

ROS2 environment entity mechanical dog navigation

Quick use

1. Power on the mechanical dog

PI4 version steps:

Press the power switch on the side of the mechanical dog and wait for the mechanical dog to start up. And connect the robot dog's WiFi to the same LAN environment as the computer.



After the mechanical dog is started, the laser radar, imu, and mechanical dog joint status nodes have been automatically started.

If you find that you cannot obtain lidar and other data, please close the mechanical dog program and restart the chassis program.

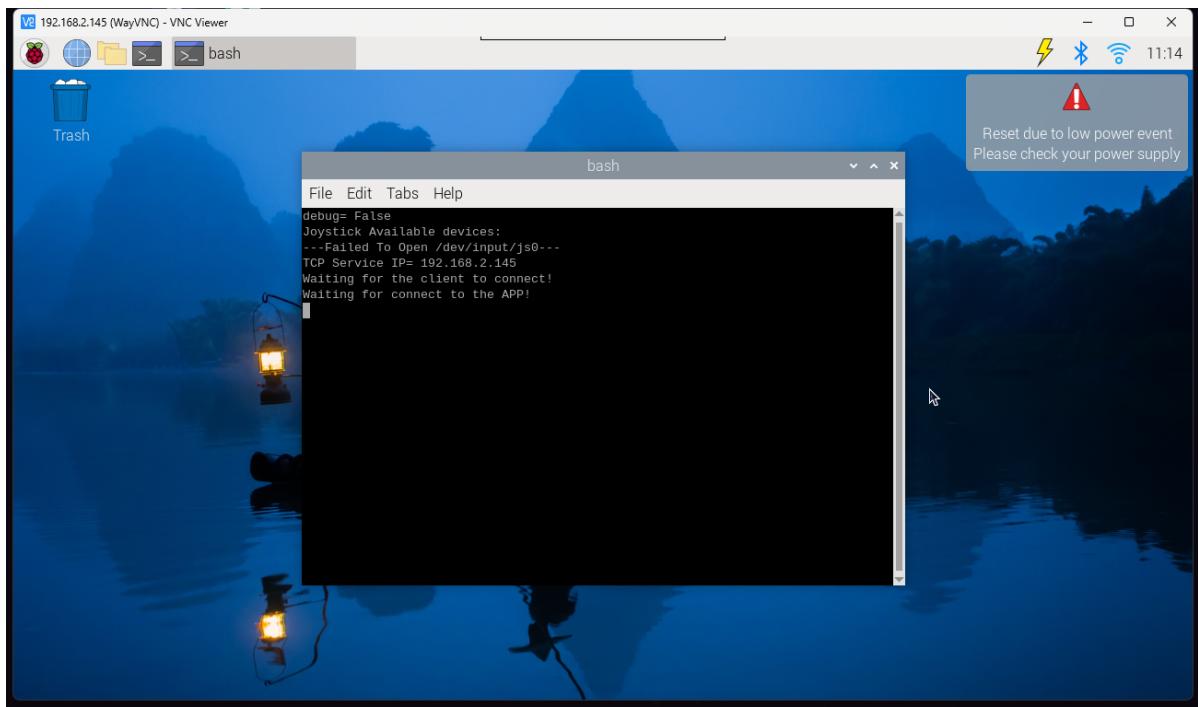
To close the large program, restart the chassis and modify the multi-level communication ID, please refer to the tutorial: 14. Radar mapping navigation\6. Obtaining the status of the physical mechanical dog in the ROS2 environment\Acquiring the real joint data of the mechanical dog in the ROS2 environment.pdf

PI5 version steps:

Press the power switch on the side of the mechanical dog and wait for the mechanical dog to start up. And connect the robot dog's WiFi to the same LAN environment as the computer.



After the mechanical dog is started, remotely connect to the mechanical dog through the IP address on the OLED.



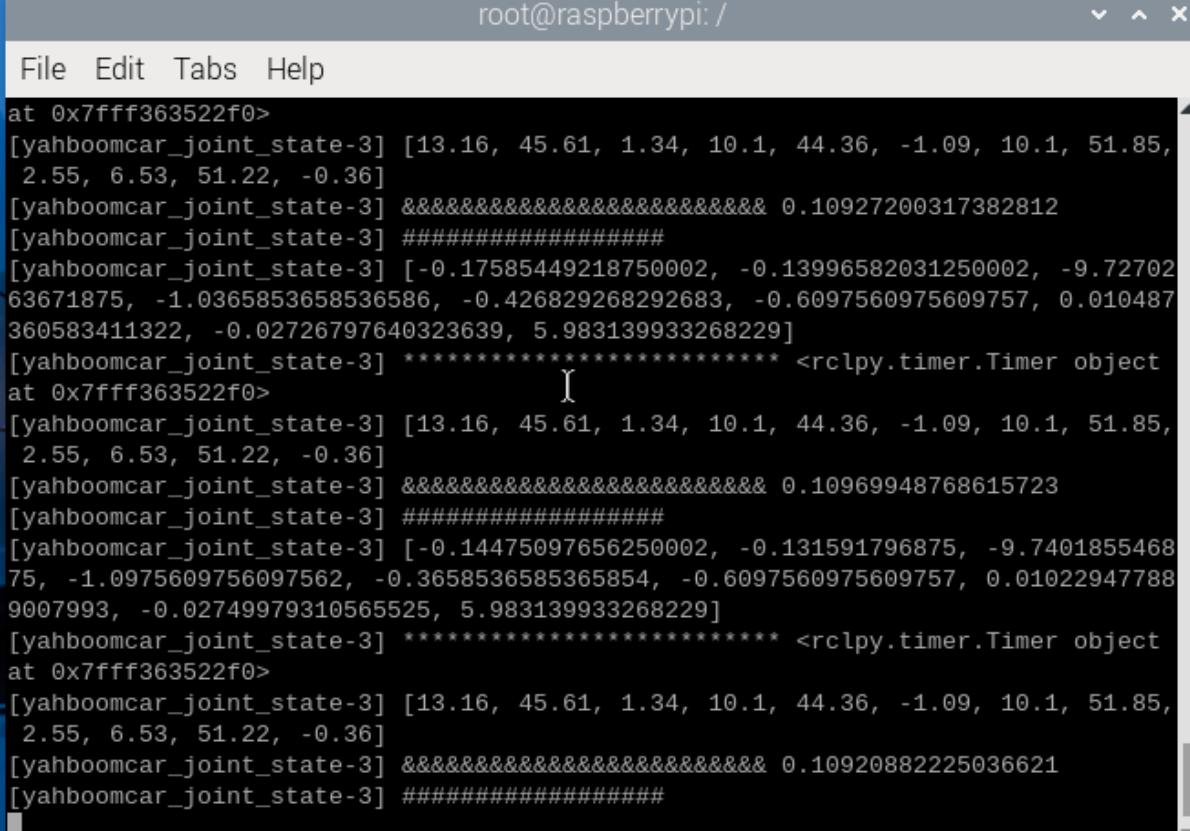
Then `ctrl+c` closes the large program and enter the following command to enter docker:

```
./run_humble.sh
```

```
TCP Service IP= 192.168.2.145
Waiting for the client to connect!
Waiting for connect to the APP!
^CKeyboardInterrupt
2024-04-28T10:17:27Z
-----program end-----
pi@raspberrypi:~ $ ./run_humble.sh
access control disabled, clients can connect from any host
root@raspberrypi:/#
```

