QR code recognition

Note: The ROS-DOMAIN-ID of the virtual machine and ROS wifi image transmission module needs to be consistent and set to 20.

1、Gameplay Introduction

This course mainly utilizes the camera of a robot to obtain the image of the camera and recognize QR code information.

2、Program code reference path

The source code for this feature is located at,

```
/home/yahboom/yahboomcar_ws/src/yahboom_esp32ai_car/yahboom_esp32ai_car/qrTracke
r.py
```

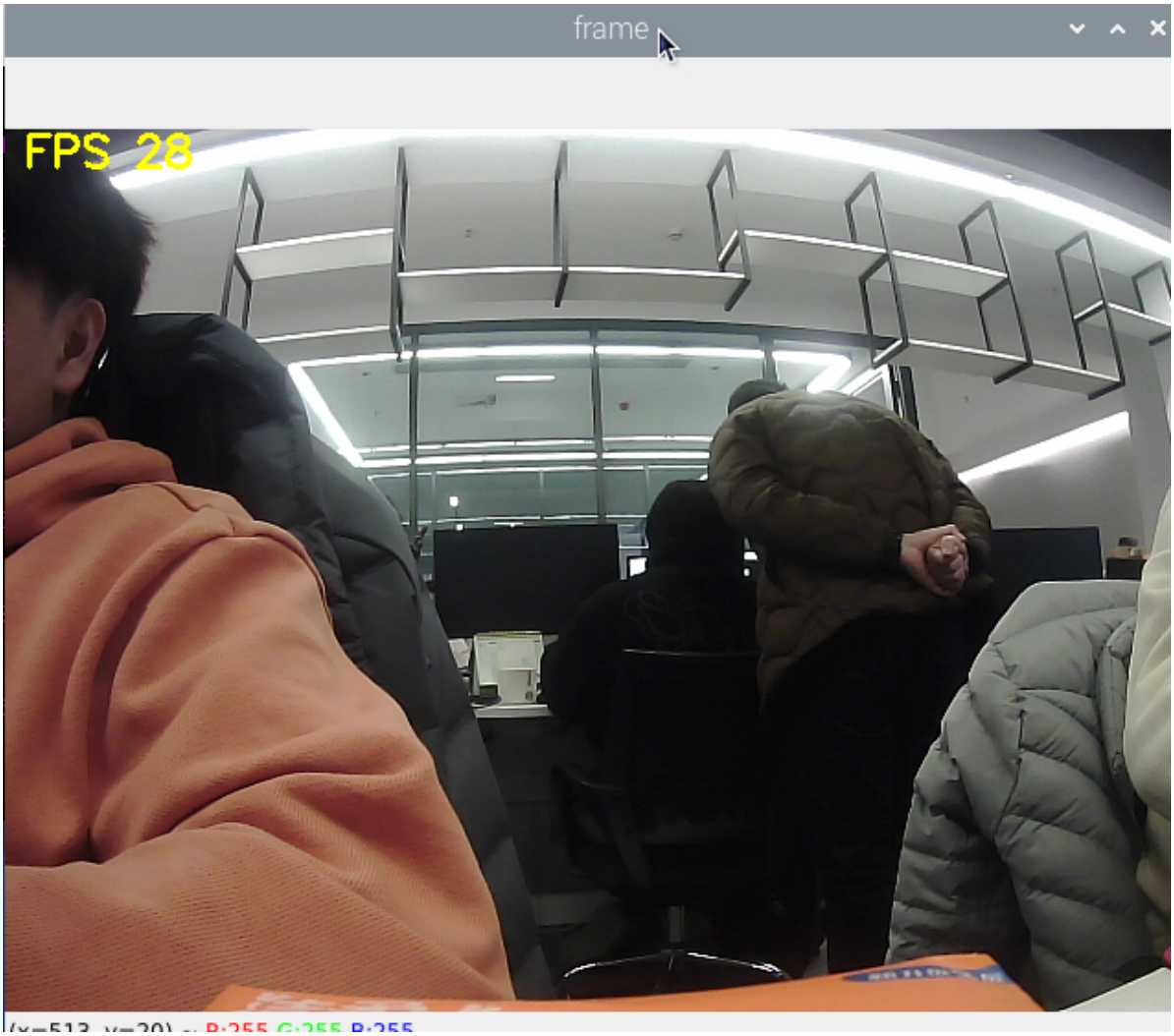
3、Program startup

3.1、Start command

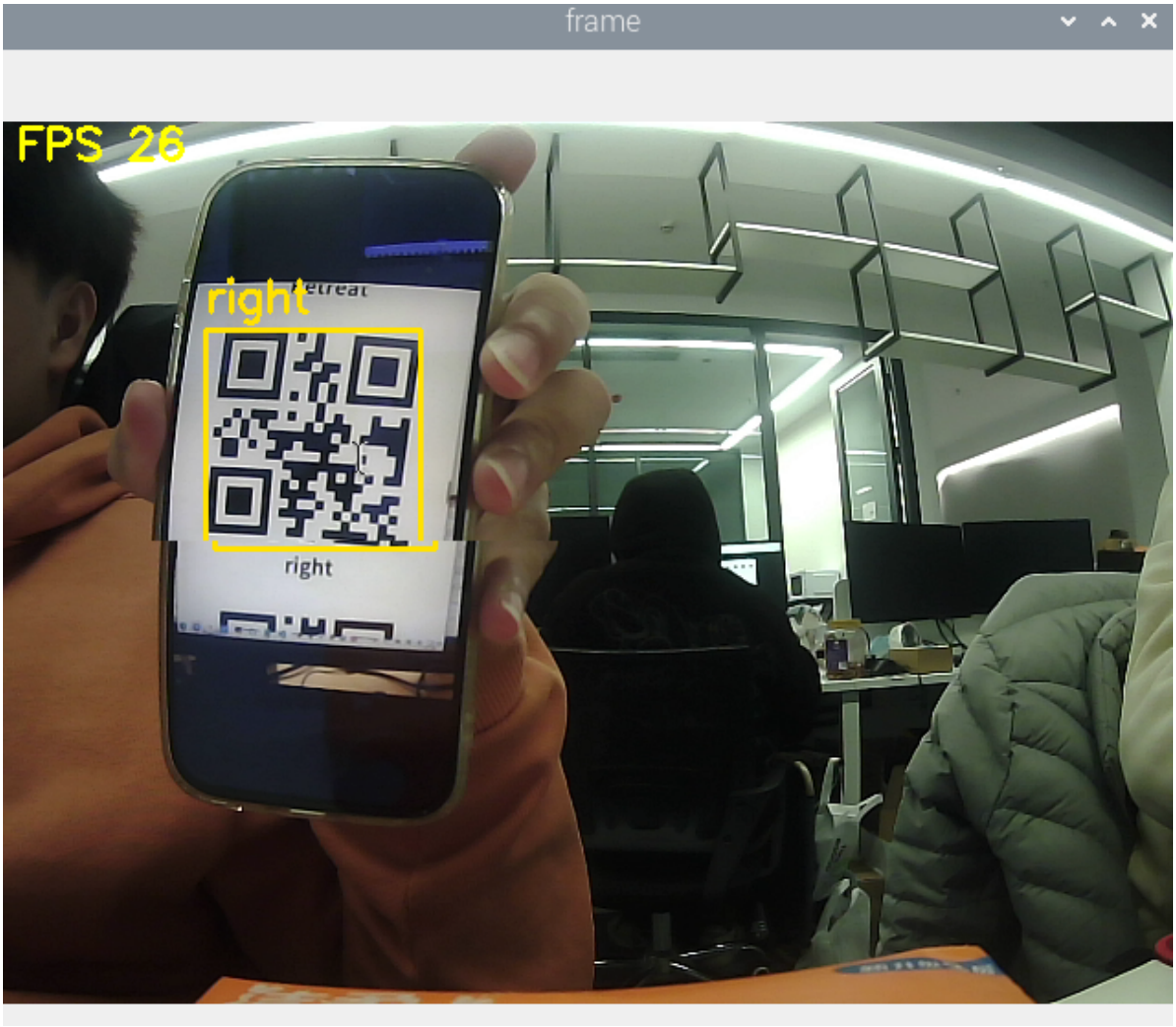
```
ros2 run yahboom_esp32ai_car qrTracker
```

**If the image of the camera is inverted, you need to refer to the * * 3. Camera Image Change * * document and correct it yourself. This experiment will not be elaborated on further.

Successfully displayed camera screen



Enable recognition of QR codes and execute commands. The currently recognizable QR code in the routine is QRCode, with information such as "forward" indicating forward, "back" indicating backward, "left" indicating left translation, "right" indicating right translation, and "stop" indicating stop. "Turnleft" represents left rotation, "turnright" represents right rotation, and "stop" represents stop.



4、Core code

Import QR code parsing library pybar

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

If pybar is not installed in the system, please open the terminal and run the following command to install.

