

ROS2 environment entity mechanical dog mapping

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.

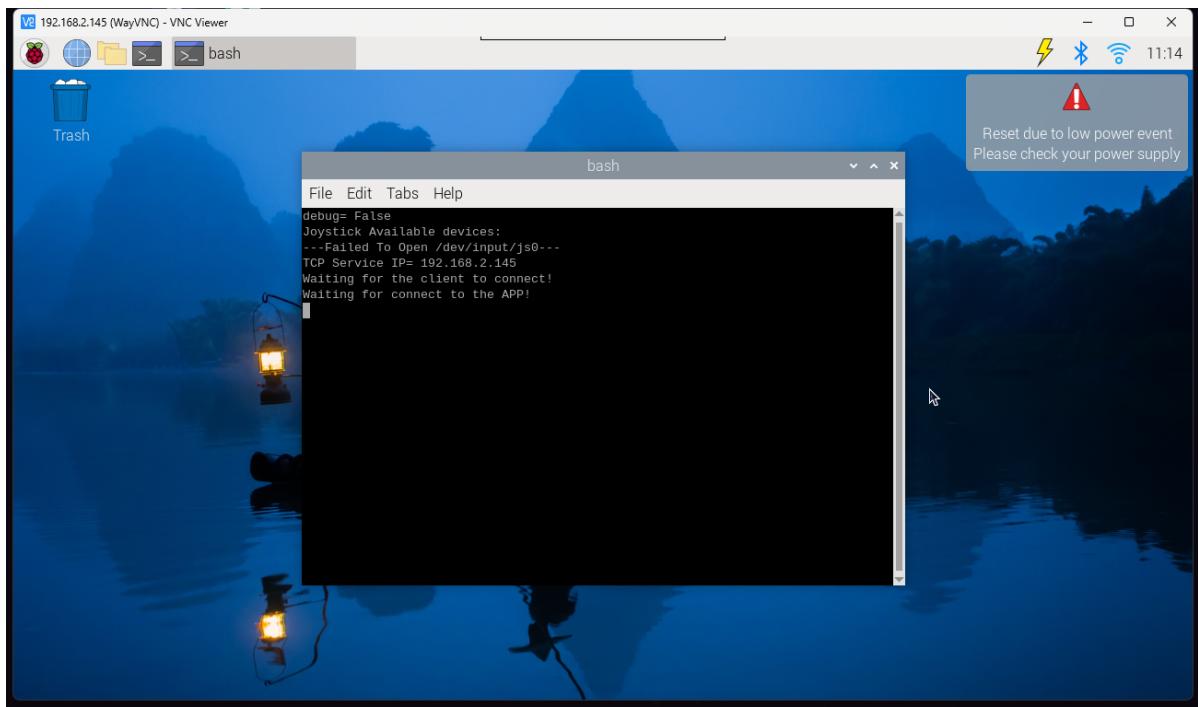
To close the large program, restart the chassis and modify the multi-level communication ID, please refer to the tutorial: 14. Radar mapping navigation\6. Obtaining the status of the physical mechanical dog in the ROS2 environment\Acquiring the real joint data of the mechanical dog in the ROS2 environment.pdf

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.

