Raspberry Pi remote control servo gimbal

Note: ESP32 camera needs to be burned with factory firmware. If you have not flashed the firmware after receiving the ESP32 camera, you do not need to do so. The factory default firmware is used

1. Experimental preparation

- ESP32 camera
- Raspberry Pi 5 development board
- 2-DOF gimbal
- 24-channel servo driver board
- USB to TTL

2. Wiring diagram

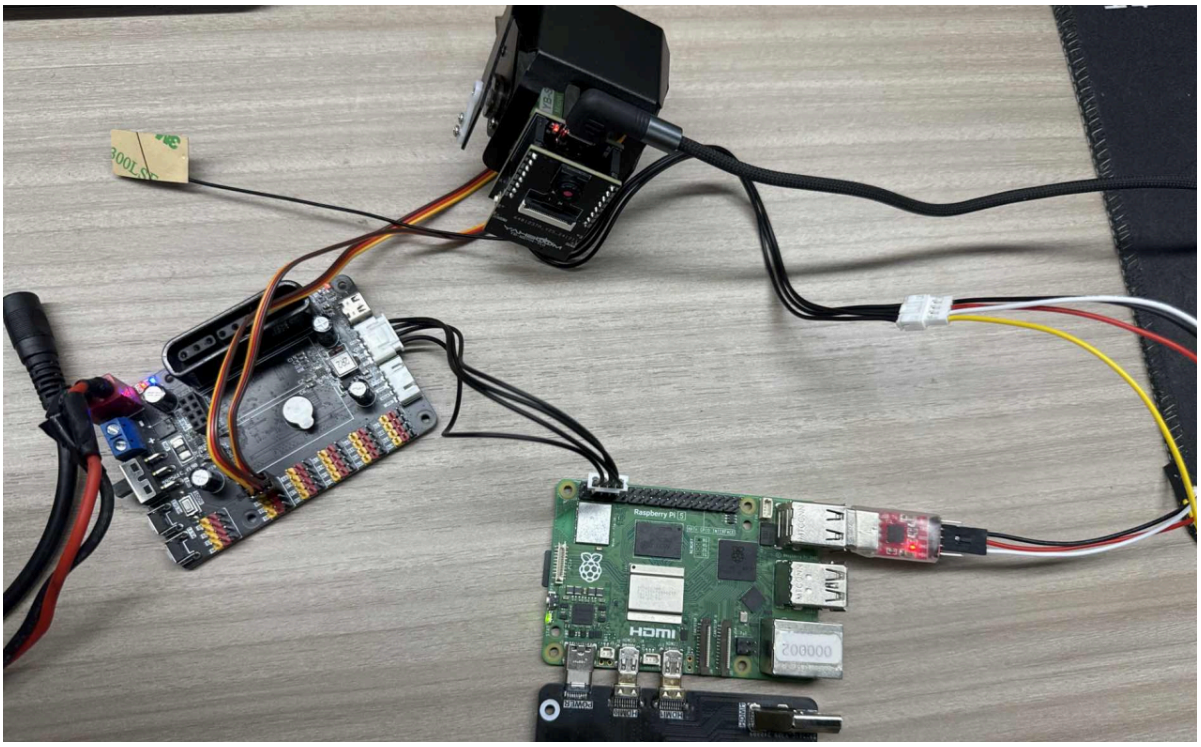
Note: Because Raspberry Pi 5 has only one serial port, an external USB to TTL is required. Because of insufficient voltage, ESP32 camera and 24-channel servo driver board need additional power supply via type-c data cable

