University Institute of Engineering

Department of Electronics & Communication Engineering

Experiment No. :- 1

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

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

2. Tool Used: MATLAB

3. Theory:

Robotics arm theory is the study of the design, control, and operation of robotic arms. It is a complex and interdisciplinary field that draws on principles from mechanical engineering, electrical engineering, computer science, and control theory. Robotic arm theory is a rapidly evolving field. New advances in technology are constantly being made, which are leading to the development of more sophisticated and capable robotic arms. These advances are making robotic arms more and more useful in a wide variety of applications, from manufacturing to healthcare to space exploration.

Kinematics is the study of motion without considering the forces that cause the motion. In robotics, kinematics is used to study the motion of robotic arms.

Forward Kinematics:- Forward kinematics is the process of calculating the position and orientation of the end effector (the end of the robotic arm) given the joint angles of the robotic arm.

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 Position Using Forward Kinematics Equations.

Step 5: - Visualize Arm Movement

Step 6: - Set Simulation Parameters

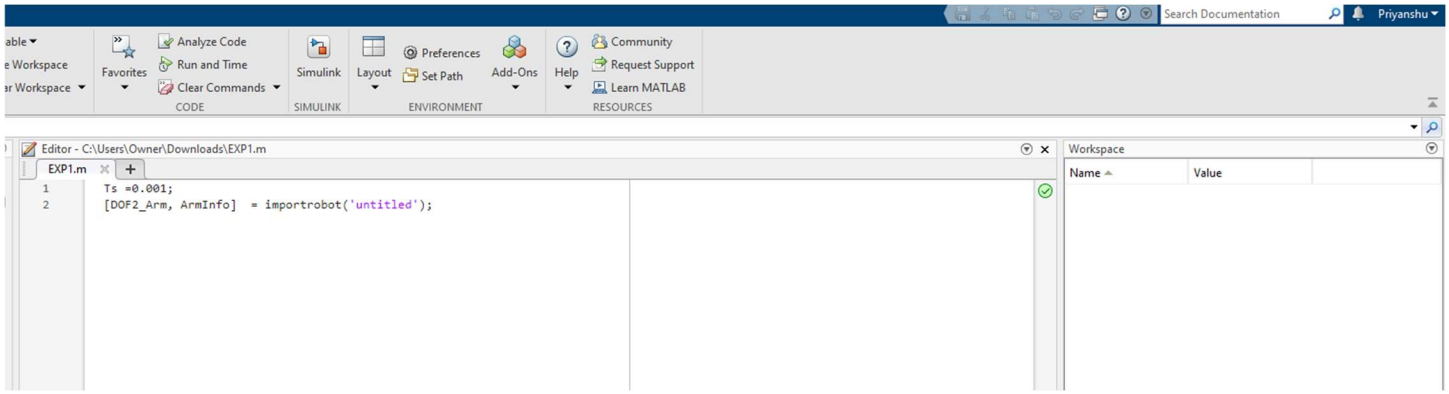
Step 7: - Run the Simulation

5. Program Code and Simulation Output:

Code:-

```
Ts=0.001;
[DOF2_Arm,ArmInfo]=importrobot('Experiment_1');
```

Code:



Whole Robot with Forward Kinamatics:

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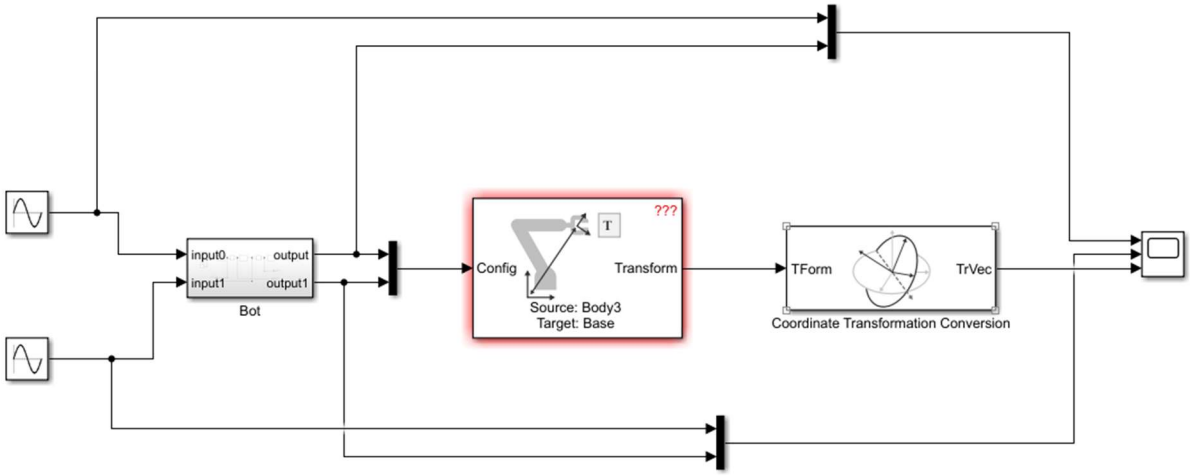
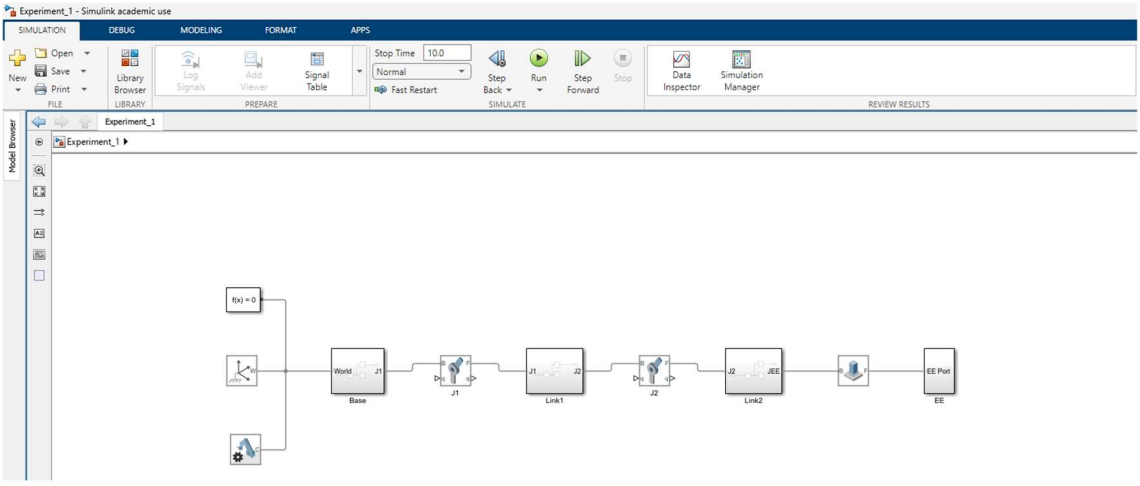


