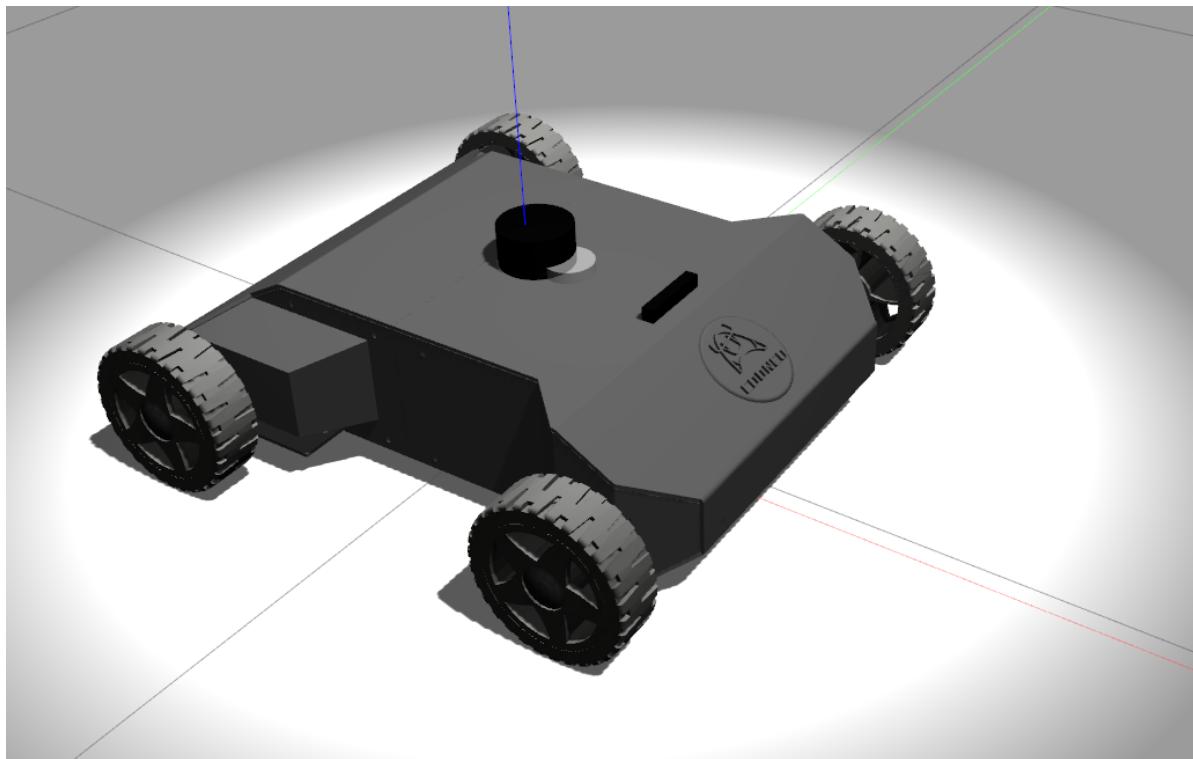


# Neor mini Simulation Tutorials

## Chapter 1: Make a indoor autonomous mobile robot



Developing Environments:

```
ubuntu 18.04 + ROS Melodic desktop full
```

Explanation:

```
mini_sim18_ws          # this folder is ROS Workspace, you can run launchs and look at every
demo.
original_neor_mini     # this folder is an original neor_mini urdf file, you can construction by
yourself
pictures               # the total process pictures
```

Neor mini Simulation in Gazebo with ROS, Follow below steps:

Step 1:

```
# open your Terminal
git clone https://github.com/COONEO/neor_mini.git
cd neor_mini/mini_sim18_ws
rosdep install --from-paths src --ignore-src -r -y  # you need wait a moment
catkin_make
```

You can see 5 ROS packages in mini\_sim18\_ws/src folder,lists:

```

neor_mini           # Storing the description of neor mini's appearance with urdf file
steer_drive_ros    # Ackermann kinematics ROS plugins
steer_mini_gazebo  # Storing the launch files of neor mini model visual in Gazebo
mini_gmapping      # Storing the launch files and gmapping params files
mini_navigation    # Storing the launch file and navigation params files

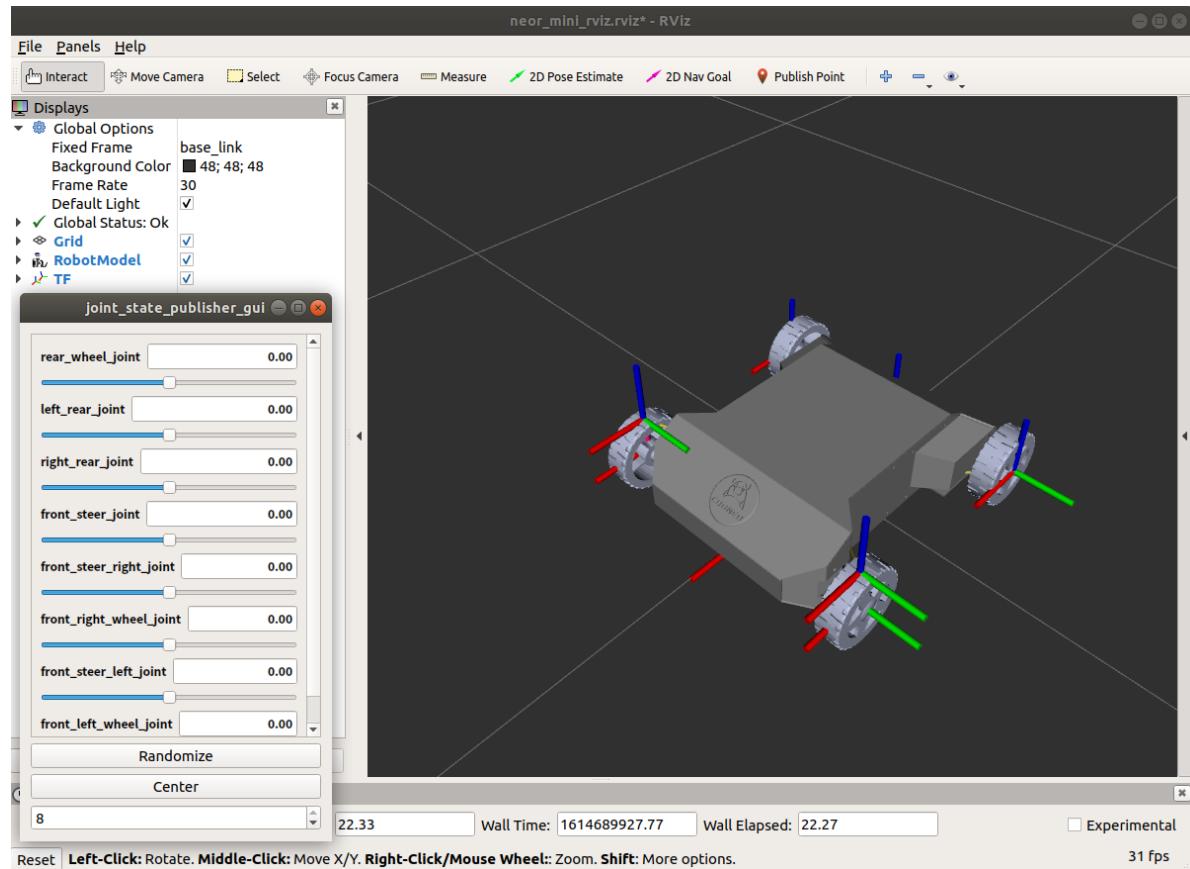
```