Raspberry Pi motherboard ----> USB to TTL	ESP32 camera
TX	RX
RX	TX
GND	GND
NC	5V

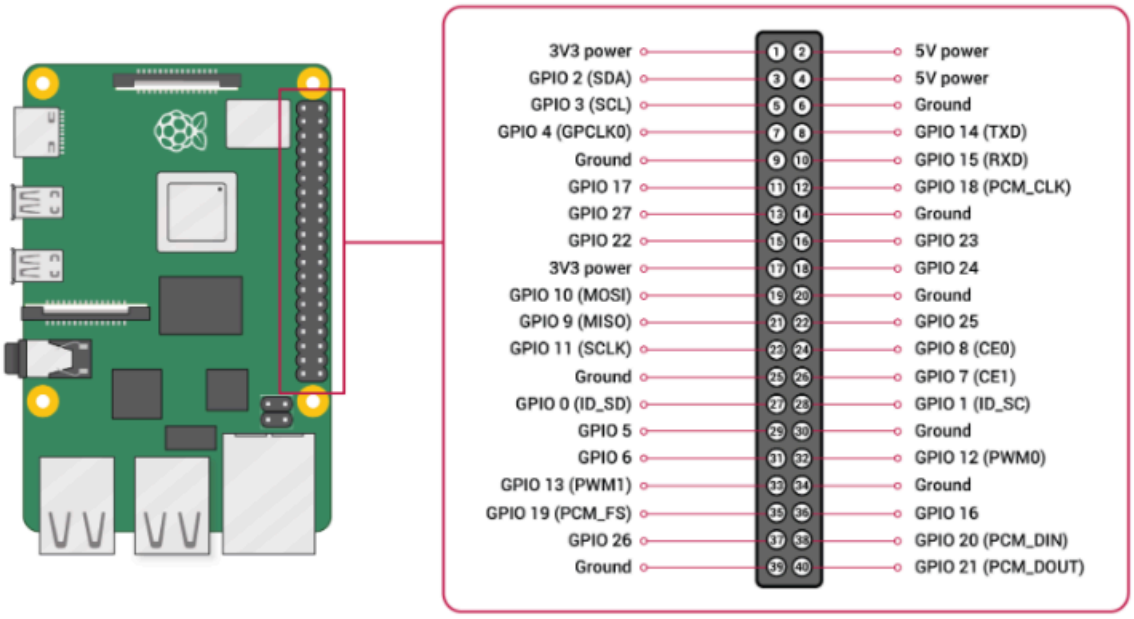
Raspberry Pi motherboard	24-channel servo driver board
GPIO14	RX
GPIO15	TX
GND	GND
5V	5V

24-channel servo driver board	Servo
s5	Vertical servo
s6	Horizontal servo

Physical connection diagram:



Pin diagram:

