RBOT 250 Robot Manipulation, Planning and Control

Final Assignment: Setup Robot Arm in Gazebo

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Summary

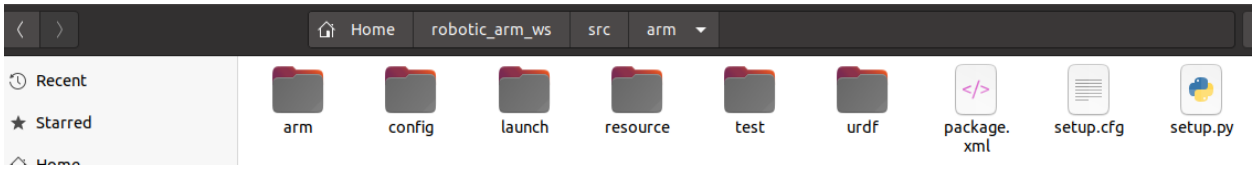
1. **Environment:**

   Below is the list of my setup used for this assignment:

   - VirtualBox
   - Ubuntu 20.04 focal
   - Ros 2 Foxy

2. **Important ROS2 Package:**

   All the code is under the folder called “robotic_arm_ws” which is the ROS workstation. The package to control is robot arm is called “arm” which you can see the structure of this package as follow:



   This package required below necessary ROS 2 packages which we can install via this linux’s command:

   ```
   sudo apt-get install
   ```

   - ros-foxy-joint-state-broadcaster
   - ros-foxy-joint-trajectory-controller
   - ros-foxy-controller-manager

3. **Command:**

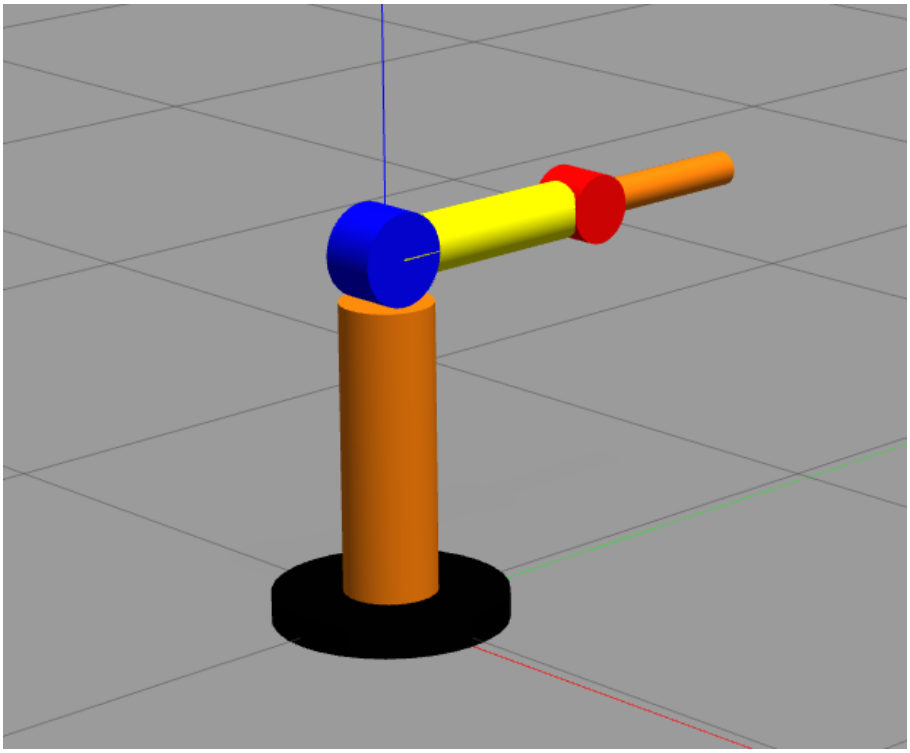
In order to run this application, after `colcon build`, we need to run these three commands:

- source install/setup.bash
    - To source this package which makes it available to the ROS environment. After that, we need two terminals to run additional commands.
- ros2 launch arm controller.launch.py
    - This command is to open the Gazebo and spawn the robot arm based on the URDF file.
- ros2 run arm trajectory_test
    - This command is to send a trajectory of goal position to the robot arm.

4. **Outcome:**

Below is an outcome of this packahe:

When Gazebo is up and running and the robot arm has spawned to the world.



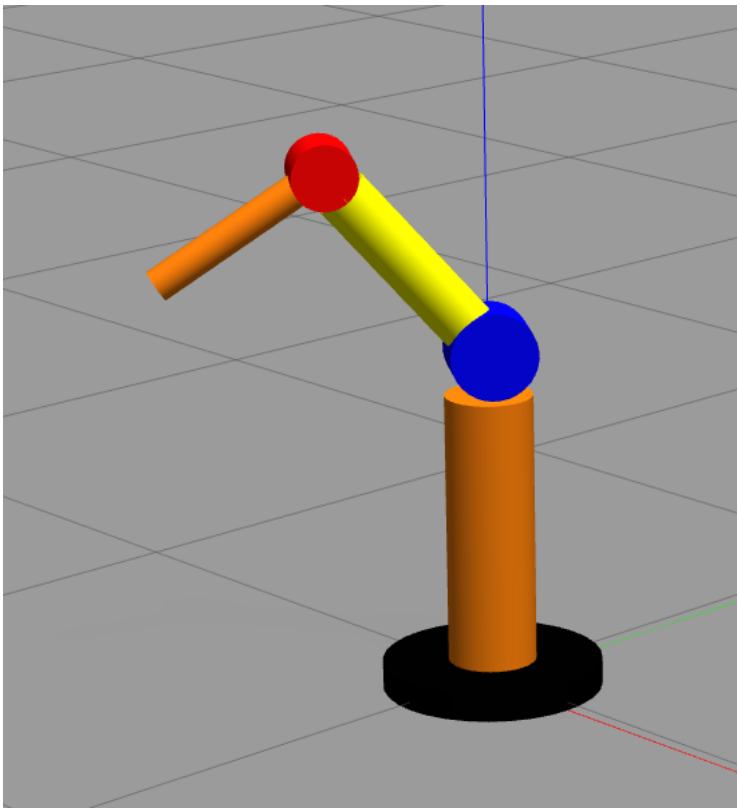
Below is a screenshot of the code that send the goal position (2.59, 0.87, 1.45) to the robot arm.

```python
import rclpy
from rclpy.node import Node
from builtin_interfaces.msg import Duration
from trajectory_msgs.msg import JointTrajectory , JointTrajectoryPoint

class Trajectory_publisher(Node):

    def __init__(self):
        super().__init__('trajectory_publsiher_node')
        publish_topic = "/joint_trajectory_controller/joint_trajectory"
        self.trajectory_publihser = self.create_publisher(JointTrajectory,publish_topic, 10)
        timer_period = 1
        self.timer = self.create_timer(timer_period, self.timer_callback)
        self.joints = ['joint_1','joint_2','joint_4']
        self.goal_positions = [2.59, 0.87, 1.45]
```

Lastly, the robot arm will move to the position.



References:

[1] https://docs.ros.org/en/foxy/Tutorials/URDF/Using-URDF-with-Robot-State-Publisher.html#publish-the-state

[2] https://automaticaddison.com/how-to-load-a-urdf-file-into-rviz-ros-2/

[3] http://gazebosim.org/tutorials?tut=ros_control&cat=connect_ros