1. Introduction and use of radar

1. Program function description

After the program runs, drive 4ROS lidar, open the radar scanning data, and visualize the lidar scanning data in rviz.

2. Program code reference path

Raspberry Pi PI5 master control, you need to enter the docker container first,

The location of the function source code is,

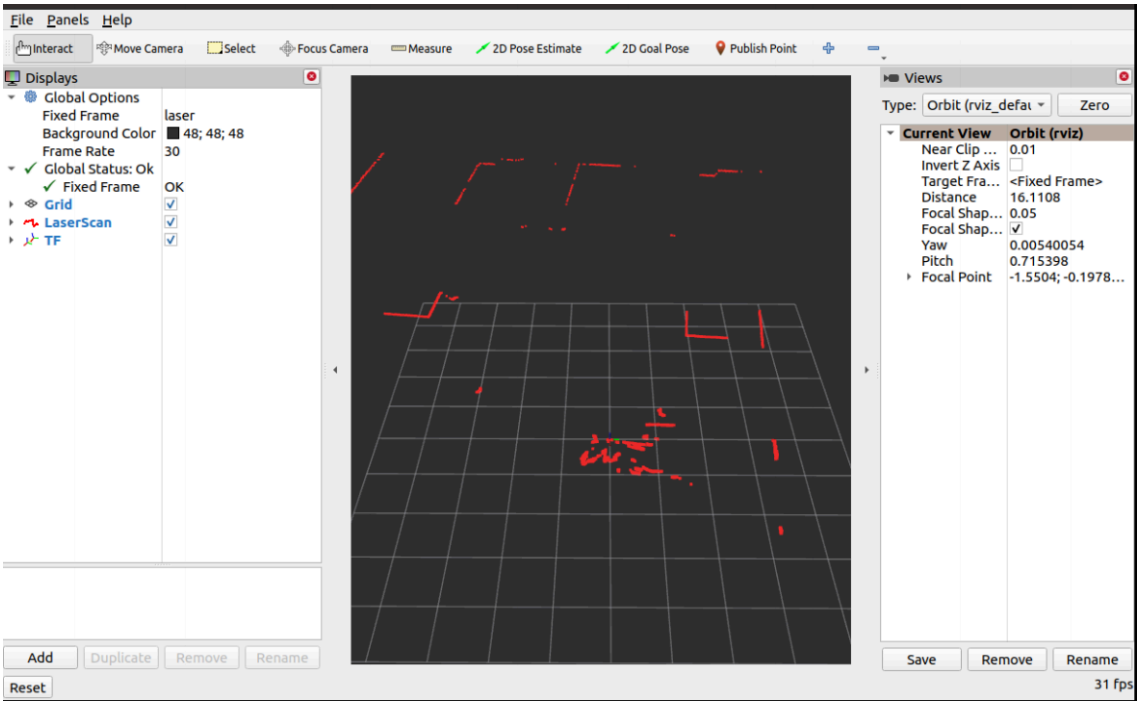
```
~/yahboomcar_ros2_ws/software/library_ws/src/ydlidar_ros2_driver-
master/launch/ydlidar_launch.py
~/yahboomcar_ros2_ws/software/library_ws/src/ydlidar_ros2_driver-
master/launch/view_ydlidar_launch.py
```

3. Program startup

After entering the docker container, enter the docker terminal,

```
ros2 launch ydlidar_ros2_driver ydlidar_launch.py #Start the radar alone
ros2 launch ydlidar_ros2_driver ydlidar_launch_view.py #Start the radar and
rviz to visualize data
```

Run screenshot,



You can use the following command to print the data scanned by the radar,

```
ros2 topic echo /scan
```

```
---
header:
  stamp:
    sec: 1677917683
    nanosec: 381620000
  frame_id: laser
angle_min: -3.1415927410125732
angle_max: 3.1415927410125732
angle_increment: 0.0013114559696987271
time_increment: 0.00011590439680730924
scan_time: 0.5552979707717896
range_min: 0.009999999776482582
range_max: 64.0
ranges:
- 0.0
- 0.0
- 0.0
- 0.0
- 0.0
- 0.0
- 0.0
- 0.04724999889731407
- 0.0
- 0.048250000923871994
- 0.04800000041723251
- 0.04899999871850014
- 0.04975000023841858
- 0.0
- 0.0
- 0.0
- 0.0507499985396862
- 0.0
- 0.0
- 0.0
- 0.0
- 0.0
- 0.0
- 0.04874999821186066
- 0.04924999922513962
```


4. 4 Introduction to ROS radar

4.1 Overview

4ROS LiDAR, based on the pulse ToF ranging principle, and equipped with related optical, electrical, and algorithm design, realizes high-frequency and high-precision distance measurement. At the same time, the mechanical structure rotates 360 degrees to continuously obtain angle information, thereby realizing 360-degree scanning ranging and outputting point cloud data of the scanning environment.

4.2. Distance measurement principle

TOF distance measurement method: TOF laser radar is based on measuring the flight time of light to obtain the distance of the target object. Its working principle is mainly manifested in that a laser

transmitter emits a modulated laser signal, which is reflected by the object to be measured and received by the laser detector. The distance of the target can be calculated by measuring the phase difference between the emitted laser and the received laser.

4.3. Performance parameters

项目	最小值	典型值	最大值	单位	备注
测距频率	/	20000	/	Hz	/
扫描频率	5	7	12	Hz	软件调速，出厂默认 7Hz
测距范围	0.05	/	30	m	80%反射率
扫描角度	/	0-360	/	Deg	/
角度分辨率	0.09@5Hz	0.13@7Hz	0.22@12Hz	Deg	测距频率为 20KHz
激光水平度	0	/	1	Deg	/

4.4. Distance measurement accuracy

距离(mm)	平均误差(mm)
50-5000	≤±60
5000-20000	≤±40
20000-30000	≤±100

4.5. Product features

- Dustproof and waterproof, meeting IP65
- 360-degree full-range scanning, 5-12Hz adjustable scanning frequency
- High-speed distance measurement, distance measurement frequency 20000Hz
- Small distance measurement error, good distance measurement stability
- Strong resistance to ambient light interference