QR code motion control

Note: The ROS_DOMAIN_ID of the Raspberry Pi and the microROS control board need to be consistent. You can check [MicroROS Control Board Parameter Configuration] to set the microROS control board ROS_DOMAIN_ID. Check the tutorial [Connect MicroROS Agent] to determine whether the IDs are consistent.

1、Introduction to gameplay

This course mainly uses the robot's camera to obtain the camera's picture, identify the QR code information, and control the robot's movement based on the QR code information.

2、Program code reference path

After entering the docker container, the location of the source code of this function is as follows.

```
/root/yahboomcar_ws/src/yahboomcar_astra/yahboomcar_astra/
```

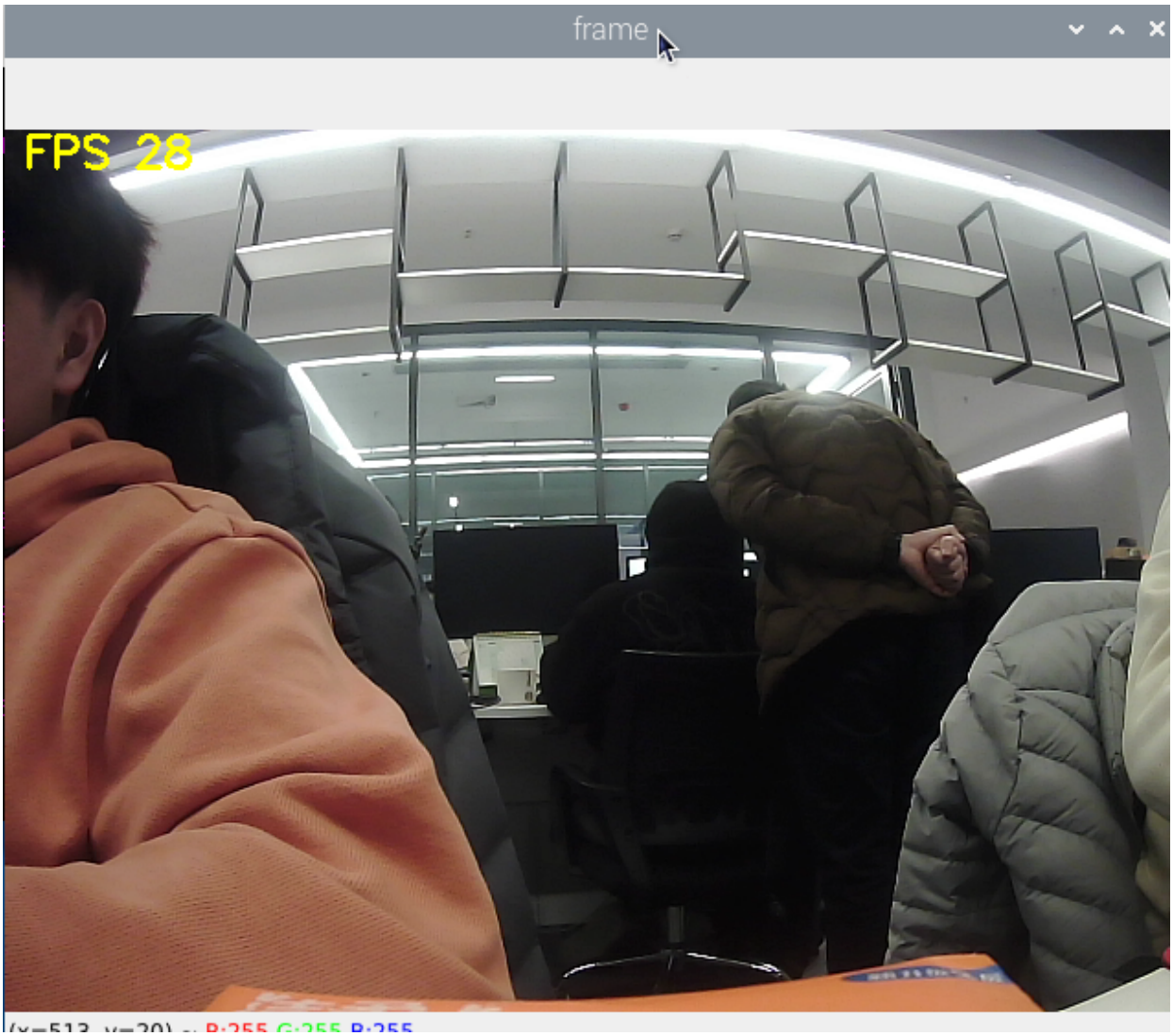
3、Program start

3.1、Start command

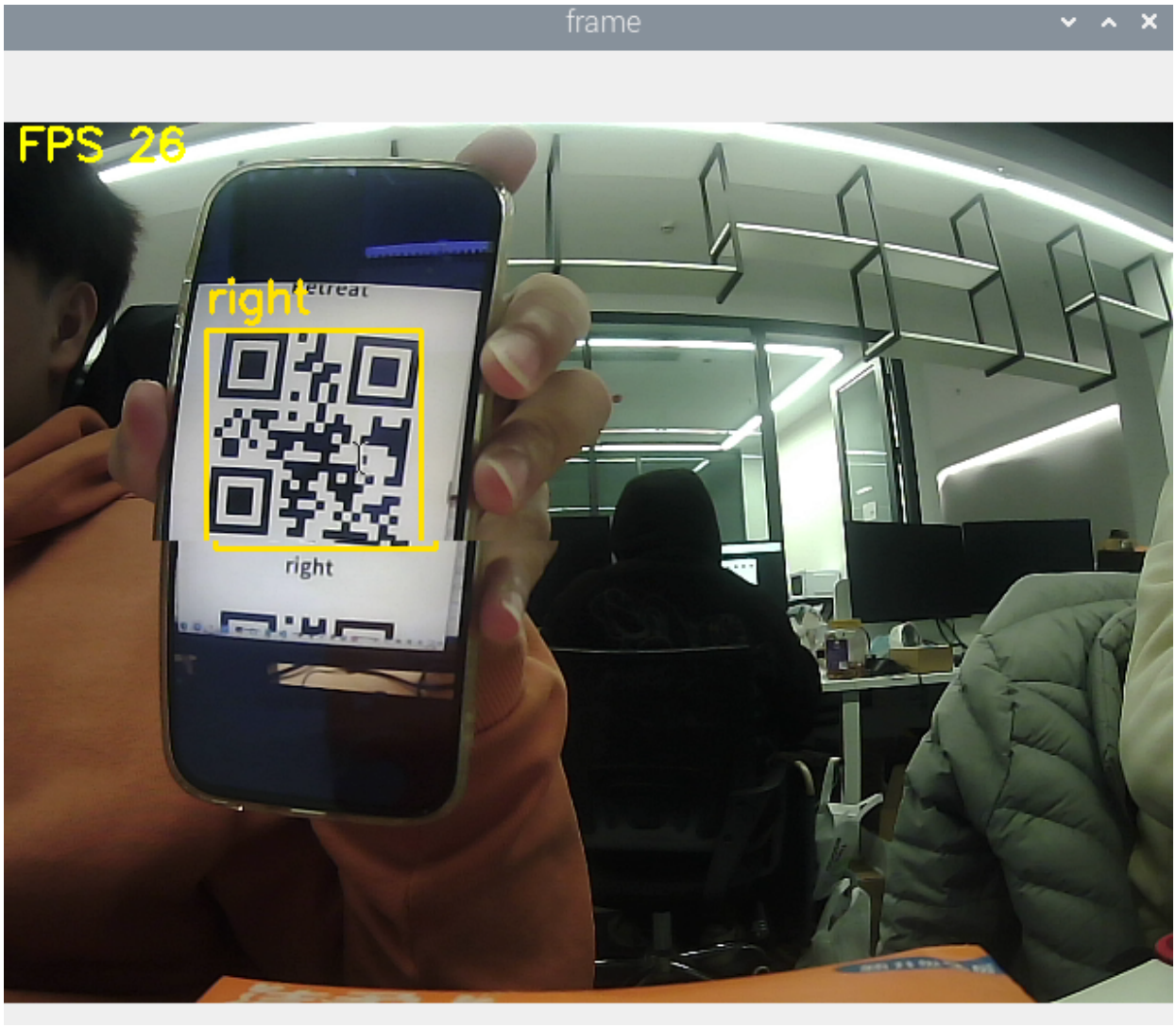
After entering the docker container, enter in the terminal.

```
ros2 run yahboomcar_astra qrTracker
```

Successfully displayed camera footage



Turn on the QR code recognition and execute the command. The QR code that can be recognized in the current routine is QRCode, and the information is "forward" which means moving forward, "back" which means going backward, "left" which means moving left, "right" which means moving right, and "stop" which means stopping. "turnleft" means left rotation, "turnright" means right rotation, and "stop" means stop.



Press q to turn off the camera.

