Hiwonder
幻尔科技

SpiderPi六足机器人

用户手册

INTELLIGENT CODING ROBOT KIT

深圳市幻尔科技有限公司
www.hiwonder.com

First Part: Operation Guide

1 Caution

1 Product List

After receiving the Raspberry Pi hexapod robot, you need to check it according to the Product list.

2 Charging

Since the battery cannot include power during transportation, please charge the battery for more than 2 hours. The robot kit consists of a rechargeable lithium battery and charger. Please pay attention to the following points when charging:

1) The charging indicator will turn green when the battery charger is connecting to the battery without power supply.
2) When the charger is connecting to the power supply. If the indicator is red, it means that the changing hasn't finished. If the indicator turns green, it means the changing has finished.

Image 1 Battery Charging Schematic Diagram

3) When the battery voltage is lower than 9.6V, the robot will stop working. Charge it on time; otherwise, it may damage due to over-discharge.

3 Operation

1) Whatever the finished product or the unassembled parts package, the SD memory card has a download system image.
2) When the robot is working, keep the robot away from your eyes to avoid accidental injury.
3) When the robot is working, do not put your fingers in the working range of the robot joints to prevent accidental injury.
4) Please put the robot on the smooth ground when you are using it, otherwise, it may fall and damage some electronic components.
5) After the robot is on, please do not twist the joints, because it will damage robot joint.
6) The servo of the robot includes various precise components. It needs to be replaced after a long time or excessive use.
7) Long press the Raspberry Pi extension board KEY2 button can turn off the Raspberry Pi when the bug occurs, but please avoid turning off the power supply to shut down the Raspberry Pi

4 Control and Connection

1) The user of the finished product can use the mobile phone APP to directly control after turning on the Raspberry Pi.
2) Mobile phone control support and Apple and Android systems, Apple system version needs 9.0, or later, Android system version requires 5.0 or later, please ensure that GPS positioning is turned on before using.
3) The robot supports the PS2 handle control (the robot product does not contain the PS2 handle, and it needs to purchase separately).
4) Support Wi-Fi connection, Wired, Wi-Fi LAN mode.
5) If the camera screen is not clear, please rotate it to adjust the focal length.

2 Mobile APP Control

1.1 Mobile APP Installation

Scan the QR code below or find the "WonderPi" installation package file (Android version only) in this folder. After downloading the apk file on your mobile phone, click it to install(Android system version needs 5.0 or later, iOS system version 9.0 or later).

Image 2-1 WonderPi Installation Package QR Code

2.1 Mobile APP Connection

Because the Raspberry Pi is able to launch Wi-Fi hotspot in the default mode. After our mobile phone connects to the Wi-Fi created by the Raspberry Pi. Following the instructions below to help the APP connect to the Raspberry Pi robot.

1) Turn on the robot power switch. If the expansion board LED1 light flashes in every two seconds, it means that the robot is working.

2) Open the phone's GPS location and Bluetooth and Wi-Fi, and select first letters "HW" Wi-Fi to connect.

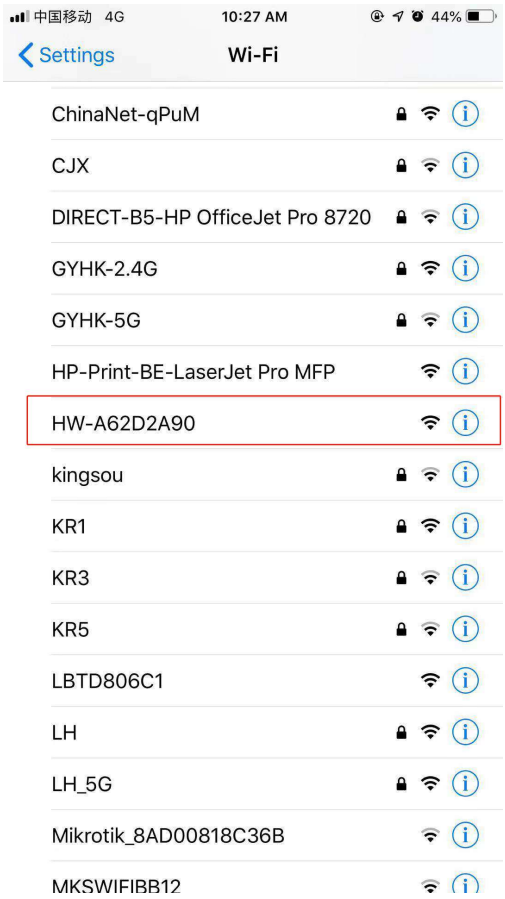

Image 2- 2 Phone Wi-Fi Interface

3) Open the WonderPi software you just installed, click the search button in the upper right corner. When the robot icon shown below appears, click the robot icon to connect to the robot.

Image 2- 3 Mobile Phone APP Search Robot

3.2 Mobile APP Operation

Touch your phone screen; the App will appear the interface like the image below. Phone App is able to control the robot do various operations or control the robot camera (rotate camera can adjust focal length).

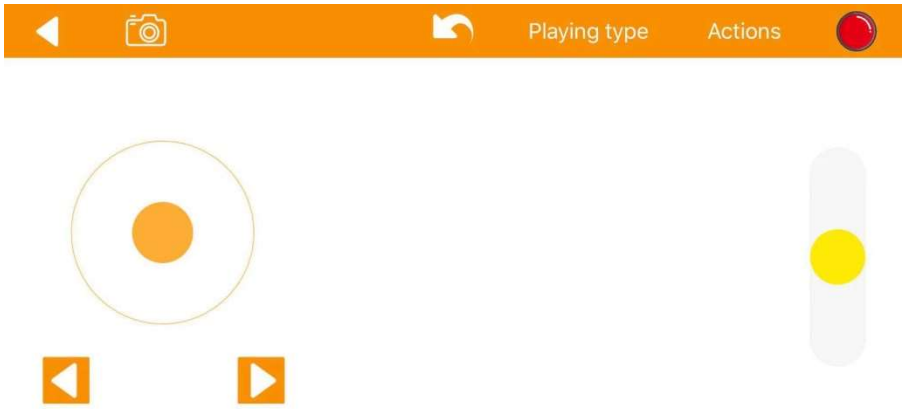

Image 2-4 APP Control Interface

Table 1 APP Icon Function Table

Icon	function	icon	function
	Click this button to return to the device selection interface		Click this button to take a photo and save it to your phone.
	Click this button, and the options bar will not appear on the screen and display full-screen image, click it again can call option bar.		Click this can show the action group
	Click this button to show the game switching optional bar		Click this button will show the software version and description.
	Click this button will open the photo saving directory		Click this button to refresh the device list
	Click this button will stop the action being performed and run the standing action.		

Swipe left the area of the screen, and the camera will turn left; slide to the right, the imaging head-turning; slid upward, taken to turn upward like the first; slides down, the camera is rotated downward.

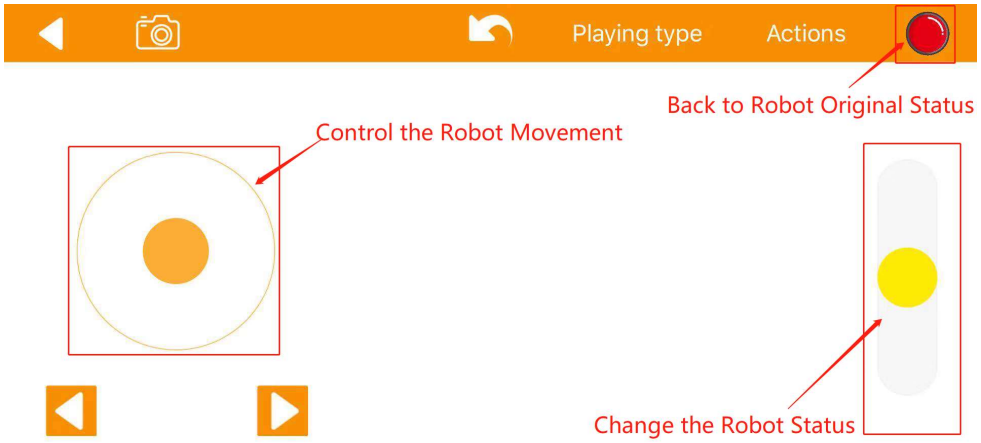

Image 2-5 Control System Interface

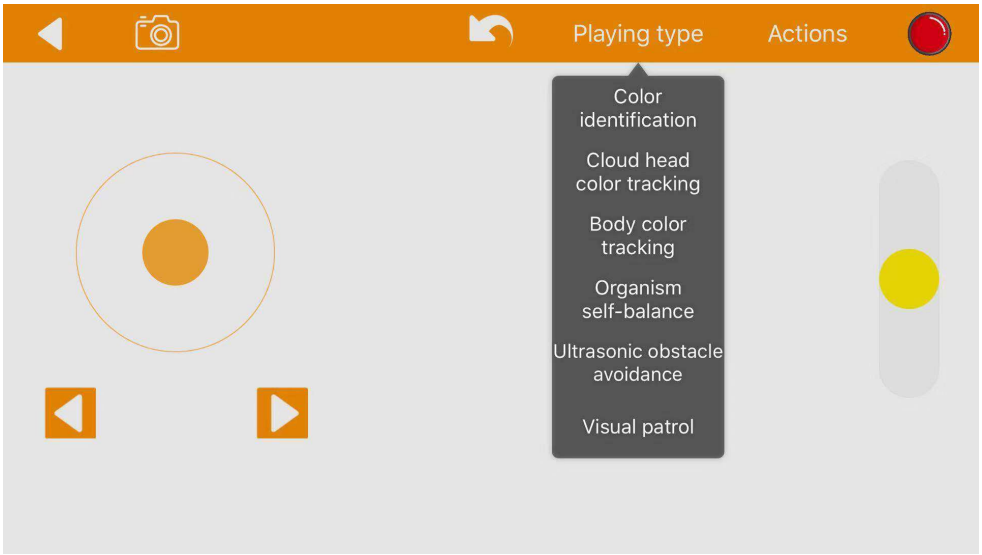

Image 2-6 Switching the Gameplay

3 Computer Control

1.1 Control Software Download

Go to the "3. Basic Tutorial -> 3. Computer Control Software " folder in the data and open the icon application directly (turn off the firewall before opening the application).

Image 3- 1 Terminal Application

1.2 Controlling Software Connection

1) Turn on the Raspberry Pi power switch

2) When Raspberry Pie is turning on, it will automatically launch a first letter " HW" named hotspot. Turn on the computer (the desktop computer needs to insert wireless network card) and connect this Wi-Fi.