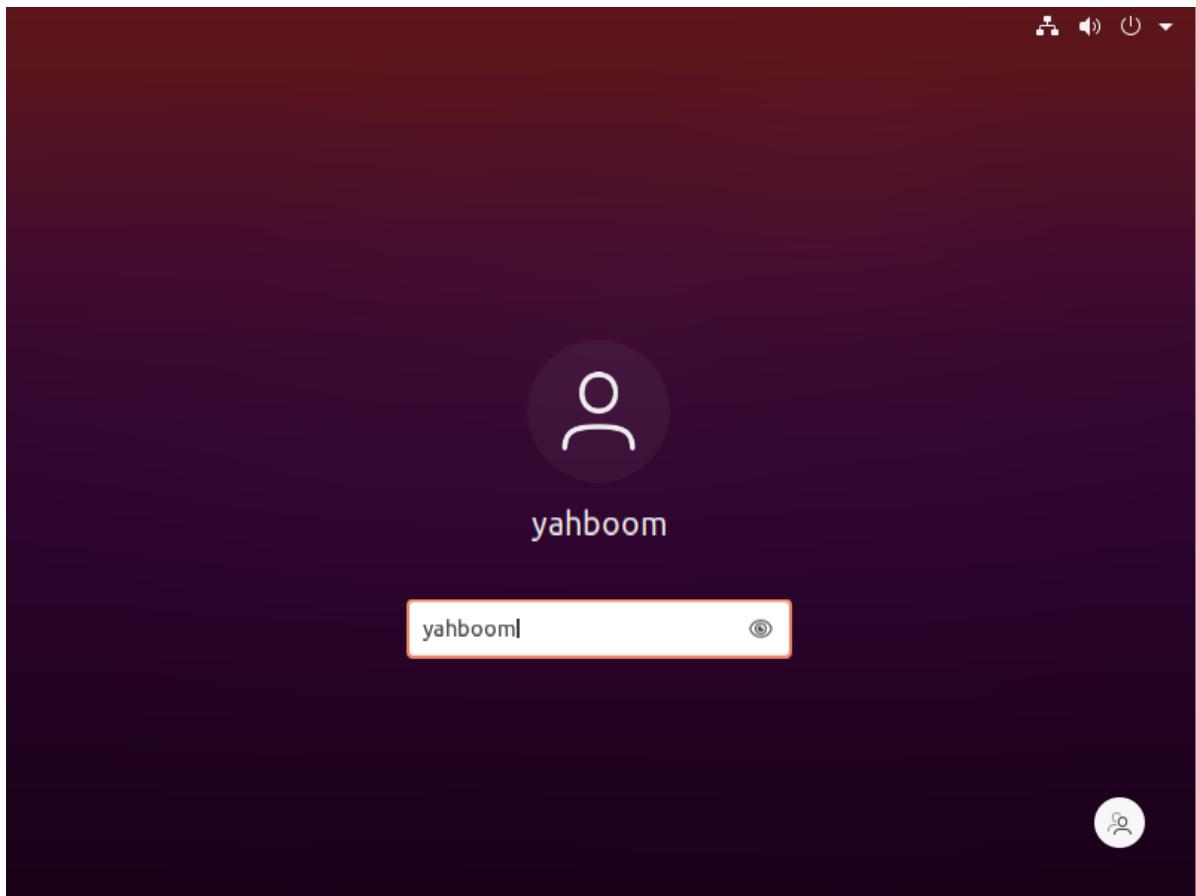
```
ros2 launch bringup Navigation_bringup.launch.py
```

```
root@raspberrypi: /  
File Edit Tabs Help  
at 0x7fff363522f0>  
[yahboomcar_joint_state-3] [8.06, 42.49, 0.85, 7.04, 43.12, 0.85, 12.14, 54.34,  
0.85, 11.12, 54.96, 0.61]  
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&&& 0.11081695556640625  
[yahboomcar_joint_state-3] #####  
[yahboomcar_joint_state-3] [0.24045410156250002, -0.1160400390625, -9.7198486328  
125, -1.0975609756097562, -0.48780487804878053, -0.5487804878048781, 0.008936438  
739299774, 0.013750852101378972, -0.12733232821358575]  
[yahboomcar_joint_state-3] ***** <rclpy.timer.Timer object  
at 0x7fff363522f0>  
[yahboomcar_joint_state-3] [8.06, 42.49, 0.85, 7.04, 43.12, 0.85, 12.14, 54.34,  
0.85, 11.12, 54.96, 0.61]  
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&&& 0.11193227767944336  
[yahboomcar_joint_state-3] ##### ]  
[yahboomcar_joint_state-3] [0.23327636718750003, -0.14833984375, -9.7330078125,  
-1.0365853658536586, -0.6097560975609757, -0.6707317073170732, 0.009365924020608  
266, 0.013580941220124564, -0.12733232821358575]  
[yahboomcar_joint_state-3] ***** <rclpy.timer.Timer object  
at 0x7fff363522f0>  
[yahboomcar_joint_state-3] [8.06, 42.49, 0.85, 7.04, 43.12, 0.85, 12.14, 54.34,  
0.85, 11.12, 54.96, 0.61]  
[yahboomcar_joint_state-3] &&&&&&&&&&&&&&&& 0.11203646659851074  
[yahboomcar_joint_state-3] #####
```

2. Open the virtual machine

Note: The default virtual machine has been installed here.