Then enter the following commands in the docker terminal to start the car radar, imu, and mechanical dog joint status nodes.

```
ros2 launch bringup Navigation_bringup.launch.py
```



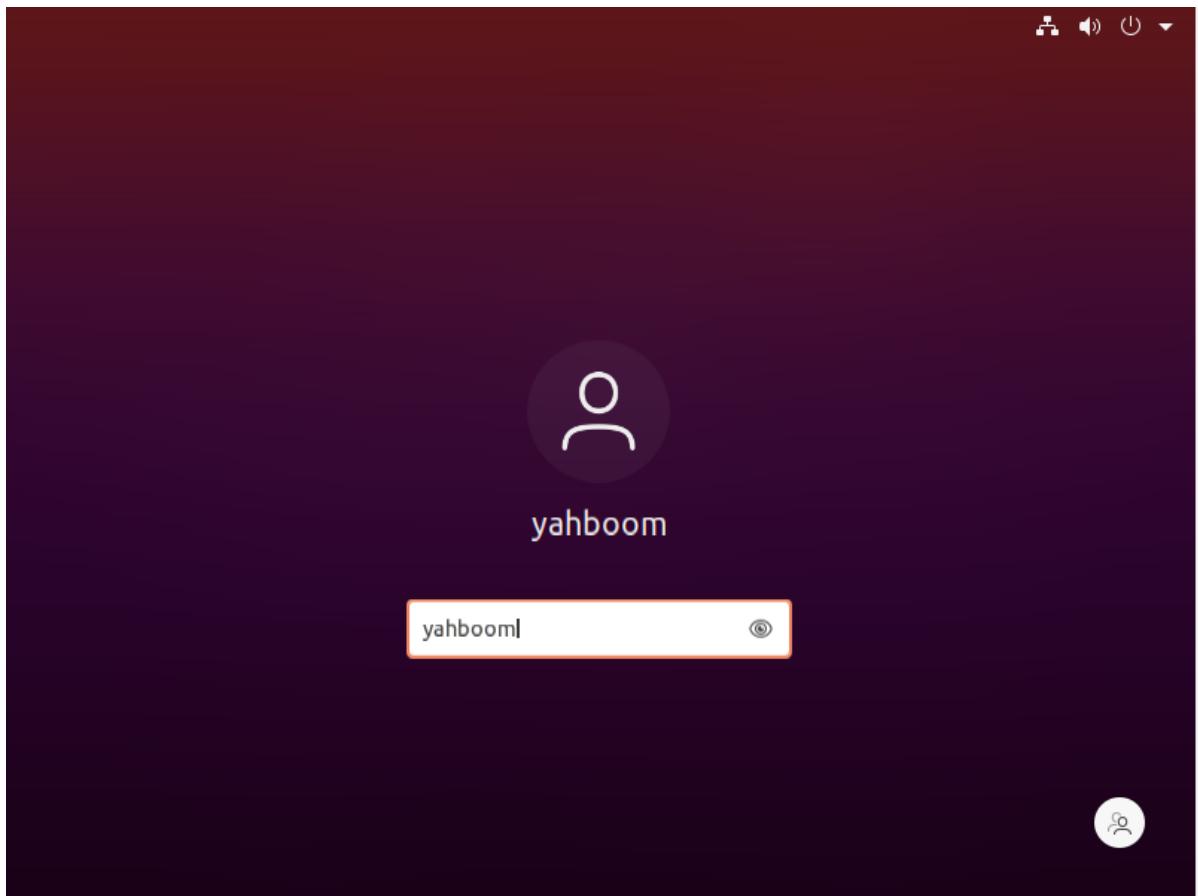
The screenshot shows a terminal window titled 'root@raspberrypi: /'. The window contains a list of ROS 2 messages. The messages are repeated multiple times, indicating periodic updates. Each message block starts with 'at 0x7fff363522f0>' followed by a list of sensor readings. The readings include coordinates and other sensor-specific data. The messages are as follows:

```
at 0x7fff363522f0>
[yahboomcar_joint_state-3] [13.16, 45.61, 1.34, 10.1, 44.36, -1.09, 10.1, 51.85,
 2.55, 6.53, 51.22, -0.36]
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&& 0.10927200317382812
[yahboomcar_joint_state-3] #####
[yahboomcar_joint_state-3] [-0.17585449218750002, -0.13996582031250002, -9.72702
63671875, -1.0365853658536586, -0.426829268292683, -0.6097560975609757, 0.010487
360583411322, -0.02726797640323639, 5.983139933268229]
[yahboomcar_joint_state-3] **** <rclpy.timer.Timer object
at 0x7fff363522f0> [
[yahboomcar_joint_state-3] [13.16, 45.61, 1.34, 10.1, 44.36, -1.09, 10.1, 51.85,
 2.55, 6.53, 51.22, -0.36]
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&& 0.10969948768615723
[yahboomcar_joint_state-3] #####
[yahboomcar_joint_state-3] [-0.14475097656250002, -0.131591796875, -9.7401855468
75, -1.0975609756097562, -0.3658536585365854, -0.6097560975609757, 0.01022947788
9007993, -0.02749979310565525, 5.983139933268229]
[yahboomcar_joint_state-3] **** <rclpy.timer.Timer object
at 0x7fff363522f0> [
[yahboomcar_joint_state-3] [13.16, 45.61, 1.34, 10.1, 44.36, -1.09, 10.1, 51.85,
 2.55, 6.53, 51.22, -0.36]
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&& 0.10920882225036621
[yahboomcar_joint_state-3] #####
```