Image 3- 2 Hotspot Name

1.3 Controlling Software Operation

1) Click the "Scan" button to scan the hotspot. after opening the 5.1 version terminal application

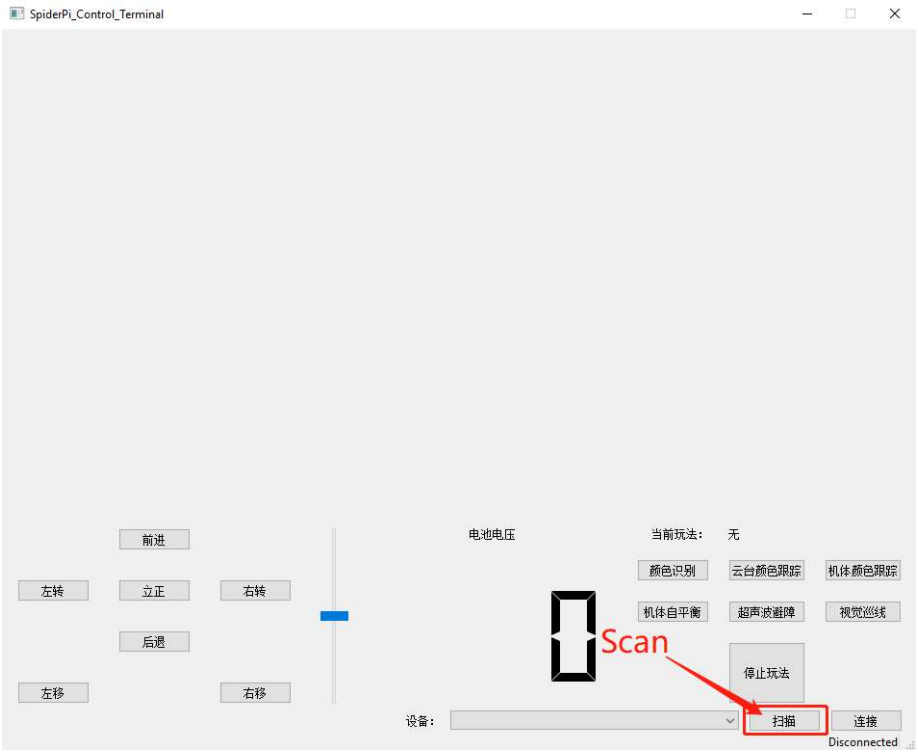

Image 3- 3 Interface Display

2) When the scan finishes, the camera's image will appear on the software interface.

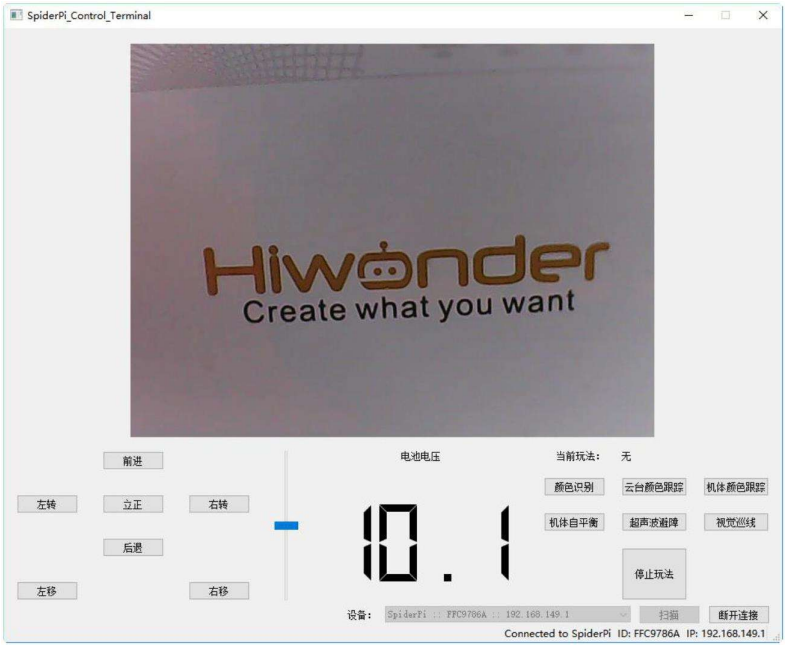

Image 3- 4 interface display

3) Next, you can control the movement of the robot by clicking these motion buttons on the left side of the interface.

4 VNC Installation

The Raspberry Pi is as a stand-alone minicomputer, so you can't connect the Raspberry Pi to the computer directly through the data cable. The monitor can directly connect to the Raspberry Pi and display the system interface. Users, who don’t have available monitor, can learn how to use VNC to remotely control and operate the Raspberry Pi.

- VNC Control.

VNC is a graphical remote control software. With VNC, we can control the Raspberry Pi directly on our computer through the Raspberry Pi hotspot. Next, we will teach you how to use VNC.

1) Double-click the "VNC-Viewer-6.17.731-Windows" file in this folder. In the pop-up dialogue box, select the installation language as "English" and click the "OK" button.

Image 4-1 VNC Installation Language Selection

2) Click the "Next" button on the pop-up interface.

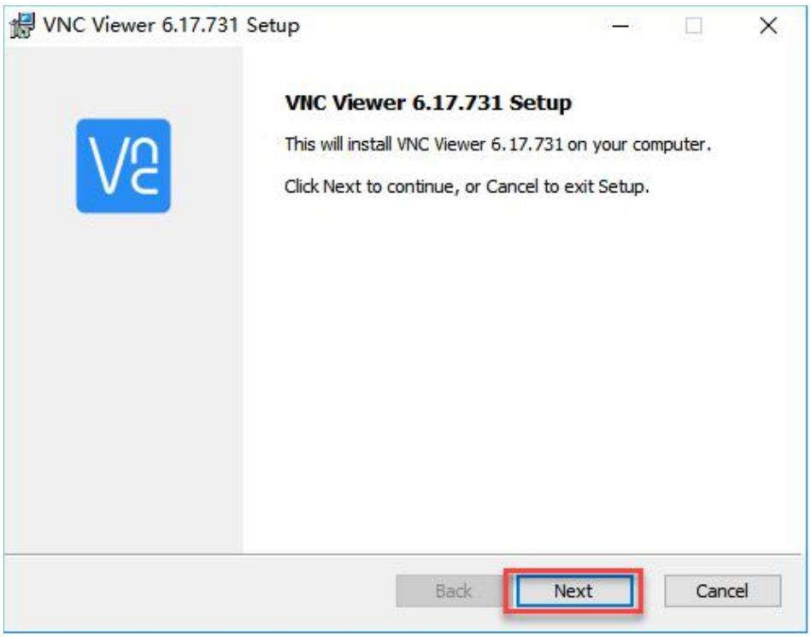

Image 4-2 VNC Installation Process

3) Click "Accept agreement" in the prompt box, and click "Next" to enter the next step.

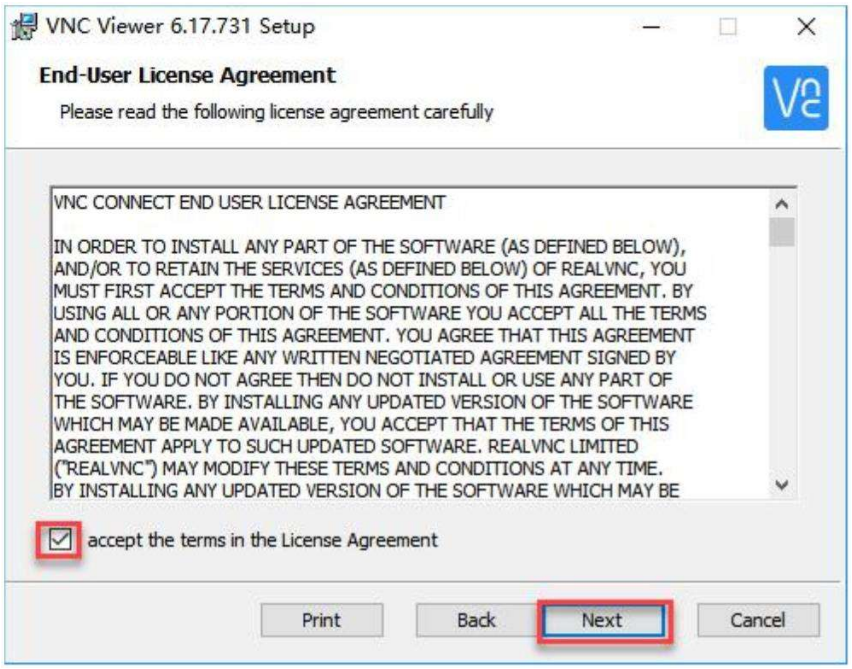

Image 4-3 VNC Installation Agreement

4) Click "Install" in the pop-up page.

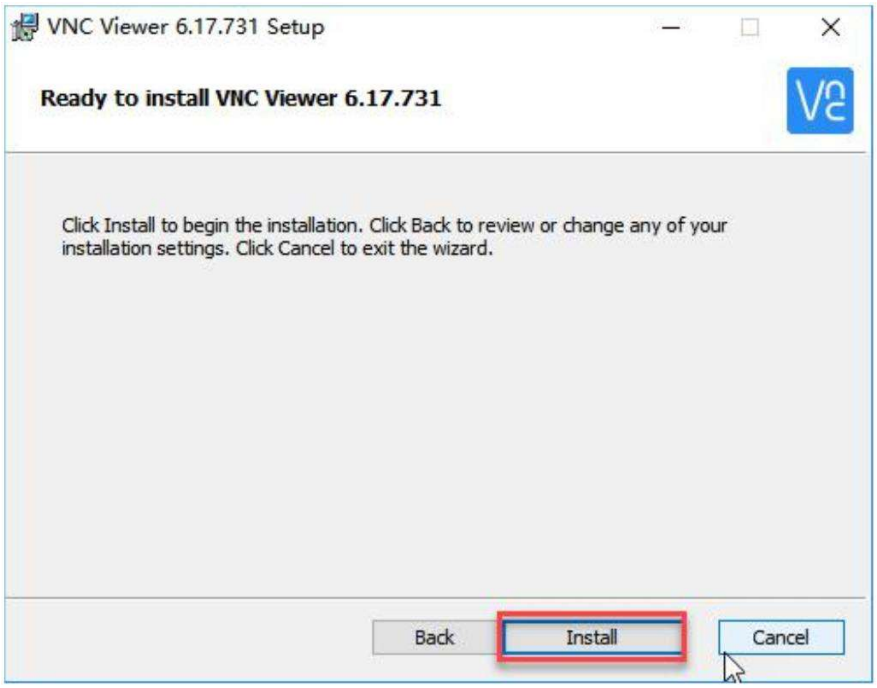

Image 4- 4 VNC Installation Reminder

5) Wait for the installation. Click the “Finish” button to end this installation. When all things are done, open VNC.