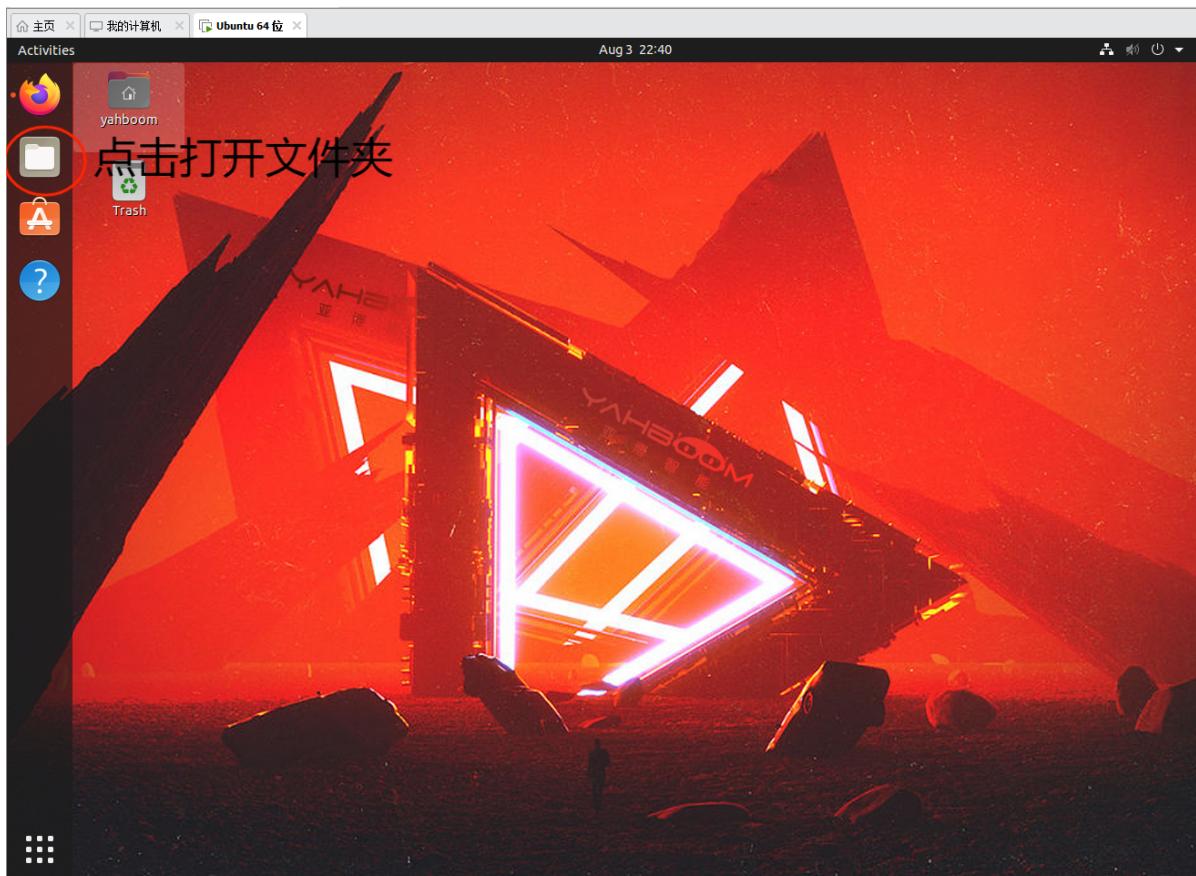
Open the virtual machine, enter the password: yahboom and press the Enter key to enter the system desktop.



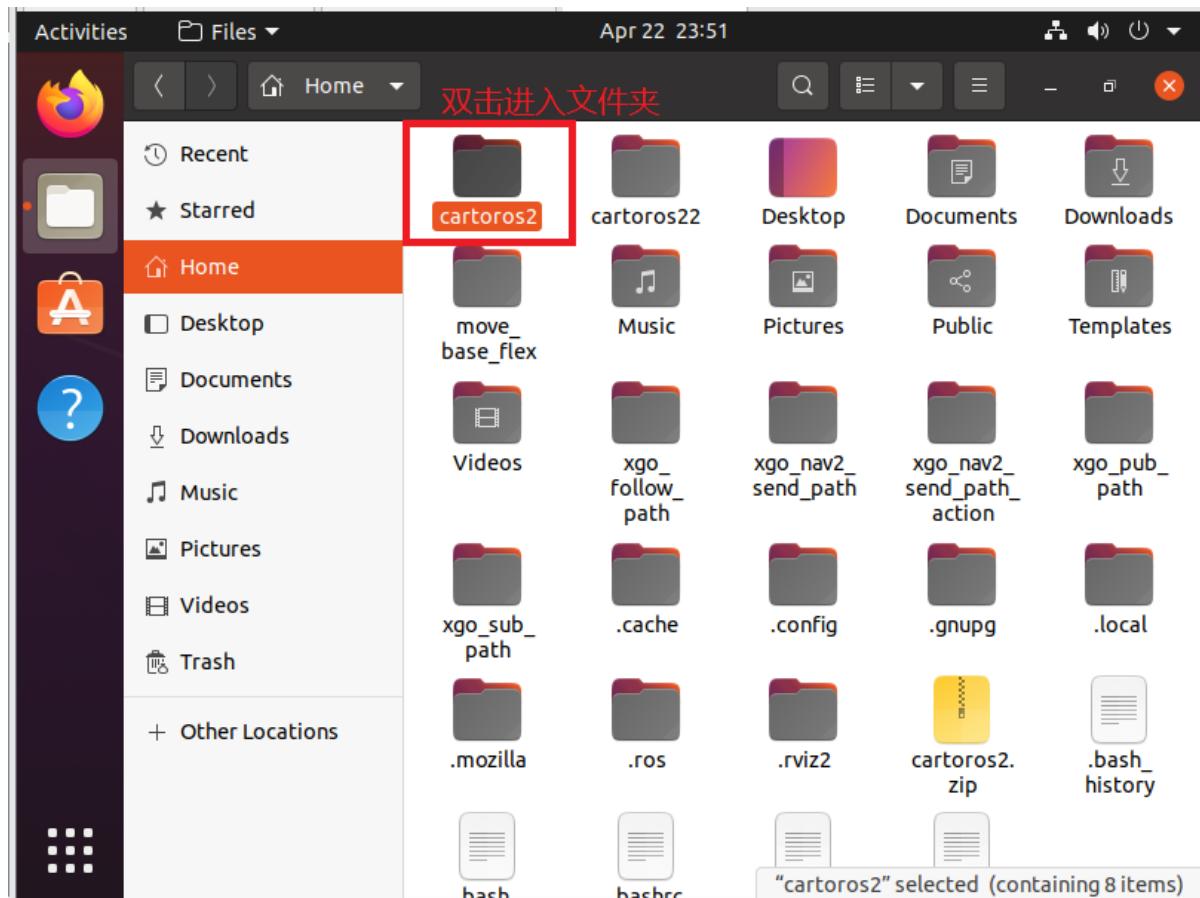
3. Start the mechanical dog mapping node