Step 2: launch neor\_mini's launch file, visualize the urdf in Rviz.

```

# show the neor_mini.urdf in Rviz
cd ~/neor_mini/mini_sim18_ws
source devel/setup.bash
roslaunch neor_mini display.launch

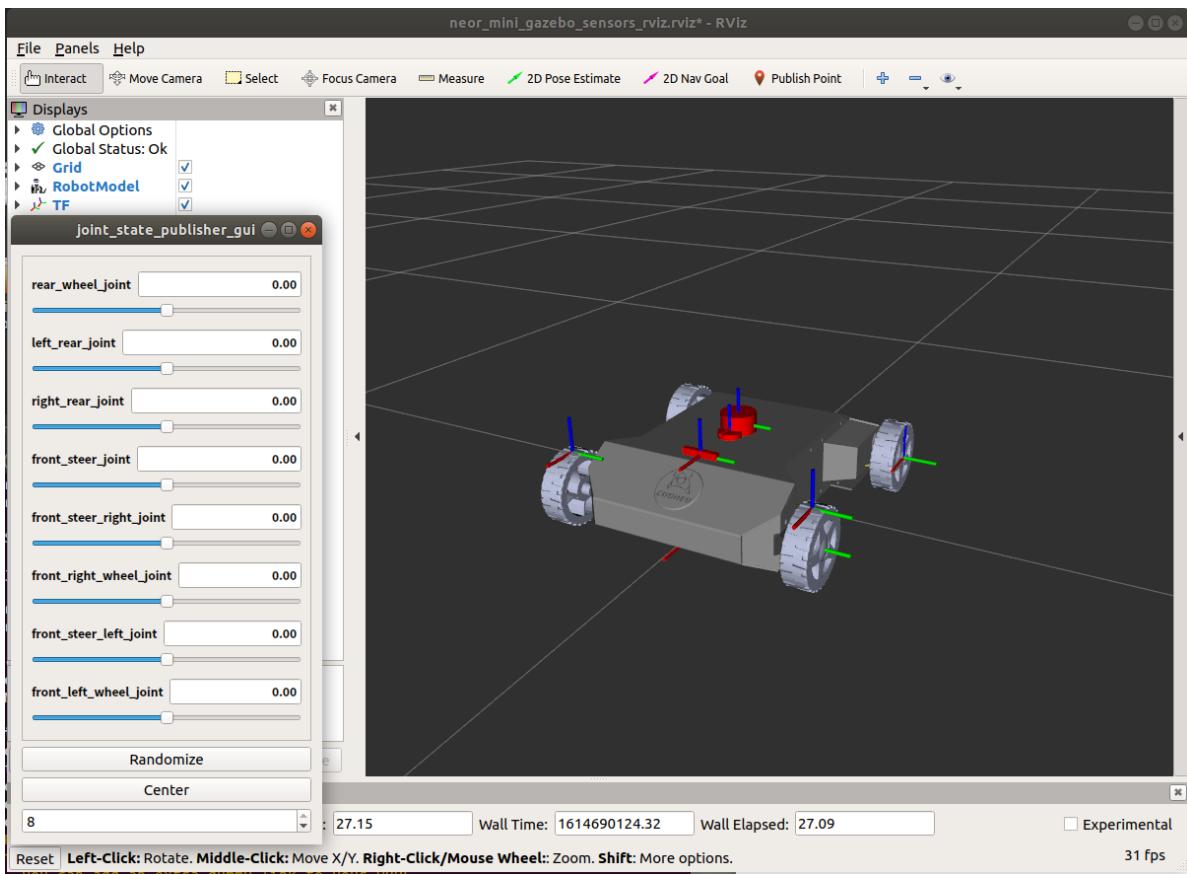
```



```

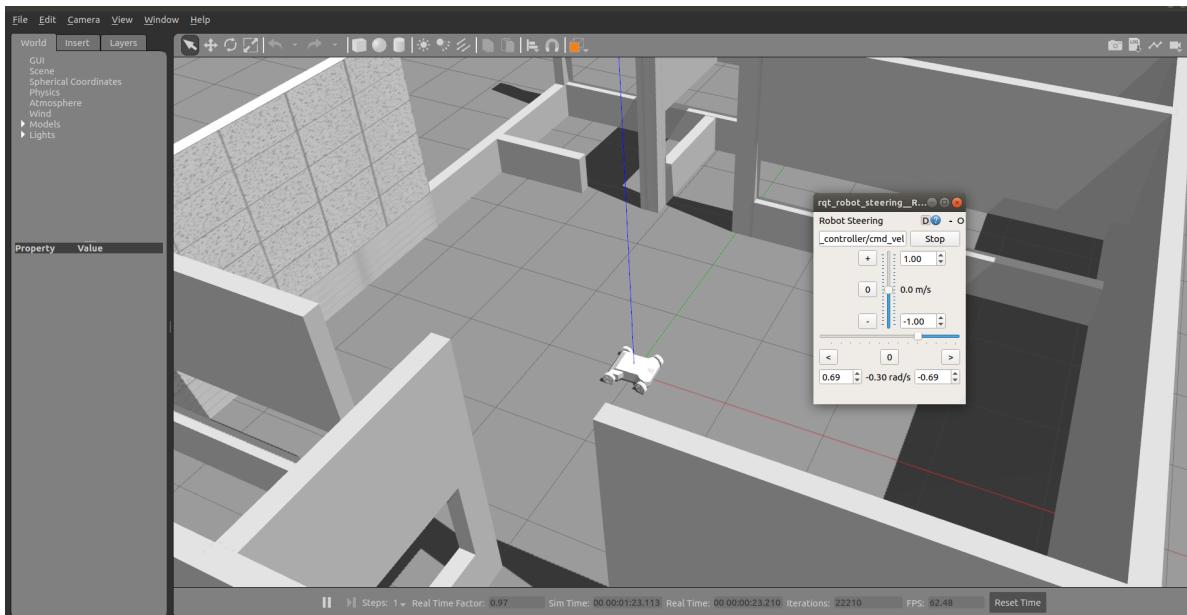
#show the neor_mini_gazebo_sensors.urdf in Rviz
cd ~/neor_mini/mini_sim18_ws
source devel/setup.bash
roslaunch neor_mini display_gazebo_sensors.launch

