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

<robot name="atom" xmlns:xacro="http://www.ros.org/wiki/xacro">
    <xacro:property name="robot_name" value="atom" />
    <xacro:property name="robot_chassis_mass" value="15"/>
    <xacro:property name="robot_chassis_length" value="0.2"/>
    <xacro:property name="robot_chassis_radius" value="0.25"/>
    <xacro:property name="robot_caster_wheel_radius" value="0.05"/>
    <xacro:property name="robot_caster_wheel_radius_collision" value="0.0499"/>

    <xacro:property name="robot_wheel_mass" value="5"/>
    <xacro:property name="robot_wheel_length" value="0.05"/>
    <xacro:property name="robot_wheel_radius" value="0.1"/>

    <xacro:property name="camera_mass" value="0.1"/>
    <xacro:property name="hokoyu_mass" value="1e-5"/>

    <!-- Make Chassis of Bot -->
    <link name="chassis">
        <pose>0 0 0.1 0 0 0</pose>

        <inertial>
            <mass value="${robot_chassis_mass}"/>
            <origin xyz="0.0 0 0" rpy=" 0 0 0"/>

            <inertia
                ixx="0.147116667" ixy="0" ixz="0"
                iyy="0.334951167" iyz="0"
                izz="0.3978345"
            />
        </inertial>

        <collision name="collision">
            <origin xyz="0 0 0.05" rpy=" 0 0 0"/>
            <geometry>
                <box size="1 0.5 0.2"/>
            </geometry>
        </collision>

        <visual name="chassis_visual">
            <origin xyz="0 0 0.05" rpy=" 0 0 0"/>
            <geometry>
                <box size="1 0.5 0.2"/>
            </geometry>

        </visual>

    </link>


    <!-- Right Wheel Back -->
    <link name="right_wheel_back">
        <inertial>
            <mass value="${robot_wheel_mass}"/>
            <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
            <inertia
                ixx="0.1" ixy="0.0" ixz="0.0"
                iyy="0.1" iyz="0.0"
                izz="0.1"
            />
        </inertial>
```

```
62
63          <visual>
64              <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
65              <geometry>
66                  <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
67              </geometry>
68          </visual>
69
70          <collision>
71              <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
72              <geometry>
73                  <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
74              </geometry>
75          </collision>
76
77      </link>
78
79      <!-- Right Wheel Front-->
80      <link name="right_wheel_front">
81          <inertial>
82              <mass value="${robot_wheel_mass}"/>
83              <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
84              <inertia
85                  ixx="0.1" ixy="0.0" ixz="0.0"
86                  iyy="0.1" iyz="0.0"
87                  izz="0.1"
88              />
89          </inertial>
90
91          <visual>
92              <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
93              <geometry>
94                  <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
95              </geometry>
96          </visual>
97
98          <collision>
99              <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
100             <geometry>
101                 <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
102             </geometry>
103         </collision>
104
105     </link>
106
107
108
109     <!-- Left wheel Back-->
110     <link name="left_wheel_back">
111         <inertial>
112             <mass value="${robot_wheel_mass}"/>
113             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
114             <inertia
115                 ixx="0.1" ixy="0.0" ixz="0.0"
116                 iyy="0.1" iyz="0.0"
117                 izz="0.1"
118             />
119         </inertial>
```

```
120
121         <visual>
122             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
123             <geometry>
124                 <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
125             </geometry>
126         </visual>
127
128         <collision>
129             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
130             <geometry>
131                 <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
132             </geometry>
133         </collision>
134
135     </link>
136
137     <!-- Left wheel Front-->
138     <link name="left_wheel_front">
139         <inertial>
140             <mass value="${robot_wheel_mass}"/>
141             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
142             <inertia
143                 ixx="0.1" ixy="0.0" ixz="0.0"
144                 iyy="0.1" iyz="0.0"
145                 izz="0.1"
146             />
147         </inertial>
148
149         <visual>
150             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
151             <geometry>
152                 <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
153             </geometry>
154         </visual>
155
156         <collision>
157             <origin xyz="0 0 0" rpy="0 1.5707 1.5707"/>
158             <geometry>
159                 <cylinder radius="${robot_wheel_radius}"
length="${robot_wheel_length}"/>
160             </geometry>
161         </collision>
162
163     </link>
164
165     <!-- Camera -->
166     <link name="camera">
167         <inertial>
168             <mass value="${camera_mass}"/>
169             <origin xyz="0 0 1" rpy="0 0 0"/>
170             <inertia
171                 ixx="1e-6" ixy="0.0" ixz="0.0"
172                 iyy="1e-6" iyz="0.0"
173                 izz="1e-6"
174               />
175         </inertial>
176
177         <visual>
```

```
            <origin xyz="0 0 1" rpy="0 0 0"/>
            <geometry>
                <box size="0.05 0.05 0.05"/>
            </geometry>
        </visual>

        <collision>
            <origin xyz="0 0 1" rpy="0 0 0"/>
            <geometry>
                <box size="0.05 0.05 0.05"/>
            </geometry>
        </collision>
    </link>

    <!-- Hokuyo Lidar -->
    <link name="hokuyo">
        <inertial>
            <mass value="${hokoyu_mass}"/>
            <origin xyz="0 0 0" rpy="0 0 0"/>

            <inertia
                ixx="1e-6" ixy="0.0" ixz="0.0"
                iyy="1e-6" iyz="0.0"
                izz="1e-6"
              />
        </inertial>

        <visual>
            <origin xyz="0 0 0" rpy="0 0 0"/>
            <geometry>
                <mesh filename="package://atom/meshes/hokuyo.dae"/>
            </geometry>
        </visual>

        <collision>
            <origin xyz="0 0 0" rpy="0 0 0"/>
            <geometry>
                <box size="0.1 0.1 0.1"/>
            </geometry>
        </collision>
    </link>

    <!-- Project center to the ground -->
    <link name="robot_footprint"></link>



    <!-- Define Joints -->

    <!-- Right Wheel Joint Back-->
    <joint type="continuous" name="right_wheel_hinge_back">
        <origin xyz="-0.2 -0.30 0" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="right_wheel_back" />
        <axis xyz="0 1 0" rpy="0 0 0" />
        <limit effort="10000" velocity="1000" />
        <dynamics damping="1.0" friction="1.0" />
    </joint>

    <!-- Right Wheel Joint Front-->
    <joint type="continuous" name="right_wheel_hinge_front">
```

```
        <origin xyz="0.2 -0.30 0" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="right_wheel_front" />
        <axis xyz="0 1 0" rpy="0 0 0" />
        <limit effort="10000" velocity="1000" />
        <dynamics damping="1.0" friction="1.0" />
    </joint>


    <!-- Left Wheel Joint Back-->
    <joint type="continuous" name="left_wheel_hinge_back">
        <origin xyz="-0.2 0.30 0" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="left_wheel_back" />
        <axis xyz="0 1 0" rpy="0 0 0" />
        <limit effort="10000" velocity="1000" />
        <dynamics damping="1.0" friction="1.0" />
    </joint>

    <!-- Left Wheel Joint Front-->
    <joint type="continuous" name="left_wheel_hinge_front">
        <origin xyz="0.2 0.30 0" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="left_wheel_front" />
        <axis xyz="0 1 0" rpy="0 0 0" />
        <limit effort="10000" velocity="1000" />
        <dynamics damping="1.0" friction="1.0" />
    </joint>

    <!-- Camera Joint -->
    <joint name="camera_joint" type="fixed">
        <origin xyz="0.26 0 0" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="camera" />
        <axis xyz="0 1 0"/>
    </joint>

    <!-- Hokoyu Joint -->
    <joint name="hokuyo_joint" type="fixed">
        <origin xyz="0.2 0 0.2" rpy="0 0 0" />
        <parent link="chassis"/>
        <child link="hokuyo" />
        <axis xyz="0 1 0"/>
    </joint>

    <joint name="robot_footprint_joint" type="fixed">
        <origin xyz="0 0 0" rpy="0 0 0" />
        <parent link="robot_footprint"/>
        <child link="chassis" />
    </joint>


    <!-- Color of bot -->
    <gazebo reference="left_wheel_front">
        <material>Gazebo/Green</material>
        <kp>1000000.0</kp> <!-- kp and kd for rubber -->
        <kd>100.0</kd>
        <mu1>1.0</mu1>
        <mu2>1.0</mu2>
        <maxVel>1.0</maxVel>
        <minDepth>0.00</minDepth>
```

```
300     </gazebo>
301 
302     <gazebo reference="left_wheel_back">
303         <material>Gazebo/Green</material>
304         <kp>1000000.0</kp> <!-- kp and kd for rubber -->
305         <kd>100.0</kd>
306         <mu1>1.0</mu1>
307         <mu2>1.0</mu2>
308         <maxVel>1.0</maxVel>
309         <minDepth>0.00</minDepth>
310     </gazebo>
311 
312     <gazebo reference="right_wheel_front">
313         <material>Gazebo/Green</material>
314         <kp>1000000.0</kp> <!-- kp and kd for rubber -->
315         <kd>100.0</kd>
316         <mu1>1.0</mu1>
317         <mu2>1.0</mu2>
318         <maxVel>1.0</maxVel>
319         <minDepth>0.00</minDepth>
320     </gazebo>
321     <gazebo reference="right_wheel_back">
322         <material>Gazebo/Green</material>
323         <kp>1000000.0</kp> <!-- kp and kd for rubber -->
324         <kd>100.0</kd>
325         <mu1>1.0</mu1>
326         <mu2>1.0</mu2>
327         <maxVel>1.0</maxVel>
328         <minDepth>0.00</minDepth>
329     </gazebo>
330     <!--<gazebo reference="right_wheel">
331         <material>Gazebo/Green</material>
332     </gazebo>-->
333 
334     <gazebo reference="camera">
335         <material>Gazebo/Red</material>
336     </gazebo>
337 
338     <gazebo reference="chassis">
339         <material>Gazebo/Blue</material>
340     </gazebo>
341 
342     <!-- Motor, Camera and Lidar Simulation -->
343     <xacro:include filename="$(find atom)/urdf/atom.gazebo" />
344 
345 </robot>
```