Note: This step is the same for virtual machines of PI4 and PI5 versions

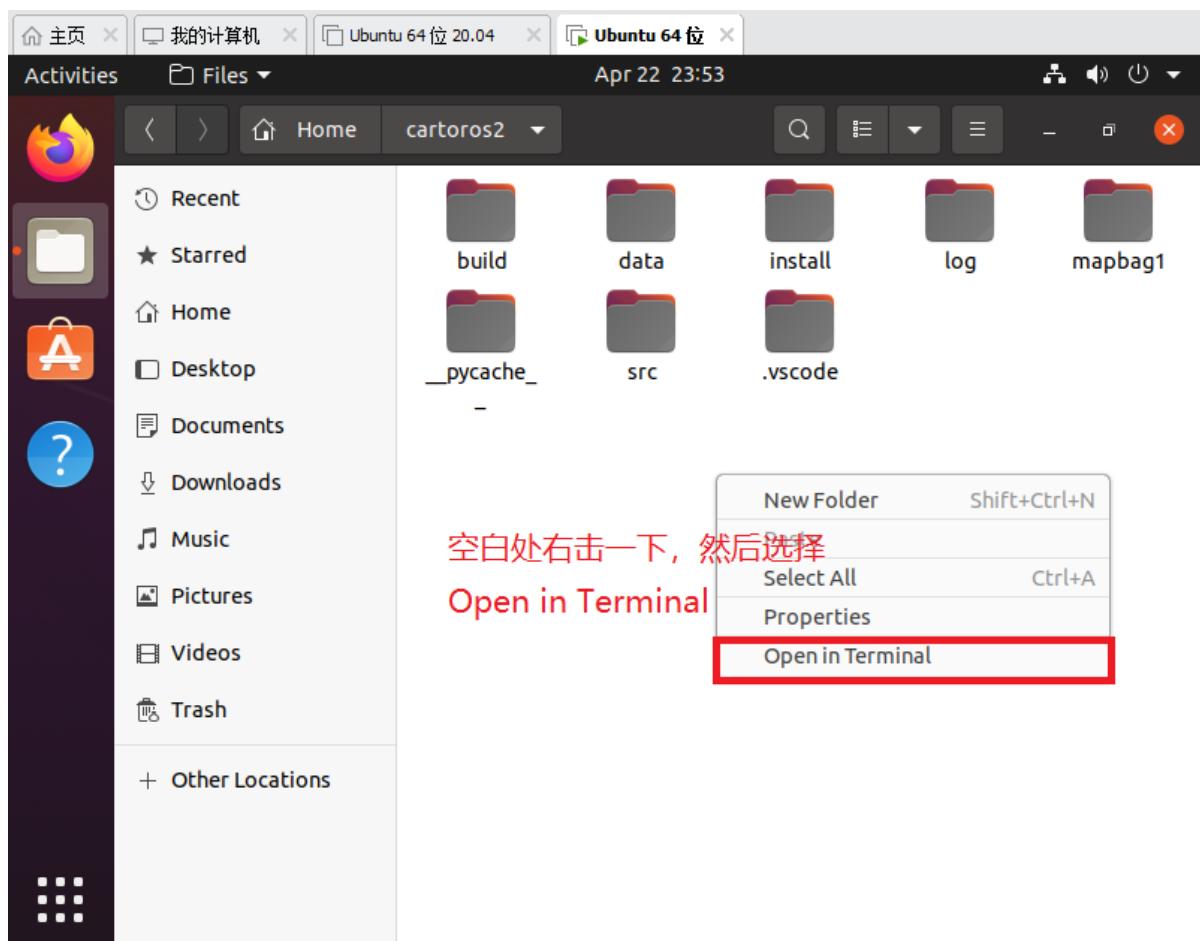
Enter the desktop system and open the folder.



