

RBE 500 Group Assignment #1

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Problem 1

Create SCARA Robot in Gazebo

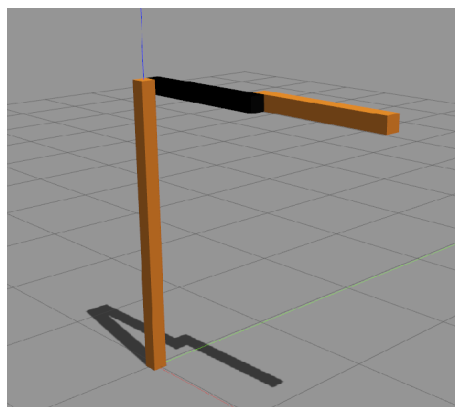
The 3 DOF SCARA robot we have built is shown below.



We undertook the following steps to create our SCARA robot.

1 — Modify joint locations

In the downloaded package, the RRBot robot has its revolute joints on the ‘sides’ of its links, as shown in the following figure.



However, for a standard SCARA robot, we want the revolute joints to sweep angles in the XY plane of the world frame, not in the XZ plane.

Hence, we edited the `<joint>` element blocks in the URDF file `rrbot_description.urdf.xacro`. For the first joint, we made the following change.

```
1 <joint name="${prefix}joint1" type="revolute">
2   <parent link="${prefix}base_link"/>
3   <child link="${prefix}link1"/>
4   <!-- Set limits of revolute joint to -90deg to +90deg, 1000 N effort limit, velocity ...
        of 180 rad/s -->
5   <limit lower="-1.5708" upper="1.5708" effort="1000" velocity="3.14159"/>
6   <origin xyz="0 0 ${height1 + axel_offset*2}" rpy="0 1.5708 0"/>
7   <axis xyz="-1 0 0"/>
8   <dynamics damping="0.7"/>
9 </joint>
```

In the above code snippet, we changed the type attribute of the joint element from continuous to revolute. We also added the limit sub-element, and modified the origin and axis sub-elements. We made similar changes for the second joint, for which the code snippet is shown below.

```
1 <joint name="${prefix}joint2" type="revolute">
2   <parent link="${prefix}link1"/>
3   <child link="${prefix}link2"/>
4   <!-- Set limits of revolute joint to -90deg to +90deg, 1000 N effort limit, ...
        velocity of 180 rad/s -->
5   <limit lower="-1.5708" upper="1.5708" effort="1000" velocity="3.14159"/>
6   <origin xyz="${width * -1} 0 ${height2 - axel_offset*2}" rpy="0 0 0"/>
7   <axis xyz="-1 0 0"/>
8   <dynamics damping="0.7"/>
9 </joint>
```

As a result, our robot now looked like the following image.