Sensing

Estimated time to completion: **4 minutes**

6.5 IMU plugin

In this section, we will learn how to add an Inertial Measurement Unit (IMU) sensor to an existing robot URDF file. The IMU sensor provides information about the robot's angular velocity and linear acceleration, which can be useful for various applications such as motion control and localization.

To add the IMU sensor to the URDF file, follow the steps below:

1. Open the URDF file of the robot in a text editor or URDF editor.
2. Locate the section where the robot's links and joints are defined. This is usually represented by tags.
3. Add the following code snippet to create a joint and link for the IMU sensor:

```
In [ ]:
<!-- ********************** IMU SETUP ********************************  -->
<!-- Each sensor must be attached to a link.                           -->
<joint name="imu_joint" type="fixed">
  <parent link="base_link"/>
  <child link="imu_link"/>
  <origin xyz="-0.10 0 0.05" rpy="0 0 0"/>
</joint>
<link name="imu_link"/>
```

This code snippet defines a fixed joint between the base link and the IMU link, along with the position and orientation of the IMU link relative to the base link.

Below the newly added link, insert the following code snippet to define the properties of the simulated IMU sensor:

```xml
In [ ]:  <gazebo reference="imu_link">
           <sensor name="br_imu" type="imu">
             <always_on>true</always_on>
             <update_rate>100</update_rate>
             <imu>
               <angular_velocity>
                 <x>
                   <noise type="gaussian">
                     <mean>0.0</mean>
                     <stddev>2e-4</stddev>
                   </noise>
                 </x>
                 <y>
                   <noise type="gaussian">
                     <mean>0.0</mean>
                     <stddev>2e-4</stddev>
                   </noise>
                 </y>
                 <z>
                   <noise type="gaussian">
                     <mean>0.0</mean>
                     <stddev>2e-4</stddev>
                   </noise>
                 </z>
               </angular_velocity>
               <linear_acceleration>
                 <x>
                   <noise type="gaussian">
                     <mean>0.0</mean>
                     <stddev>1.7e-2</stddev>
                   </noise>
                 </x>
                 <y>
                   <noise type="gaussian">
                     <mean>0.0</mean>
                     <stddev>1.7e-2</stddev>
                   </noise>
```

```xml
          </y>
          <z>
            <noise type="gaussian">
              <mean>0.0</mean>
              <stddev>1.7e-2</stddev>
            </noise>
          </z>
        </linear_acceleration>
      </imu>
      <plugin name="bytes_imu" filename="libgazebo_ros_imu_sensor.so">
        <ros>
          <namespace>imu</namespace>
          <remapping>~/out:=data</remapping>
        </ros>
        <initial_orientation_as_reference>false</initial_orientation_as_reference>
      </plugin>
    </sensor>
</gazebo>
```

This code snippet defines the properties of the IMU sensor, including its update rate, noise characteristics of the angular velocity and linear acceleration measurements, and the associated Gazebo plugin configuration.

Save the URDF file after adding the code snippets.

Following these steps, you have successfully added an IMU sensor to the existing robot URDF file. The IMU sensor will now be included when you launch your robot model in ROS2, and it will publish data to the specified ROS topics for further processing and analysis.

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