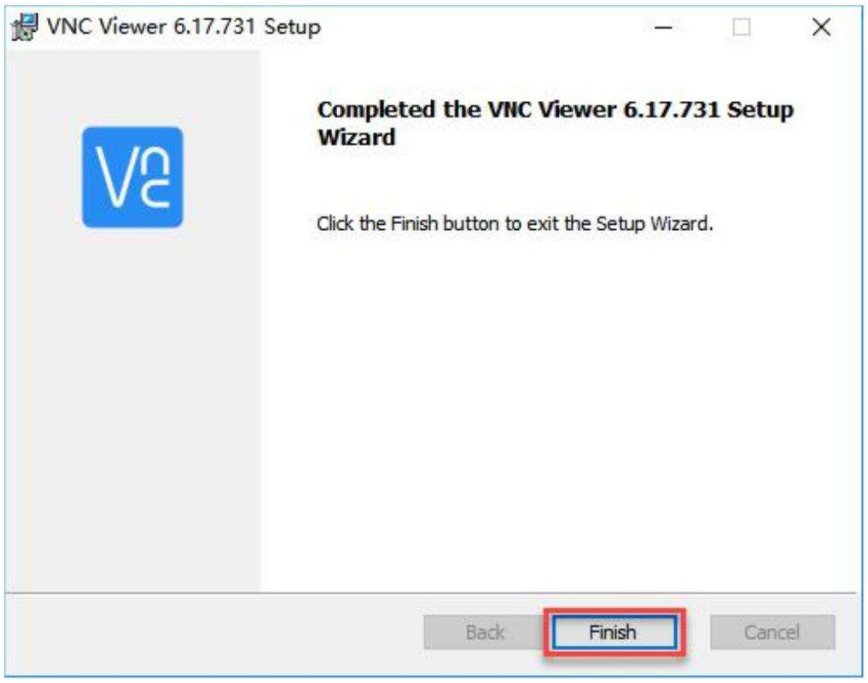

Figure 4- 5 VNC Installation Completion Prompt

6) After connecting the 

VNC successfully Double-click to open

Second Part: Advanced Tutorial

1 How to do the gameplay

1) Use the charger to charge the battery (After charging finishes the battery charger indicator will switch turn from the red to the green). Insect battery to the Raspberry Pi, and turn on its power switch.
The LED1 and LED2 of the Raspberry Pi will keep on. After a while, the LED1 will flash every 2 seconds, which means that the Raspberry Pi is working.
2) The Raspberry Pi will launch a hotspot, which first letter name is HW after opening the switch. The default IP address is 192.168.149.1.

Image 1-1 Raspberry Pi Wi-Fi

3) Enter the default IP address of the Raspberry Pi 192.168.149.1 in the VNC Viewer: and press "Enter". Click "Continue" , If the software warns that the connection is not safe.

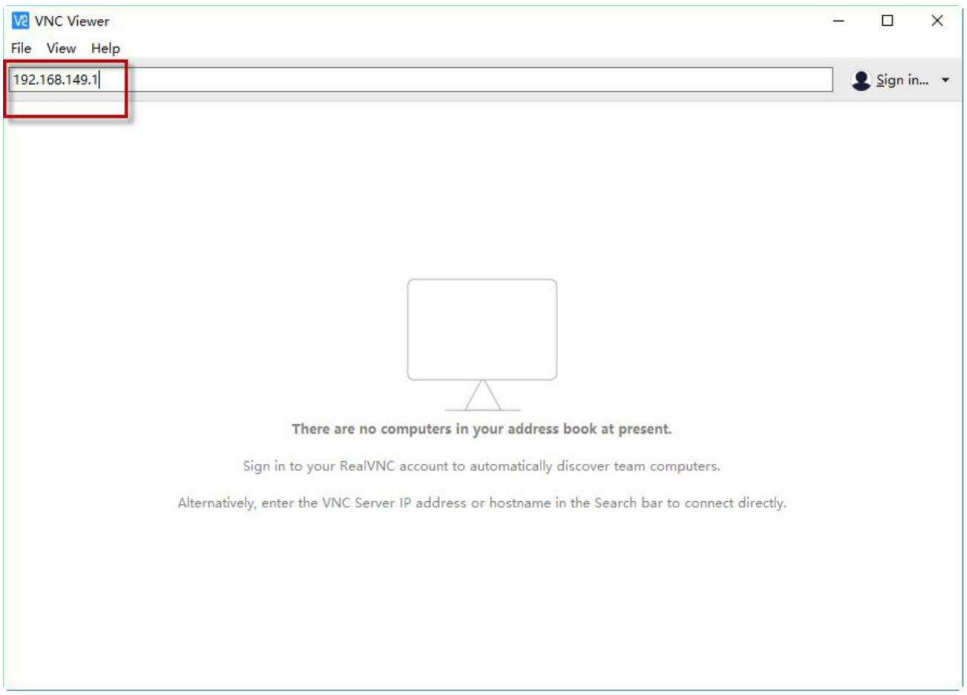

Image l-2 IP Input Mode

4) Enter the password "raspberry" in the pop-up prompt box. (if it requires to enter the account name, please "pi"), check the "Remember password" box, and then click "OK". Raspberry Pi's desktop will display on your computer's monitor. After entering the Raspberry Pi interface, a warning dialogue box will pop up(That's a normal circumstance), click " OK " to close it. (If black screen occurs, Please restart the Raspberry Pi .)

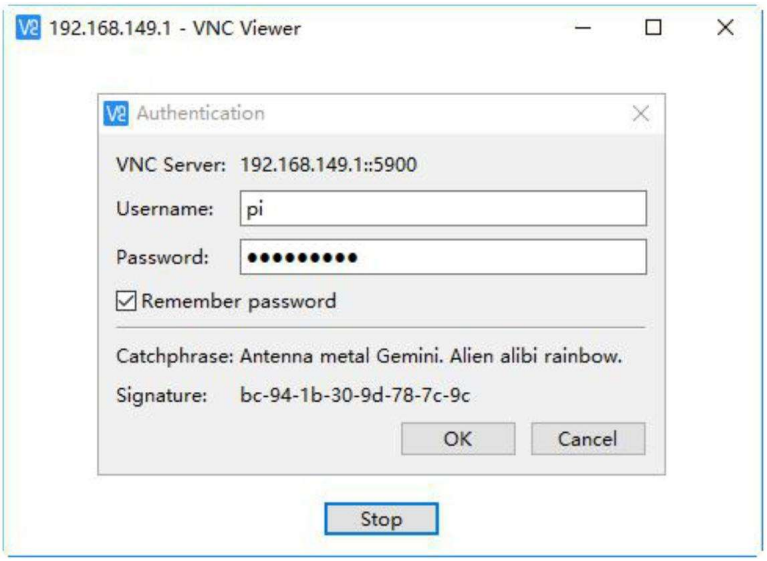

Image 1-3 Raspberry Pi Login Interface (If the first line cannot be entered, enter the password to second-line directly.)

5) Click the LX terminal in the upper left corner (or click the shortcut key Ctrl+Alt+T), enter "cd hexapod/" and press "Enter" to locate the directory where the game program is stored.

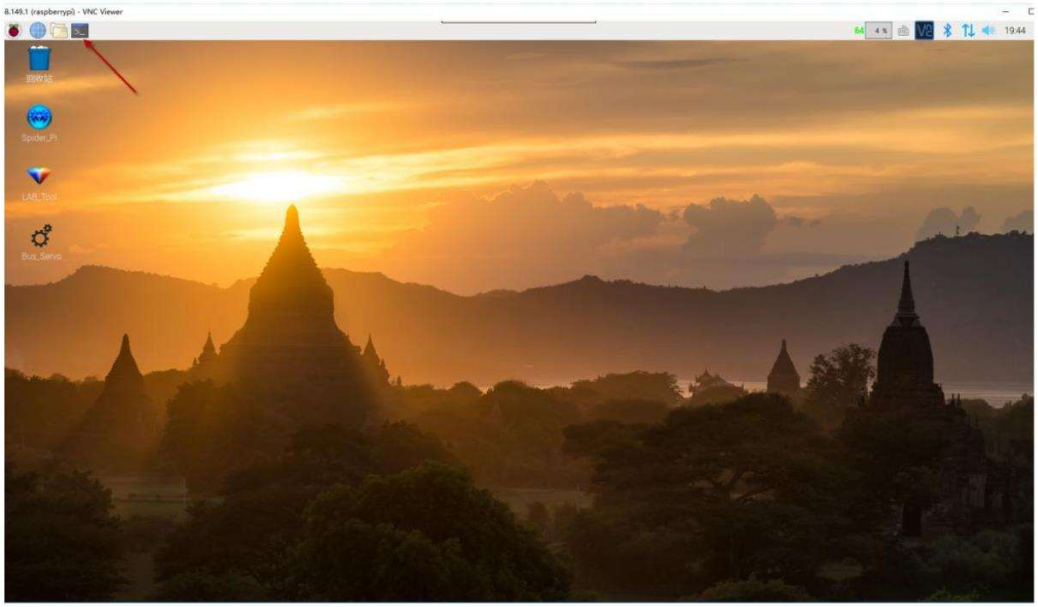

Image l-4 Terminal Open Position

Image 1-5 Locate the Game Directory

6) Enter ls -l (This 'l' is the English letter 'L')

Image 1-6 Enter the command to open the game program

7) Press Enter, you will find all the files in the directory displayed on the LX terminal. The six .py files shown below are the gameplay file. "Hexapond_balance.py" is the organism self-balance program, "cv_color_tracking.py" is the body colour tracking program, "cv_track_stream.py" is the cloud head colour tracking program, "cv_color_stream.py" colour identification program, "cv_linefollow" is line tracking program, and "sonar.py" is the ultrasonic obstacle avoidance program

