2、Handheld laser lidar drawing

1.Install the dependency library, take the ros-melodic version as an example.

Input following command in terminal.

```
sudo apt install ros-melodic-moveit ros-melodic-moveit-visual-tools ros-melodic-kdl-* ros-melodic-joint-state-publisher-gui ros-melodic-trac-ik liborocos-kdl-dev ros-melodic-teleop-twist-keyboard ros-melodic-moveit-resources ros-melodic-navigation ros-melodic-gmapping ros-melodic-hector-slam ros-melodic-slam-karto ros-melodic-robot-state-publisher ros-melodic-geographic-msgs ros-melodic-libuvc-* ros-melodic-rtabmap-ros libavformat-dev libavcodec-dev libswresample-dev libswscale-dev libavutil-dev libsdl1.2-dev ros-melodic-pointcloud-to-laserscan ros-melodic-mbf-msgs ros-melodic-mbf-costmap-core ros-melodic-costmap-converter ros-melodic-bfl ros-melodic-serial ros-melodic-teleop-twist-joy ros-melodic-laser-proc ros-melodic-rosserial-arduino ros-melodic-rosserial-python ros-melodic-rosserial-server ros-melodic-rosserial-client ros-melodic-rosserial-msgs ros-melodic-amcl ros-melodic-map-server ros-melodic-urdf ros-melodic-xacro ros-melodic-interactive-markers ros-melodic-octomap* ros-melodic-joy* ros-melodic-dwa-local-planner ros-melodic-multirobot-map-merge python-catkin-tools python3-dev python3-catkin-pkg-modules python3-numpy python3-yaml build-essential ros-melodic-imu-tools ros-melodic-cartographer*
```

2.Start drawing command

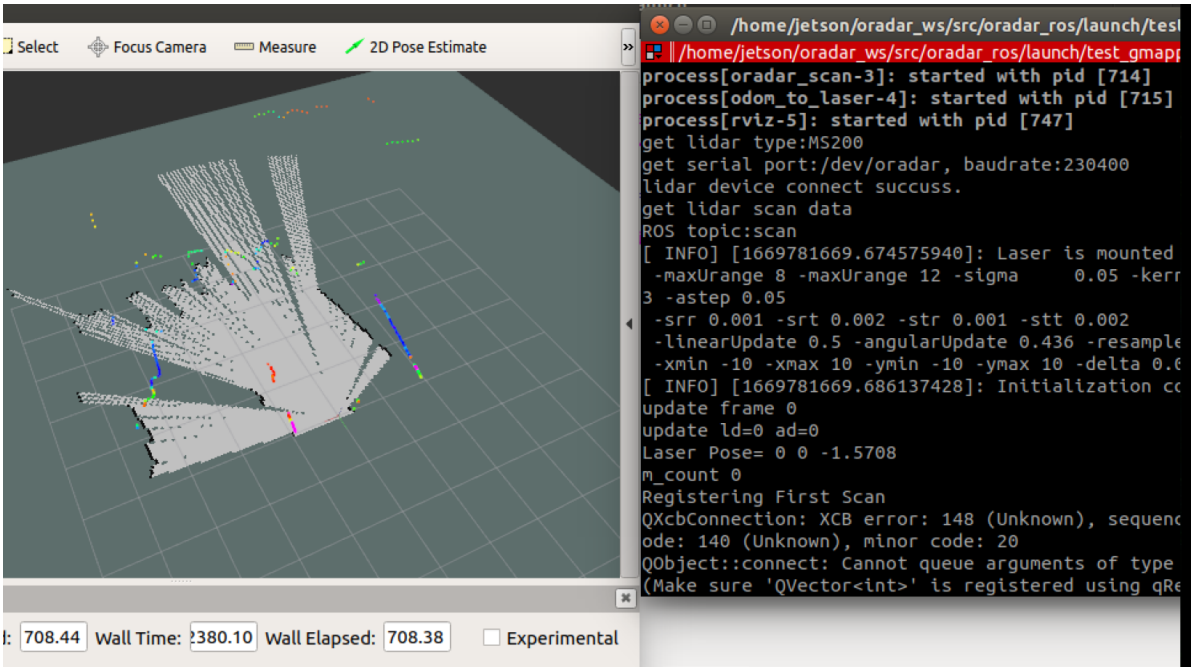
Take the mapping of gmapping as an example.

Input following command in terminal.

```
roslaunch oradar_lidar test_gmapping.launch
```

When the following screen appears, it means that the operation has been successfully.

The following screen shows successful operation.



3、Map saving

Take gmapping as an example.

Input following command in terminal to save map.

```
rosrun map_server map_saver -f ~/oradar_ws/src/oradar_ros/maps/map
```

The map will be saved to~/oradar_ ws/src/oradar_ Under the ros/maps/folder, there is a pgm image and a yaml file.

map.yaml

```
image: map.pgm
resolution: 0.05
origin: [-15.4,-12.2,0.0]
negate: 0
occupied_thresh: 0.65
free_thresh:  0.196
```

Parameter resolution:

- Image: The path of the map file, either absolute or relative
- Resolution: map resolution, m/pixel
- Origin: 2D position (x, y, yaw) in the lower left corner of the map, where yaw rotates counterclockwise (yaw=0 means no rotation
- To). At present, many parts of the system will ignore the yaw value.
- Negate: whether to reverse the meaning of white/black, free/occupied (the interpretation of threshold is not affected)
- occupied_ Threshold: pixels whose occupancy probability is greater than this threshold will be considered as fully occupied.
- free_ Threshold: pixels with occupancy probability less than this threshold will be considered completely free.

4、View relevant information

View tf tree

```
rosrun rqt_tf_tree rqt_tf_tree
```

View node communication.

```
rosrun rqt_graph rqt_graph
```

5、Reference website of algorithm data

5.1、Mapping algorithm

Gmapping：http://wiki.ros.org/gmapping/

hector_slam：http://wiki.ros.org/hector_slam

hector_slam/Tutorials：http://wiki.ros.org/hector_slam/Tutorials/SettingUpForYourRobot

hector_mapping：http://wiki.ros.org/hector_mapping

karto：http://wiki.ros.org/slam_karto

Cartographer：https://google-cartographer.readthedocs.io/en/latest/

Cartographer ROS：https://google-cartographer-ros.readthedocs.io/en/latest/

5.2、Self-built mapping navigation

rrt_exploration：http://wiki.ros.org/rrt_exploration

rrt_exploration/Tutorials：http://wiki.ros.org/rrt_exploration/Tutorials

5.3、Save Map

map_server：https://wiki.ros.org/map_server