Group Assignment 1

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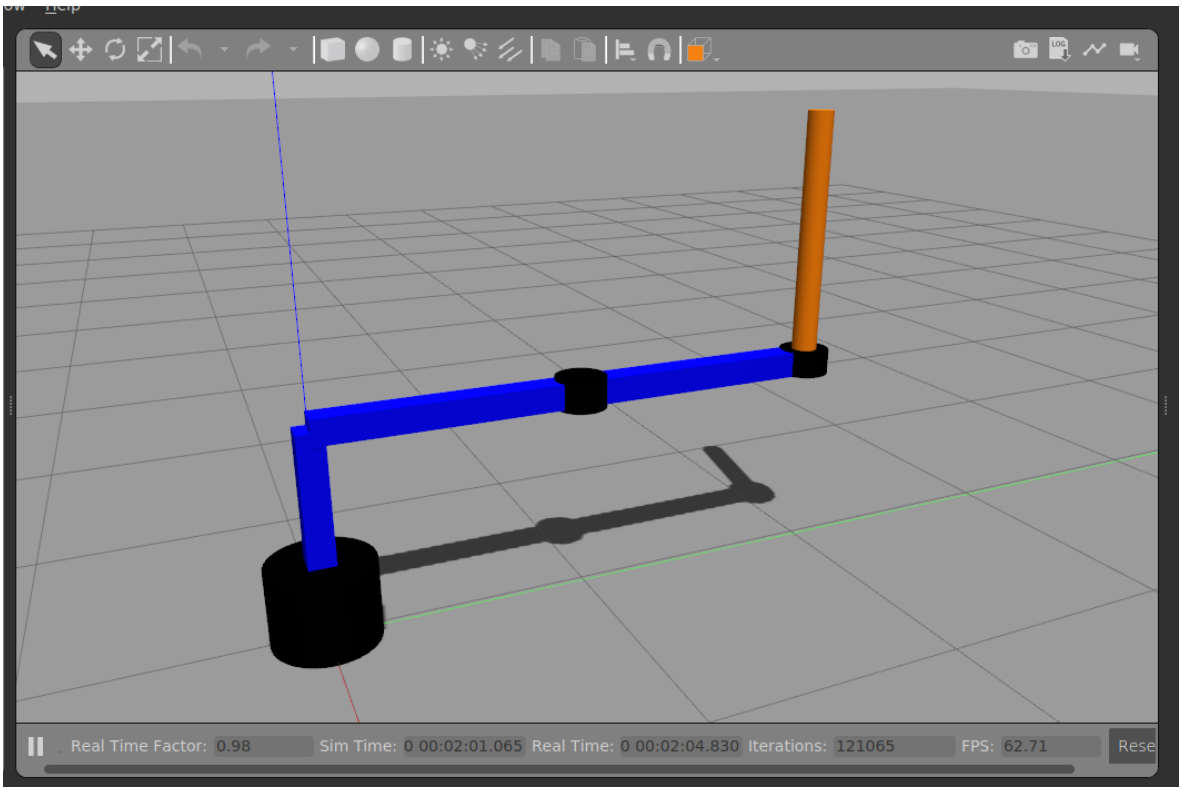
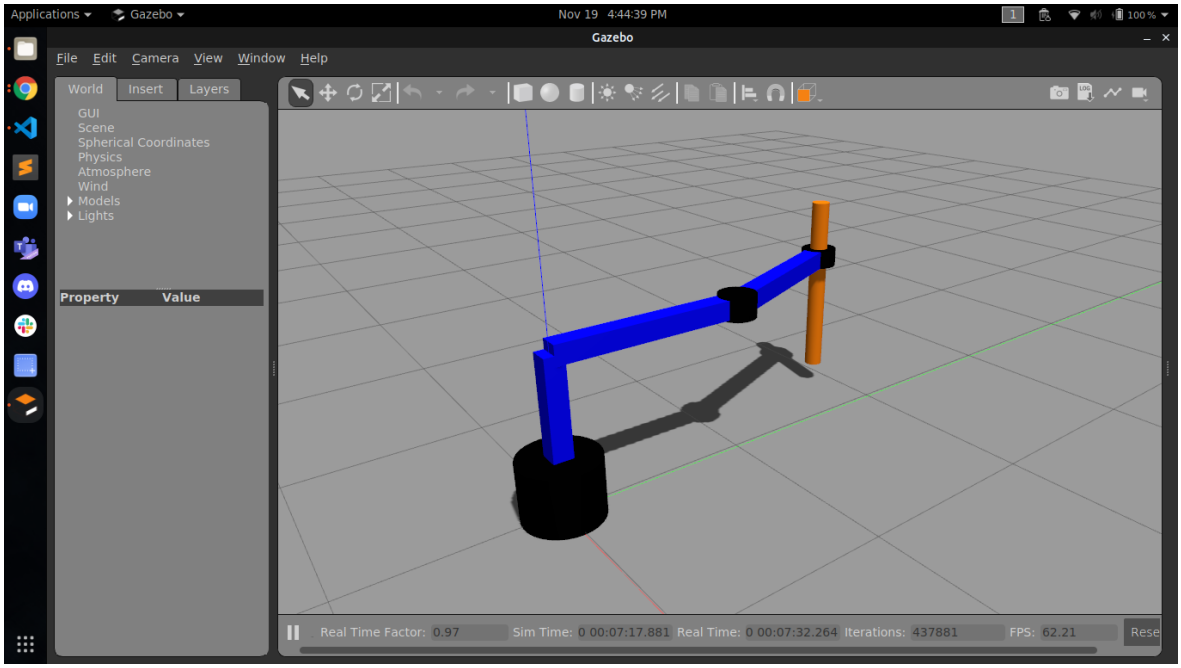
Part 1. Create and Spawn Robot in Gazebo Environment

