3. Keyboard control

Function package path: ~/transbot_ws/src/transbot_ctrl

Start low-level control

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```
roslaunch transbot_bringup bringup.launch
```

Raspberry Pi 5

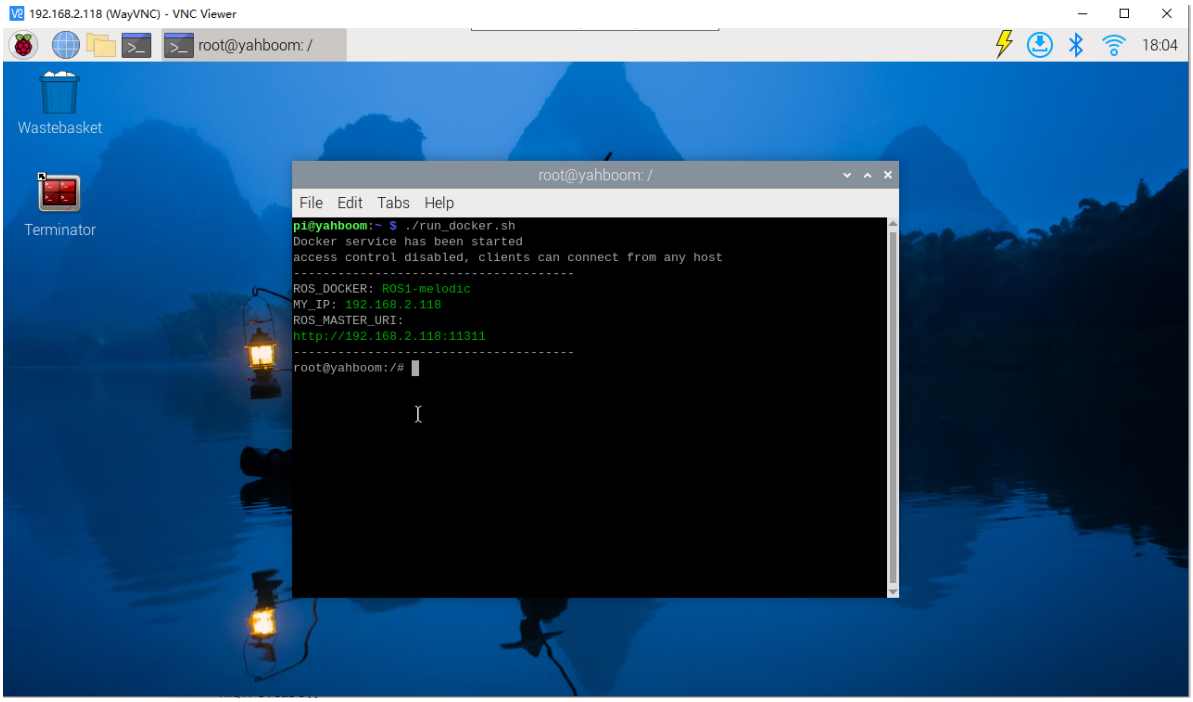
Before running, please confirm that the large program has been permanently closed

Enter docker

Note: If there is a terminal that automatically starts docker, or there is a docker terminal that has been opened, you can directly enter the docker terminal to run the command, and there is no need to manually start docker

Start docker manually

```
./run_docker.sh
```




```
roslaunch transbot_bringup bringup.launch
```

3.1, teleop_twist_keyboard.py

Wiki: http://wiki.ros.org/teleop_twist_keyboard

Source code: https://github.com/ros-teleop/teleop_twist_keyboard

This function package can be installed directly into the system. The factory image of the car has been installed, no need to reinstall it

- Install

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```
sudo apt-get install ros-melodic-teleop-twist-keyboard
```