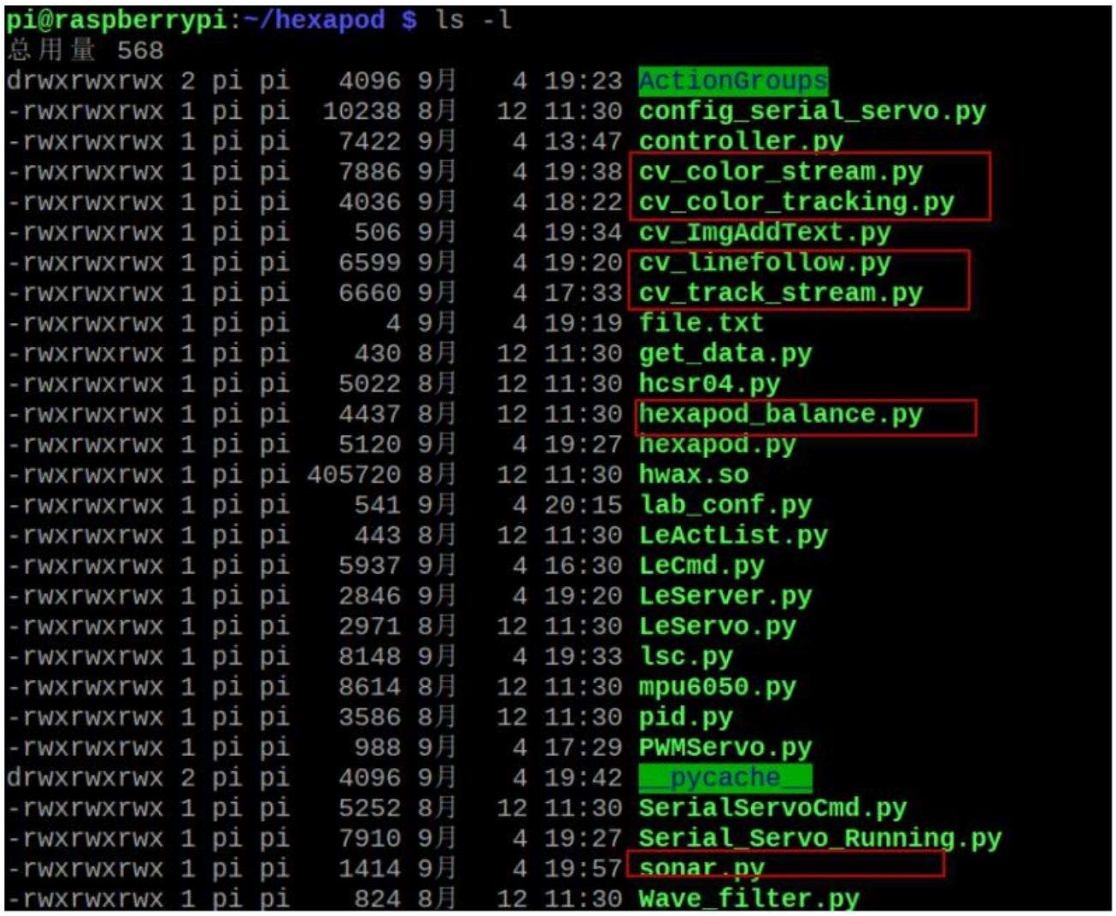

Image 1-7 Gameplay Directory File

8) When you want to run gameplay, you can enter "python3 program name.py" and press "Enter" to run the gameplay. For example, to run the colour identification gameplay program "cv_color_stream.py" , you can enter the "python3 cv_color_stream.py" command.

Image 1- 8 Enter Specified Gameplay Command

9) After pressing the "Enter", the camera image will pop up. If a red object is placed in front of the robot, the robot will nod, but other colour object put in front of robot, it will shake its head.

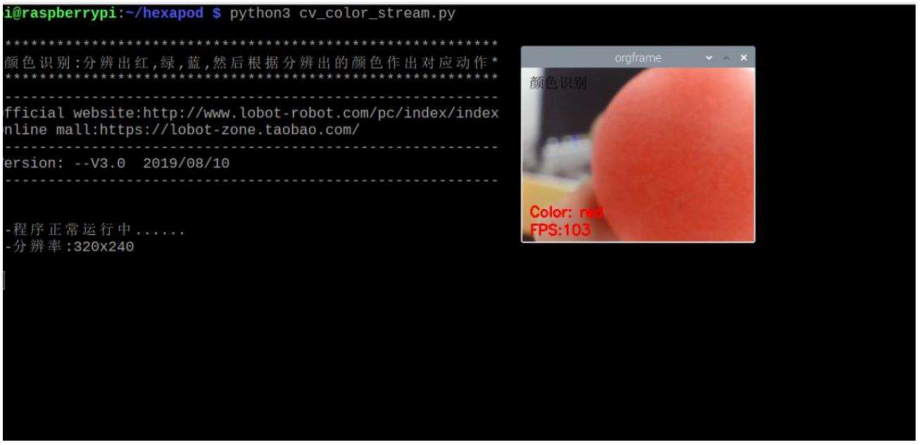

Image 1- 9 Color Identification Gameplay Running Interface

10) If you want to stop the game program, you can click the LX terminal part and let its window be at the front, then press "Ctrl+C" on the keyboard at the same time to stop running the game program.

2 Colour Identification

This gameplay mainly uses the camera to identify the object colour and let the robot do specific action according to this, if the object is red, the robot will nod, otherwise it will shake its head.

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 2- 1 Image Recognition Program Location

2) Next, enter the command shown on the image below. In the pop-up window, we can see the real-time image. If there is a red object in front of the camera, the object will be circled in the window, and the robot will nod. Otherwise, it will shake its head.

Image 2-2 Colour Identification Programs Running Command

Image 2-3 Colour Identification Image

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

3 Cloud Head Colour Tracking

In the last lesson, we have learned about the Raspberry Pi color recognition function. In this lesson, we will learn how to let the robot recognise the colour and let the camera follow the object of the target colour as well

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 3-1 Image Recognition Program Location

2) Next, enter the command shown on the image below. In the pop-up window, we can see the real-time image. If there is a blue object in the camera's field of view, the robot head will follow the movement of the object. The object cannot move too fast. Otherwise, it cannot catch it

Image 3-2 Cloud Head Colour Tracking Programs Running Command

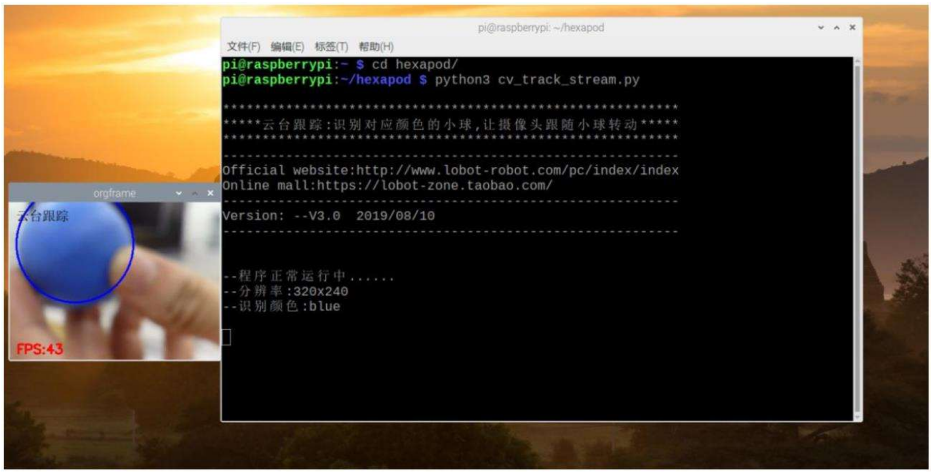

Image 3-3 Cloud Head Blue Colour Object Tracking

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

4 Body Colour Tracking

Last lesson we have learned about Raspberry Pi cloud head tracking, this lesson we will learn how to make the robot move with the target colour object

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 4-1 Image Recognition Program Location

2) Next, enter the command shown on the image below. In the pop-up window, we can see the real-time image. Put a red object in front of the camera (the default colour of the program is red), and the robot will judge the positional relation between the centre of the object and the centre of the screen, and turn left or right to follow it. The object cannot move too fast. Otherwise, it cannot catch it

Image 4-2 Body Colour Tracking Programs Running Command

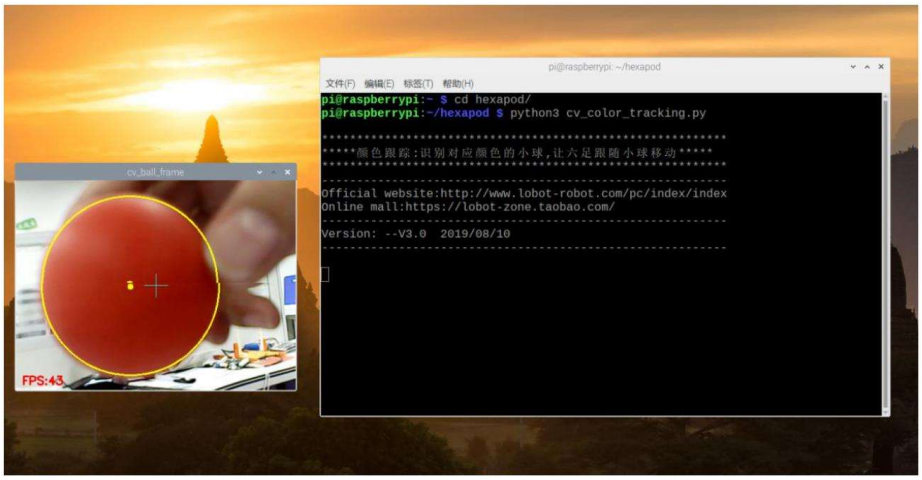

Image 4-3 Body Colour Tracking Image

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

5 Organism Self-balance

Spider Pi hexagon robot has a self-balancing function that automatically adjusts the foot when the terrain is tilted, keeping the body, camera, sensor, and controller balance.

However, for some reasons, the angle of the six-legged inclination is limited, and the sum of the absolute values of the roll and pitch angles should be less than 30° . If it exceeds 30° , the robot angle will remain still.

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 5-1 Image Recognition Program Location

2) the robot on a horizontal table, and then LX after the command input terminal shown in FIG, press "Enter" key(Press Enter key), the body's self-balancing procedure to start. At this point, we can see that the robot first sits down, measures the plane angle, and then stands up, at which point the body self-balancing game is ready. We can tilt the table at a certain angle, and you can see that the robot keeps the height of the body by adjusting the height of the six feet. Be sure to place the robot on a level surface before starting the gameplay.

