1. Introduction and use of lidar

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Before driving the laser lidar, you need to identify the olidar lidar device on the car side. The environment has been set up in the system image. After connecting to the car through SSH or VNC, enter in the terminal:

```
ll /dev/olidar
```

The result shows lidar and its corresponding port, indicating that the lidar device is connected successfully. If no result is displayed, you can try to re-plug the lidar USB.

1.1, Program Function Description

After the program runs, start the olidar MS200 laser lidar, turn on the lidar scanning data, and visualize the laser lidar scanning data in rviz on the virtual machine side.

1.2, Program code reference path

After SSH connects to the car, the function source code for starting the lidar is located at,

```
/home/sunrise/software/library_ws/src/olidar_lidar/launch/ms200_scan.launch
```

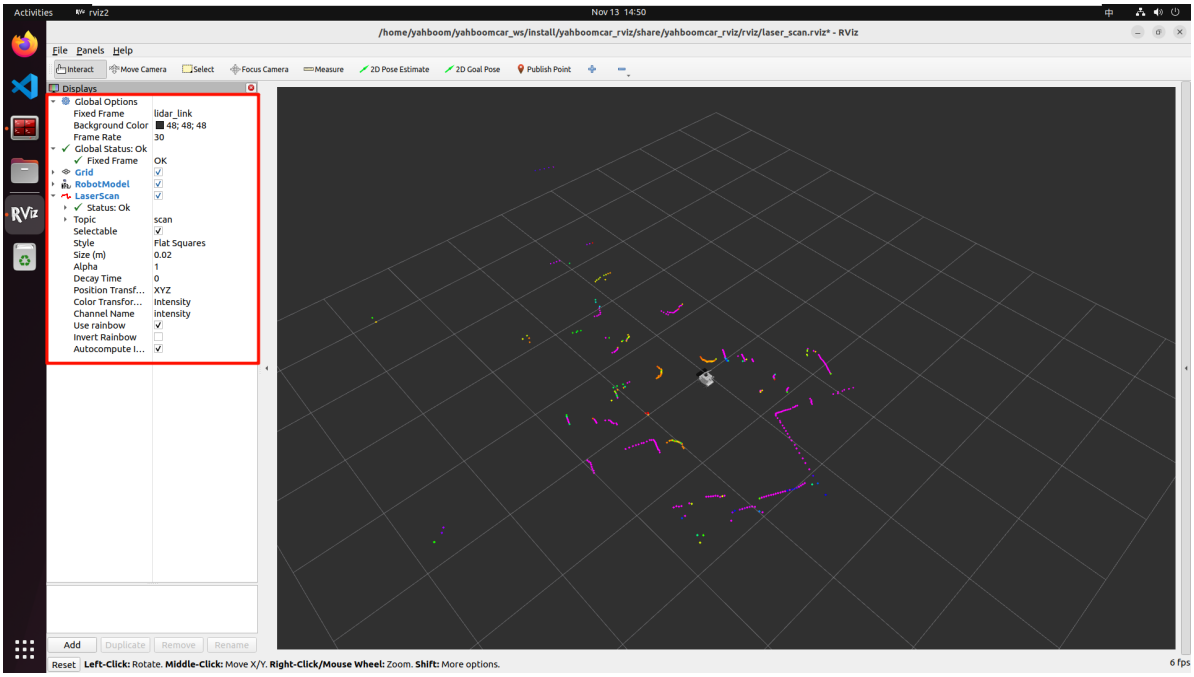
1.3, Program startup

After SSH connects to the car, run in the terminal,

```
ros2 launch olidar_lidar ms200_scan.launch.py
```