Raspberry Pi 5

Enter the same docker from multiple terminals

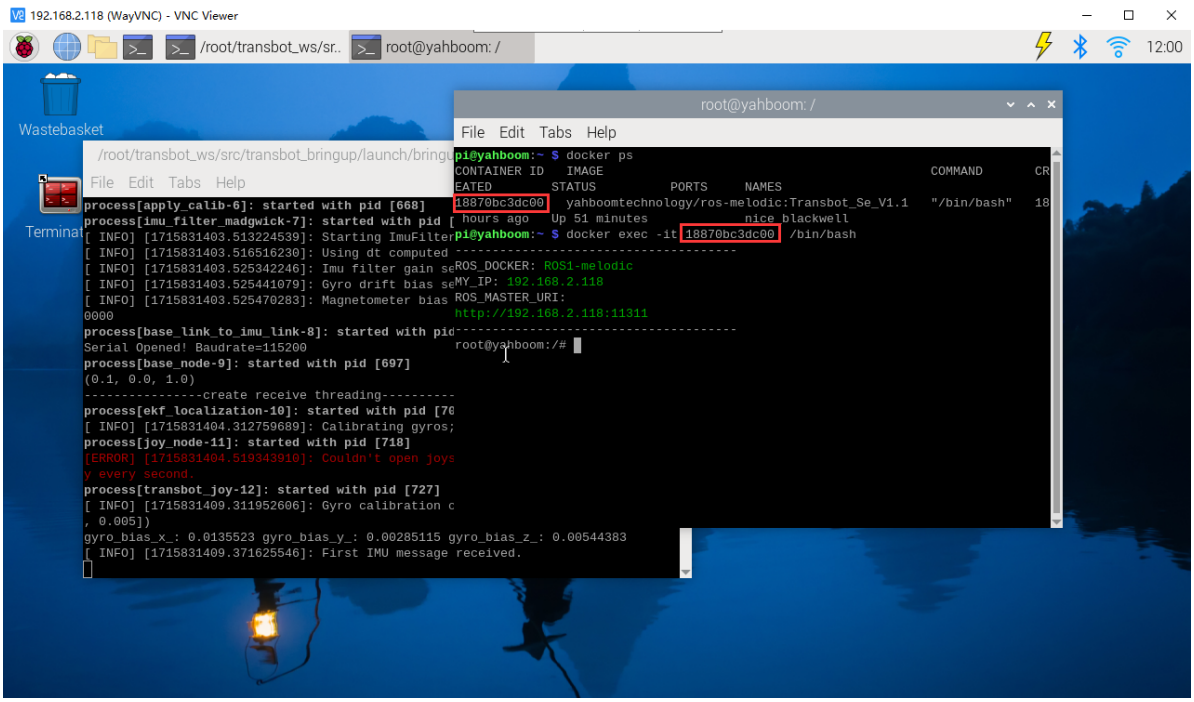
Keep the program of the previous docker terminal running and open a new terminal

Enter the following command

```
docker ps
```

Enter the same docker and use the following 18870bc3dc00 to modify the ID displayed on the actual terminal.

```
docker exec -it 18870bc3dc00 /bin/bash
```




```
sudo apt-get install ros-melodic-teleop-twist-keyboard
```

- run

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```
rosrun teleop_twist_keyboard teleop_twist_keyboard.py
```

Raspberry Pi 5

Enter the same docker from multiple terminals

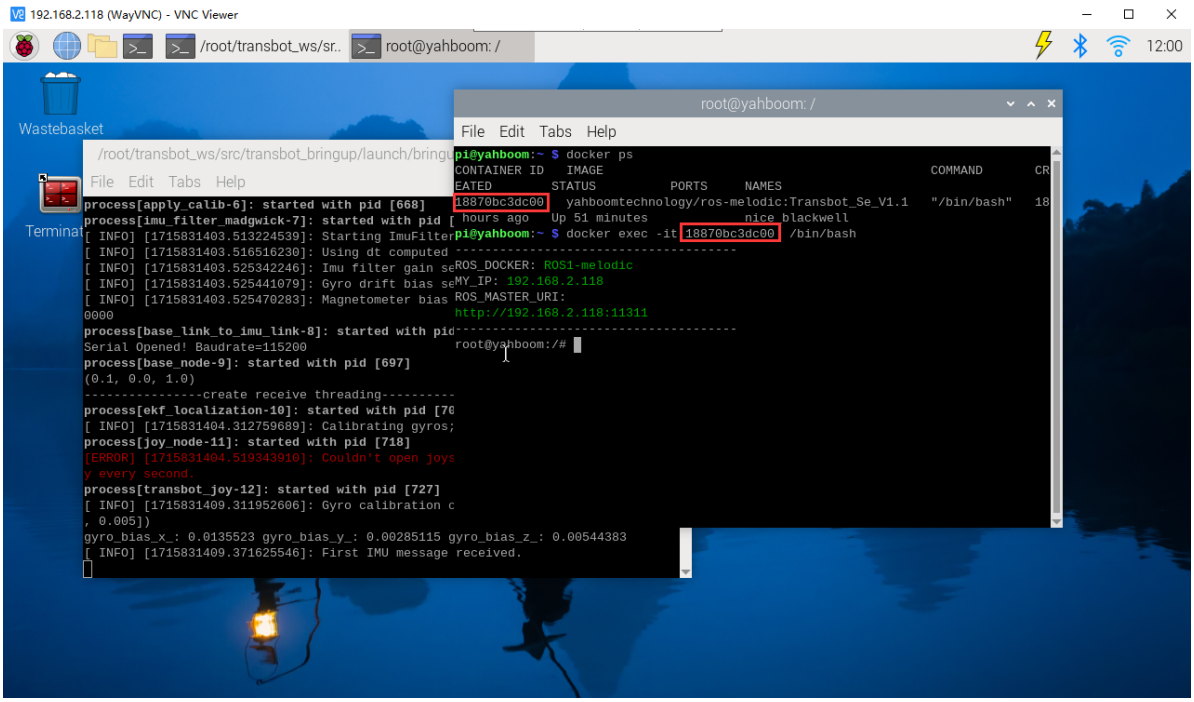
Keep the program of the previous docker terminal running and open a new terminal

Enter the following command