```

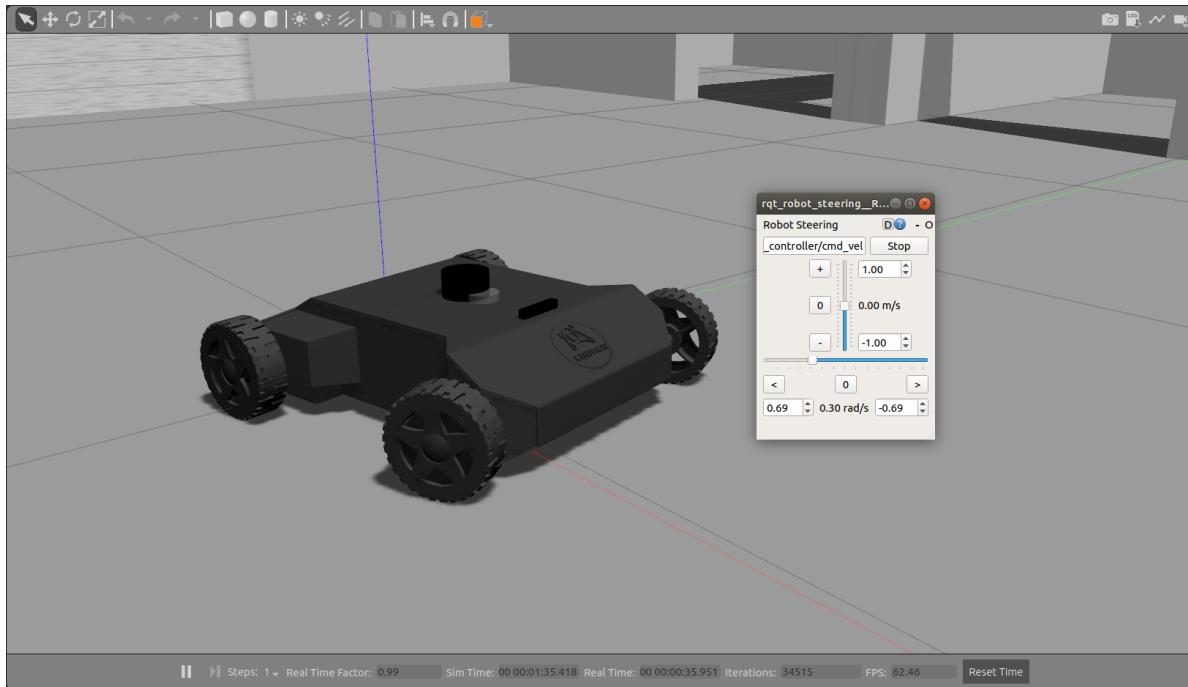


Step 3: launch steer\_mini\_gazebo's launch file. visualize the urdf in Gazebo and try to control neor\_mini .

```
#show the neor_mini_gazebo.urdf in Gazebo
cd ~/neor_mini/mini_sim18_ws
source devel/setup.bash
roslaunch steer_mini_gazebo steer_mini_sim.launch
```

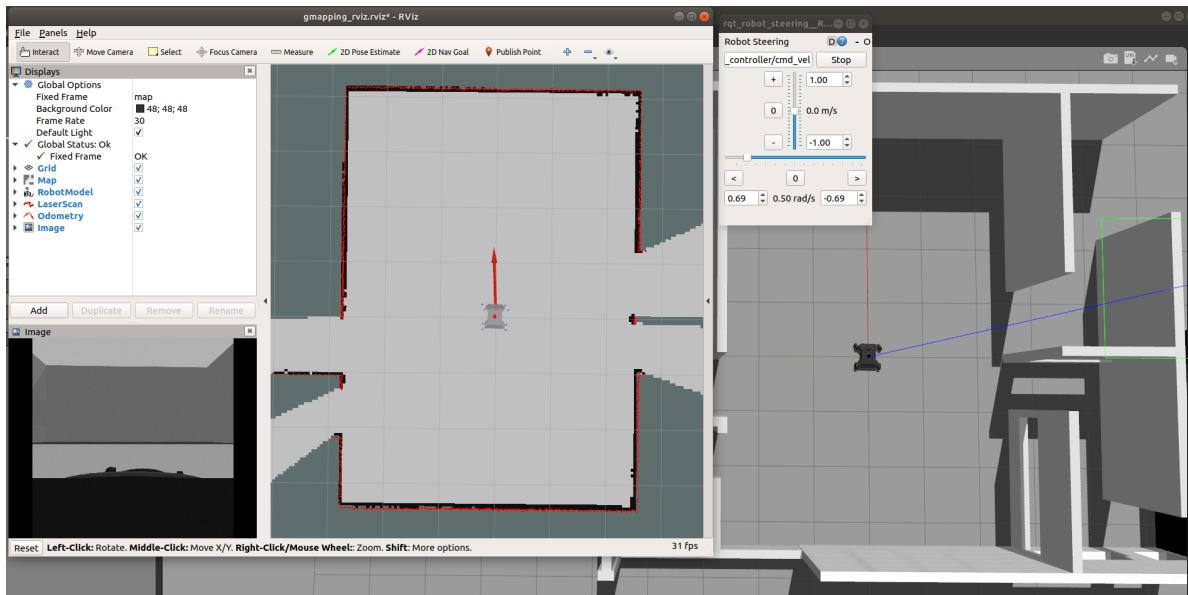


```
#show the neor_mini_gazebo_sensors.urdf in Gazebo
cd ~/neor_mini/mini_sim18_ws
source devel/setup.bash
roslaunch steer_mini_gazebo steer_mini_sim_sensors.launch
```