Then double click on the cartoros2 folder



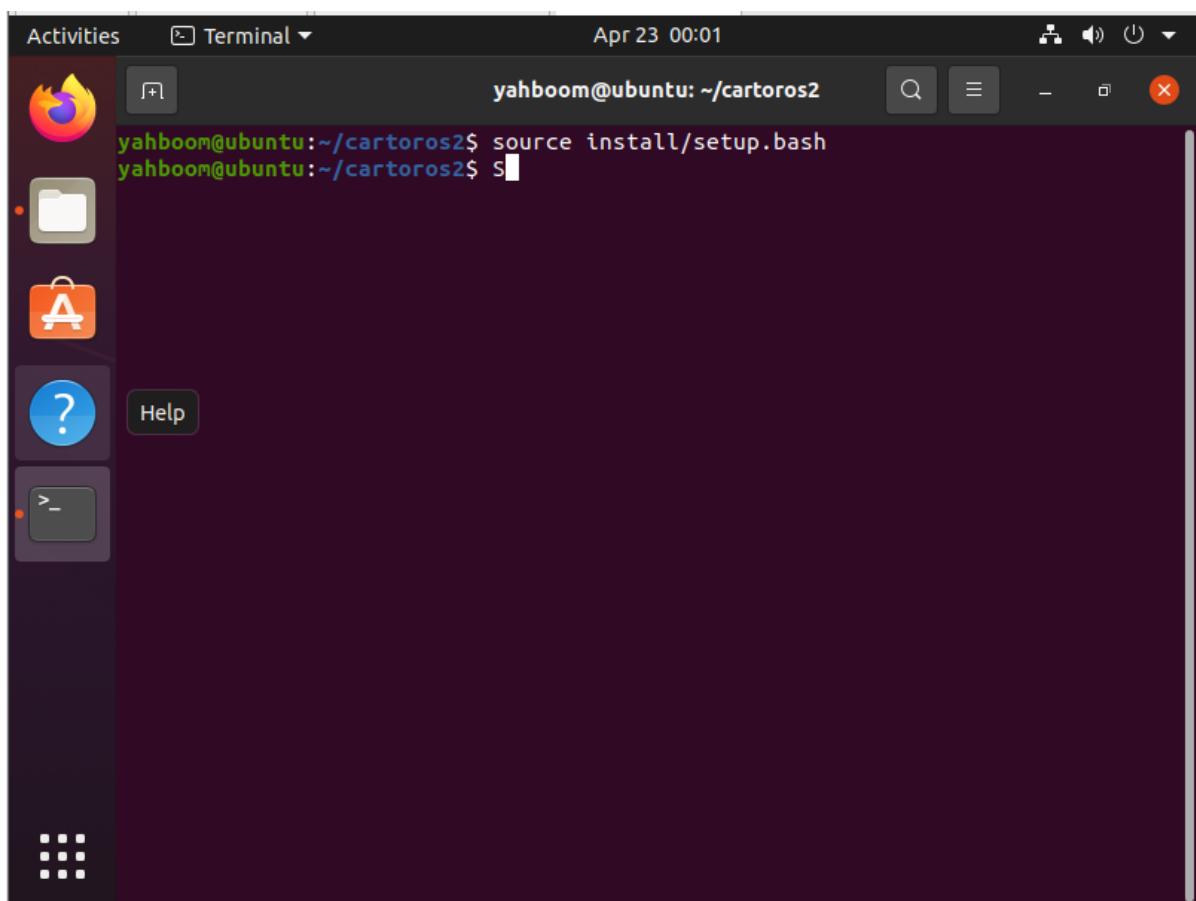
Then right-click in an empty space of the folder and select Open in Terminal



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

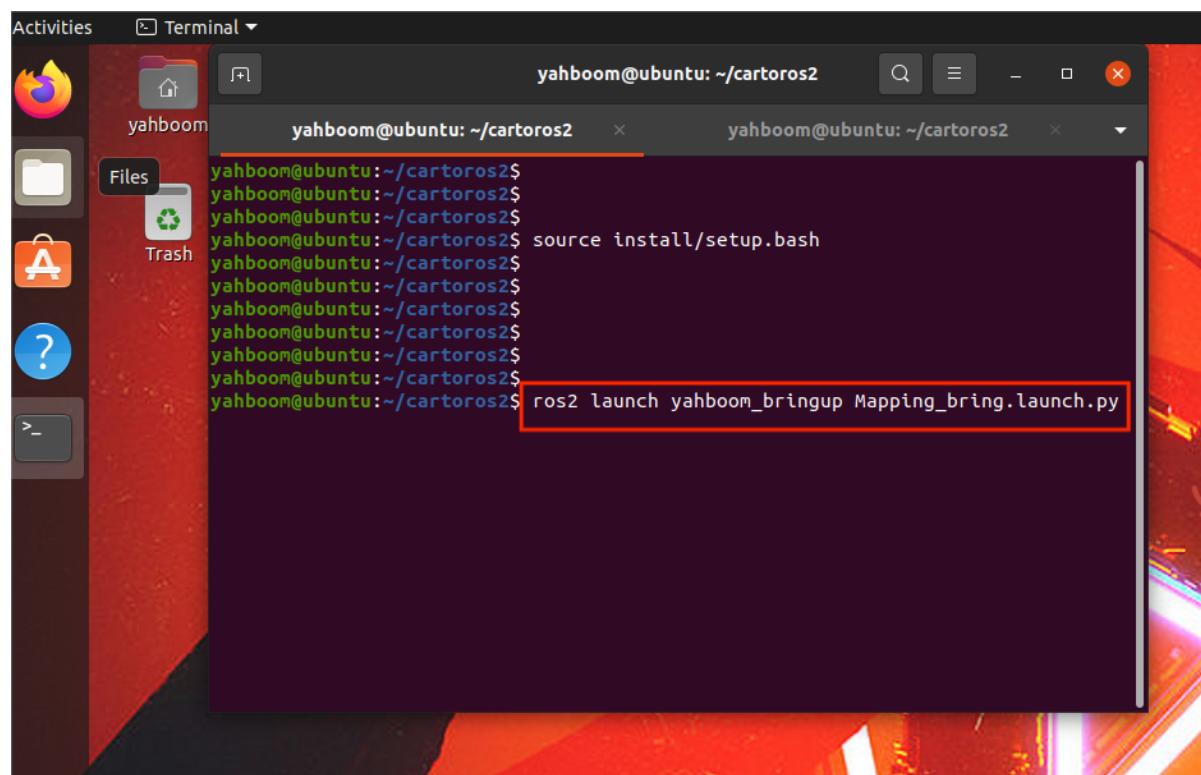
```
source install/setup.bash
```

After completing the input, press the Enter key.