4、core code

Import the QR code parsing library pybar

```
import pyzbar.pyzbar as pyzbar
from PIL import Image
```

If pybar is not installed on your system, please open a terminal and run the following command to install it.

The factory docker environment has been configured, and this step is suitable for self-development.

```
pip3 install pyzbar
sudo apt install libzbar-dev
```

Analyze the grayscale image and extract the information and image position of the QR code in the image. If there is no QR code in the image, the information is None.

```
def detect_qrcode(image):
    # 转为灰度图像 Convert to grayscale image
    gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
    barcodes = pyzbar.decode(gray)
    for barcode in barcodes:
        # 提取二维码的数据和边界框的位置 The data of the QR code and the position of the
bounding box are extracted
        (x, y, w, h) = barcode.rect
        barcodeData = barcode.data.decode("utf-8")
        barcodeType = barcode.type
        # print("[INFO] Found {} barcode: {}".format(barcodeType, barcodeData))
        car_control(barcodeData)
        return barcodeData, (x, y, w, h)
    return None, (0, 0, 0, 0)
```

Control the robot movement according to the string command of info.

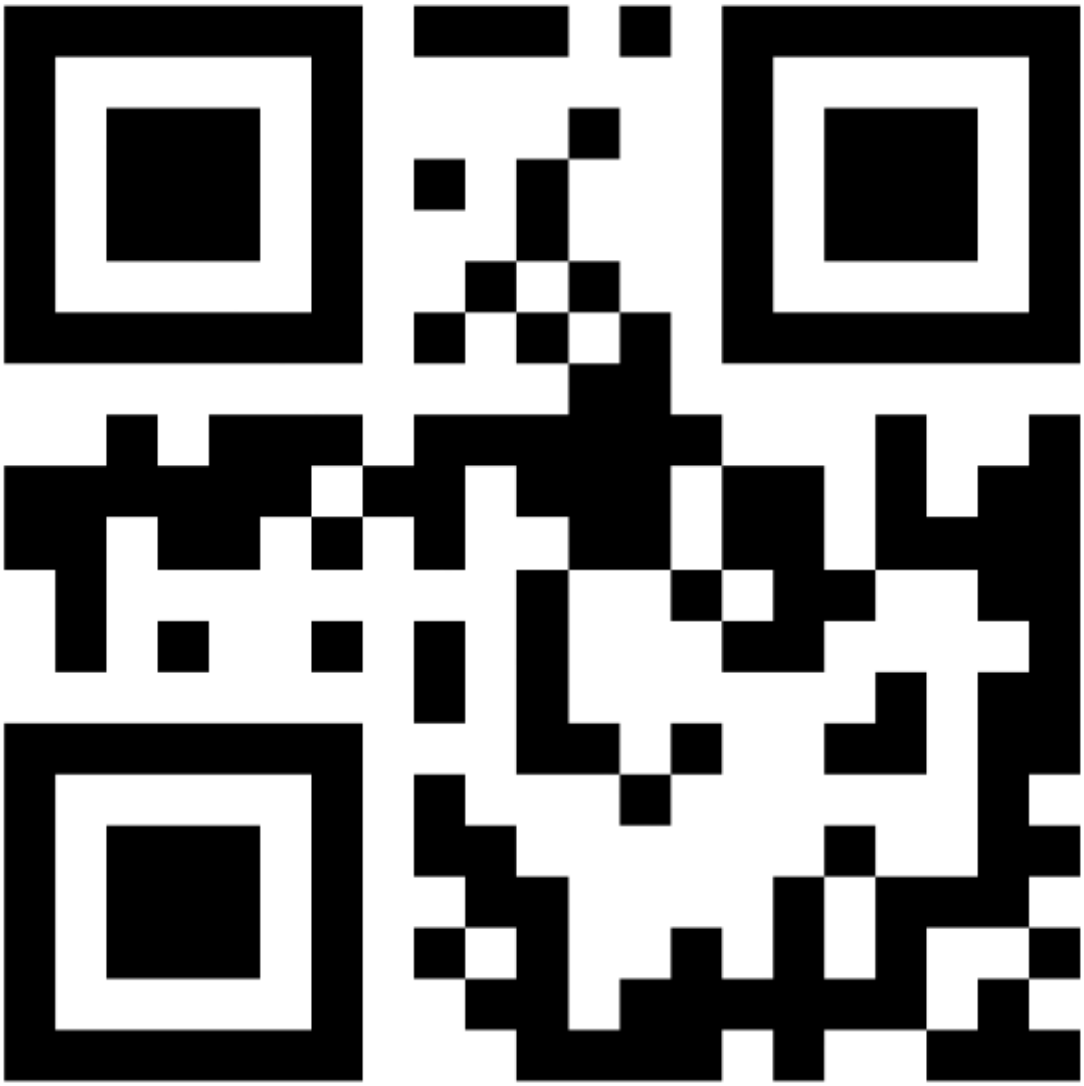
```
def robot_action(self,data):
    if data == "forward":
       self.pub_vel(0.3,0.0,0.0)
    elif data == "back":
       self.pub_vel(-0.3,0.0,0.0)
    elif data == "left":
       self.pub_vel(0.0,0.0,1.0)
    elif data == "right":
       self.pub_vel(0.0,0.0,-1.0)
    elif data == "stop":
       self.pub_vel(0.0,0.0,0.0)
    elif data == "turnright":
       self.pub_vel(0.3,0.0,-0.5)
    elif data == "turnleft":
       self.pub_vel(0.3,0.0,0.5)
    elif data == "stop":
       self.pub_vel(0.0,0.0,0.0)
```