2. Open the virtual machine

Note: The default virtual machine has been installed here.

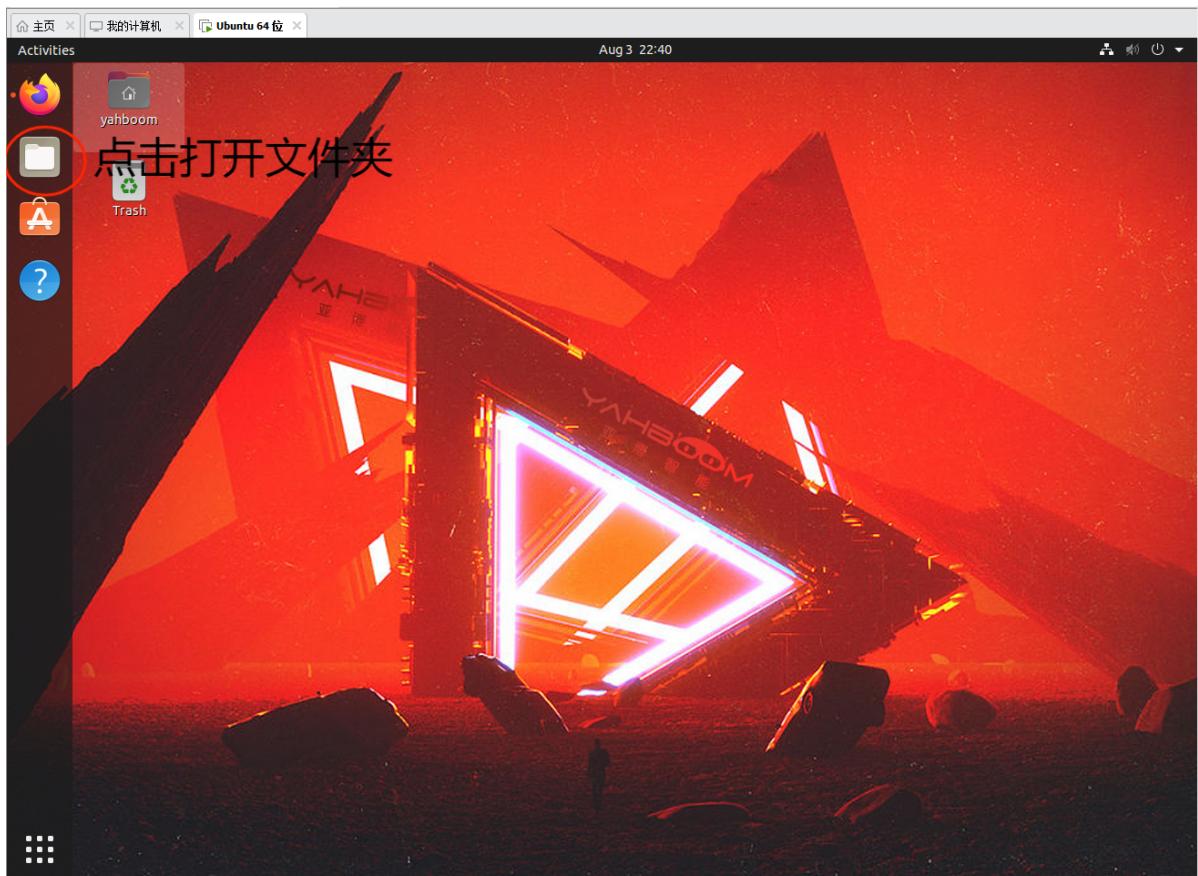
Open the virtual machine, enter the password: yahboom and press the Enter key to enter the system desktop.