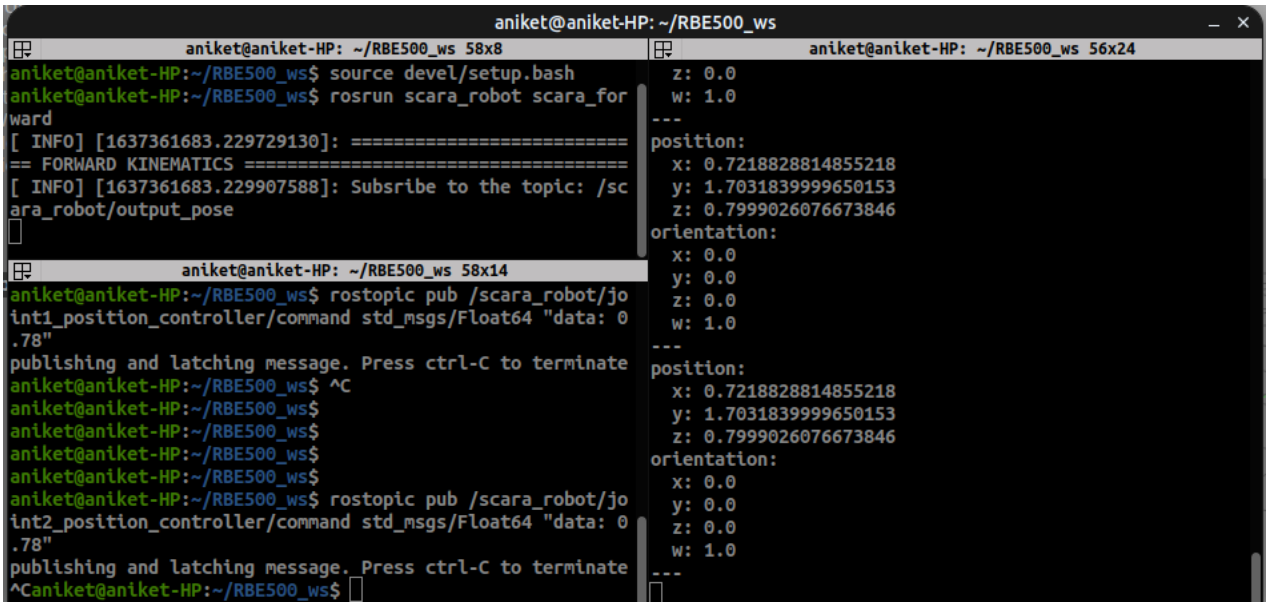




Robot has a base that is fixed to the world frame using a joint called joint0. A revolute joint1 is on top of this base which rotates the robot about its Z-axis. Then link1 and link1_h forms the L-shaped arm of the robot. Revolute joint2 connects link1_h and link2 and prismatic joint3 connects link2 and end effector arm link3.