```
docker ps
```

Enter the same docker and use the following 18870bc3dc00 to modify the ID displayed on the actual terminal.

```
docker exec -it 18870bc3dc00 /bin/bash
```




```
rosrun teleop_twist_keyboard teleop_twist_keyboard.py
```

- control

Button	Car [linear, angular]	Button	Car [linear, angular]
[i] or [I]	[linear, 0]	[u] or [U]	[linear, angular]
[,]	[-linear, 0]	[o] or [O]	[linear, - angular]
[j] or [J]	[0, angular]	[m] or [M]	[- linear, - angular]
[l] or [L]	[0, - angular]	[.]	[- linear, angular]
Button	**Speed change**	**Button**	**Speed change**
[q]	Linear speed and angular speed are both increased by 10%	[z]	Linear speed and angular speed are both reduced by 10%
[w]	Only the linear speed increases by 10%	[x]	Only the linear speed decreases by 10%
[e]	Only the angular velocity increases by 10%	[c]	Only the angular velocity decreases by 10%

In addition to the above keys, any key stops movement. [Ctrl]+[c] to exit.

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```
rqt_graph
```

Raspberry Pi 5

Enter the same docker from multiple terminals

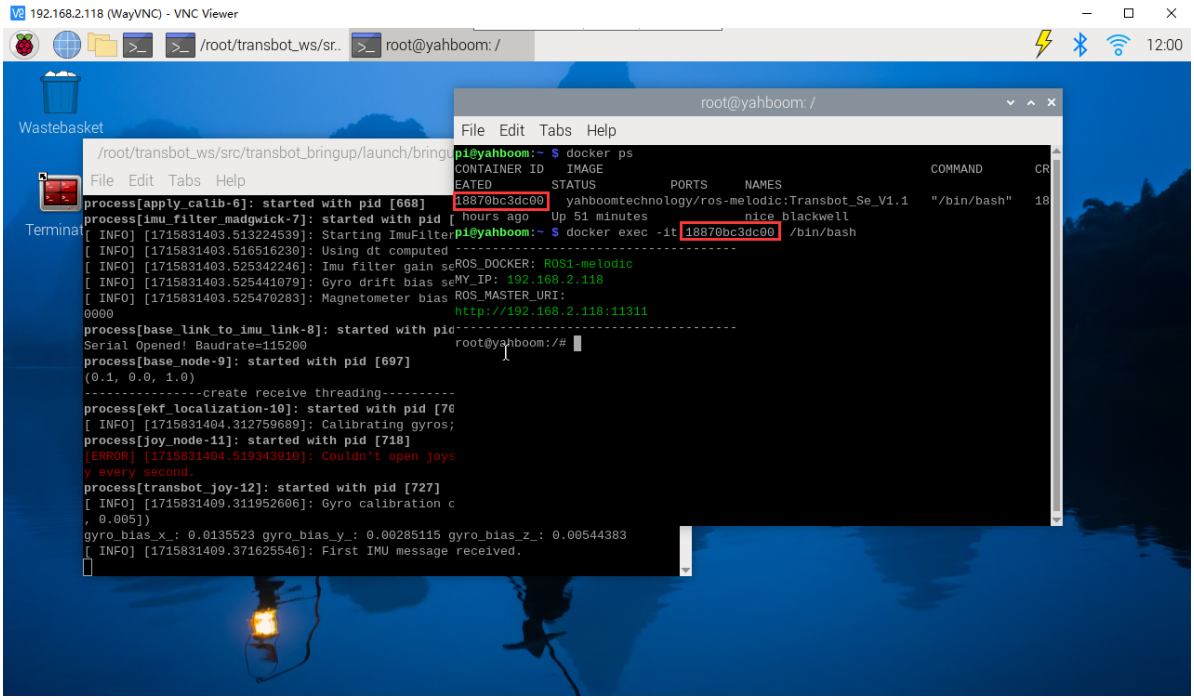
Keep the program of the previous docker terminal running and open a new terminal

