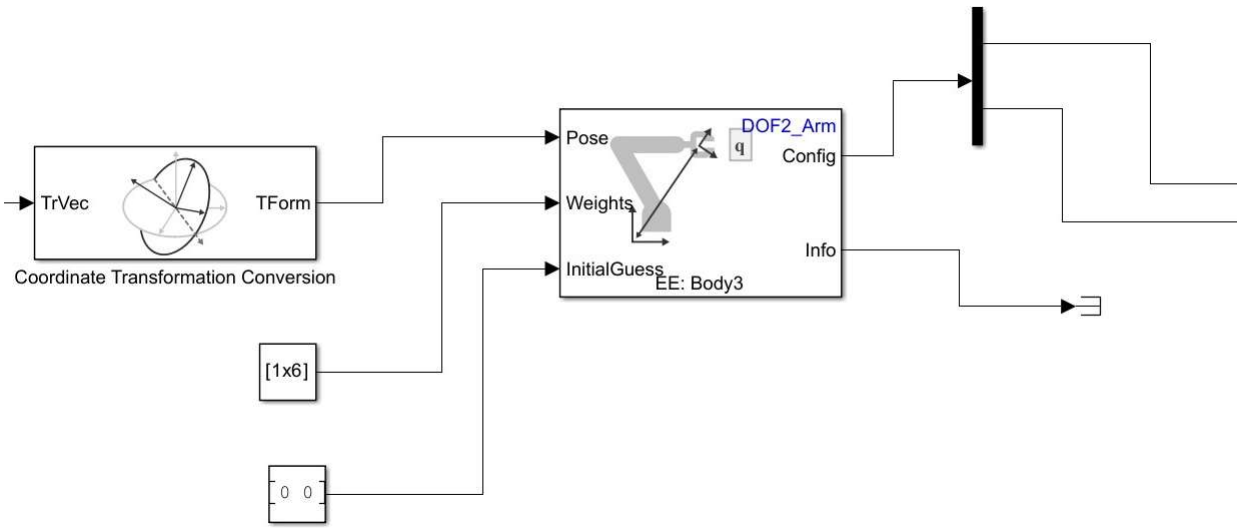
Code:-

```
Ts=0.001;
[DOF2_Arm,ArmInfo]=importrobot('Experiment_2');
```

Code:



Whole Robot with Reverse Kinamatics:



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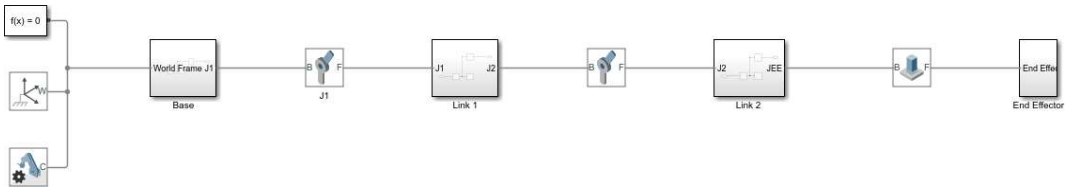
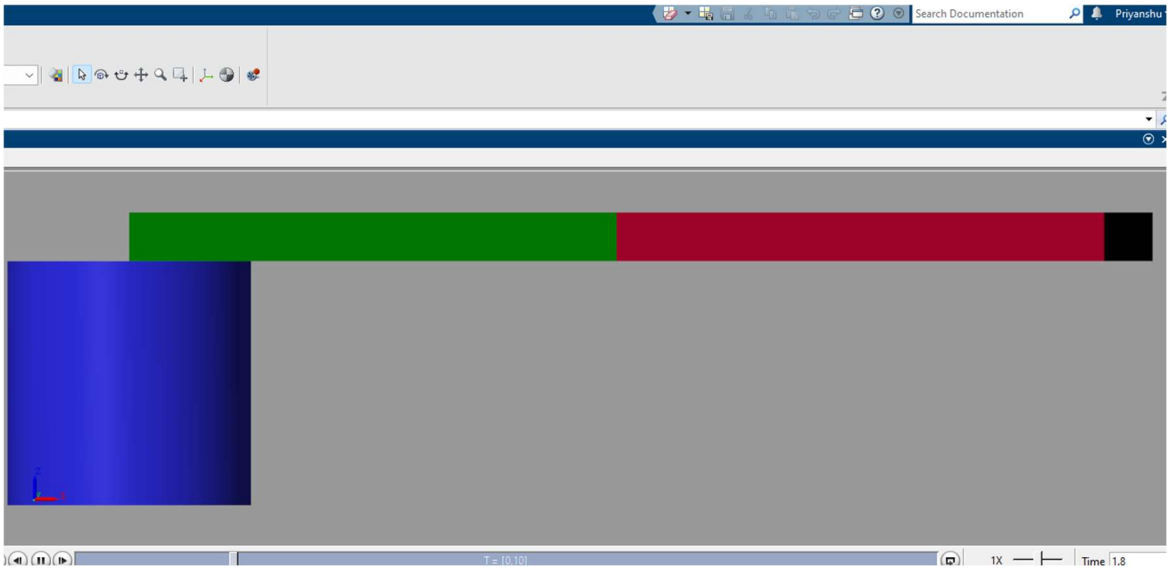
Robot Body:



2D- Robot View



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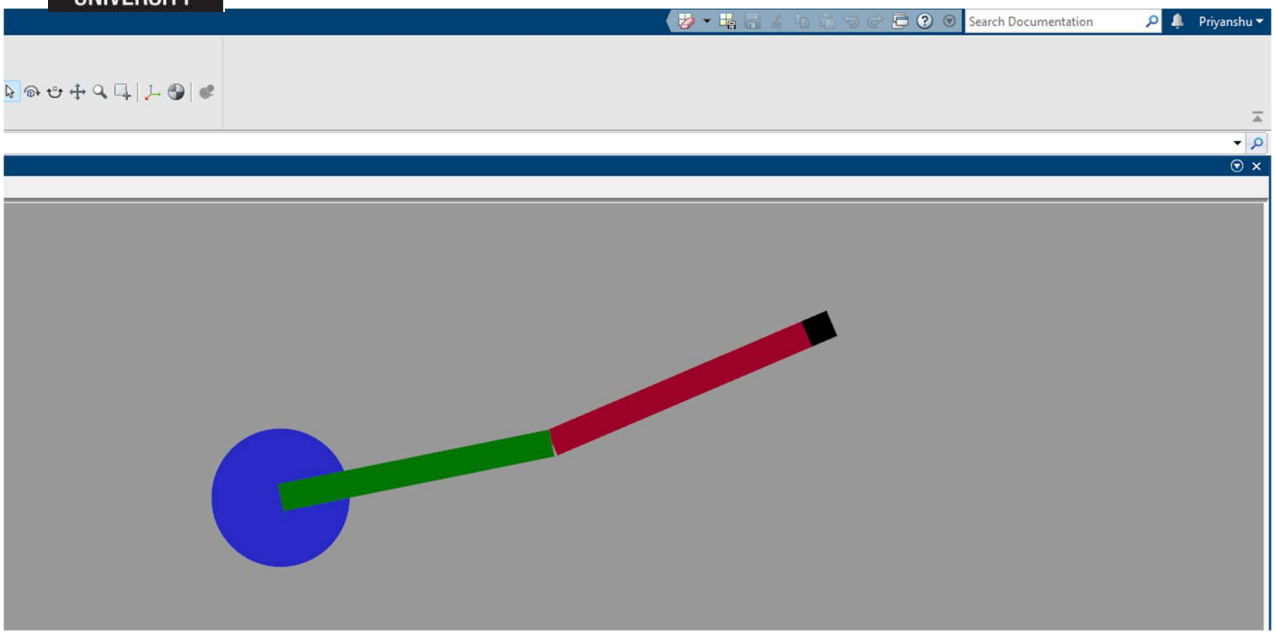
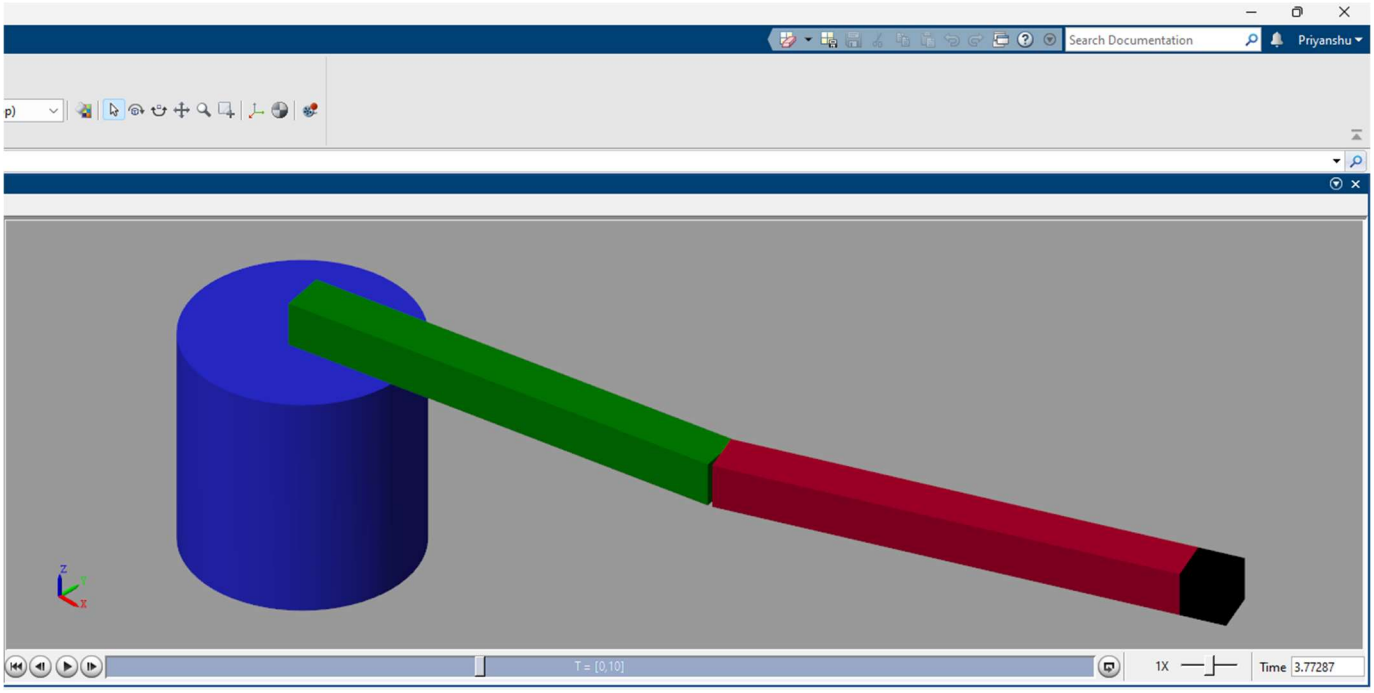
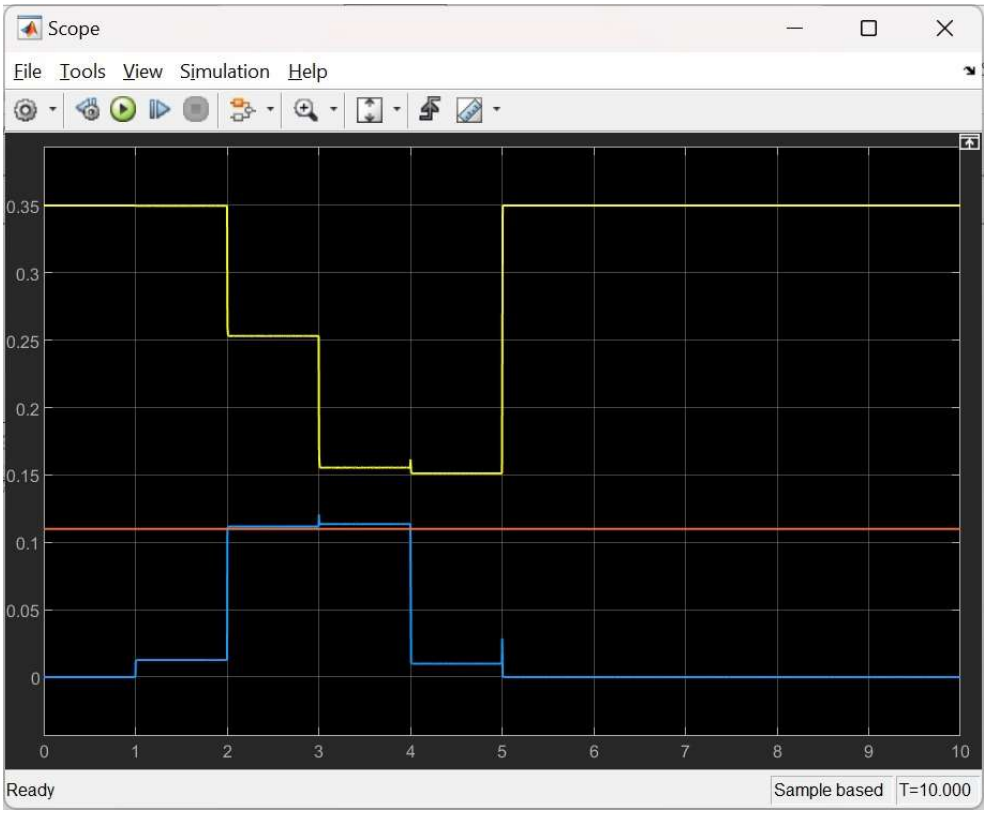




PLOT



Result and Discussion:-

Through this experiment, we discovered how to compute joint angles using coordinates. In this experiment, the coordinates that our end effector will move on are given to us; they form a square. For this project, reverse kinematics will be used. The X and Y coordinates on which our end effector is travelling were generated using signal editor.

Learning outcomes (What I have learnt):

- Learn to use MATLAB, Simulink and Simscape.
- Learn about different components of Robotics
- Learn to about Reverse Kinematics.
- Learn to simulate the robot in Simulink.