Lesson 3 Getting Started with Raspberry Pi

In this lesson, we will learn how to install and remotely log in to the Raspberry Pi OS under Windows. We will download the code program to control the robot.

3.1 Preparation

- When studying this lesson, you need to prepare the following components first:
  One SD card that has been formatted (we recommend using an SD card with memory above 16G), one card reader, a Raspberry Pi development board.
- You need to insert the SD card into the card reader first, and then connect the card reader tothe computer.



3.2 Burning the downloaded Raspberry Pi OS to the SD card

We recommend using the Raspberry Pi Imager tool officially provided by the Raspberry Pi. Raspberry Pi Imager is a new image burning tool launched by the Raspberry Pi Foundation. Users can download and run this tool on Windows, Mac OS and Ubuntu to burn the OS image for the Raspberry Pi.

3.2.1 Downloading Raspberry Pi Imager

1. Visit the official website of Raspberry Pi to download through a browser:
   https://www.raspberrypi.org/downloads/
   - For Windows OS, click "**Download for windows**" to download.
   - For Mac OS, click "**Download for macOS**" to download.
   - For Linux OS, Click "**Download for Ubuntu**" to download.

Raspberry Pi Imager

Raspberry Pi Imager is the quick and easy way to install **Raspberry Pi OS** and other operating systems to a microSD card, ready to use with your Raspberry Pi.

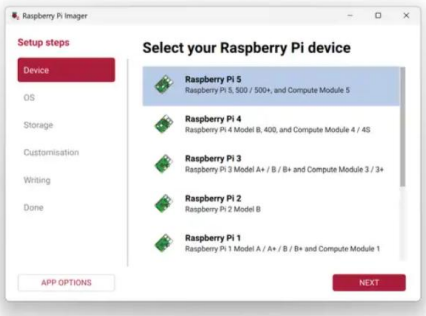
Download and install Raspberry Pi Imager on a computer with an SD card reader. Insert the microSD card you'll use with your Raspberry Pi into the reader and run Raspberry Pi Imager.

Download for Windows

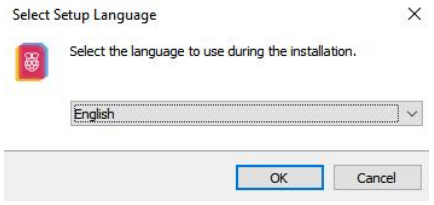
Download for macOS

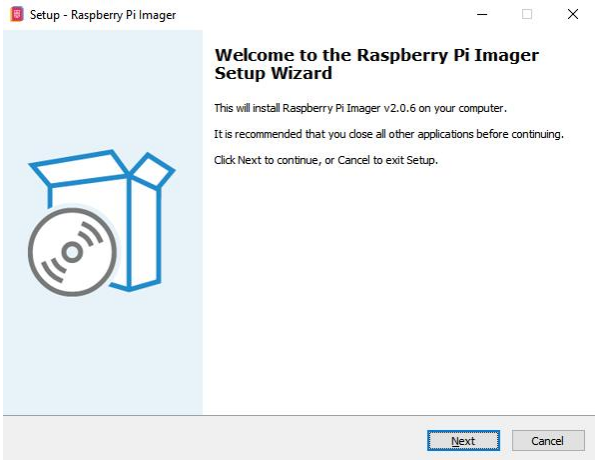
Download for Linux (x86_64)

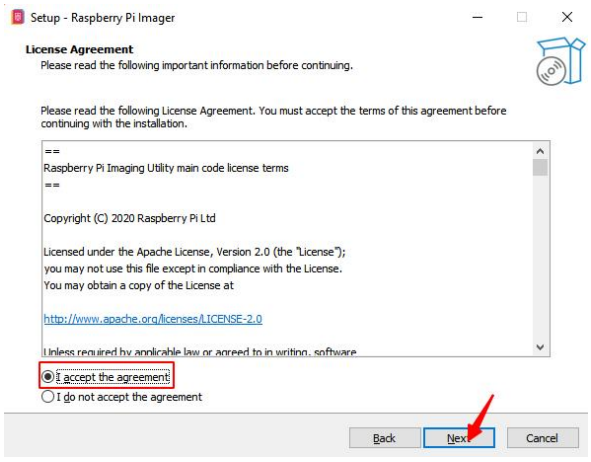
To install on **Raspberry Pi OS**, type `sudo apt install rpi-imager` into a terminal window

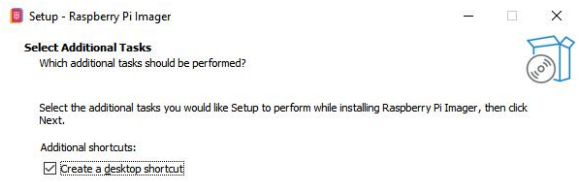


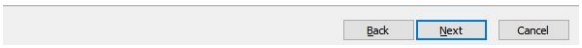
2. Open the downloaded file "**imager_2.0.x.exe**" and install.