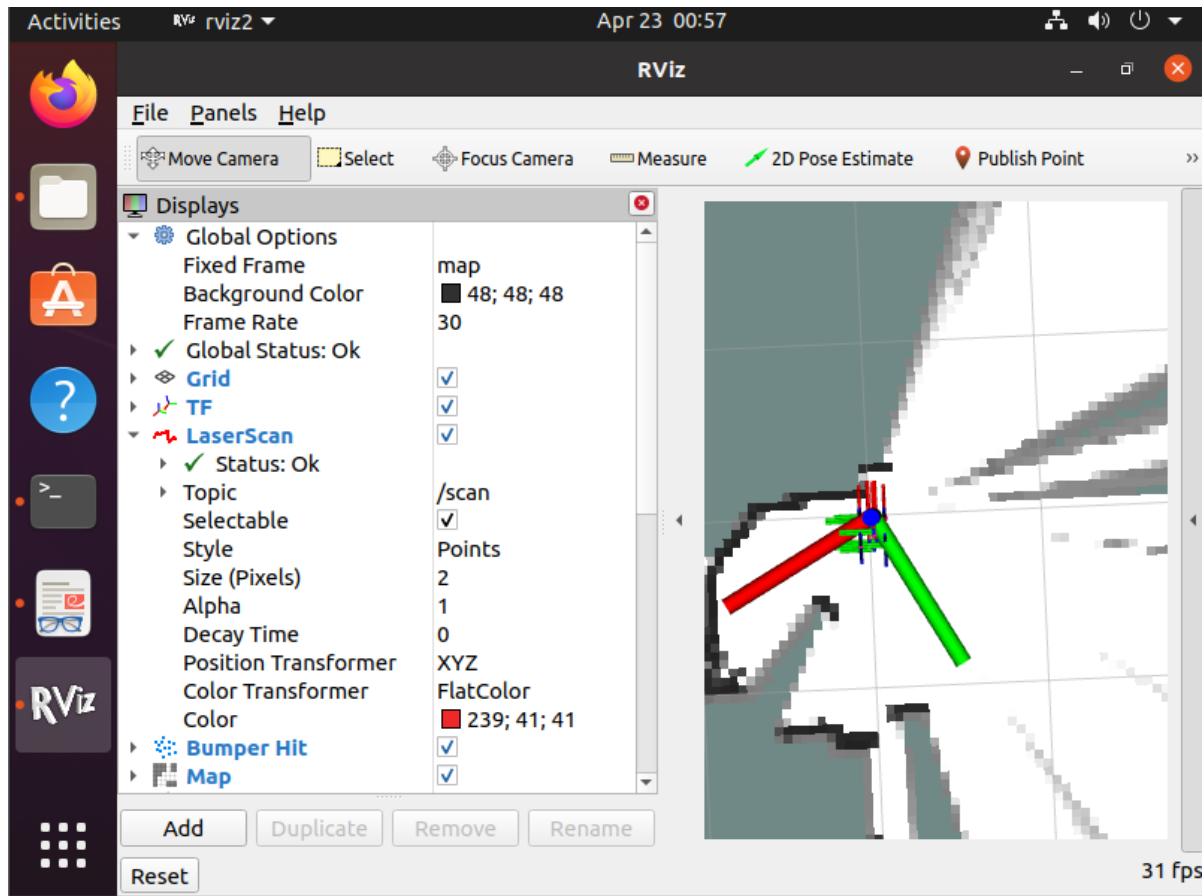


Then enter the command

```
ros2 launch yahboom_bringup Mapping Bring.launch.py
```



Then press the Enter key to start drawing.