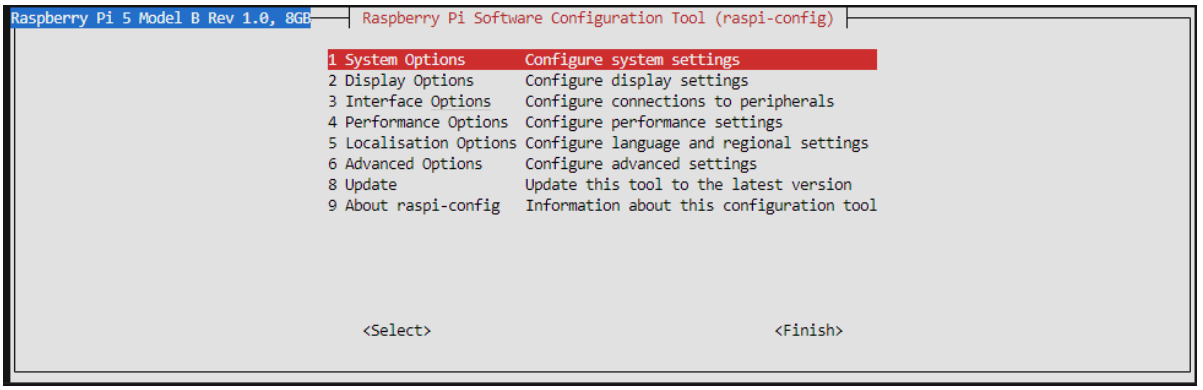


3. Experimental steps and experimental results

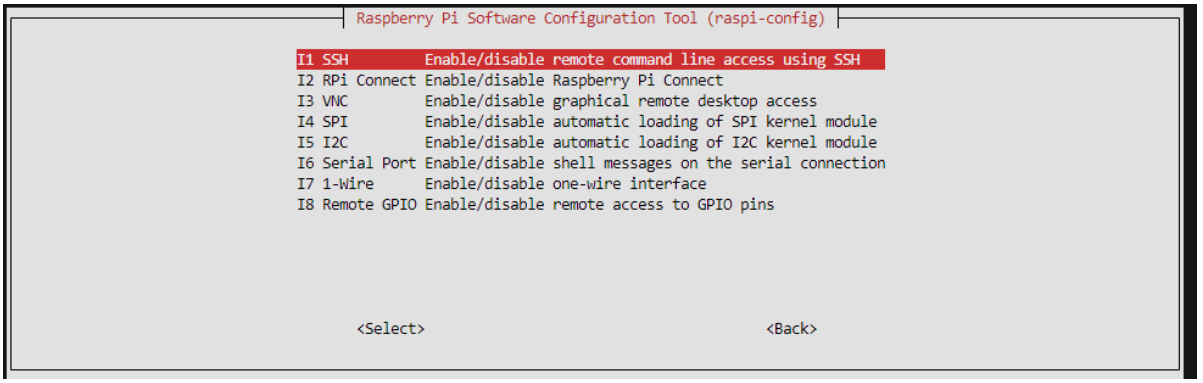
Quick method: You can directly connect to the wifi opened by esp32. The name of this experiment is ESP32_WIFI_TEST. Then the IP address camera information of the mobile app is 192.169.4.1. You can use the app to control the servo

1. Upload the provided program source code "pi_servo.py" file to your own Raspberry Pi motherboard.
2. The official image of the Raspberry Pi motherboard does not open the serial port by default. Now you need to open the serial port. Enter in the terminal,

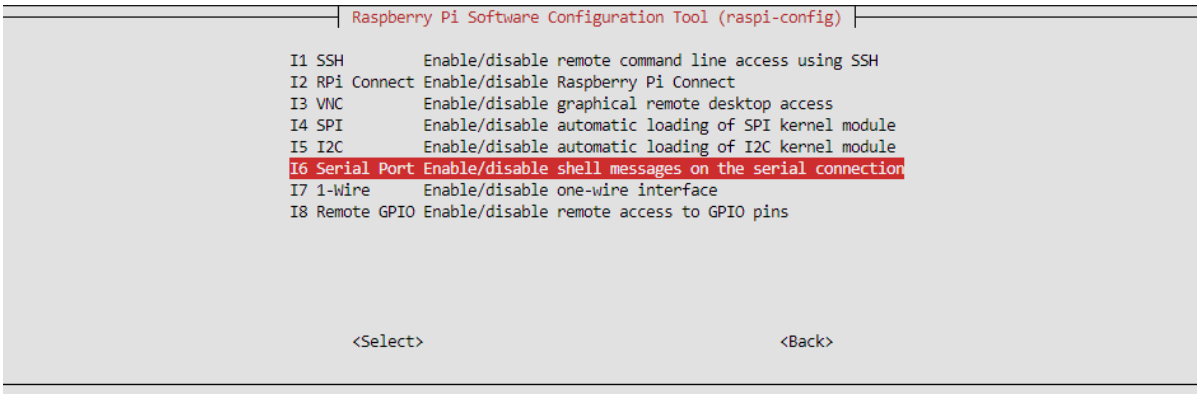
```
sudo srpi-config
```



Select Interface Options,



Select I6 Serial Port, press Enter to enable, and then restart the Raspberry Pi to use it.