Robot Body:



Forward Kinematics:

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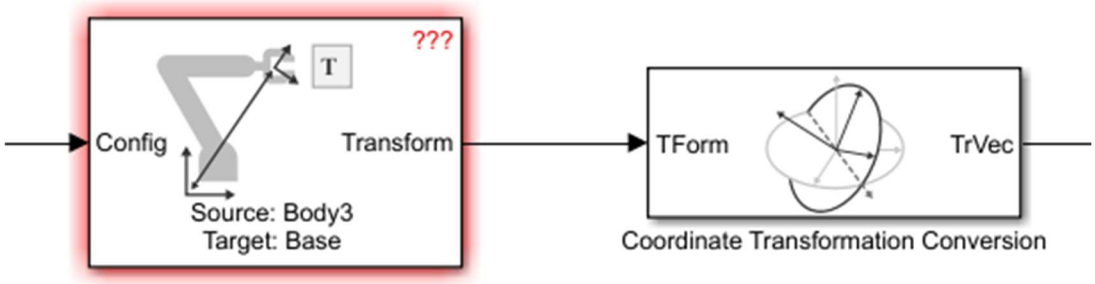
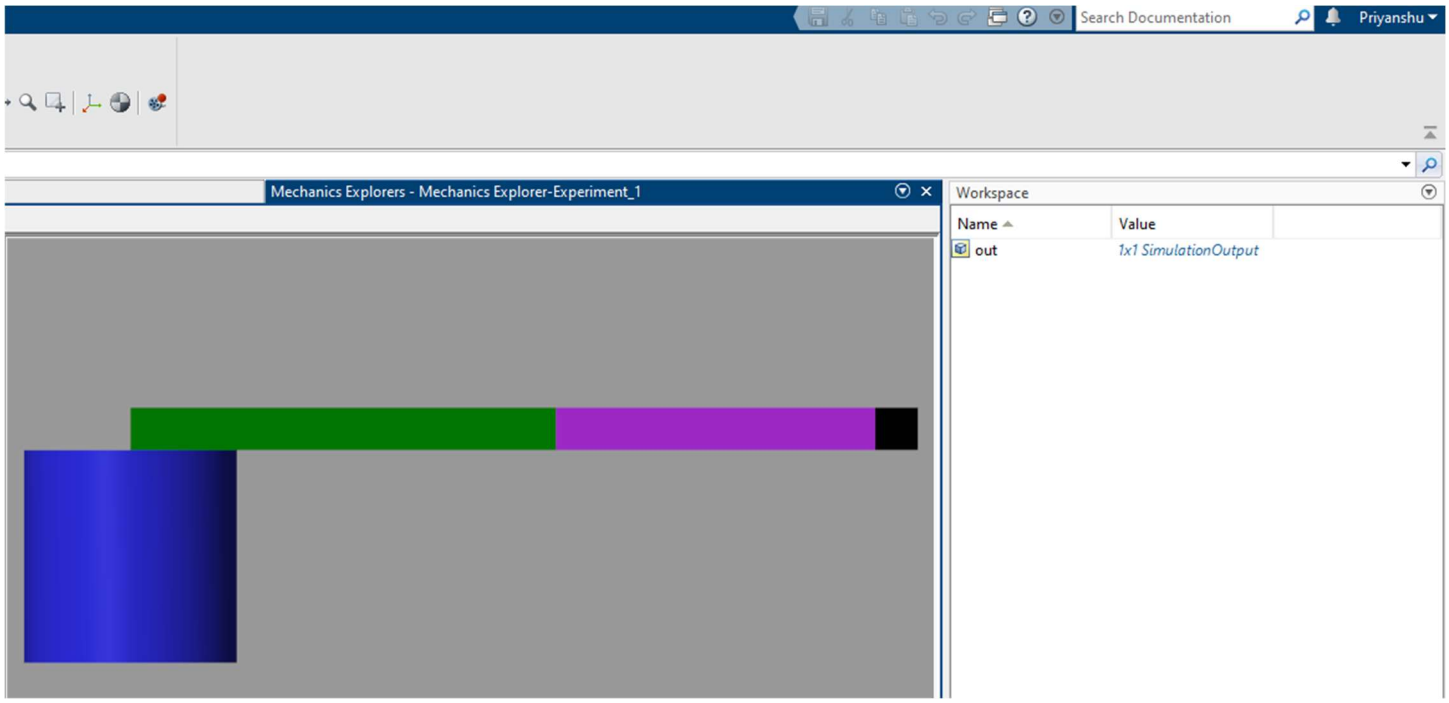