#### Step 4 : Gmapping with neor\_mini urdf

```
# launch gmapping_steer_mini_sim.launch file and construction map
cd ~/neor_mini/mini_sim18_ws
source devel/setup.bash
roslaunch mini_gmapping gmapping_steer_mini_sensors.launch
```



When you think the construction map is finished, Open a new terminal, you can run the below command to save the map.

```

cd ~/neor_mini/mini_sim18_ws/
source devel/setup.bash
cd src/mini_gmapping/map
rosrun map_server map_saver -f cooneo_office_map # You can saved as another name

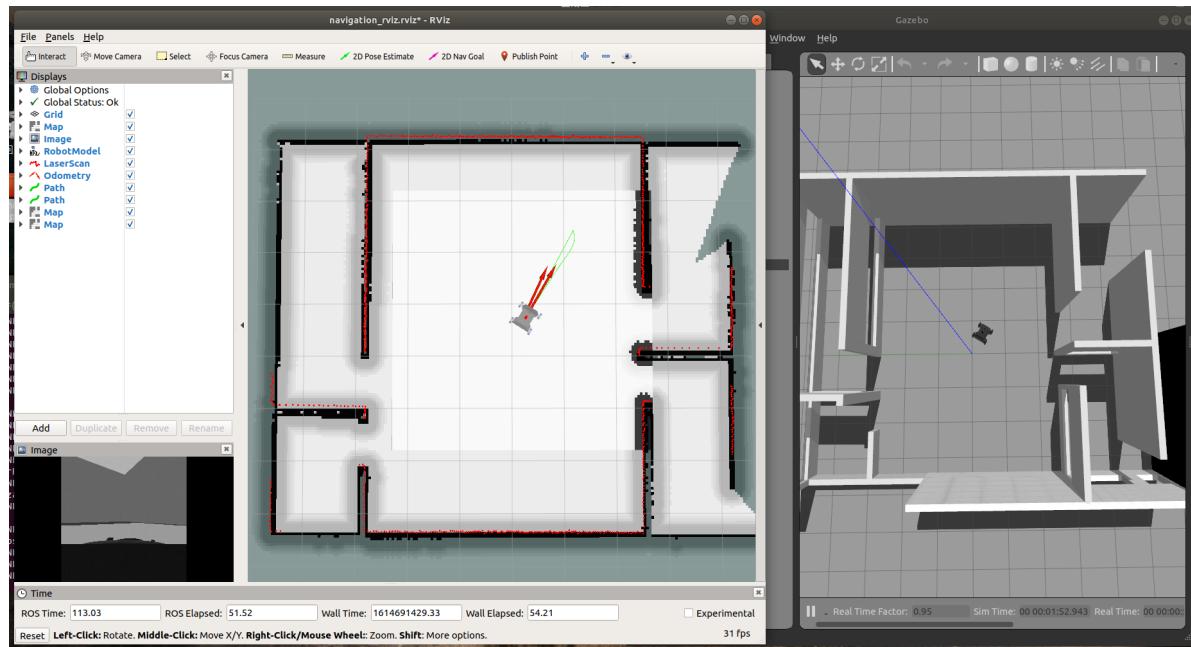
```

Step 5 : Using cooneo\_office\_map to make a navigation demo.

```

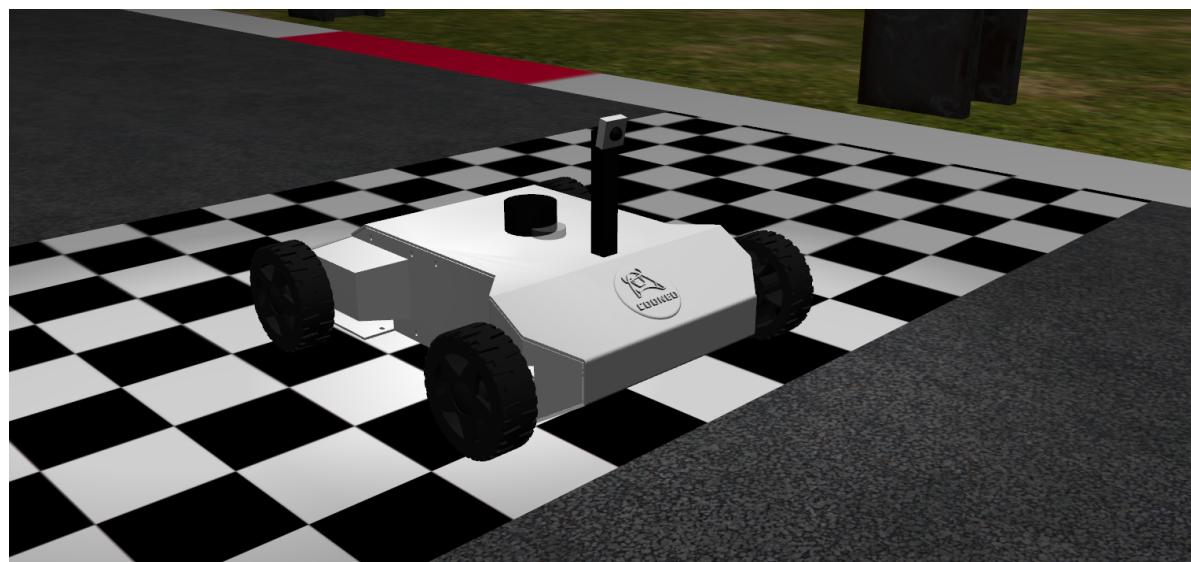
cd ~/neor_mini/mini_sim18_ws/
source devel/setup.bash
roslaunch mini_navigation navigation_steer_mini_sensors.launch # start a navigation demo

```



When you run up the list launch file, your monitor will show two windows, one is Rviz, another is Gazebo. looking at the rviz window up toolbar, you need to click "2D Nav Goal", and select a navigation goal on the map, soon the neor\_mini model car will plan a route, and arrived.