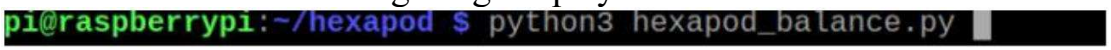

Image 5-2 Organism Self-balance Running Command

Image 5-3 Organism Self-balance Testing

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

6 Ultrasonic Obstacle Avoidance

1.1 Ultrasonic Obstacle Avoidance Code

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 6-1 Ultrasonic Obstacle Avoidance Program Loaction

2) Put the robot on the ground, then enter the command shown below and press "Enter". After entering the command, the robot will keep moving forward. If it encounters an obstacle, it will display the "Right" first capital letter on the L X terminal interface, and turn to the right to avoid the obstacle and continue to move forward.

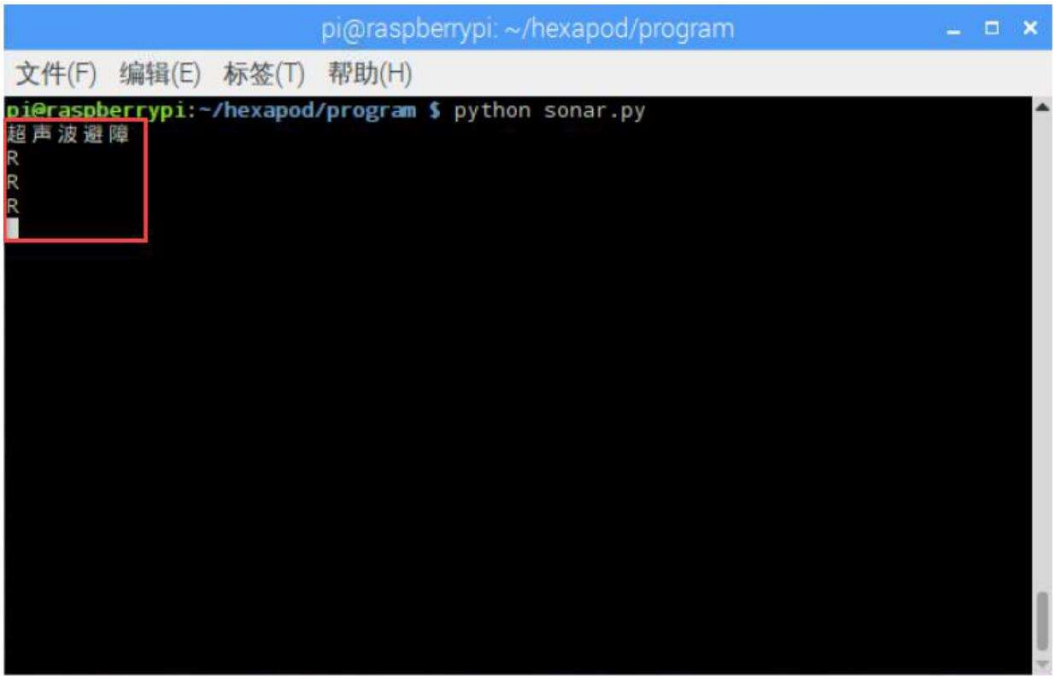

Image 6-2 Ultrasonic Obstacle Avoidance Program Runing Prompt

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

1.2 Modify the Detection Distance and Rotation Angle

1) Open the LX terminal, enter "visonar.py", and click "Enter" to use the bi editor to open the cloud head tracking program

```
pi@raspberrypi:~/hexapod/program $ vi sonar.py
```

Image 6-3 Open Ultrasonic Obstacle Avoidance Program

2) Enter "23" , then press and hold the "shift+g" button on the keyboard to automatically jump to the 23rd line. Press the "i" button on the keyboard to enter the editor mode. The “40” shown on the red box below is the ultrasonic default distance unit centimetres. When the obstacle distance is greater than 40 cm or can’t detect any object (distance value equal 0), the robot will go forward. If you want to shorten the default distance, Enter other numbers in it.

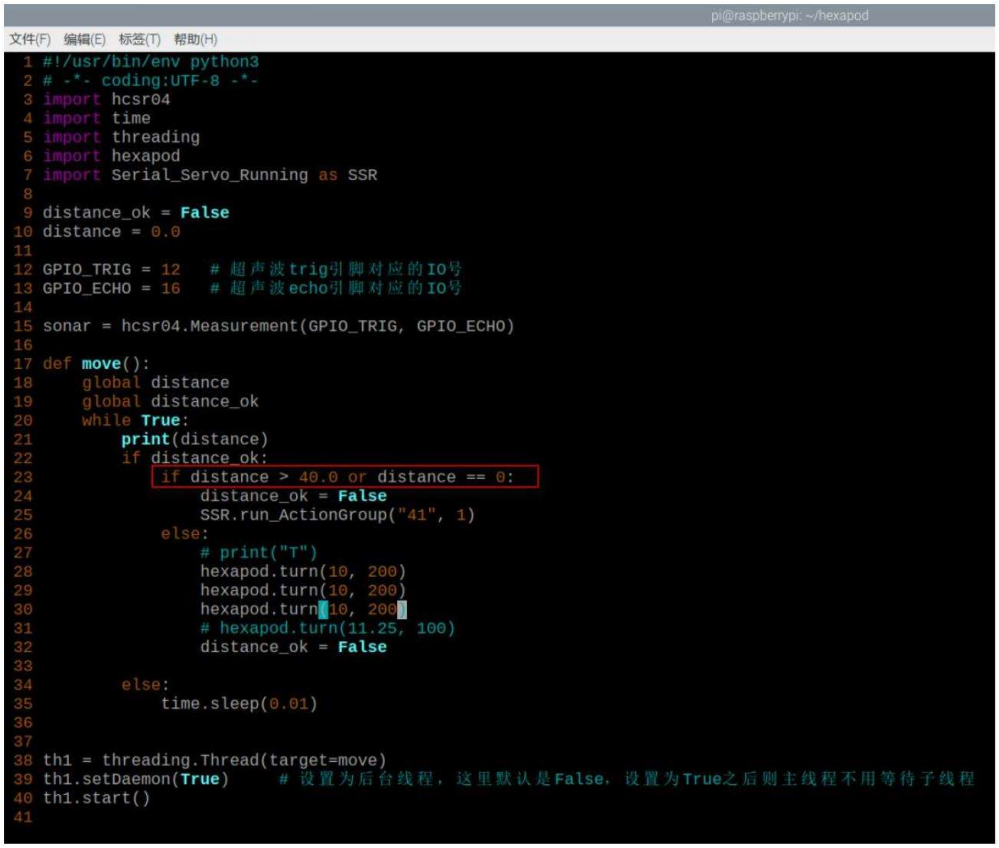

Image 6-4 Modify Ultrasonic Detection Distance

3) These three "(10,200) " commands in the red frame determine the angle of rotation of the robot after encountering obstacles. After modification, the robot can rotate with different angles after encountering obstacles

```
def move():
    global distance
    global distance_ok
    while True:
        print(distance)
        if distance_ok:
            if distance > 40.0 or distance == 0:
                distance_ok = False
                SSR.run_ActionGroup("41", 1)
            else:
                # print("T")
                hexapod.turn(10, 200)
                hexapod.turn(10, 200)
                hexapod.turn(10, 200)
                # hexapod.turn(11.25, 100)
                distance_ok = False

        else:
            time.sleep(0.01)

```

Image 6-5 Rotation Parameter Setting

4) Press the "Esc" key on the keyboard to exit the editor mode and enter the ":wq" command to save the file and exit the LX editor.

7 Visual Patrol

1) Start the VNC to remotely connect to the robot. Open the LX terminal (shortcut Ctrl+Alt+T), enter the command as shown below and press "Enter" to locate the image recognition directory.

Image 7-1 Visual Patrol Program Location

2) Next, enter the command shown below. In the pop-up window, we can see the real-time image, and the robot moves with following the black line.

Image 7-2 Visual Patrol Running Command

Image 7-3 Robot Following the Black Line

3) Press "Ctrl+C" on the keyboard at the same time to stop running the game program.

8 Advanced Tutorial

1.1 Modify the Identification Color

1.1 Lab Colour Space

The default color of color identification gameplay is the blue, change the parameter in the program to modify the default color. Usually, the color space we use is RGB color, which color display is based on a mixture of three original color red, green and blue.

L component means the brightness of the pixel. The greater the L value, the higher the brightness is.
A component means the range from red to green.
B component means the range from yellow to blue.
In OpenCV, the range of values of R, G, and B in the RGB colour space is [0-255], but the range of L values in the Lab colour space is [0-100]. L value 0 means black; in contrast, L value 0 means white. The range of a and b values are [127, -128]. Both a and b value are 0 mean grey.

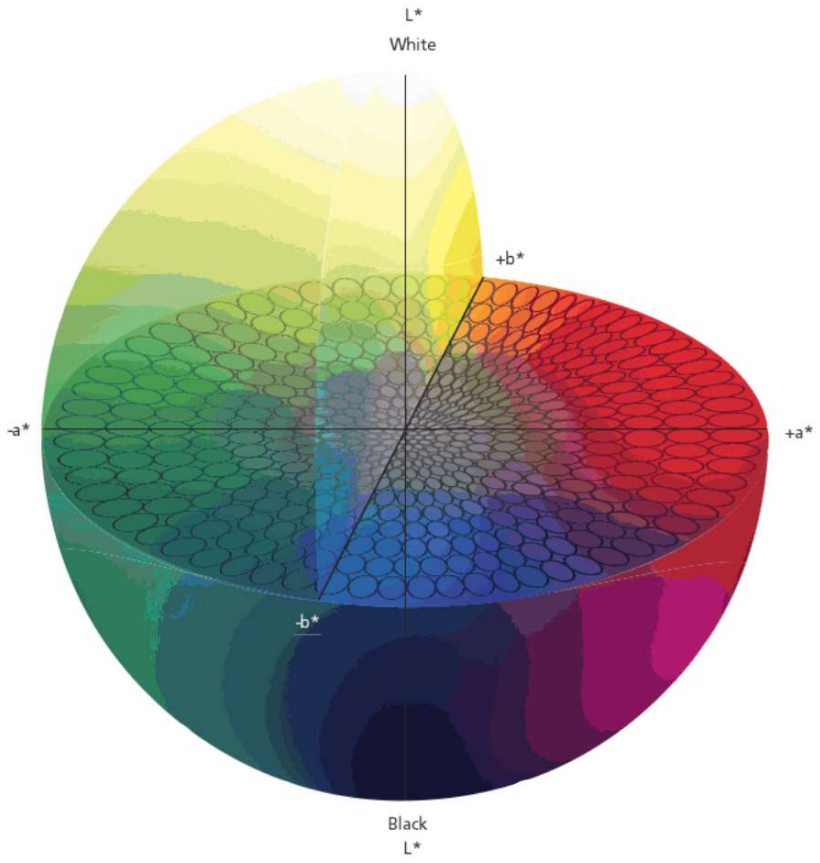

Image 8-1 Common Color Corresponding Lab Value

2.1 The Method of Turning RGB to Lab

Following the steps below to turn RGB to Lab.

1) Open the PS software and import the target image.

2) Use the "Sipper tool" in the PS to select the colour you want.

3) Click on the "Color Picker" at the bottom left to see the between Lab and RGB as shown below.

Figure 8- 2 Color Palette

4.1 Modify the recognised colour

Re as an example and the rest of the gameplay colour switching can refer to this. The specific modification is as follows:

1) Open VNC and enter the following command to open the colour setting program. Recommend you to use a screenshot to record the initial value.

```
pi@raspberrypi:~/hexapod $ vi lab_conf.py
```

Image 8-3 Color Setting Program

```
#!/usr/bin/python3
#coding=utf8

#颜色的字典
color_range = {
'red': [(85, 164, 0), (255, 255, 255)],
'green': [(157, 0, 0), (252, 110, 255)],
'blue': [(108, 0, 0), (255, 248, 120)],
'black': [(0, 0, 0), (62, 255, 250)],
'white': [(217, 0, 0), (255, 255, 250)],
                }

#backup
'''
color_range = {
'red': [(85, 164, 0), (255, 255, 255)],
'green': [(157, 0, 0), (252, 110, 255)],
'blue': [(108, 0, 0), (255, 248, 120)],
'black': [(0, 0, 0), (62, 255, 250)],
'white': [(217, 0, 0), (255, 255, 250)],
                }
'''

"lab_conf.py" [noeol] 22L, 540C                                    1,1
```

Image 8-4 Default Color Parameters

2) Click the icon below the, and click "Execute", if the prompt box come out.

Image 8- 5 Open the LAB Tool

3) Point the camera at the colour you want to recognise, and the right side box first selects "red" (because this gameplay program defaults to the red colour). Then drag the sliders of L, A, and B until the colour area on the left screen turns to the white and the other regions turn black. For example, to identify orange put the orange image in front of the camera, and drag L, A and B corresponding slider until the left side orange part turns to white, while the other colours turn black. Finally, click the "Write" button below to write the modified data.

Image 8-6 Modified to Orange

4) After the modification complete, we can check if the modified value is successfully written in, and then enter the following command to check the colour setting program.

```
pi@raspberrypi:~/hexapod $ vi lab_conf.py
```

Image 8- 7 Open the Color Setting Program

5) Check the command marked by red frame below. If the modified value has been written in the configuration program, press "Esc", and enter the "WQ" to quit.

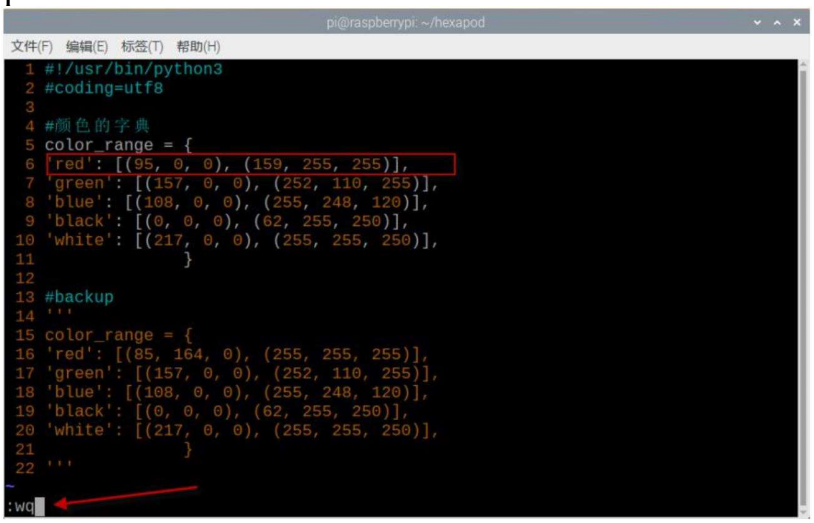

Image 8- 8 Setting Complete

6) Put the orange object in front of the camera. It can be seen that the program has changed from red to the orange.

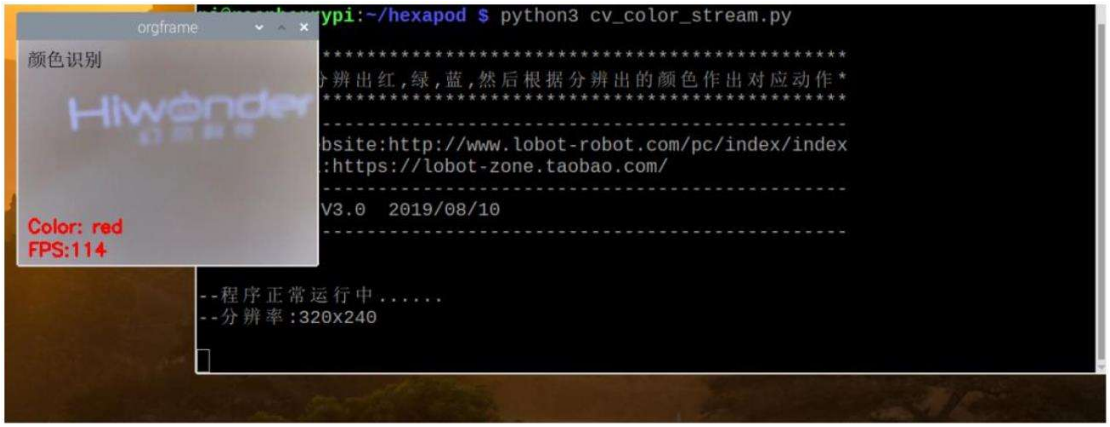

Image 8- 9 Recognition Effect

1.1 Raspberry Pi Hotspot Modification

In this section, we will teach you how to change the default Wi-Fi name and password.
1) Open the Raspberry Pi, enter VNC, and remotely connect to the Raspberry Pi Desktop.
2) Press "Ctrl+Alt+T" to open the LX terminal.
3) Enter the following command to use the editor to open the Wi-Fi profile.

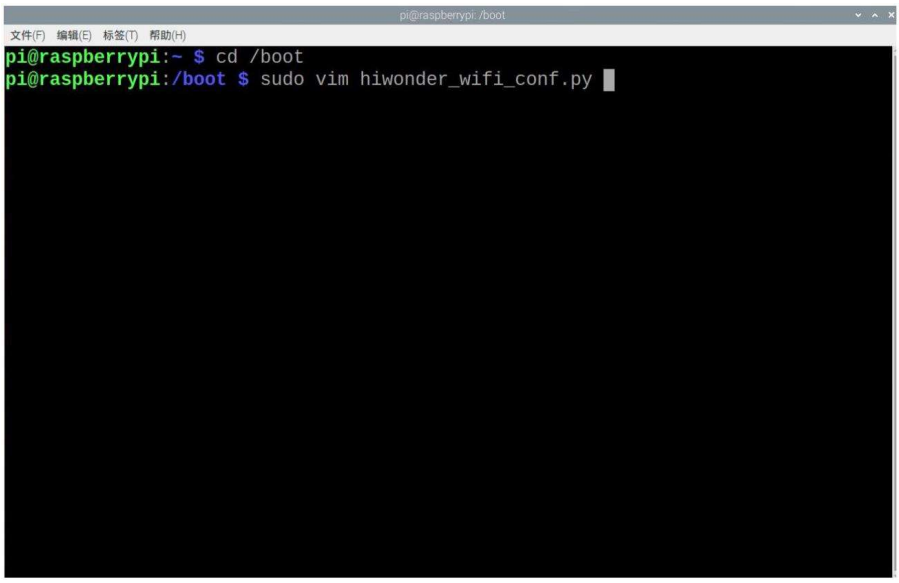

Image 8-10 Open the Wi-Fi Setting

4) The interface is as shown:

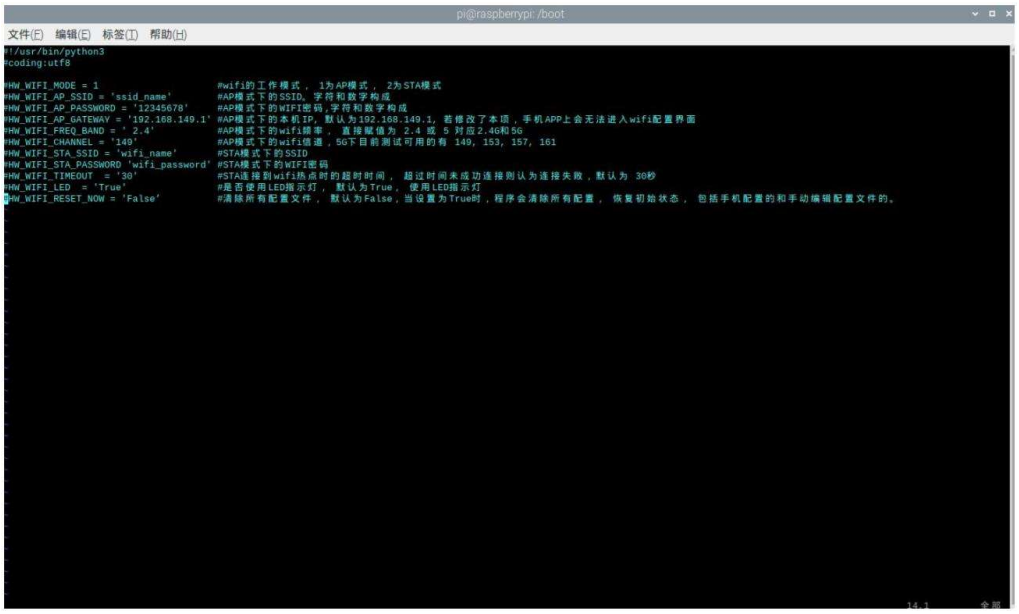

Image 8-11 Configuration File Display

5) Click "i" will display "- Insert -"on the left. Modify the parameter according to your needs.

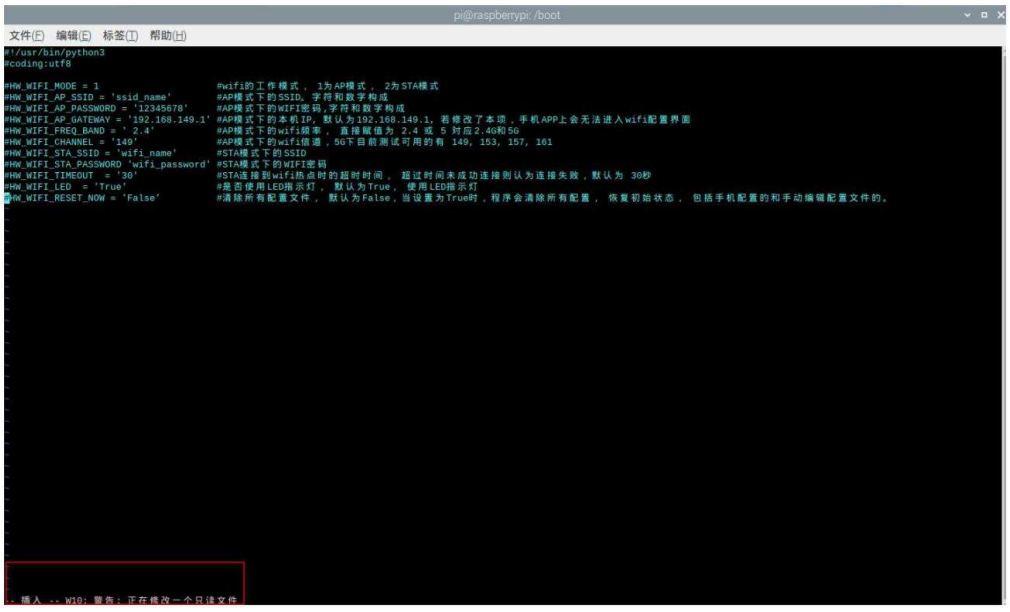

Image 8-12 Insert mode

6) For example, If you change the Raspberry Pi Wi-Fi name to "Hiwonder" and password to "28433321" , you only need to modify the command like the image below. Cautious: command only works after un-comment "#" .

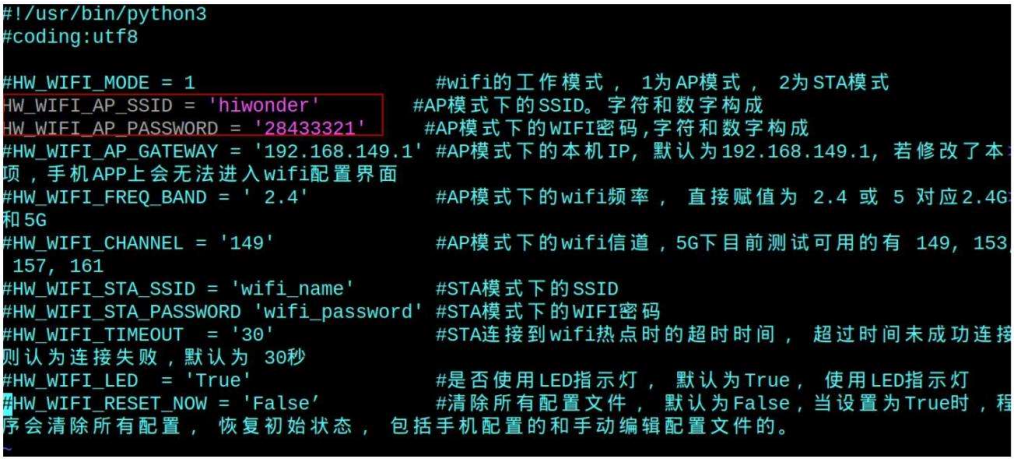

Image 8-13 Modify the Wi-Fi Name and Password

7) After the modification completed, press the "ESC" button on the keyboard, then enter ":wq" to save the file and exit the program.

Image 8-14 Save and Exit the Program File

8) Enter "sudo systemctl restart hw-wifi.service" , and click "Enter" file to restart it. At this time, VNC will fail to connect Raspberry Pi. In the Wi-Fi setting area, you can see that the Wi-Fi name has changed to "Hiwonder". " , and enter the password "28433321" to connect.

```
pi@raspberrypi:~ $ cd /boot
pi@raspberrypi:/boot $ sudo vim hiwonder_wifi_conf.py
pi@raspberrypi:/boot $ sudo systemctl restart hw-wifi.service
```

Image 8-15 Restart Command

Image 8-16 Wi-Fi Connection Page

1.1 Common Linux Commands

Table 2 Linux Common Command Table

Command name	Full name in English	Description
ls	List	lists the files in the current directory
cd	Change Directory	Switch directory path
pwd	Print Working Directory	display the directory
ping	Packet Internet Groper	Test network connection
Shut down	Shut down	For shut down
reboot	Reboot	For reboot
cp	Copy	For copy
rm	Remove	Remove something
mkdir	Make directory	Creation folder
man command	Manual	display command help

		information
echo	Echo	Let the inputting command echo back to the terminal interface
sudo	Superuser do	Run commands as system administrator
clear	Clear	Clear up all the command in the terminal

1.9 Frequently Asked Question(FAQ)

1.1 Command Problem

Question 1: Does the Raspberry Pi memory card need to burn the system image?
Answer: Whether the unassembled parts of finished parts product kit, the system image has already burned in the memory card,

Question 2: Can the robot be used directly without programming?
Answer: Yes. Users, who have purchased the finished parts product, can directly control according to the tutorial guide, while users, who bought the unassembled parts product, can use it, before assembling and debugging the robot according to the tutorial guide.

1.1 Control Section

Question 1: Why does the phone App fail to connect to the robot?
Answer: You can follow the steps below to solve this problem.
1) If the phone cannot search hotspot, please confirm that the mobile phone location permission turns on.
2) If the phone fails to connect hotspot, please make sure that the relevant network configuration program has not been modified, and try to connect it by a computer.
3) If the computer has access to connect to the robot, but the phone doesn't. Your phone may not compatible with this or Android system version is earlier than 5.0, please try to change another phone to use.

Question 2: Why does the screen only display image, and fail to use the action module
Answer: Please check that whether the servo wire has already plugged into the Raspberry Pi expansion board, and restart the Raspberry Pi as well as the mobile app. If there is nothing wrong with the servo wire please refer to the following question " Why do the robot servo joint fail to rotate and lose control ?".

Question 3: Can the iOS system phone connect to the robot?
Answer: iOS users can enter "WonderPi" to the Apple store to download robot App

Question 4: Does it support handle control?
Answer: Support. The handle is an optional selection, not including in the product kit.

Question 5: Why does the angle of the head-turning to the left and right be different when using the mobile APP to control it?

Answer: This is because the head part servo hasn’t adjusted properly. Follow the steps below to adjust neck part servo to the middle position.

1) Click the "Red" button on the APP to let the robot stand. If the robot head turns to the one side, It means the position of the servo is not in the middle of it has rotates before installation.
2) Unplug the servo wire of the neck part servo and remove head and neck connecting servo horn.

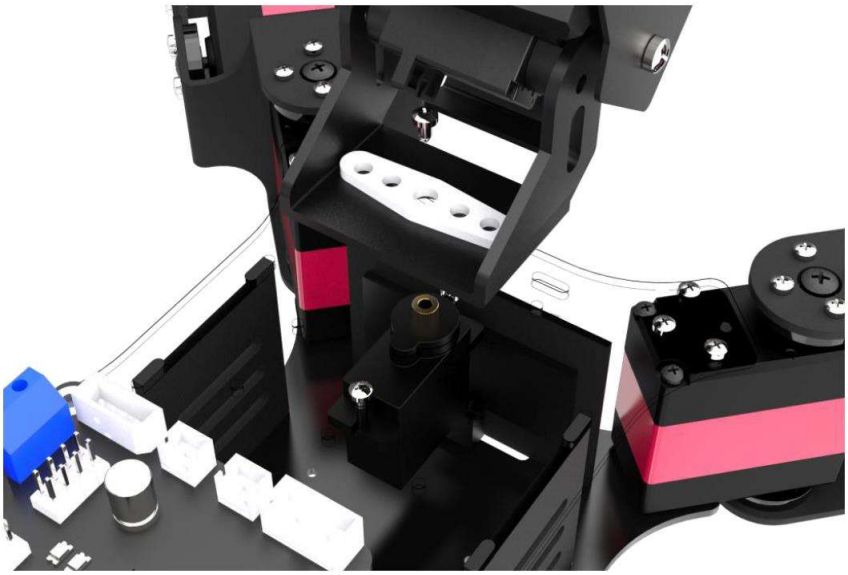

Image 9-1 Neck Part Disassembly Schematic Diagram

3) Connect the neck servo to the PWM servo port of the Raspberry Pi expansion board. Reset robot to reset the neck part servo position.

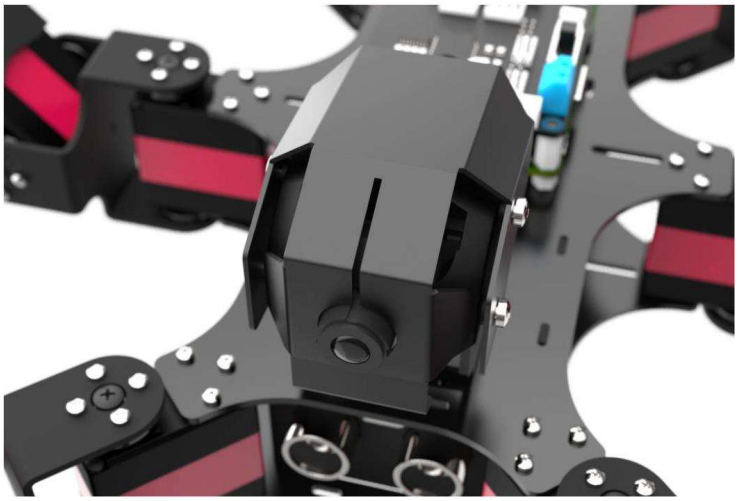

Image 9-2 Head in Middle Position

1.1 Robot Section

Question 1: Why does the robot move in the opposite direction?
Answer: In this case, please check whether the installation of the main and assistant servo horns are reversed. The metal shaft side connects to the main servo horn, and the plastic shaft side it connects to the associate servo horn.

Question 2: Why do the robot servo joint fail to rotate and lose control?
Answer: There are two main reasons: power on and power off. Please connect the servo that cannot rotate to the controller / debugging board.