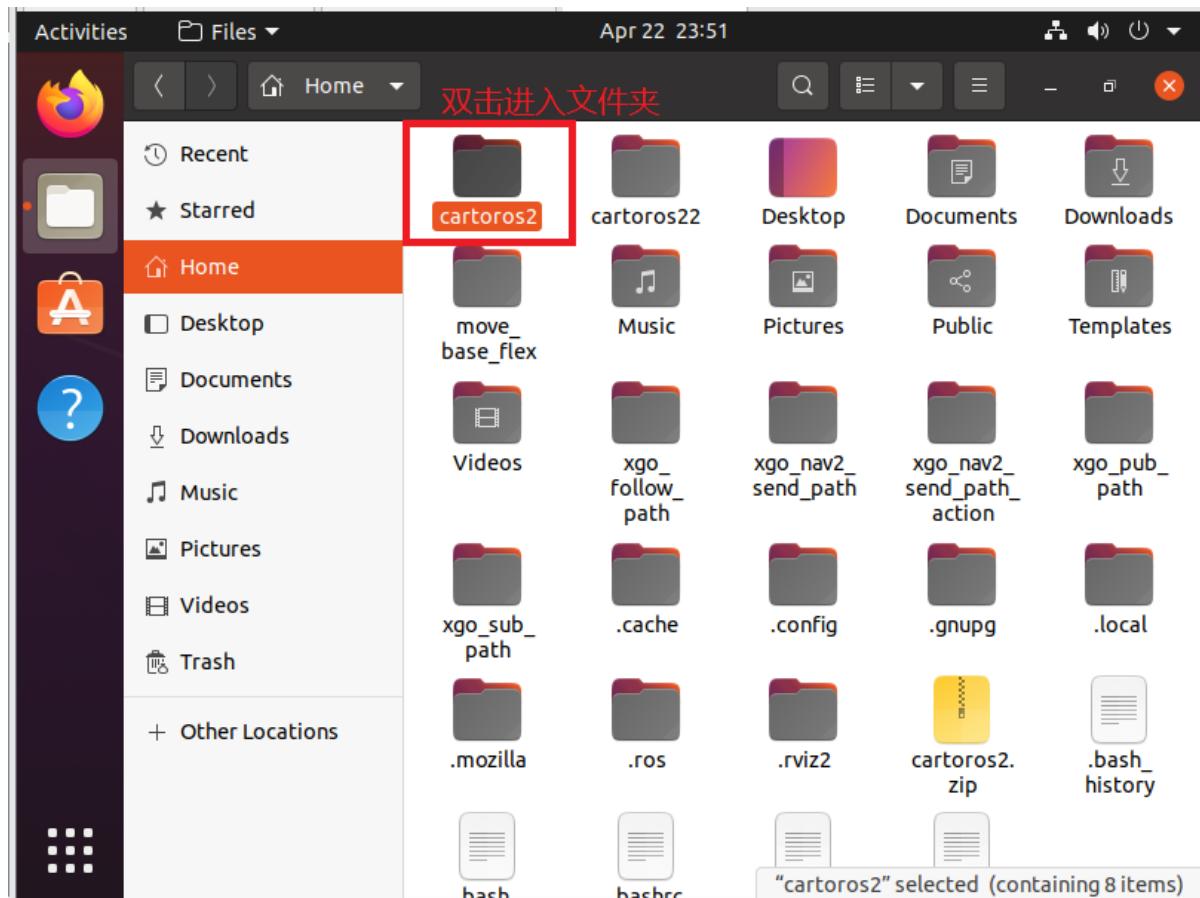
3. Start the mechanical dog navigation node

PI4 version steps:

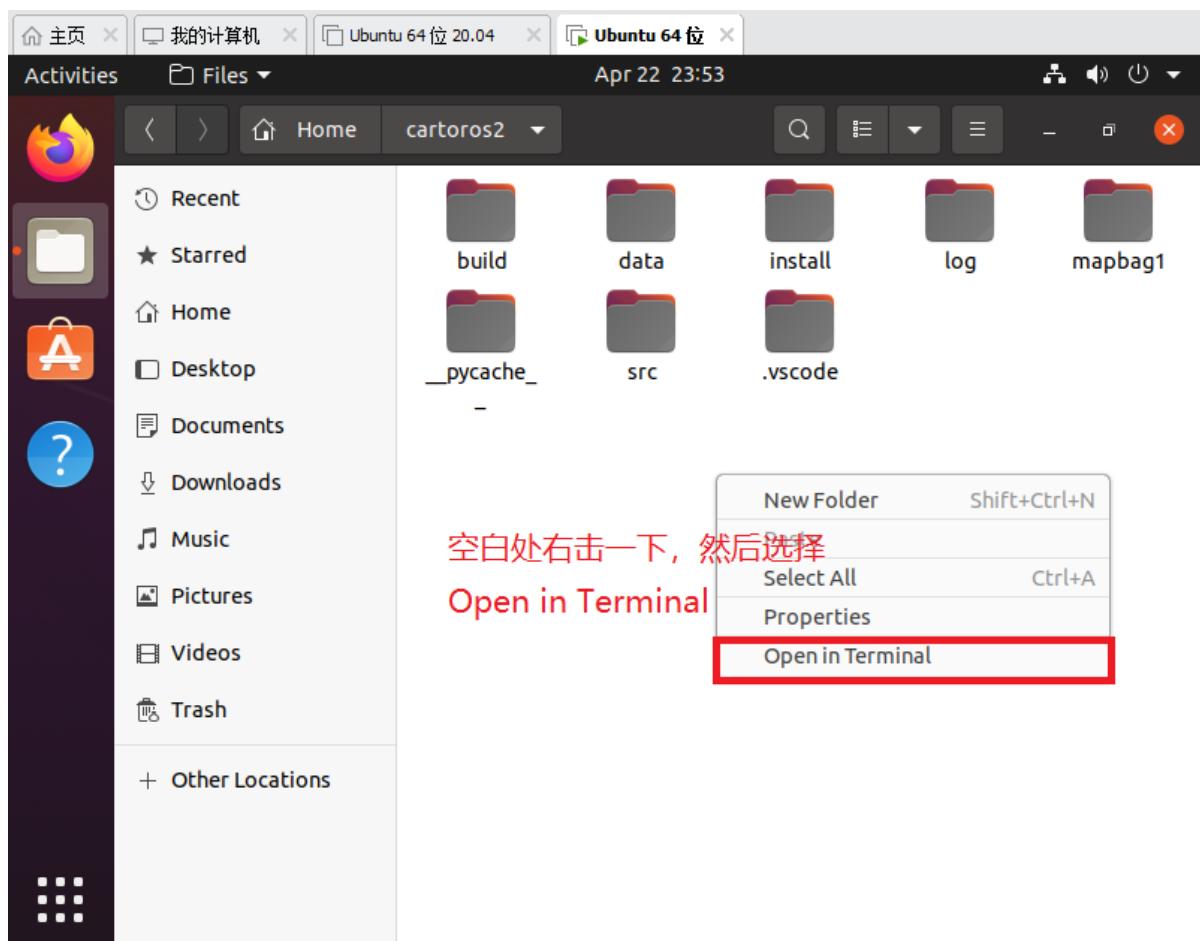
Enter the desktop system and open the folder.