## Chapter 2: Make a outdoor line-tracking mobile robot



Step 1 : Copy Gazebo-world from neor\_mini\_linetrack/models folder

```
# open a Terminal  
cp -r ~/neor_mini/mini_sim18_ws/src/neor_mini_linetrack/models/* ~/gazebo/models/
```

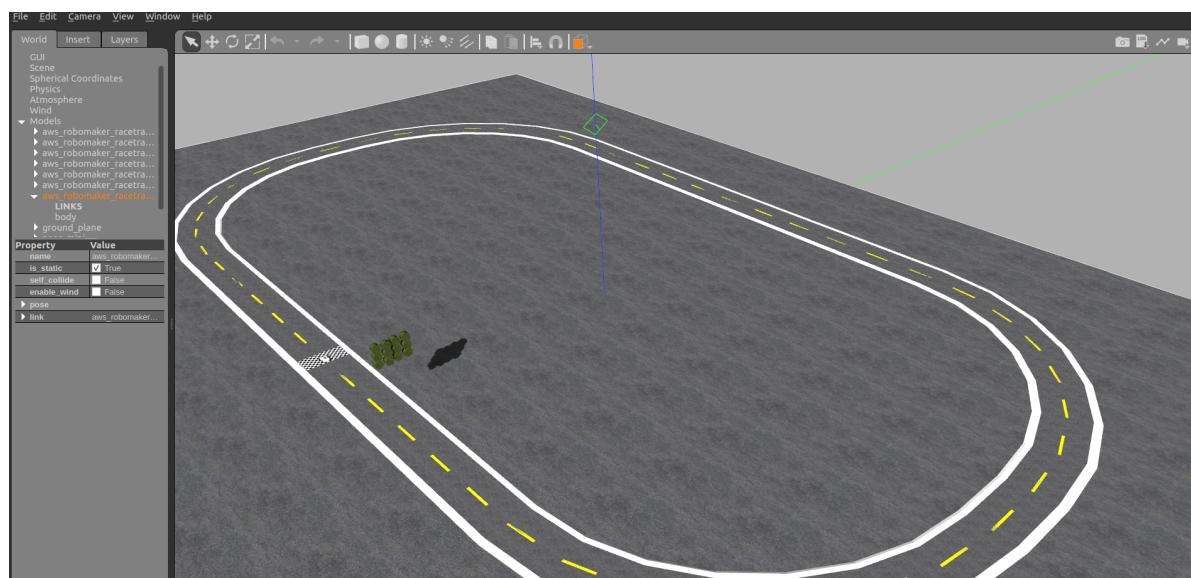
and you will see four new folder in your ./gazebo/models folder as follows:



Step 2 : launch neor\_mini\_linetrack package launch file

```
# open a Terminal  
cd ~/neor_mini/mini_sim18_ws/  
catkin_make # compile you all ros node in you workspace  
source devel/setup.bash  
roslaunch neor_mini_linetrack neor_mini_linetrack_day.launch
```

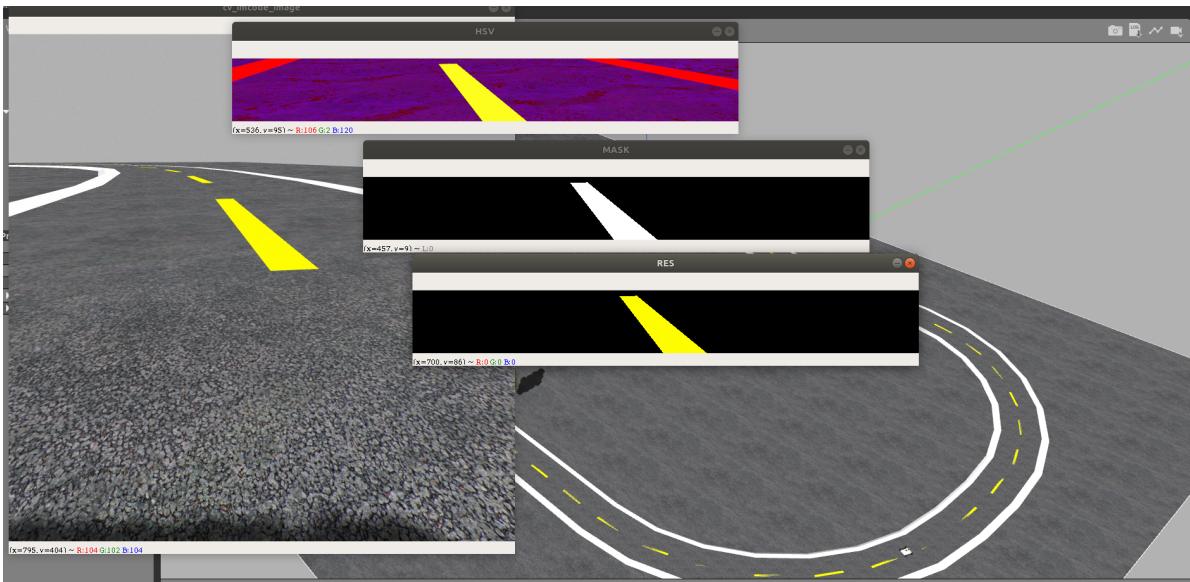
and you will see:



Step 3: rosrun line-tracking python node

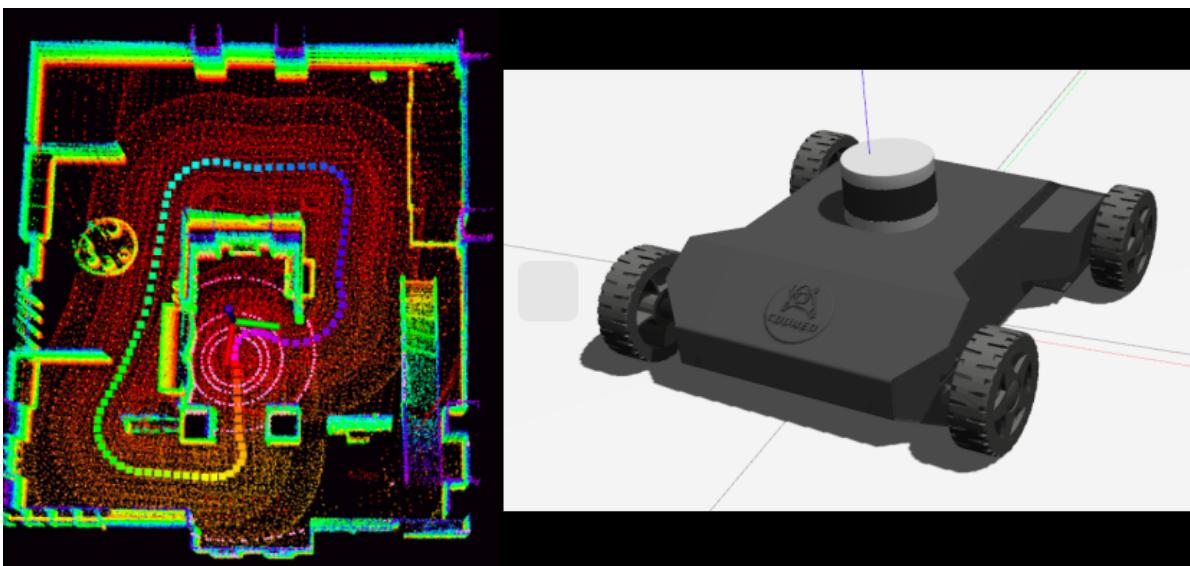
```
# open a Terminal  
cd ~/neor_mini/mini_sim18_ws/  
source devel/setup.bash  
rosrun neor_mini_linetrack line_follower_object.py
```