Image processing program

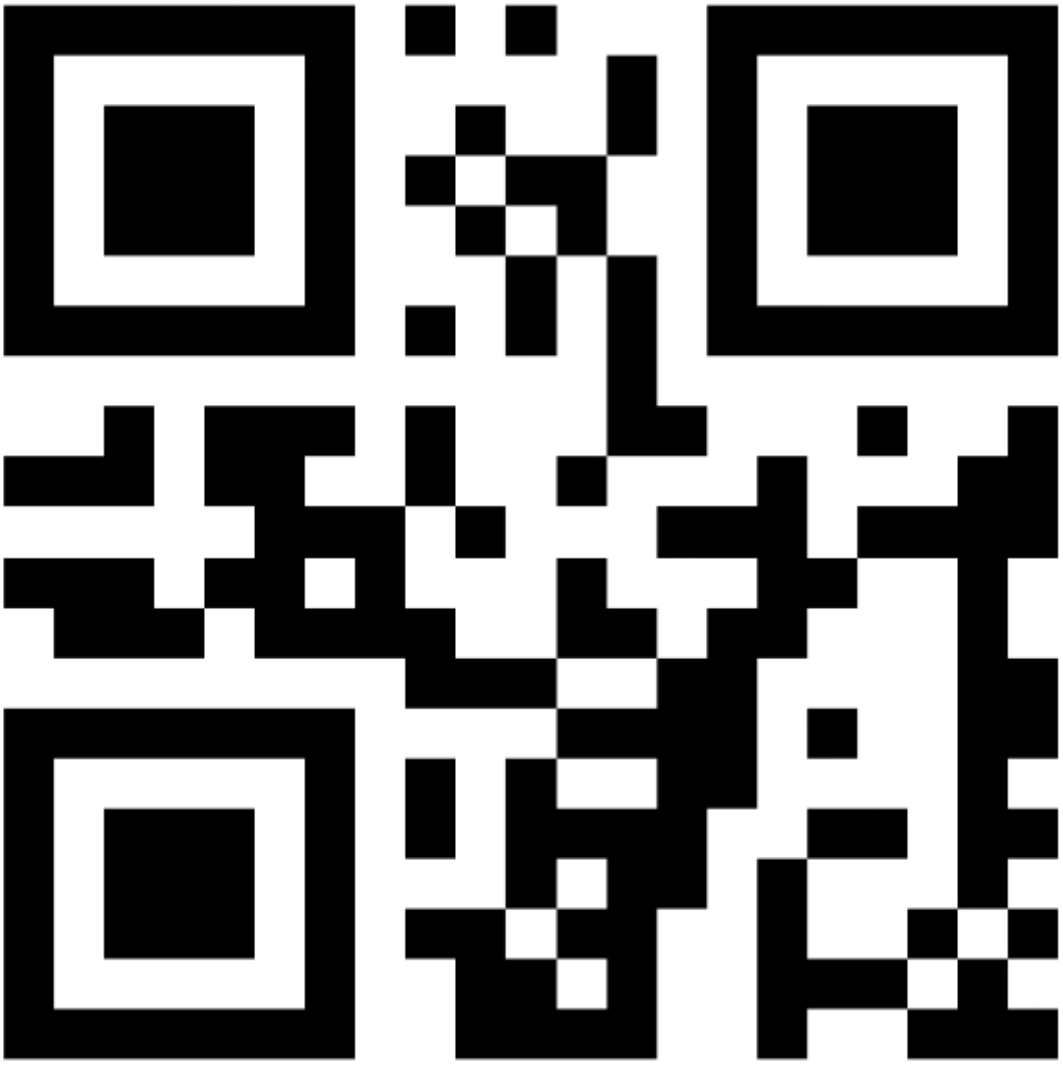
```
ret, frame = capture.read()
            action = cv2.waitKey(10) & 0xFF
            payload, (x, y, w, h) = QRdetect.detect_qrcode(frame.copy())
            if payload != None:
                cv2.rectangle(frame, (x, y), (x + w, y + h), (0, 225, 255), 2)
                cv2.putText(frame, payload, (x, y - 10), cv2.FONT_HERSHEY_SIMPLEX,
0.8, (0, 225, 255), 2)
                QRdetect.robot_action(payload)
            else:
                QRdetect.pub_vel(0.0,0.0,0.0)
```

Appendix (QR code picture):

forward

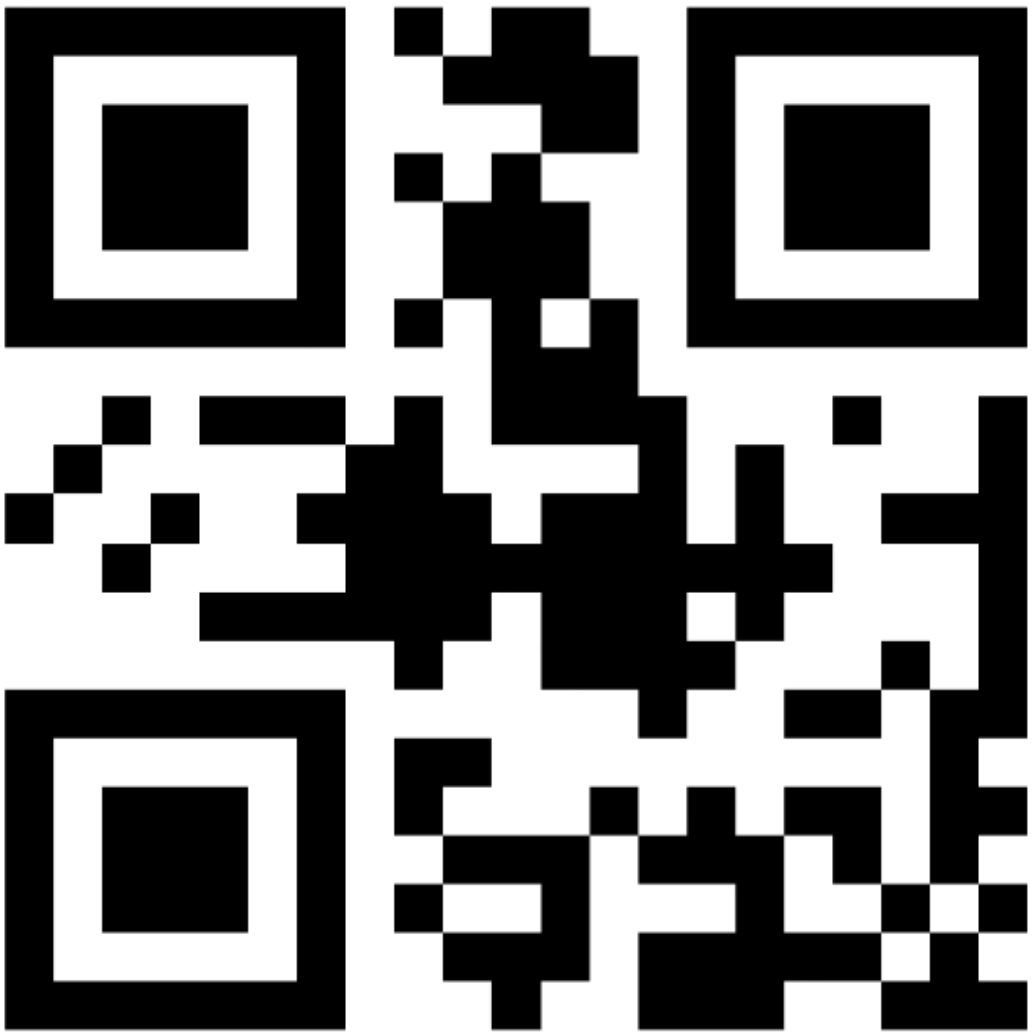


back



left

right



stop

turnleft

turnright