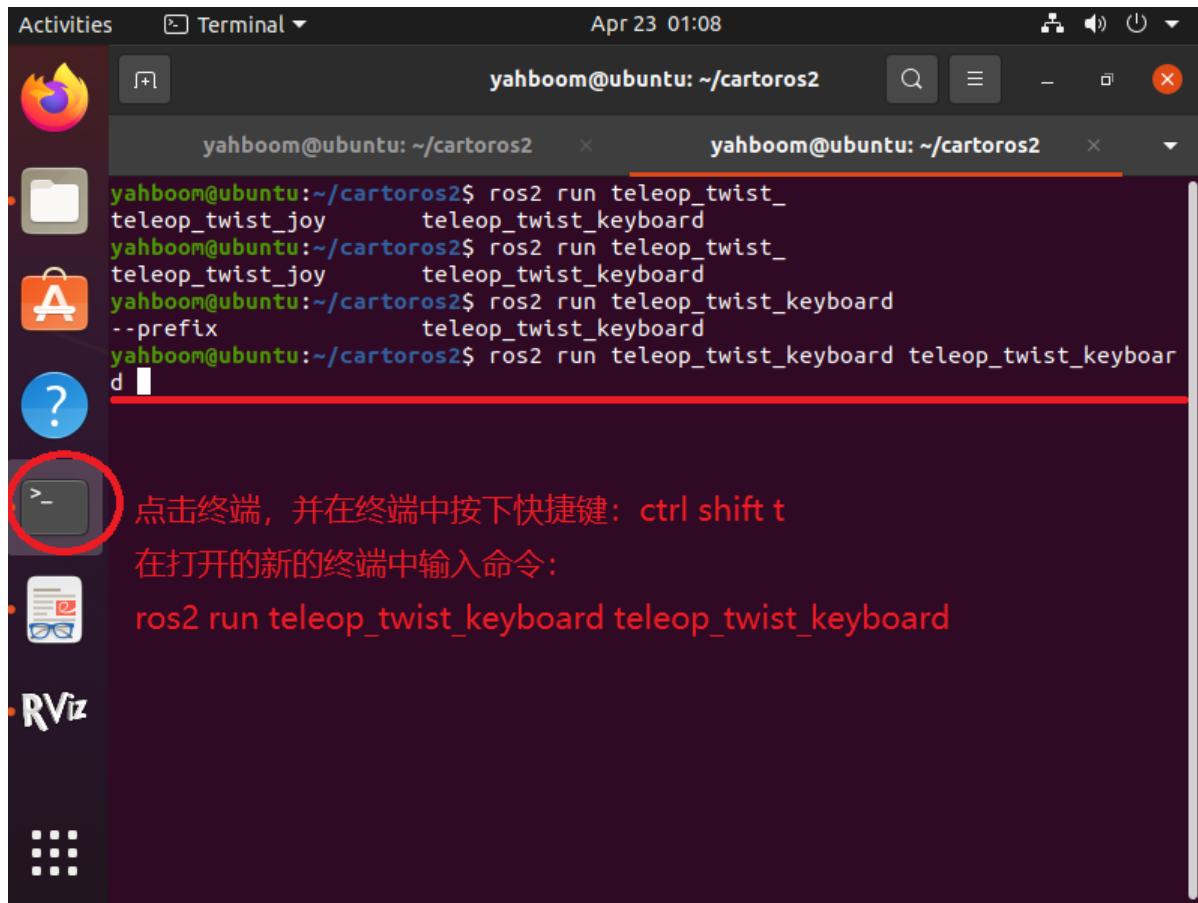


4. Control the mechanical dog to walk and build a map

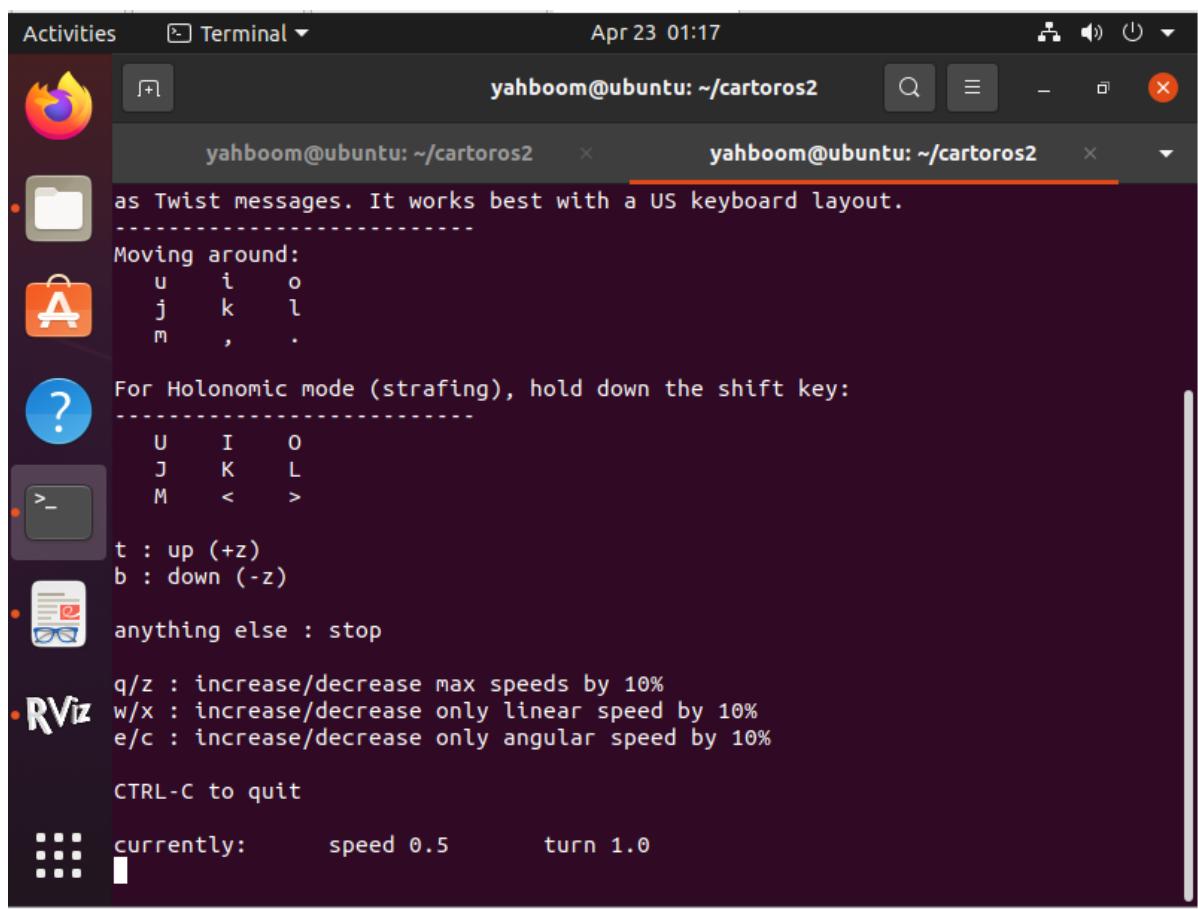
Click on the terminal and press the shortcut key: **ctrl + shift + t**

