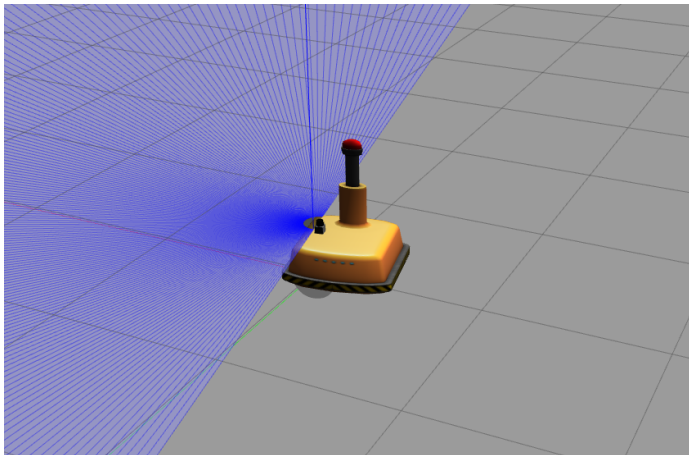
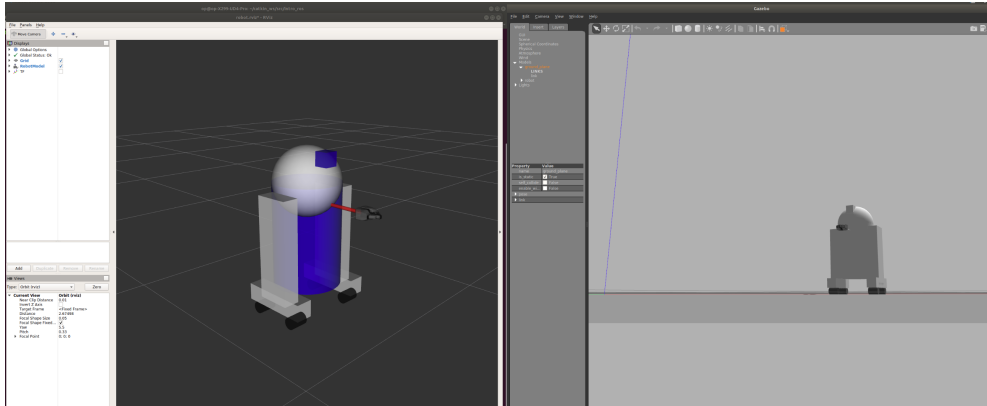


Introduction to ROS2: Basics, Motion, and Vision

Hagen Robot





Step 01

create a new package

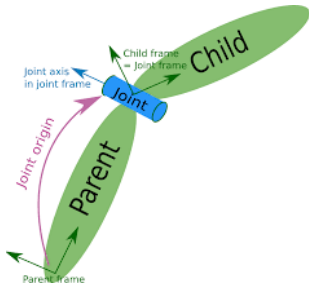
```
cd <path to workspace>/catkin_ws/src  
ros2 pkg create --build-type ament_python hagen_robot_diff_drive
```

create robot model config file

```
mkdir -p models/hagen_robot_model  
cd models/hagen_robot_model  
touch model.config
```

Step 02

- 1 How to define movable joints in sdf?
- 2 Continuous joint: can take on any angle from negative infinity to positive infinity on a specified axis, e.g., z-axis by specifying 0 0 1
- 3 Revolute joints: rotate in the same way that the continuous joints do, but these type of joints have strict limits
- 4 Prismatic joints: moves along an axis, not around it



Step 03



- 1 Robot's location is at 0 0 .04 (x,y,z) and no orientation change with respect to the **Gazebo coordinate system**
- 2 Robot's chassis (**chassis**) should be constructed as a box whose dimensions are 0.4 x 0.2 x 0.1 (Length x Width x Height) in m
- 3 Add a mesh for the robot chassis
- 4 Add caster wheel to the robot's chassis and its pose (-0.19 0 0 0 0 0)
- 5 Add left and right wheels (**left_wheel** and **right_wheel**) with respect to **chassis** and those poses are 0.12 0.19 0.1 0 1.5707 1.5707 and 0.12 -0.19 0.1 0 1.5707 1.5707, respectively. The **pose** is defined as **x y z roll pitch yaw**
- 6 Add a laser scanner **laser_link** with pose 0.15 0 0.30 0 0 0 with respect to **chassis**
- 7 Add **revolute joints** from **left_wheel** and **right_wheel** to **chassis**,
- 8 Add **fixed joint** between **laser_link** and **chassis**
- 9 Add a **plugin** for **diff_drive** robot controller

Step 04

create a node for launch the robot using a sdf file

```
cd <path to workspace>/catkin_ws/src/hagen_robot_diff_drive/hagen_robot_diff_drive  
touch spawn_robot.py
```

update the setup.py adding an entry point to the node that was developed

```
entry_points= {  
'console_scripts': [  
'spawn_robot = hagen_robot_diff_drive.spawn_robot:main'  
], },
```

Step 05

create a launch script for spawn the robot

```
spawn_entity      =      Node(package='hagen_robot_diff_drive',      execut-  
able='spawn_robot',  
arguments=['HagenRobot', 'hagen_robot', '0.0', '0.0', '0.0'],  
output='screen')
```