Then double click on the cartoros2 folder



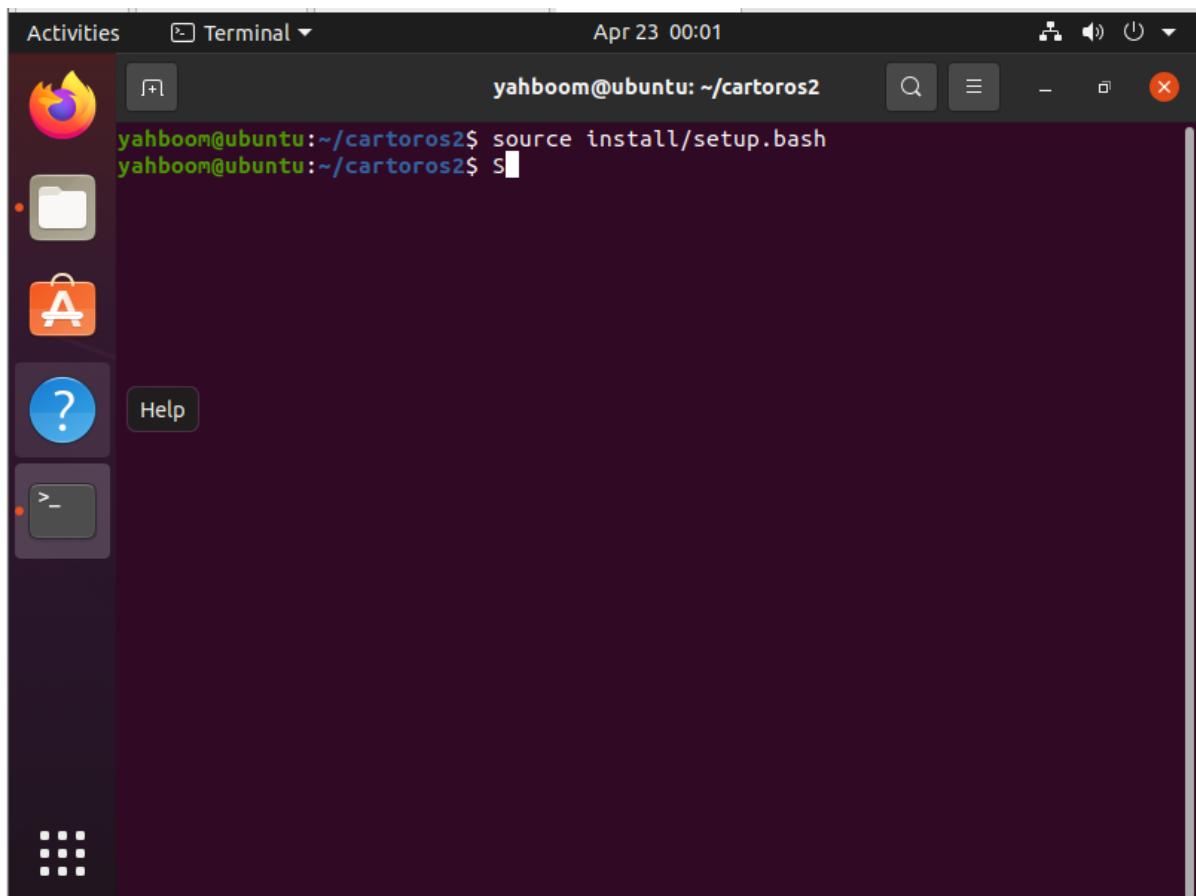
Then right-click in an empty space of the folder and select Open in Terminal



Then enter the following command in the terminal to activate the environment

```
source install/setup.bash
```

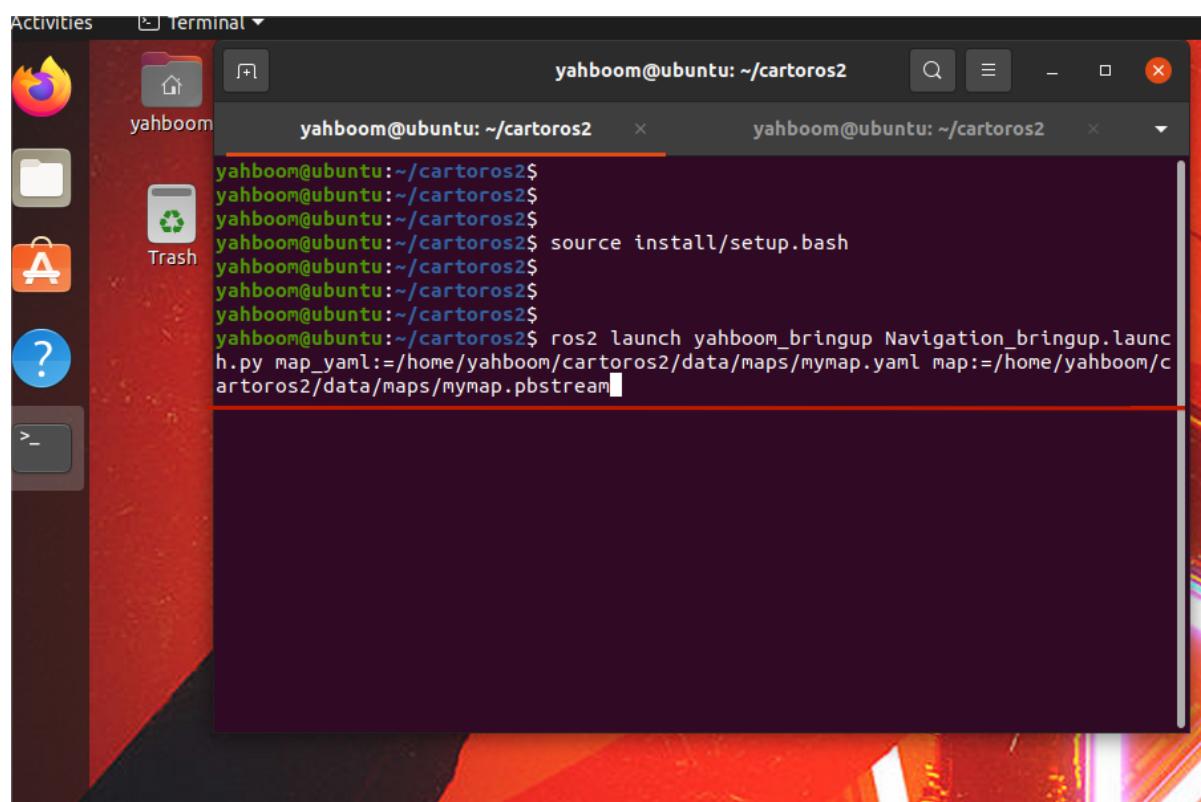
After completing the input, press the Enter key.



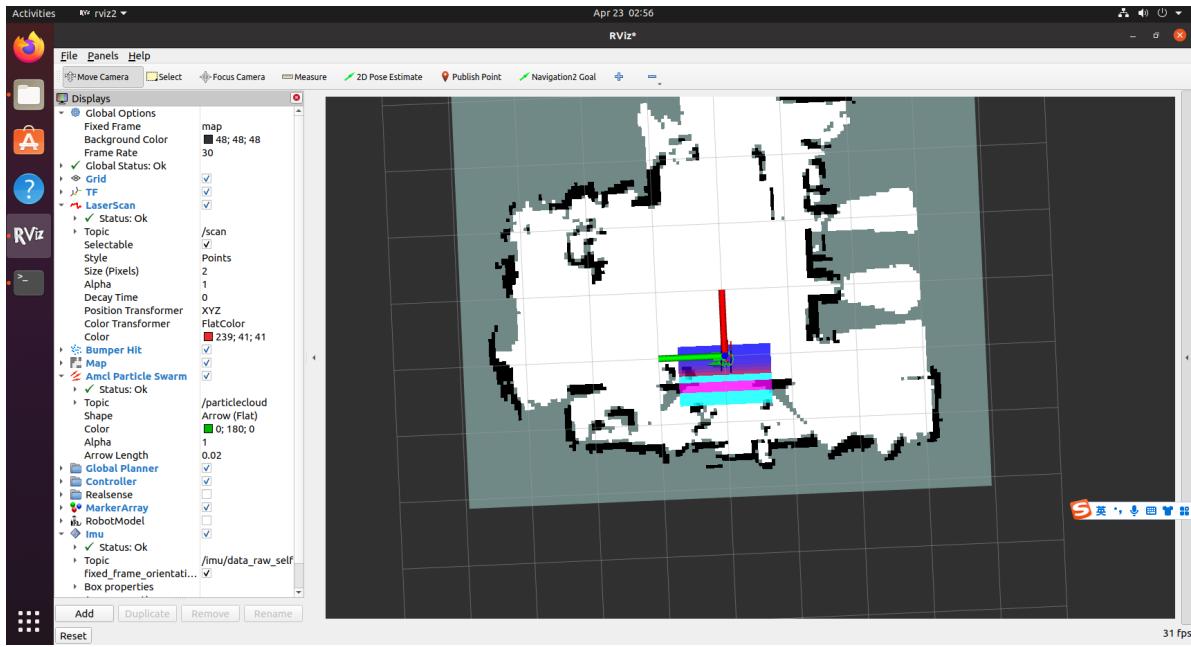
Then enter the command

```
ros2 launch yahboomBringup NavigationBringup.launch.py  
map_yaml:=/home/yahboom/cartoros2/data/maps/mymap.yaml  
map:=/home/yahboom/cartoros2/data/maps/mymap.pbstream
```

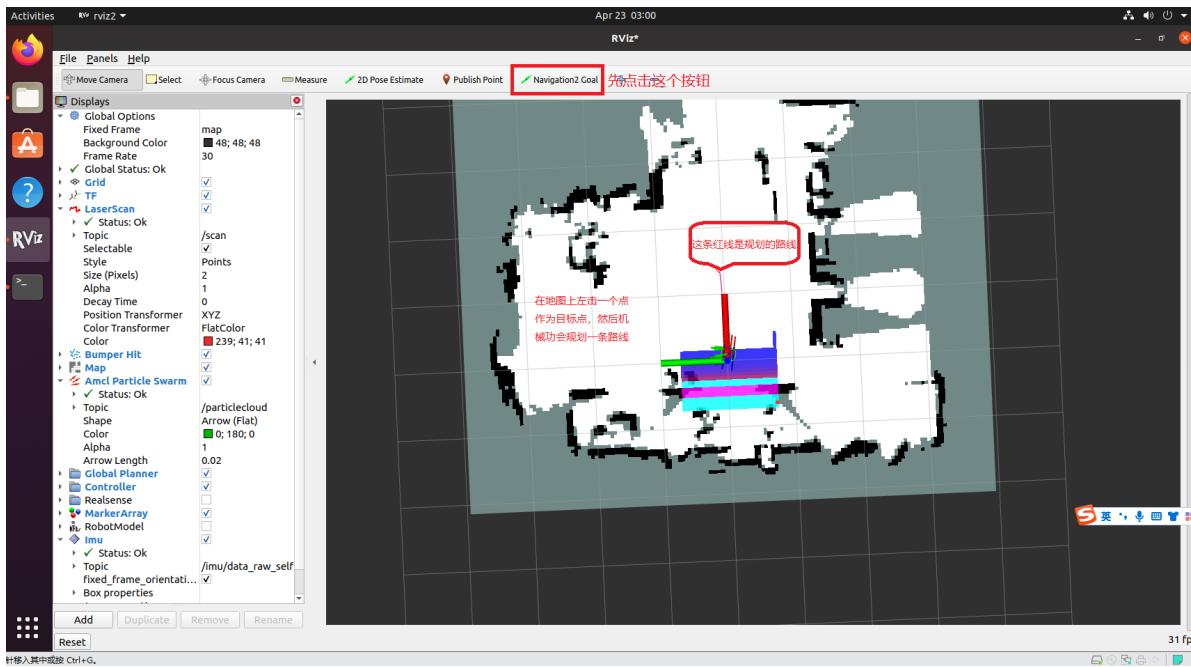
Where map_yaml is the yaml file of the map, and map is the pbstream file of the map.



Then press the Enter key to navigate.



After clicking the Navigation2 Goal button, click a target point on the map interface, and the route will be automatically planned and driven to the target point.

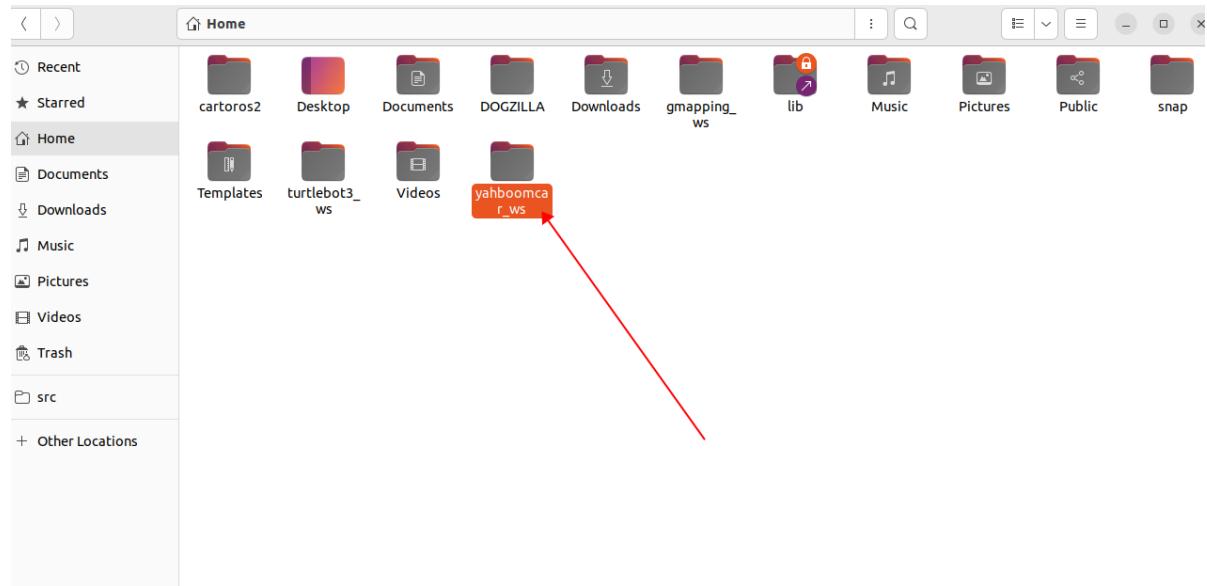


P15 version steps:

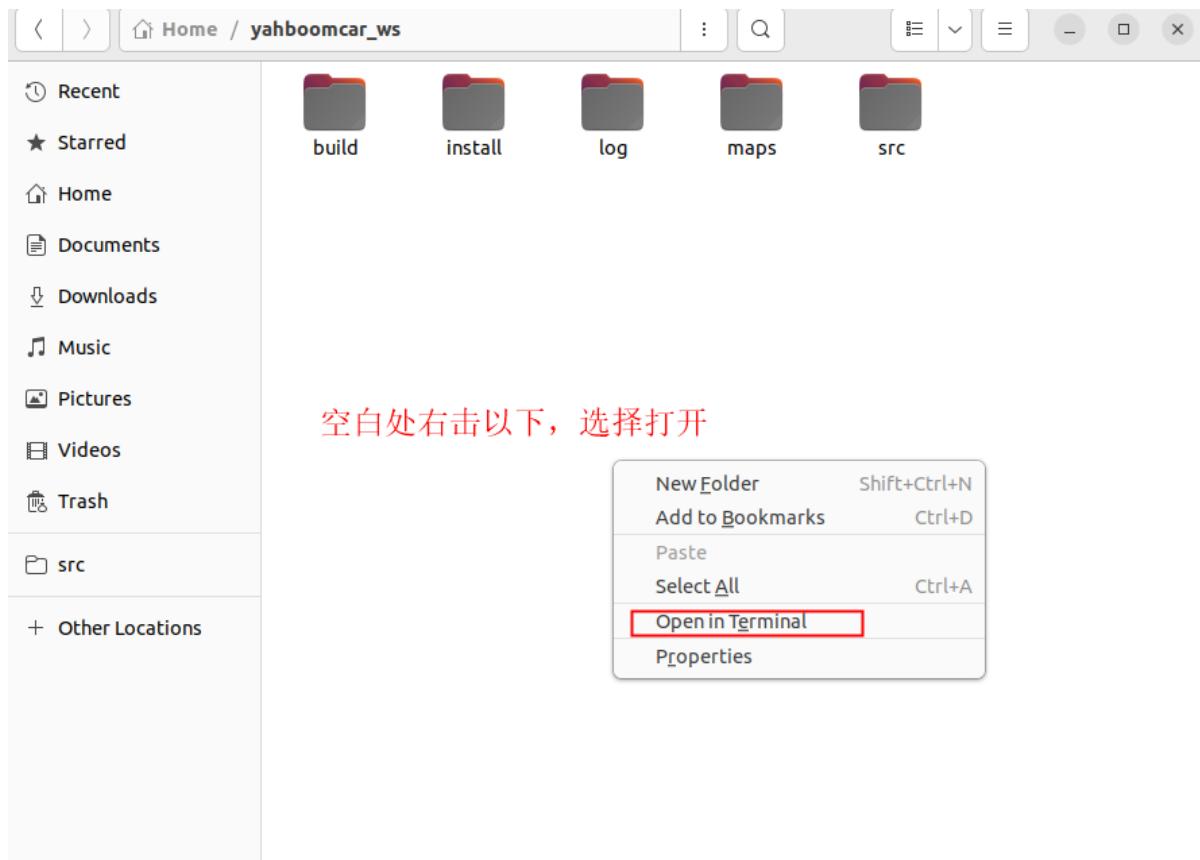
Enter the desktop system and open the folder.