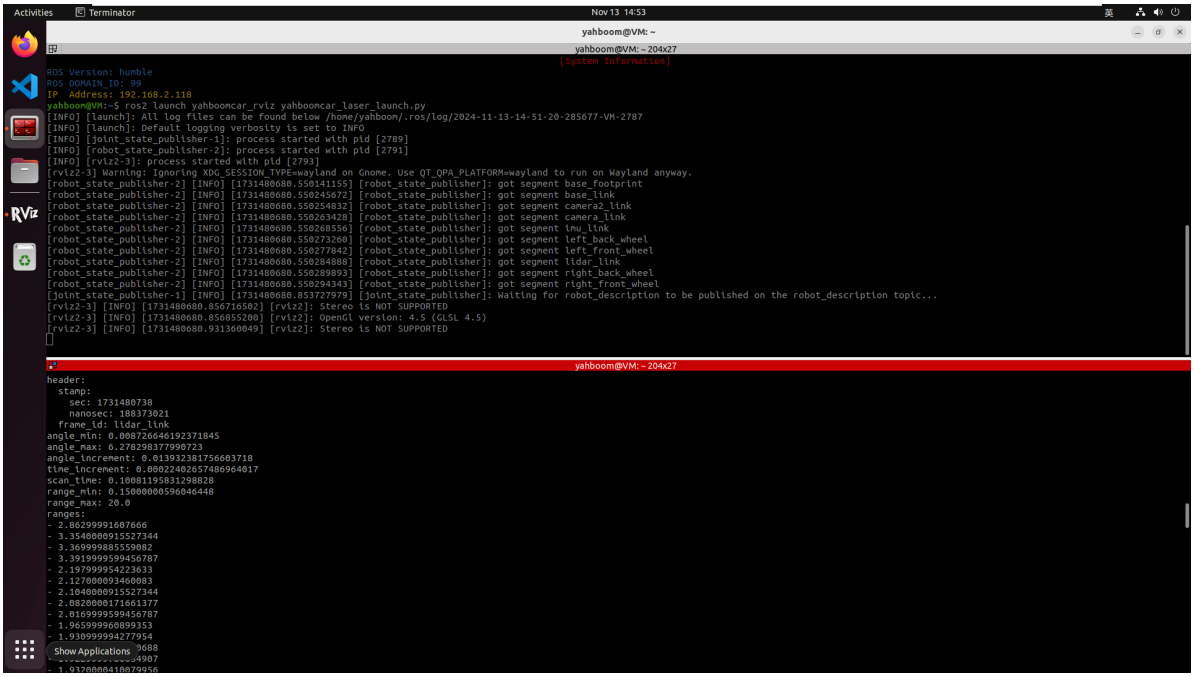
Open the virtual machine terminal and run,

```
ros2 launch yahboomcar_rviz yahboomcar_laser_launch.py
```



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

```
ros2 topic echo /scan
```



1.4, Introduction to MS200 lidar

1.4.1, Overview

Single-line laser lidar refers to a lidar whose laser source emits a single-line beam. It is divided into triangulation and TOF laser lidar, and is mainly used in the field of robots. It has fast scanning speed, high resolution and high reliability. Compared with multi-line laser lidar, single-line laser lidar has faster response in angular frequency and sensitivity, so it is more accurate in the distance and accuracy of obstacle measurement.

1.4.2, Distance measurement principle

The measurement principle of Oruida MS200 is TOF ranging method.

TOF laser lidar is based on measuring the flight time of light to obtain the distance of the target object. Its working principle is mainly manifested as a beam of modulated laser signal emitted by a laser transmitter, which is received by a laser detector after being reflected by the object to be measured. The distance of the target can be calculated by measuring the phase difference between the emitted laser and the received laser.

1.4.3 Baud rate

The baud rate used by the MS200 lidar is 230400.

1.4.4 Specifications

Product Model	MS200e	Instruction
Measuring range	0.03m~12.0m	90% reflectivity
Measurement accuracy	Typical value: ±10mm [0.2m~ 2.0m) ±20mm [2.0m~12.0m] Maximum value: ±40mm [0.2m~12.0m]	Statistical results of at least 100 radar acquisitions at room temperature indoors at 90 per cent reflectivity. Accuracy is the difference between the mean and the true value of the data, and precision is the sample standard deviation of the data (1σ)
Measurement accuracy	Typical value: ≤4mm [0.2m~2.0m) ≤15mm [2.0m~12.0m] Maximum value: ≤15mm [0.2m~2.0m) ≤30mm [2.0m~12.0m]	
Data Information	Distance, angle, intensity, timestamp	-
Scan Angle	360°	-
counting frequency	4500 points/second	-
rotational angle	7~15Hz, default 10Hz	Configurable, 1Hz interval
angular resolution	0.8°@10Hz	Angular resolution related to point frequency
Laser Output Pitch Angle	0.5°~2°	Based on the bottom surface of the outer frame of the lidar base
Laser zero degree exit azimuth	0±2°	-
laser wavelength	near infrared	-
human eye security level	Class 1 IEC60825-1:2014	-
Ambient light resistance	30,000Lux	-
working life	≥10,000 hours	Based on 600rpm test
Working power	DC 5.0±0.5V	-
voltage ripple	<100mV	-
Start-up current	<500mA	-
Working Current	typical value 260mA	-
working temperature	-10℃~50℃	typical value 25℃
Storage temperature	-30℃~70℃	typical value 25℃
Protection level	IP5X	-
Product Size	37.7*37.5*33.0	Length X Width X Height (in mm)
net weight	About 40g	-
accreditation	RoHS2.0, REACH, CE, FCC	-

Among them, the parameters such as ranging range, measurement accuracy, rotation speed, and angular resolution are all important indicators of lidar working performance.