Can’t rotate when power off :
1) In the power-off situation, use your hand to rotate the servo to determine whether the servo is able to be rotated by hand when the power is off.
2) If it is difficult to rotate servo, it means that the servo has blocked. The servo blocking means the artificial or mechanical reason cause the break down of rotation of the servo output shaft. After the servo blocked, the internal current will increase to 7-8 times and the temperature will also rise and it may cause damage to the servo

Can’t rotate when power on :
1) Please check the ID number of the servo. If the servo ID hasn’t set at the beginning. Because of the serial servo characteristics, if the servo is not respectively connected to the Raspberry Pi expansion board, all the servos connected to the same servo wire will be set to the same ID number.
2) Check if there is some problem with the connection between the connecting wire and the servo port. Connect the servo to the PC software and drag the slider on it to test whether the servo can work properly.

Question 3: Why can't I turn on the camera?
Answer: If the camera fails to turn on. Please refer to the following steps to solve this problem.
1) Disconnect the camera connection wire on the Raspberry Pi USB port, open VNC, and enter the command "lsusb " .

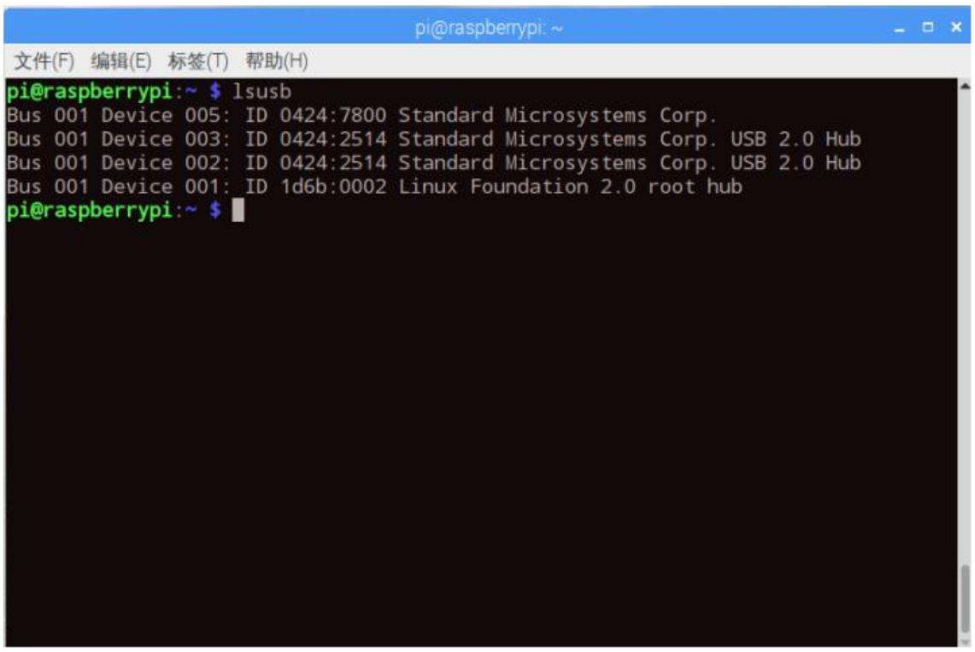

Image 9-3 Before Connecting the Camera

2) Insert the camera connecting the wire on the Raspberry Pi USB port and enter the command "lsusb" again. If it works properly, The ID number of the camera will appear.

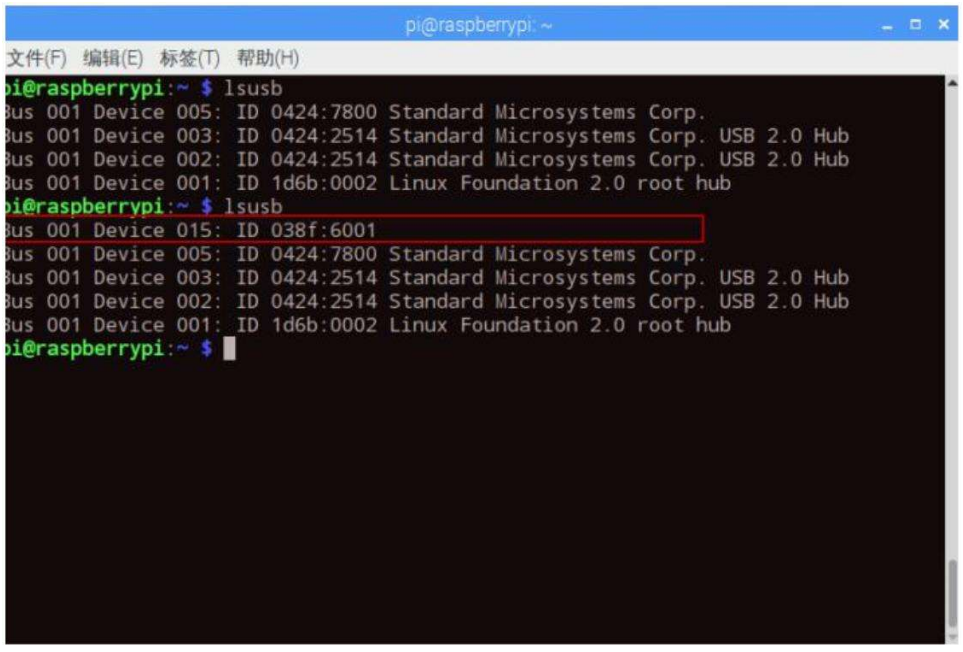

Image 9-4 Camera ID

3) After inserting the connecting wire, restart the Raspberry Pi.

4) Click the browser icon on the interface, and enter the address "http://127.0.0.1:8080/?action=stream?dummy=param.mjpg". If the camera works properly, the camera image will come out.

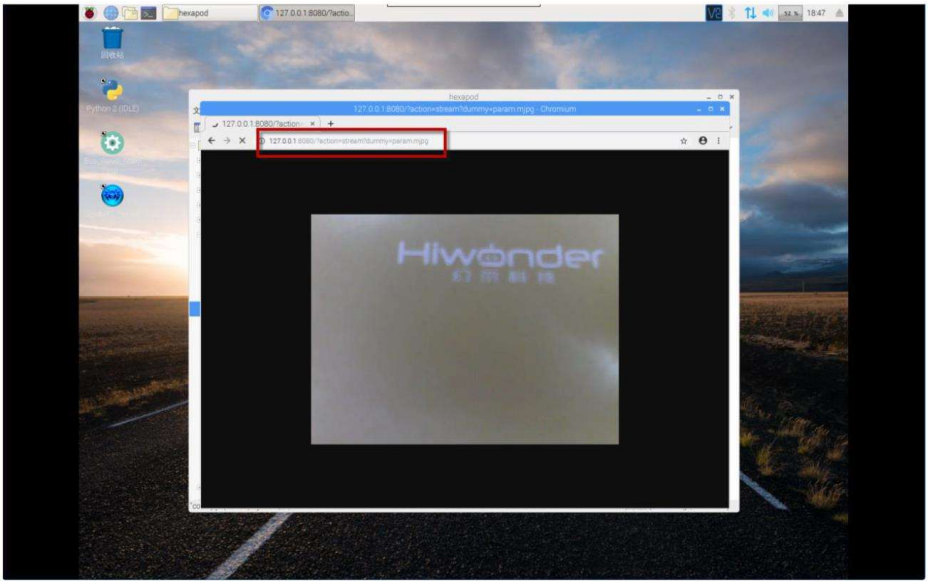

Image 9-5 Real-time Image

Question 4: Why do I refer to the tutorial above to modify the program, the colour identification function still cannot work correctly?
Answer: Because colour identification is greatly affected by the environment, adjust the range of Lab values can solve this problem

Question 5: Why does the camera servo shake?
Answer: The servo shaking may be caused by the servo blocking. The servo blocking means the artificial or mechanical reason cause the break down of rotation of the servo output shaft. After the servo blocked, the internal current will increase to 7-8 times and the temperature will also rise and it may cause damage to the servo

1.1 Raspberry Pi Section

Question 1: Why can’t the computer find the hot spots launched by the Raspberry Pi?
Answer: The Raspberry Pi is a minicomputer. It usually takes about 1 minute to turn on. Hot Raspberry Pi is open at the start of generation after the machine is complete, if a search is a hot spot within minutes less than normal because the Raspberry Pi might still be open through the process, or hot spots in the build. If you still can't find a hot spot for 2 minutes, there are several possibilities:

1) If Raspberry Pi is not in the AP hotspot mode, you can check the status of LED1 on the expansion board. The indicator means that it is in LAN mode. At this time, you can try to long-press the KEY1 button on the expansion board until LED1 becomes flashing
2) If the computer or laptop network card is in poor contact or is not working correctly, you can use your mobile phone to search for hotspots. If the phone can find the hotspot, it means the computer may have some problem. Try to use other computers.
3) If the Raspberry Pi does not work usually, it may cause by the memory card damage, poor contact or the failure of the Raspberry Pi. The failure performance is as follows: The LED1 and LED2 on the expansion board are slight light or off, and meanwhile the PWR of the Raspberry Pi is off, you can try to pull out the memory card, wipe it by a dry tissue, and then plug it back. If it does not usually work, please re-burn image. Burn Image can be referred to like the tutorial.
4) The image has been modified. If you change the image when you are not familiar with the specific network configuration, it may cause the failure working of the hotspot and you can re-burn the image to solve this problem.

Question 2: Why does the display turn black when connecting to VNC?
Answer: It is normal for VNC to have about 5 seconds black screen after the connection. It is an abnormal situation if the black screen still exists over five seconds and it can be solved by doing the following methods:
1) Restart, most of the black screen matter can be solved by restart.
2) If the problem is still not solved after restart at several times, it may have some problem with the Raspberry Pi or the memory card. You can try to pull out the memory card, wipe it by a dry tissue, and then plug it back.

Question 3: Why do both LED indicator on the Raspberry Pi flash frequently?
Answer: when the battery voltage becomes lower, the LED1and LED2 indicator on the Raspberry Pi expansion board will turn to the frequent flash mode. Please charge it in time to avoid over-discharge of the lithium battery.

10 More Information

1 Contact us

Contact e-mail: support@hiwonder.com
9:00-21:00 on weekdays.
Official website: www.hiwonder.com

Company Address: 2nd Floor, Building B, Cultural Innovation Park, No. 1 Dongjin Road, No. 227 Ai Nan Road, Longgang Street, Longgang District, Shenzhen, Guangdong, China