

1 Useful Resources

Robot modelling in urdf is rather tedious. Here are a couple of guides which I have found useful.

- URDF/xacro guide
- Guide for gazebo plugins (used to simulate sensors/actuators in gazebo)
- Sonar Plugin Guide

2 Installation

1. Install the joint state publisher:

```
$ sudo apt install  
    ros-melodic-joint-state-publisher-gui
```

2. Next, git clone realsense package into your catkin folder and run catkinmake.

```
$ git clone  
    https://github.com/pal-robotics/realsense_gazebo_plugin.git
```

3 Package Overview

3.1 urdf

The urdf folder is used to store (.urdf.xacro) and (.gazebo.xacro) files.

- (.urdf.xacro) files describe the transformations between the various links of the robot, along with other variables such as inertia.
- (.gazebo.xacro) files would describe the kinematic properties of the robot such as velocity limits, coefficient of friction etc.

3.1.1 Intel Realsense D435 camera

- The (_d435.gazebo.xacro) file is used to describe the various kinematic properties of the depth camera.

- The (`_d435.urdf.xacro`) file is used to describe the various frames of the depth camera.

The (`<camera>_bottom_screw_frame`) is used as the main reference point for the depth camera. It is centered about the bottom tripod mount of the depth camera. Thus, to define the position of the depth camera on the robot, we would have to provide the transformation from base link to the bottom screw frame link

3.2 meshes

The meshes folder is used to store the various mesh files of the robot(.stl .dae). The mesh files are used to visualize various components of the robot(sensors, chassis) and to enable accurate collisions within gazebo.

3.3 rviz

The rviz folder is used to store the various rviz configs.

3.4 launch

- The launch folder is used to store roslaunch files. Launch files titled `simulate_<robotname>.launch` are used to launch the gazebo simulation environment and rviz.
- Launch files titled `view_<robot>.launch` are used to view the robots urdf model in rviz.

4 Mesh Manipulation

test test

5 Gazebo World from 2D Map

5.1 Setup & Installation

1. Ensure that the map server is installed on your system.

```
$ sudo apt install ros-melodic-map-server
```

2. Clone the *map2gazebo* repository into your catkin/src folder.

3. Navigate to the *map2gazebo* package in your catkin/src folder and run the following commands.

```
$ pip install --user trimesh
$ pip install --user numpy
$ pip install --user pycollada
$ pip install --user scipy
$ pip install --user networkx
```