and you will see four new windows ,it's like this:



Congratulations!!! you will see the neor\_mini urdf model running automatically using the data from the camera.

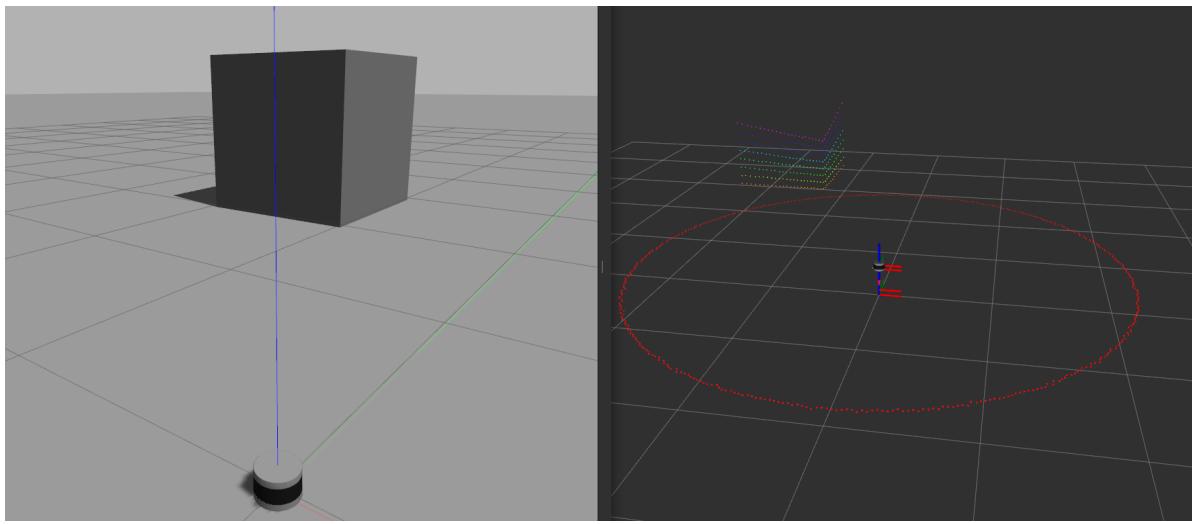
## Chapter 3: Velodyne-16 & Lego\_LOAM 3D Mapping



Step 1: launch velodyne\_simulator ROS package, and you will see:

```
# open a Terminal
cd ~/neor_mini/minisim18_ws/
source devel/setup.bash

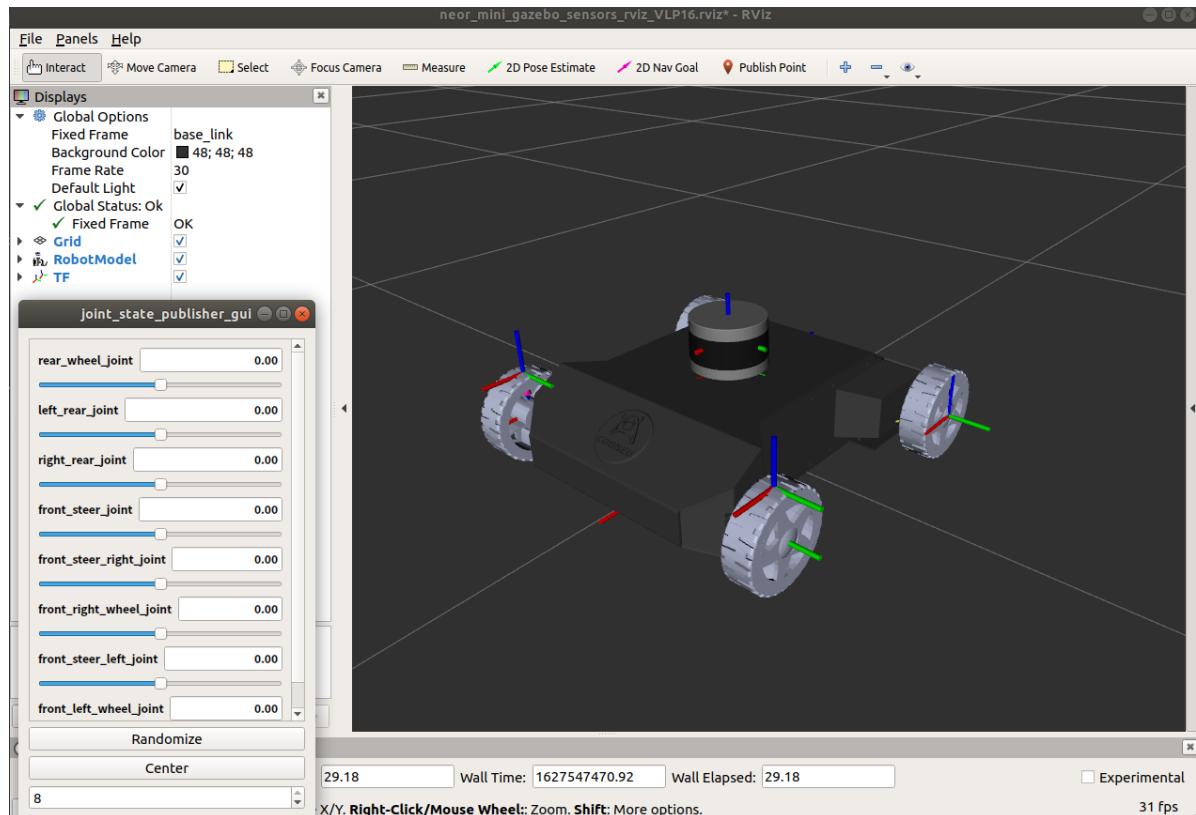
# launch VLP-16
rosrun velodyne_description velodyne_16.launch
```