Part 2.

The forward kinematics node subscribes to the topic **/scara_robot/joint_states** through which it receives the joint values of robot from gazebo. Then these three joint values are used to calculate the end effector pose using forward kinematics and then is published on the topic **/scara_robot/output_pose**.

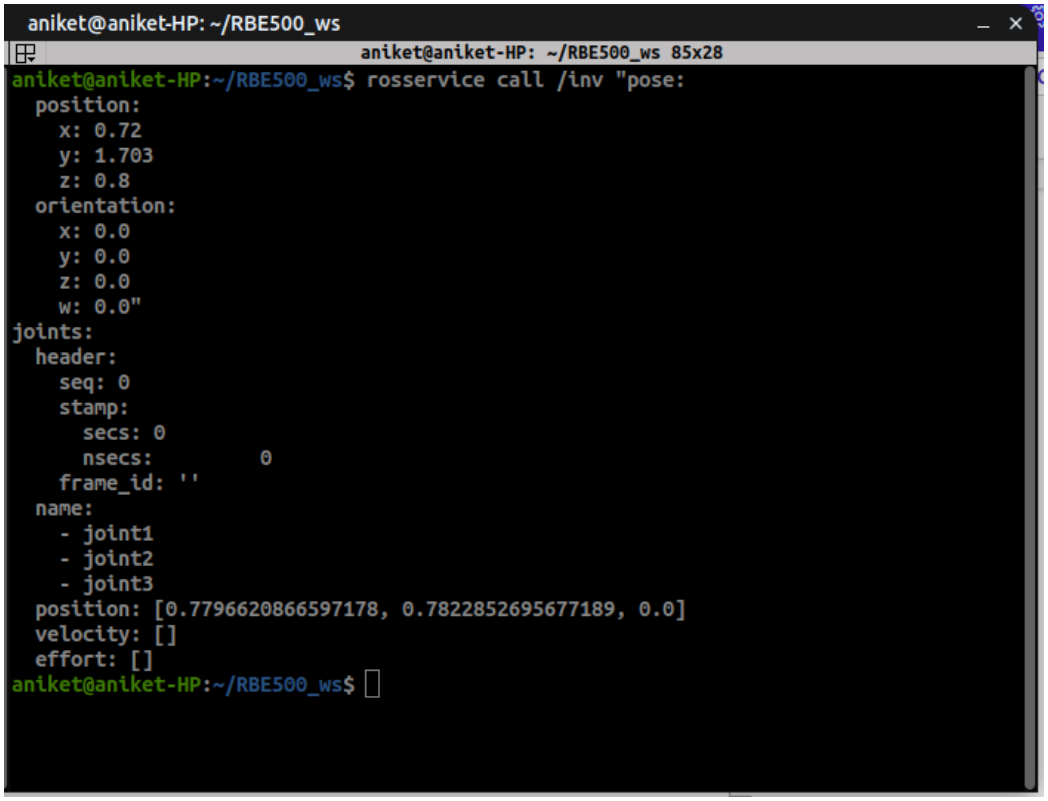


Left terminal: Published 0.78 radians to joint1 and joint2

Right terminal: Pose of the end effector after joint1 and joint2 were rotated by 0.78 radians

Part 3.

The server file takes the pose values using **geometry_msgs/Pose** message type. Then server takes the position x, y and z values from **Pose.position** object and calculates the three joint variables joint1, joint2 and joint3 using inverse kinematics. Then the server file prints the joint state response using **sensor_msgs/JointState** message type.



This terminal shows that when you give the Pose from the forward kinematics node to the service call, the output gives you a Joint State object which shows the values of all 3 joints. We see that these are the same values that we had given to the joints in Part 2.

Result:

The values given to Gazebo to move the robot were given to forward kinematics node. Then we took the values for the End effector Pose from the forward kinematics node and sent it to the inverse kinematics server as a request. The values returned match the initial value.