Enter the following command

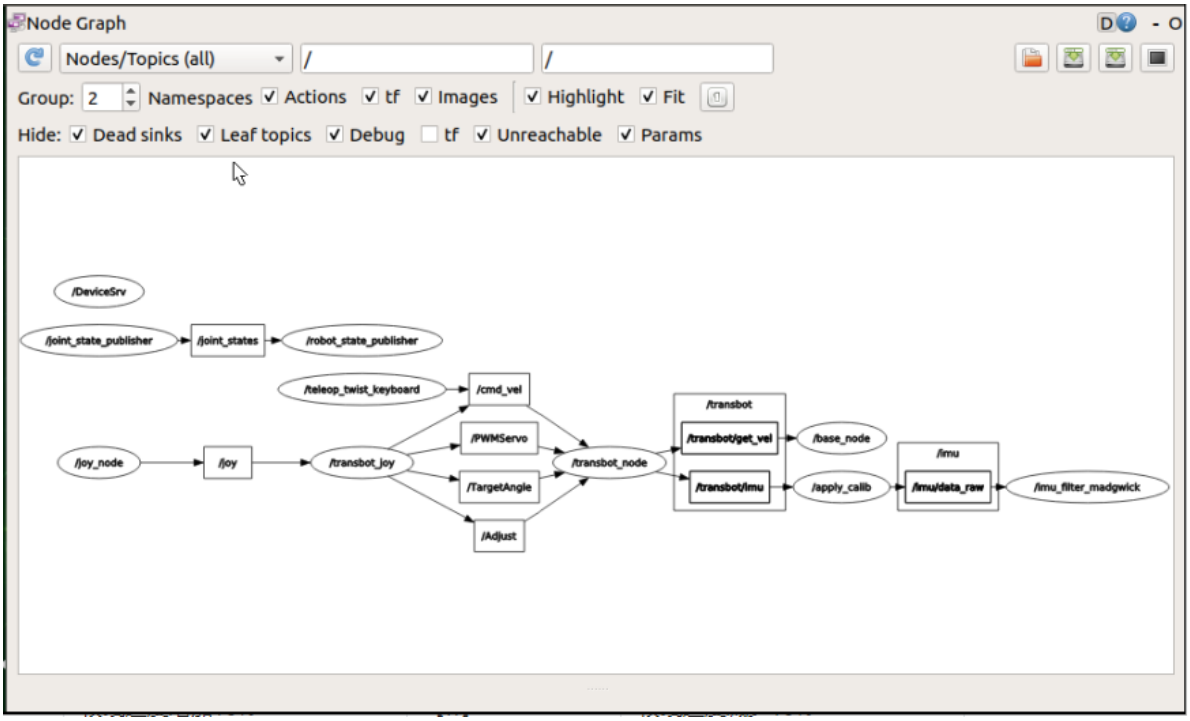
```
docker ps
```

Enter the same docker and use the following 18870bc3dc00 to modify the ID displayed on the actual terminal.

```
docker exec -it 18870bc3dc00 /bin/bash
```




```
rqt_graph
```



The node [teleop_twist_keyboard] publishes a message to the topic [/cmd_vel] and is subscribed by the node [/transbot_node].