3. Open the code just uploaded, and change it to the name and password of the wifi you want to connect to. You can also change the name of the hotspot and the corresponding wifi mode.

```
Sta_wifi_ssid = "Yahboom2"        #sta的wifi名称 wifi name of sta
Sta_wifi_pd = "yahboom890729"          #sta的wifi名称 wifi name of sta

AP_wifi_ssid = "ESP_WIFI_TEST"  #ap的WiFi名称 The WiFi name of the ap
AP_wifi_pd = ""                 #ap的wifi密码 ap's wifi password
```

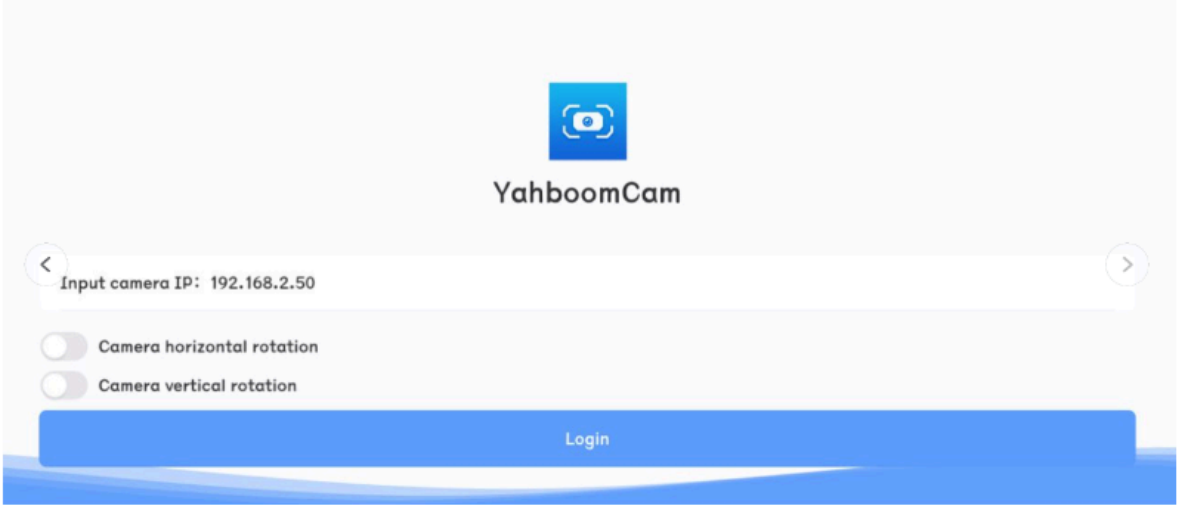
4. Run the program in the terminal, and it will return the ip address of the current network connection and the address of the hotspot.

```
python3 pi_servo.py
```