Enter the command in the terminal:

```
ros2 run teleop_twist_keyboard teleop_twist_keyboard
```



By pressing the Enter key, you can press the keyboard keys in the terminal to control the movement of the mechanical dog. Among them, I is forward, K is pause, and < is backward.



5. Save the map

When the map scan is completed, we press the shortcut key Ctrl shift t in the terminal to reopen a terminal window and enter the following command

First enter the following command to activate the environment

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

Then enter the following command to stop mapping,

```
ros2 service call /finish_trajectory cartographer_ros_msgs/srv/FinishTrajectory "{trajectory_id: 0}"
```

Then enter the following command to save the pbstream file

```
#pi4
ros2 service call /write_state cartographer_ros_msgs/srv/writestate "{filename: '/home/yahboom/cartoros2/data/maps/mymap.pbstream'}"

#pi5
ros2 service call /write_state cartographer_ros_msgs/srv/writestate "{filename: '/home/yahboom/yahboomcar_ws/maps/mymap.pbstream' }"
```

The path of the filename parameter is the path where the pbstream file of the map is saved.

Finally enter the following command to convert the pbstream file to a pgm file.

```
#pi4
ros2 run cartographer_ros pbstream_to_ros_map_node -
map_filestem=/home/yahboom/cartoros2/data/maps/mymap -
pbstream_filename=/home/yahboom/cartoros2/data/maps/mymap.pbstream -
resolution=0.05

#pi5
ros2 run cartographer_ros cartographer_pbstream_to_ros_map -
map_filestem=/home/yahboom/yahboomcar_ws/maps/mymap -
pbstream_filename=/home/yahboom/yahboomcar_ws/maps/mymap.pbstream -
resolution=0.05
```

The screenshot shows a Linux desktop environment with a terminal window open in a window manager. The terminal window title is "yahboom@ubuntu: ~/cartoros2". The application bar (dock) on the left contains icons for various applications, including a browser, file manager, terminal, and system tools. A red circle highlights the terminal icon, with the text "选中终端" (Select Terminal). Another red circle highlights the keyboard icon, with the text "按下快捷键" (Press the hotkey). A third red circle highlights the terminal icon again, with the text "Ctrl shift t".

```
yahboom@ubuntu:~/cartoros2$ source install/setup.bash
yahboom@ubuntu:~/cartoros2$ ros2 service call /finish_trajectory cartographer_ros_msgs/srv/FinishTrajectory "{trajectory_id: 0}"
requester: making request: cartographer_ros_msgs.srv.FinishTrajectory_Request(trajectory_id=0)

response:
cartographer_ros_msgs.srv.FinishTrajectory_Response(status=cartographer_ros_msgs.msg.StatusResponse(code=0, message='Finished trajectory 0.'))

yahboom@ubuntu:~/cartoros2$ ros2 service call /write_state cartographer_ros_msgs/srv/WriteState "{filename: '/home/yahboom/cartoros2/data/maps/mymap.pbstream'}"
waiting for service to become available...
requester: making request: cartographer_ros_msgs.srv.WriteState_Request(filename='/home/yahboom/cartoros2/data/maps/mymap.pbstream')

response:
cartographer_ros_msgs.srv.WriteState_Response(status=cartographer_ros_msgs.msg.StatusResponse(code=0, message="State written to '/home/yahboom/cartoros2/data/maps/mymap.pbstream'."))

yahboom@ubuntu:~/cartoros2$ ros2 run cartographer_ros pbstream_to_ros_map_node -map_filestem=/home/yahboom/cartoros2/mymap -pbstream_filename=/home/yahboom/cartoros2/data/maps/mymap.pbstream -resolution=0.05
I0423 01:41:58.994668 9452 pbstream_to_ros_map_main.cc:50] Loading submap slices from serialized data.
I0423 01:41:59.019959 9452 pbstream_to_ros_map_main.cc:70] Generating combined map image from submap slices.
```