3.2, transbot_keyboard.py

Note: Button control method is the same as above

Start mode

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```
rosrun transbot_ctrl transbot_keyboard.py
roslaunch transbot_ctrl transbot_keyboard.launch
```

Raspberry Pi 5

Enter the same docker from multiple terminals

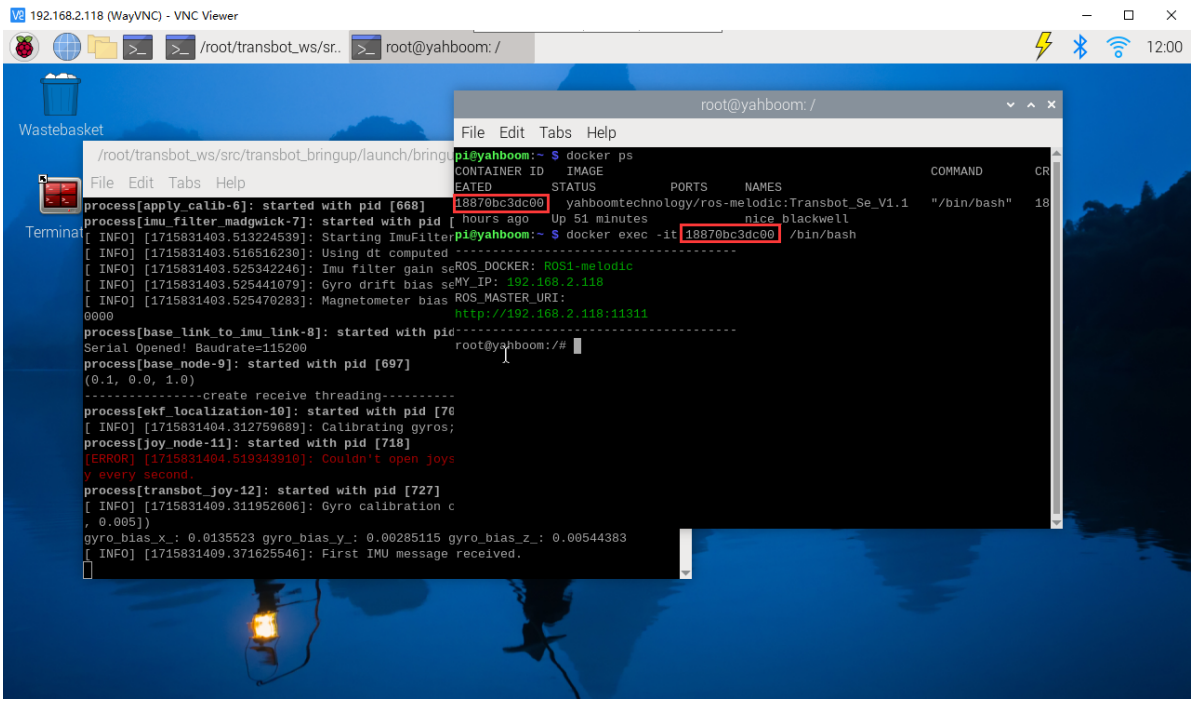
Keep the program of the previous docker terminal running and open a new terminal

Enter the following command

```
docker ps
```

Enter the same docker and use the following 18870bc3dc00 to modify the ID displayed on the actual terminal.

```
docker exec -it 18870bc3dc00 /bin/bash
```




```
rosrun transbot_ctrl transbot_keyboard.py
roslaunch transbot_ctrl transbot_keyboard.launch
```

Code analysis

Mainly used select module, termios module and tty module

```
import sys, select, termios, tty
```

- The select module is mainly used for socket communication, seeing changes in file descriptions, and completing work in a non-blocking manner.
- The termios module provides an interface for IO controlled POSIX calls for tty
- The tty module is mainly used to change the mode of the file descriptor fd

Get current key information

```
def getKey():
     #tty.setraw(): Change the file descriptor fd mode to raw; fileno(): Return
an integer file descriptor (fd)
     tty.setraw(sys.stdin.fileno())
     # select(): Directly call the IO interface of the operating system; monitor
all file handles with the fileno() method
     rlist, _, _ = select.select([sys.stdin], [], [], 0.1)
     # Read a byte input stream
     if rlist: key = sys.stdin.read(1)
     else: key = ''
     #tcsetattr sets the tty attribute of the file descriptor fd from the
attribute
     termios.tcsetattr(sys.stdin, termios.TCSADRAIN, settings)
     return key
```

Get speed limit

```
     linear_limit = rospy.get_param('~linear_limit', 0.45)
     angular_limit = rospy.get_param('~angular_limit', 2.0)
```

control flow

```
# Get current key information
             key = getKey()
             # Determine whether the key string is in the mobile dictionary
             if key in moveBindings.keys():
                 x = moveBindings[key][0]
                 th = moveBindings[key][1]
                 count = 0
             # Determine whether the key string is in the speed dictionary
             elif key in speedBindings.keys():
                 speed = speed * speedBindings[key][0]
                 turn = turn * speedBindings[key][1]
                 count = 0
                 # speed limit
                 if speed > linear_limit: speed = linear_limit
                 if turn > angular_limit: turn = angular_limit
                 print(vels(speed, turn))
                 # Print msg information a certain number of times cumulatively
                 if (status == 14): print(msg)
                 status = (status + 1) % 15
             # If the button is ' ' or 'k', stop the movement
             elif key == ' ': (x, th) = (0, 0)
             else:
                 #Set the function to stop the movement if it is not pressed for
a long time
                 count = count + 1
                 if count > 4: (x, th) = (0, 0)
                 if (key == '\x03'): break
             # make an announcement
             twist = Twist()
             twist.linear.x = speed * x
             twist.angular.z = turn * th
             pub.publish(twist)
```