Double-click to open the yahboomcar_ws folder



Then right-click in an empty space of the folder and select Open in Terminal



Then enter the following command in the terminal to activate the environment

```
source install/setup.bash
```

After completing the input, press Enter.

```
yahboom@yahboom-virtual-machine:~/yahboomcar_ws$ source install/setup.bash
yahboom@yahboom-virtual-machine:~/yahboomcar_ws$
```

Then enter the command to start the relocation function

```
ros2 launch yahboom_dog_cartographer localization_imu_odom.launch.py
load_state_filename:=/home/yahboom/yahboomcar_ws/maps/mymap.pbstream
```

```
[+]- yahboom@yahboom-virtual-machine: ~/yahboomcar_ws
```

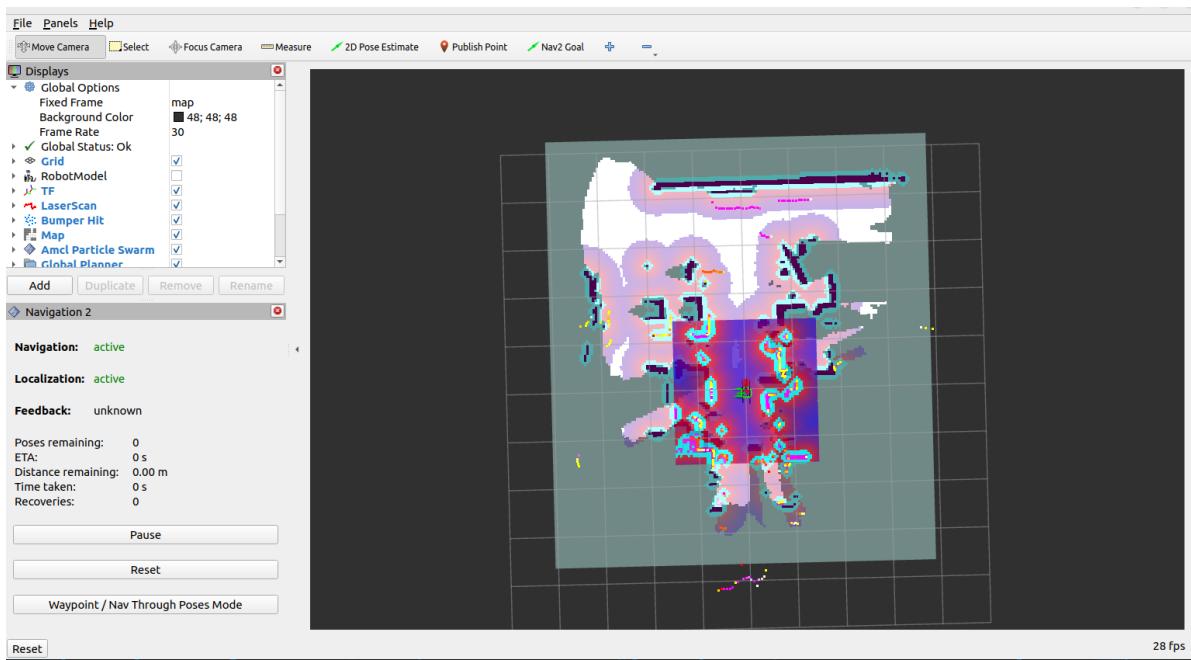
```
/share/cartographer/configuration_files/trajectory_builder_2d.lua' for 'trajectory_builder_2d.lua'.
[cartographer_node-1] [INFO] [1714300732.505165702] [cartographer logger]: I0428
18:38:52.000000 6171 configuration_file_resolver.cc:41] Found '/opt/ros/humble
/share/cartographer/configuration_files/trajectory_builder_3d.lua' for 'trajectory_builder_3d.lua'.
[cartographer_node-1] [INFO] [1714300732.505199532] [cartographer logger]: I0428
18:38:52.000000 6171 configuration_file_resolver.cc:41] Found '/opt/ros/humble
/share/cartographer/configuration_files/trajectory_builder_3d.lua' for 'trajectory_builder_3d.lua'.
[cartographer_node-1] [INFO] [1714300732.557136750] [cartographer logger]: I0428
18:38:52.000000 6171 map_builder_bridge.cpp:117] Loading saved state '/home/yahboom/yahboomcar_ws/maps/mymap.pbstream'...
[cartographer_node-1] [INFO] [1714300732.625084345] [cartographer logger]: I0428
18:38:52.000000 6171 map_builder_bridge.cpp:136] Added trajectory with ID '1'.
[cartographer_node-1] [INFO] [1714300732.691241270] [cartographer logger]: I0428
18:38:52.000000 6171 ordered_multi_queue.cc:172] All sensor data for trajectory 1 is available starting at '638498975326548929'.
[cartographer_node-1] [INFO] [1714300732.691513274] [cartographer logger]: I0428
18:38:52.000000 6171 local_trajectory_builder_2d.cc:135] Extrapolator is still
initializing.
[cartographer_node-1] [INFO] [1714300732.892889455] [cartographer logger]: I0428
18:38:52.000000 6171 pose_graph_2d.cc:148] Inserted submap (1, 0).
```

Repeat the above steps to open the terminal, reopen a terminal and enter navigation commands.

```
ros2 launch yahboom_dog_navigation2 navigation2.launch.py use_sim_time:=False
map:=~/home/yahboom/yahboomcar_ws/maps/mymap.yaml
```

```
yahboom@yahboom-virtual-machine:~/yahboomcar_ws$ source install/setup.bash
yahboom@yahboom-virtual-machine:~/yahboomcar_ws$ ros2 launch yahboom_dog_navigation2 navigation2.launch.py use_sim_time:=False map:=~/home/yahboom/yahboomcar_ws/maps/mymap.yaml
```

Then press the Enter key to navigate.



After clicking the Navigation2 Goal button, click a target point on the map interface, and the route will be automatically planned and driven to the target point.