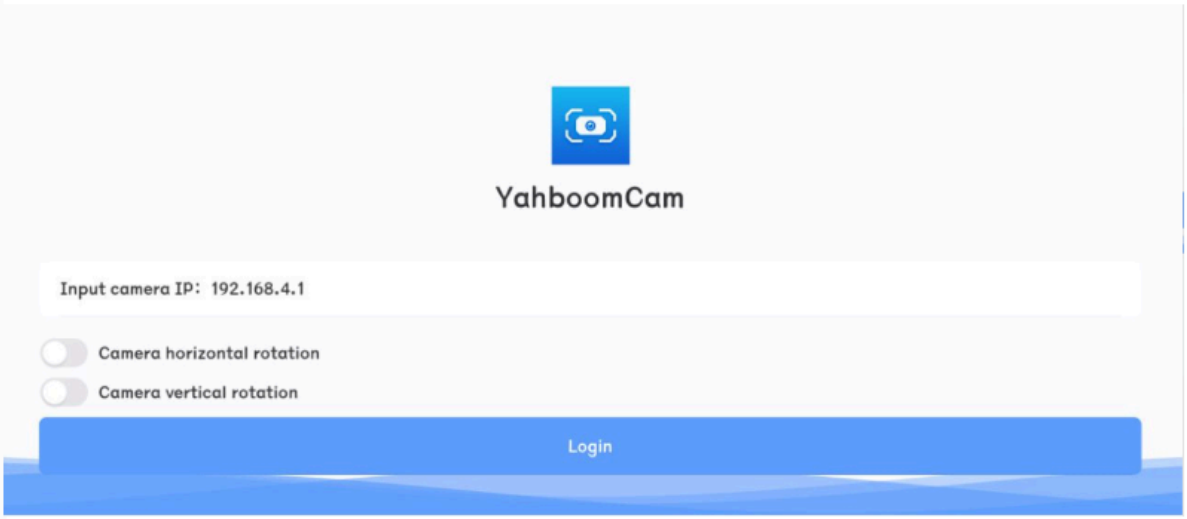
```
yahboom@raspberrypi:~ $ python3 pi_servo.py
serial start ...
set_wifi_mode
set_ai_mode
ap_ip:192.168.4.1

sta_ip:192.168.2.97
```

5. Use the app to control the movement of the car. After installing the "ESP32Cam" app, open it.

- On the login page, set it according to the IP obtained by the serial port assistant. If the IP obtained by the serial port assistant is "192.168.2.50", then the configuration is as follows

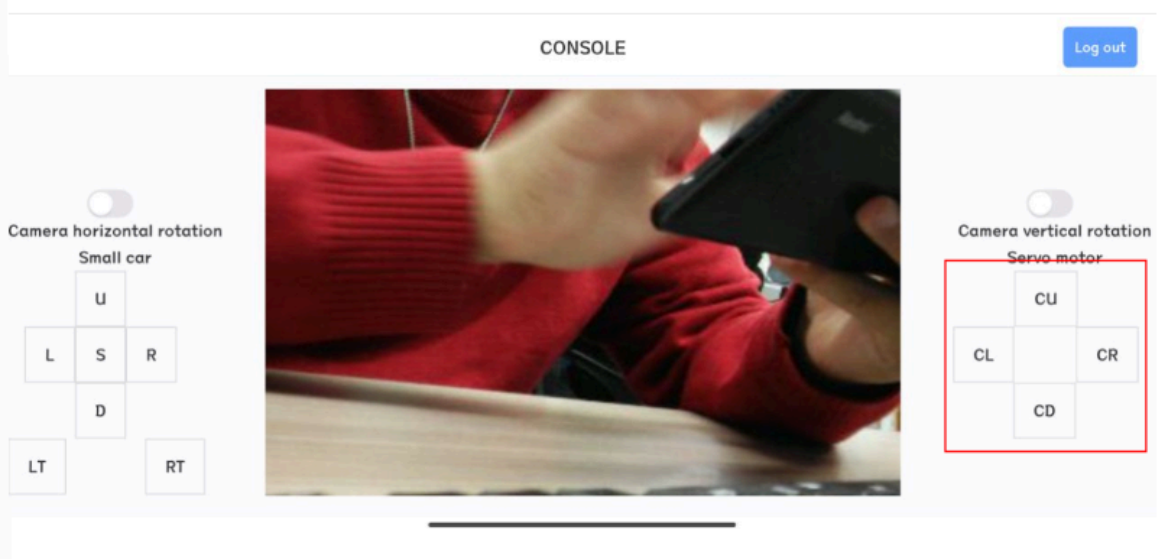


- Then click login directly
- (Optional) If you want to connect to the hotspot of the wifi camera, the IP address must be set to 192.168.4.1, as shown in the figure



- When the IP address is configured correctly and connected successfully, you can control the servo gimbal through the app console page

Horizontal screen



Note: Every time you restart the app, you need to click the exit button in the upper right corner, then exit and reconfigure the IP address information before logging in