Virtual machines with data tape do not require operation

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

Analyze grayscale images, extract information about QR codes and image positions from the images. 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)
```

Image processing program

```
def handleTopic(self, msg):
        self.last_stamp = msg.header.stamp
        if self.last_stamp:
            total_secs = Time(nanoseconds=self.last_stamp.nanosec,
seconds=self.last_stamp.sec).nanoseconds
            delta = datetime.timedelta(seconds=total_secs * 1e-9)
            seconds = delta.total_seconds()*100

            if self.new_seconds != 0:
                self.fps_seconds = seconds - self.new_seconds

            self.new_seconds = seconds

        start = time.time()
        frame = self.bridge.compressed_imgmsg_to_cv2(msg)
        frame = cv2.resize(frame, (640, 480))
        action = cv2.waitKey(10) & 0xFF

        payload, (x, y, w, h) = self.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)
            self.QRdetect.robot_action(payload)
        else:
            self.QRdetect.pub_vel(0.0,0.0,0.0)


        end = time.time()
        fps = 1 / ((end - start)+self.fps_seconds)

        text = "FPS : " + str(int(fps))
        cv2.putText(frame, text, (10,20), cv2.FONT_HERSHEY_SIMPLEX, 0.8,
(0,255,255), 2)
        cv2.imshow('frame', frame)
```

appendix: