

# ROS Lab 5

Vipul Dinesh, 220929024, MTE-A-09

1. Create `ur5e.urdf` in the urdf folder

`ur5e.urdf`

```
<?xml version="1.0"?>

<robot name="ur5e">

  <!-- Base Link -->
  <link name="base_link">
    <visual>
      <geometry>
        <cylinder radius="0.1" length="0.2"/>
      </geometry>
      <origin xyz="0 0 0" rpy="0 0 0"/>
      <material name="gray">
        <color rgba="0.5 0.5 0.5 1.0"/>
      </material>
    </visual>
  </link>

  <!-- Joint 1 -->
  <joint name="shoulder_pan_joint" type="revolute">
    <parent link="base_link"/>
    <child link="shoulder_link"/>
    <origin xyz="0 0 0.2" rpy="0 0 0"/>
    <axis xyz="0 0 1"/>
    <limit lower="-3.14" upper="3.14" effort="100"
velocity="1"/>
  </joint>

  <!-- Shoulder Link -->
  <link name="shoulder_link">
    <visual>
      <geometry>
        <box size="0.1 0.1 0.4"/>
      </geometry>
      <origin xyz="0 0 0.2" rpy="0 0 0"/>
      <material name="blue">
        <color rgba="0.0 0.0 1.0 1.0"/>
      </material>
    </visual>
  </link>
```

```

    <!-- Joint 2 -->
    <joint name="shoulder_lift_joint" type="revolute">
        <parent link="shoulder_link"/>
        <child link="upper_arm_link"/>
        <origin xyz="0 0 0.4" rpy="0 0 0"/>
        <axis xyz="0 1 0"/>
        <limit lower="-1.57" upper="1.57" effort="100"
velocity="1"/>
    </joint>

    <!-- Upper Arm Link -->
    <link name="upper_arm_link">
        <visual>
            <geometry>
                <box size="0.1 0.1 0.3"/>
            </geometry>
            <origin xyz="0 0 0.15" rpy="0 0 0"/>
            <material name="green">
                <color rgba="0.0 1.0 0.0 1.0"/>
            </material>
        </visual>
    </link>

    <!-- Joint 3 -->
    <joint name="elbow_joint" type="revolute">
        <parent link="upper_arm_link"/>
        <child link="forearm_link"/>
        <origin xyz="0 0 0.3" rpy="0 0 0"/>
        <axis xyz="0 1 0"/>
        <limit lower="-1.57" upper="1.57" effort="100"
velocity="1"/>
    </joint>

    <!-- Forearm Link -->
    <link name="forearm_link">
        <visual>
            <geometry>
                <box size="0.1 0.1 0.25"/>
            </geometry>
            <origin xyz="0 0 0.125" rpy="0 0 0"/>
            <material name="red">
                <color rgba="1.0 0.0 0.0 1.0"/>
            </material>
        </visual>

```

```

</link>

<!-- Joint 4 -->
<joint name="wrist_1_joint" type="revolute">
  <parent link="forearm_link"/>
  <child link="wrist_1_link"/>
  <origin xyz="0 0 0.25" rpy="0 0 0"/>
  <axis xyz="0 0 1"/>
  <limit lower="-3.14" upper="3.14" effort="100"
velocity="1"/>
</joint>

<!-- Wrist 1 Link -->
<link name="wrist_1_link">
  <visual>
    <geometry>
      <box size="0.1 0.1 0.2"/>
    </geometry>
    <origin xyz="0 0 0.1" rpy="0 0 0"/>
    <material name="yellow">
      <color rgba="1.0 1.0 0.0 1.0"/>
    </material>
  </visual>
</link>

<!-- Joint 5 -->
<joint name="wrist_2_joint" type="revolute">
  <parent link="wrist_1_link"/>
  <child link="wrist_2_link"/>
  <origin xyz="0 0 0.2" rpy="0 0 0"/>
  <axis xyz="0 1 0"/>
  <limit lower="-3.14" upper="3.14" effort="100"
velocity="1"/>
</joint>

<!-- Wrist 2 Link -->
<link name="wrist_2_link">
  <visual>
    <geometry>
      <box size="0.1 0.1 0.15"/>
    </geometry>
    <origin xyz="0 0 0.075" rpy="0 0 0"/>
    <material name="cyan">
      <color rgba="0.0 1.0 1.0 1.0"/>
    </material>
  </visual>
</link>

```

```

        </visual>
    </link>

    <!-- Joint 6 -->
    <joint name="wrist_3_joint" type="revolute">
        <parent link="wrist_2_link"/>
        <child link="wrist_3_link"/>
        <origin xyz="0 0 0.15" rpy="0 0 0"/>
        <axis xyz="0 0 1"/>
        <limit lower="-3.14" upper="3.14" effort="100"
velocity="1"/>
    </joint>

    <!-- Wrist 3 Link -->
    <link name="wrist_3_link">
        <visual>
            <geometry>
                <box size="0.1 0.1 0.1"/>
            </geometry>
            <origin xyz="0 0 0.05" rpy="0 0 0"/>
            <material name="purple">
                <color rgba="0.5 0.0 0.5 1.0"/>
            </material>
        </visual>
    </link>

    <!-- End Effector -->
    <link name="end_effector">
        <visual>
            <geometry>
                <sphere radius="0.05"/>
            </geometry>
            <origin xyz="0 0 0.1" rpy="0 0 0"/>
            <material name="white">
                <color rgba="1.0 1.0 1.0 1.0"/>
            </material>
        </visual>
    </link>

    <!-- End Effector Joint -->
    <joint name="ee_fixed_joint" type="fixed">
        <parent link="wrist_3_link"/>
        <child link="end_effector"/>
        <origin xyz="0 0 0.1" rpy="0 0 0"/>
    </joint>

```

```
</robot>
```

2. Reassign all launch files from `arm.urdf` to `ur5e.urdf`
3. Rebuild the package and source it again
  - `cd ~/ros2_ws/`
  - `colcon build --packages-select urdf_tutorial`
  - `source ~/ros2_ws/install/setup.zsh`
4. Run rviz launch file and set fixed frame to base link
  - `ros2 launch urdf_tutorial arm_rviz.launch.py`
5. Manipulate joint state publisher to articulate the arm