### Step 2: Install the Velodyne-16 on the neor\_mini

```
# open a Terminal
cd ~/neor_mini/minisim18_ws/
source devel/setup.bash

# start launch file and see neor_mini + vlp-16 in Rviz
roslaunch neor_mini display_gazebo_sensors_VLP16.launch
```

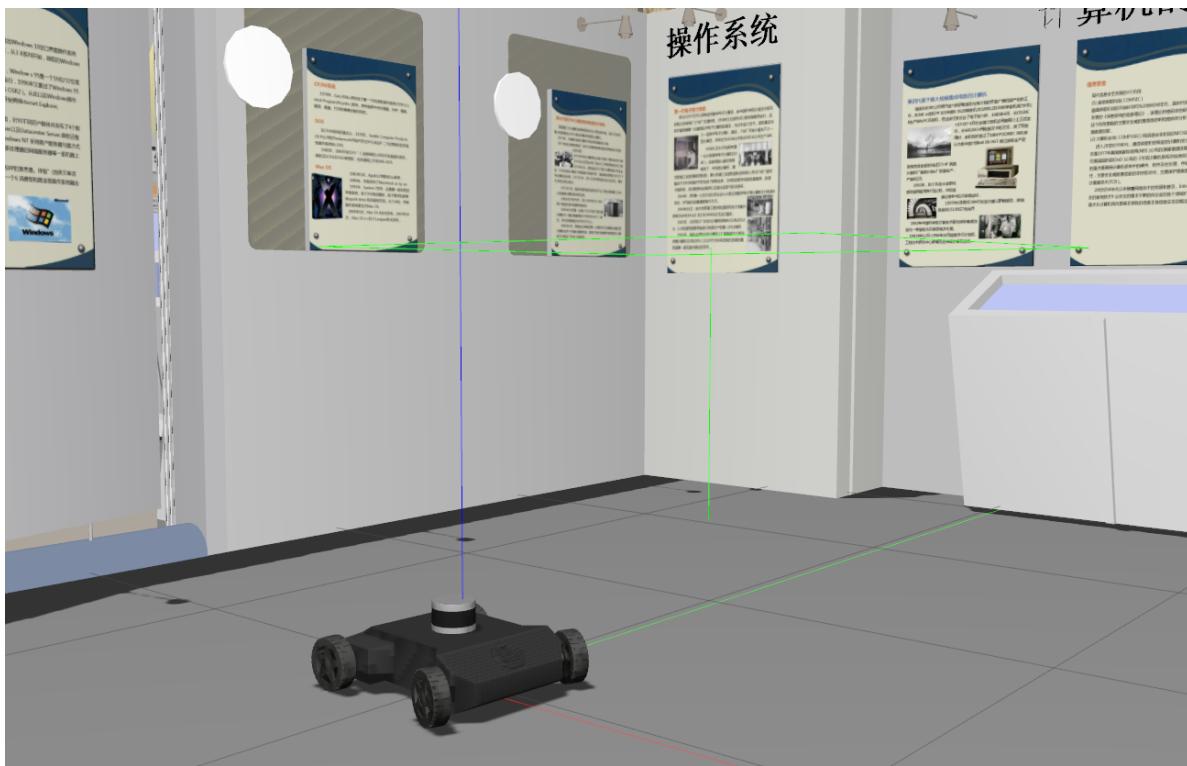


### Step 3: launch the neor\_mini+vlp16 model in Gazebo

```
# open a Terminal and add the museum model world into Gazebo's model folder
cp -r ~/neor_mini/mini_sim18_ws/src/neor_mini/models/* ~/.gazebo/models/

# open a Terminal
cd ~/neor_mini/mini_sim18_ws/
source devel/setup.bash

# start launch file and see neor_mini + vlp-16 in Gazebo
roslaunch steer_mini_gazebo steer_mini_sim_sensors_VLP16.launch
```



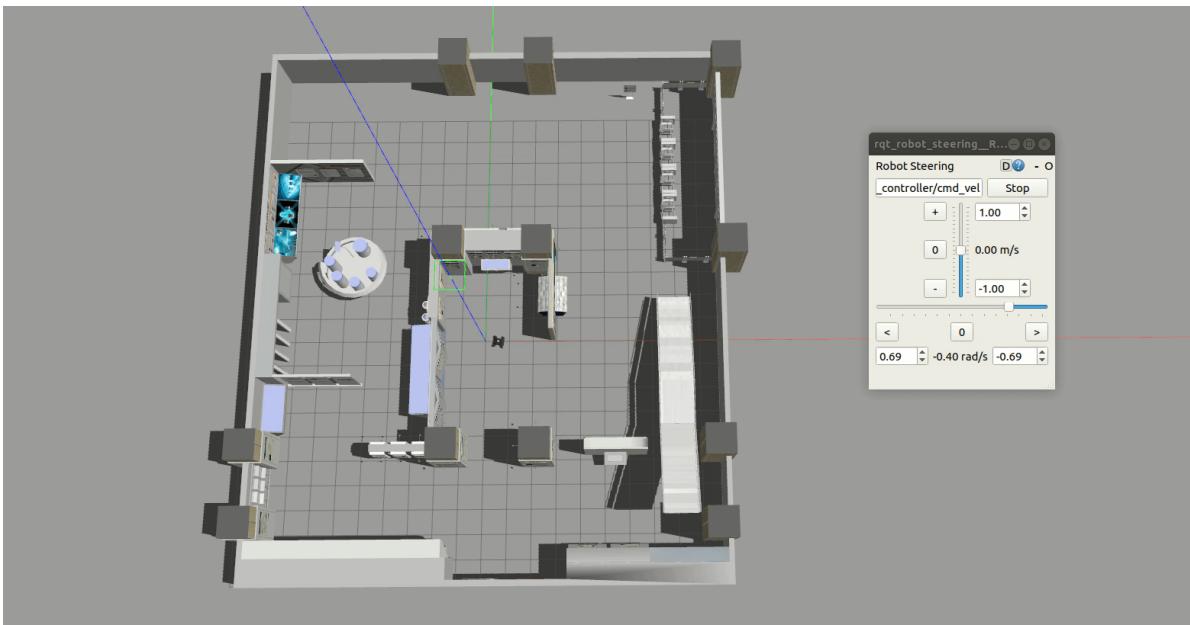
(Gazebo from: *iscas\_museum.world* )

#### Step 4: Record the data collected by VLP-16 in Gazebo

```
# open a Terminal
cd ~/neor_mini/mini_sim18_ws/
source devel/setup.bash
roslaunch steer_mini_gazebo steer_mini_sim_sensors_VLP16.launch

# open another Terminal and record VLP-16 data By rosbag
cd ~/neor_mini/mini_sim18_ws/
rosbag record -a

# and then, control the neor_mini traverses the iscas_museum world
```

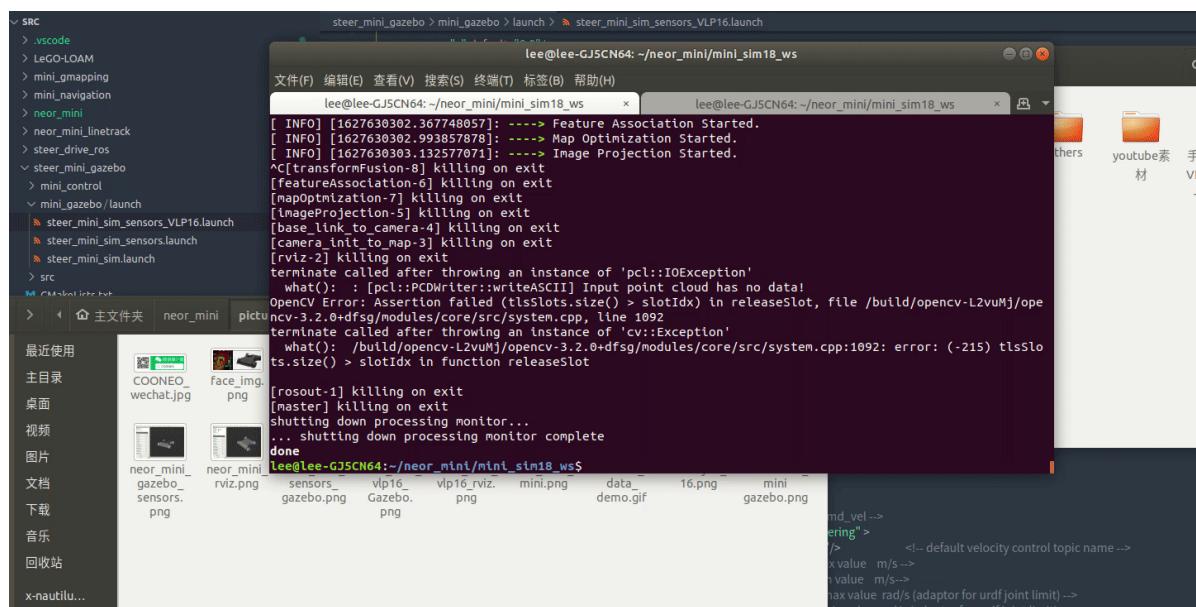


### Step 5: Play the Record data && Mapping by Lego\_Loam

```
# open a Terminal
cd ~/neor_mini/minisim18_ws/
source devel/setup.bash
roslaunch lego_loam run.launch

# open another Terminal and "cd" in your bag file folder
cd ~/neor_mini/minisim18_ws/
source devel/setup.bash
rosbag play ####.bag      # replace with your own or current bag file's name

# and then, you will see mapping by Leg_Loam
```



Congratulations!!! You can run Velodyne-16 Lidar in Gazebo with neor\_mini and Mapping by Lego\_Loam.

The Lego\_loam ROS Package from The RobustFieldAutonomyLab.

```
@inproceedings{legoloam2018,  
  title={LeGO-LOAM: Lightweight and Ground-Optimized Lidar Odometry and Mapping on Variable  
  Terrain},  
  author={Shan, Tixiao and Englot, Brendan},  
  booktitle={IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)},  
  pages={4758-4765},  
  year={2018},  
  organization={IEEE}  
}
```

2021.07.30

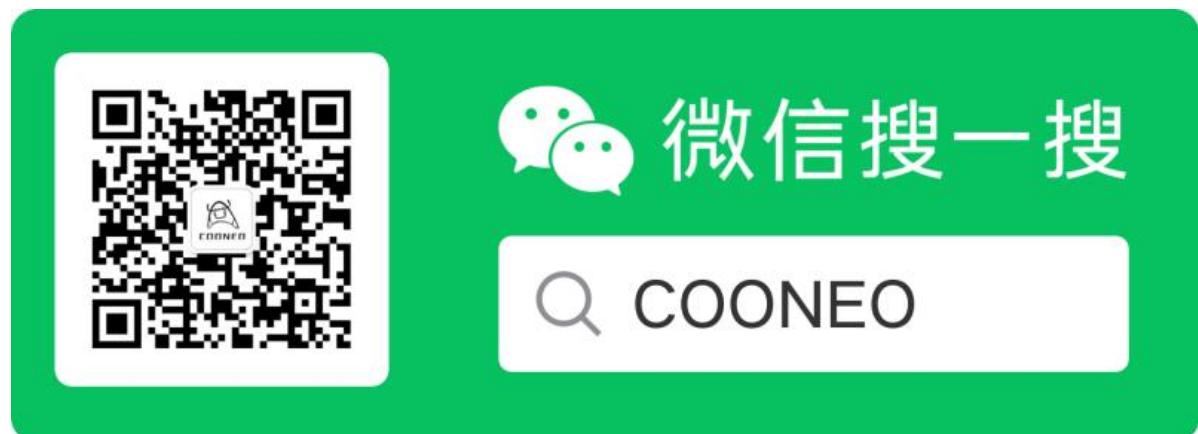
author:ZhaoXiang Lee

COONEO Co.,Ltd

Web:<http://cooneo.cc>

E: [cooneo@outlook.com](mailto:cooneo@outlook.com)

For more details,you can search "COONEO" in your WeChat.



**neor\_mini**