

Algorithmic Robotics Lab

COSC 432

Lab – Project

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Date: 9/12/2023

Objective

To create and simulate a SCARA robot using ROS2.

Introduction

The name SCARA stands for Selective Compliance Assembly Robot Arm, which refers to the robot's ability to move freely and maintain stiffness in three axes while being compliant in the final axis. This type of flexibility makes them well-suited to tasks such as pick and place, sorting, and assembly.

It comprises of three revolute joints and one prismatic joint (RRRP) as seen in the figure below.

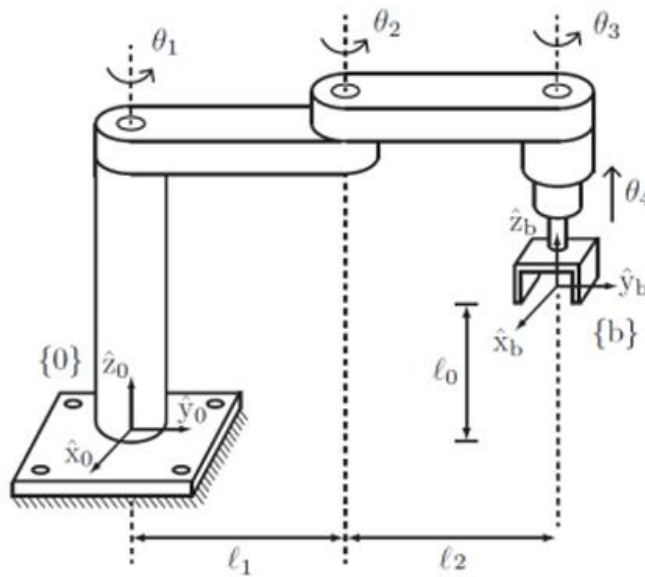


Figure 1: RRRP SCARA Robot

Note: I used Windows Subsystem for Linux to do this project.

Steps followed:

1. Altered the given example URDF file to create the configuration as in fig1. I named the file “ar_proje.urdf” and saved it in the following directory: [\\wsl.localhost\Ubuntu-22.04\home\nougatx22\ar_proje.urdf](#)
2. Opened 3 terminals and tested the URDF code as follows:

Commands:

In each of the 3 terminals, start with:

```
source /opt/ros/iron/setup.bash
```

Terminal 1:

```
ros2 run robot_state_publisher robot_state_publisher  
/home/nougatx22/ar_proje.urdf
```

Terminal 2:

```
ros2 run joint_state_publisher_gui joint_state_publisher_gui
```

Terminal 3:

```
ros2 run rviz2 rviz2
```

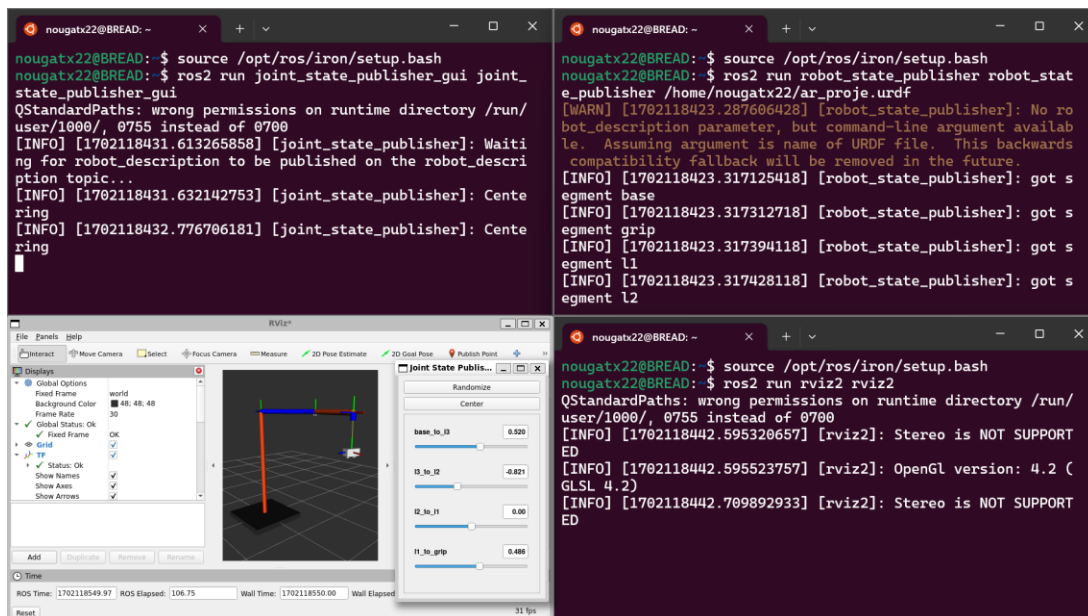


Figure 2

3. Created a launch folder inside ros2_ws (path: `\\wsl.localhost\Ubuntu-22.04\home\nougatx22\ros2_ws\launch_scara`), named it “`launch_scara`”, created a python file named “`scara_launch.py`” with the following code:

```
from launch import LaunchDescription
from launch_ros.actions import Node

def generate_launch_description():
    return LaunchDescription([
        Node(
            package='robot_state_publisher',
            executable='robot_state_publisher',
            name='robot_state_publisher',
            output='screen',
            arguments=[' /home/nougatx22/ar_proje.urdf' ]
        ),
        Node(
            package='joint_state_publisher_gui',
            executable='joint_state_publisher_gui',
            name='joint_state_publisher_gui',
            output='screen',
        ),
        Node(
            package='rviz2',
            executable='rviz2',
            name='rviz2',
            output='screen',
```

```
),  
])
```

4. Finally, I opened a terminal and ran the following command from inside the `launch_scara` directory to open RViz2 with the robot and the GUI in one go:

```
ros2 launch scara_launch.py
```

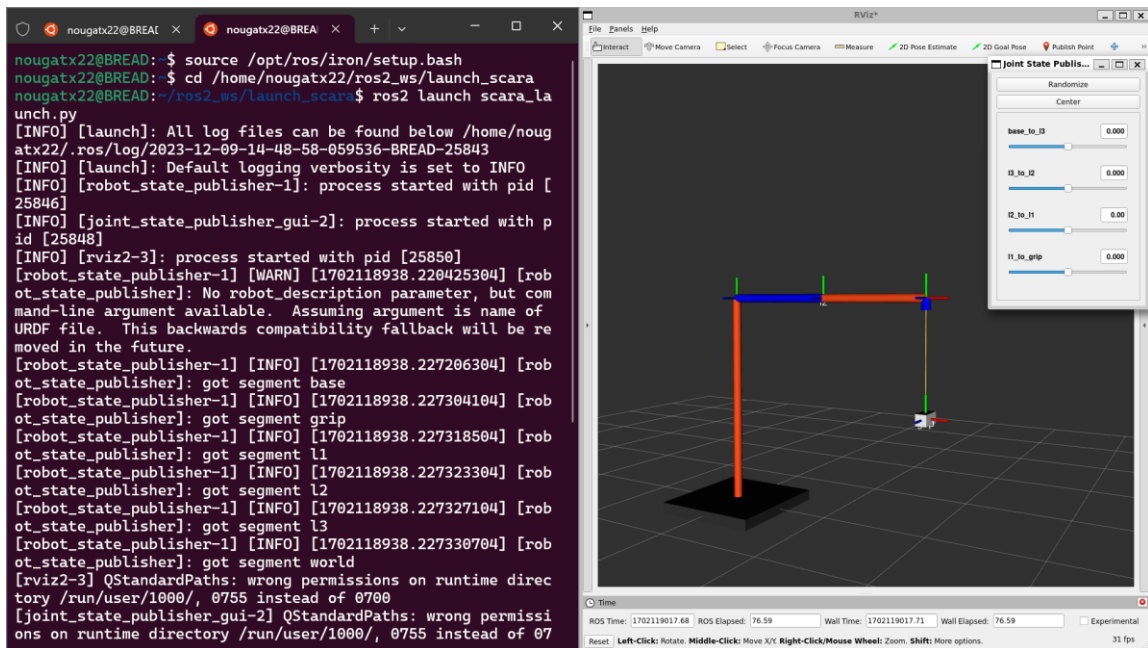


Figure 3

Conclusion

I was able to create and simulate a SCARA Robot in Rviz2 by using ROS2 skills gained in the lab.