2D view of Robot:



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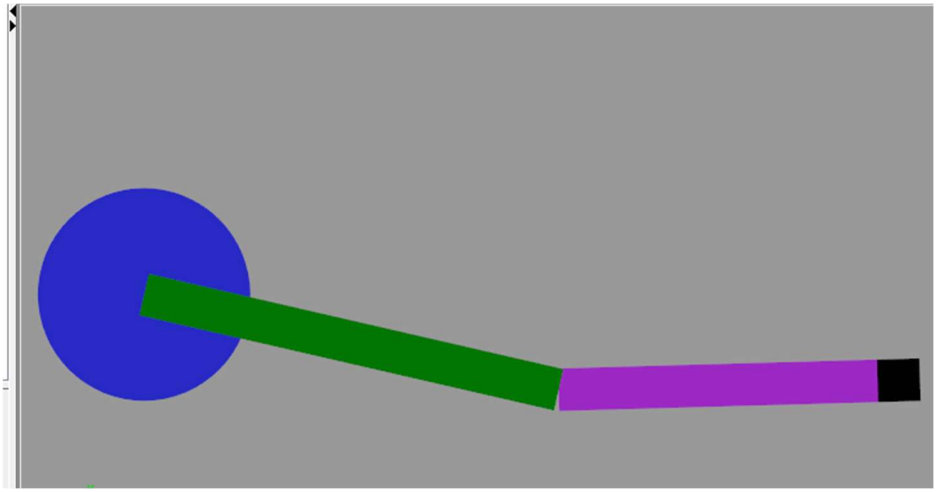
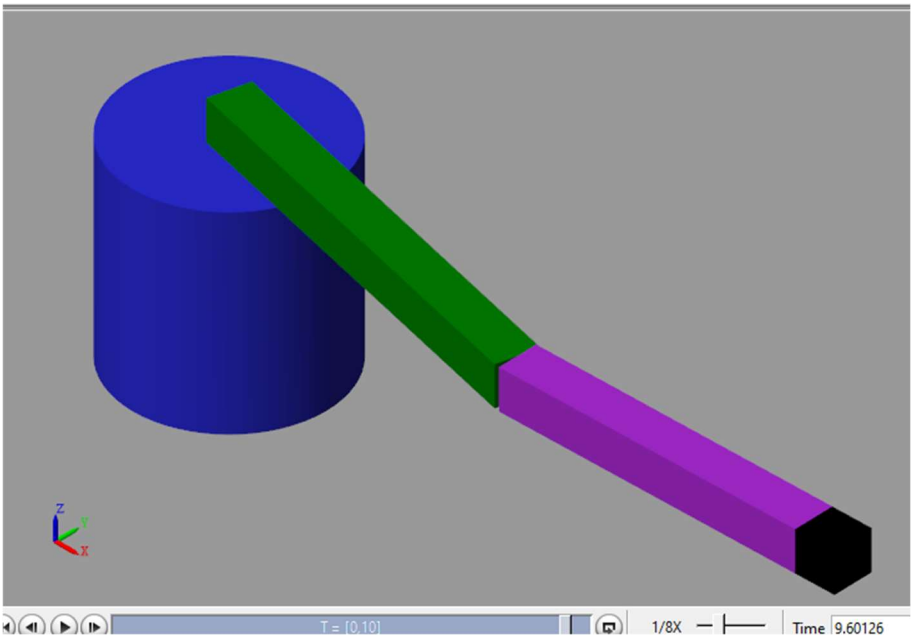
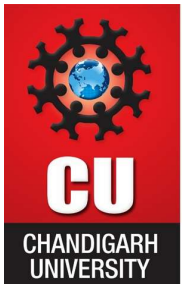




Result and Discussion:-

In this experiment we learned how to use MATLAB, Simulink and Simscape to make a robotic arm with Degree of freedom 2. We use Many joints and connected the links as well as End effector together.



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Learning outcomes (What I have learnt):

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