

URDF in XACRO

FE ROS

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URDF opisuje robota

```
<link name="shoulder_link">
  <visual>
    <origin rpy="0 0 3.14159265359" xyz="0 0 0"/>
    <geometry>
      <mesh filename="package://ur_description/meshes/ur10e/visual/shoulder.dae"/>
    </geometry>
    <material name="LightGrey">
      <color rgba="0.7 0.7 0.7 1.0"/>
    </material>
  </visual>
  <collision>
    <origin rpy="0 0 3.14159265359" xyz="0 0 0"/>
    <geometry>
      <mesh filename="package://ur_description/meshes/ur10e/collision/shoulder.stl"/>
    </geometry>
  </collision>
  <inertial>
    <mass value="7.778"/>
    <origin rpy="0 0 0" xyz="0 0 0"/>
    <inertia ixx="0.0314743125769" ixy="0.0" ixz="0.0" iyy="0.0314743125769" iyz="0.0" izz="0.021875625"/>
  </inertial>
</link>
<joint name="shoulder_pan_joint" type="revolute">
  <parent link="base_link_inertia"/>
  <child link="shoulder_link"/>
  <origin rpy="0 0 0" xyz="0 0 0.1807"/>
  <axis xyz="0 0 1"/>
  <limit effort="330.0" lower="-6.28318530718" upper="6.28318530718" velocity="2.09439510239"/>
  <dynamics damping="0" friction="0"/>
</joint>
```

Primer robota UR10e

URDF – nalaganje na parameter server

```
<param name="robot_description" textfile="$(find package_name)/<relative_path_to_urdf>"/>
```

URDF – `<robot>`

```
<robot name="no_robot">
```

```
...
```

```
</robot>
```

URDF – <joint>

```
<joint name="shoulder_pan_joint" type="revolute">  
  <parent link="base_link_inertia"/>  
  <child link="shoulder_link"/>  
  <origin rpy="0 0 0" xyz="0 0 0.1807"/>  
  <axis xyz="0 0 1"/>  
  <limit effort="330.0" lower="-6.28318530718" upper="6.28318530718" velocity="2.09439510239"/>  
  <dynamics damping="0" friction="0"/>  
</joint>
```

URDF – <link>

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<link name="shoulder_link">
  <visual>
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      <mesh filename="package://ur_description/meshes/ur10e/visual/shoulder.dae"/>
    </geometry>
    <material name="LightGrey">
      <color rgba="0.7 0.7 0.7 1.0"/>
    </material>
  </visual>
  <collision>
    <origin rpy="0 0 3.14159265359" xyz="0 0 0"/>
    <geometry>
      <mesh filename="package://ur_description/meshes/ur10e/collision/shoulder.stl"/>
    </geometry>
  </collision>
  <inertial>
    <mass value="7.778"/>
    <origin rpy="0 0 0" xyz="0 0 0"/>
    <inertia ixx="0.0314743125769" ixy="0.0" ixz="0.0" iyy="0.0314743125769" iyz="0.0" izz="0.021875625"/>
  </inertial>
</link>
```

XACRO – generacija URDF z macro-ji

```
<link name="${prefix}shoulder_link">
  <visual>
    <origin xyz="0 0 0" rpy="0 0 ${pi}"/>
    <geometry>
      <mesh filename="${shoulder_visual_mesh}"/>
    </geometry>
    <material name="${shoulder_visual_material_name}">
      <color rgba="${shoulder_visual_material_color}"/>
    </material>
  </visual>
  <collision>
    <origin xyz="0 0 0" rpy="0 0 ${pi}"/>
    <geometry>
      <mesh filename="${shoulder_collision_mesh}"/>
    </geometry>
  </collision>
  <xacro:cylinder_inertial radius="${shoulder_inertia_radius}" length="${shoulder_inertia_length}" mass="${shoulder_mass}">
    <origin xyz="0 0 0" rpy="0 0 0" />
  </xacro:cylinder_inertial>
  <joint name="${prefix}shoulder_pan_joint" type="revolute">
    <parent link="${prefix}base_link_inertia" />
    <child link="${prefix}shoulder_link" />
    <origin xyz="${shoulder_x} ${shoulder_y} ${shoulder_z}" rpy="${shoulder_roll} ${shoulder_pitch} ${shoulder_yaw}" />
    <axis xyz="0 0 1" />
    <limit lower="${shoulder_pan_lower_limit}" upper="${shoulder_pan_upper_limit}"
      effort="${shoulder_pan_effort_limit}" velocity="${shoulder_pan_velocity_limit}"/>
    <xacro:if value="${safety_limits}">
      <safety_controller soft_lower_limit="${shoulder_pan_lower_limit + safety_pos_margin}" soft_upper_limit="${shoulder_
pan_upper_limit - safety_pos_margin}" k_position="${safety_k_position}" k_velocity="0.0"/>
    </xacro:if>
    <dynamics damping="0" friction="0"/>
  </joint>
```

Primer robota UR ... katerega koli

XACRO – nalaganje

```
<param name="robot_description" command="$(find xacro)/xacro '$(find package_name)/<relative_path_to_xacro>'" />
```


XACRO – parametri ("property")

Posamezen parameter:

```
<xacro:property name="R" value="2.1" />
```

Ali celoten XML blok:

```
<xacro:property name="fixed_origin">  
  <origin xyz="1.2 0 0" rpy="0 0 0" />  
</xacro:property>
```

```
<wheel_origin name="back_right_wheel">  
  <xacro:insert_block name="fixed_origin" />  
</wheel_origin >
```

XACRO - matematika

```
<xacro:property name="circumference" value="\${2 * pi * R}"/>
```

XACRO – pogojni stavki

```
<xacro:if value="<expression>">  
  <... some xml code here ...>  
</xacro:if>
```

```
<xacro:unless value="<expression>">  
  <... some xml code here ...>  
</xacro:unless>
```