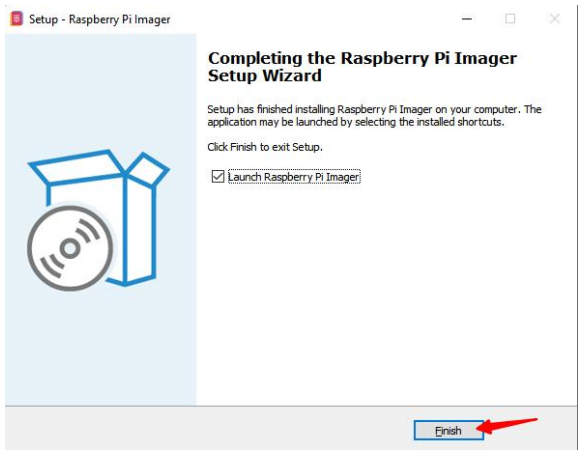




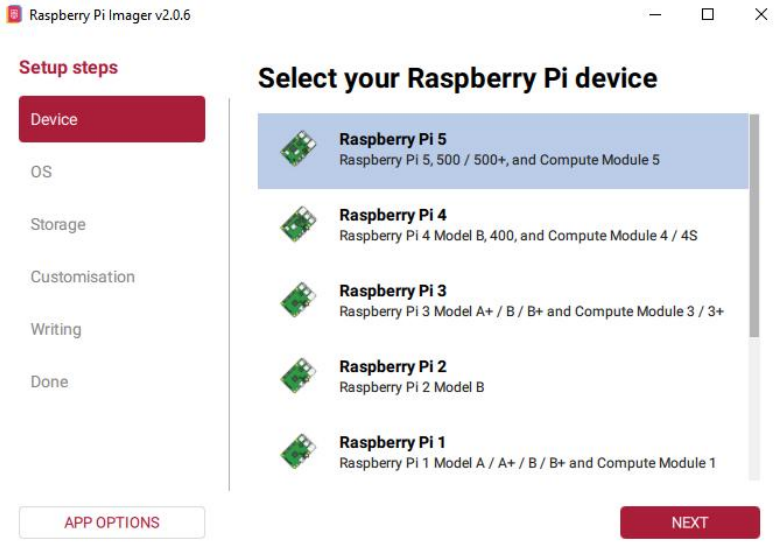








3.The software interface after opening is as shown below:

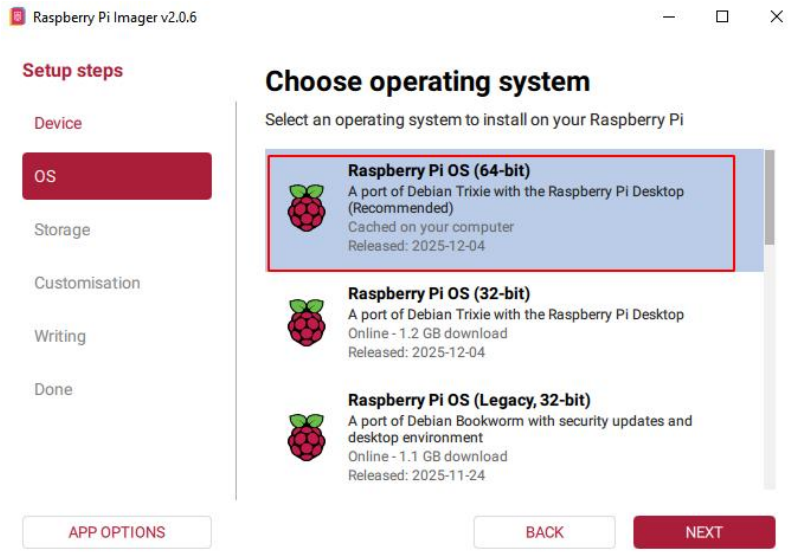


3.2.2 Burning Raspberry Pi OS to SD card with Raspberry Pi Imager

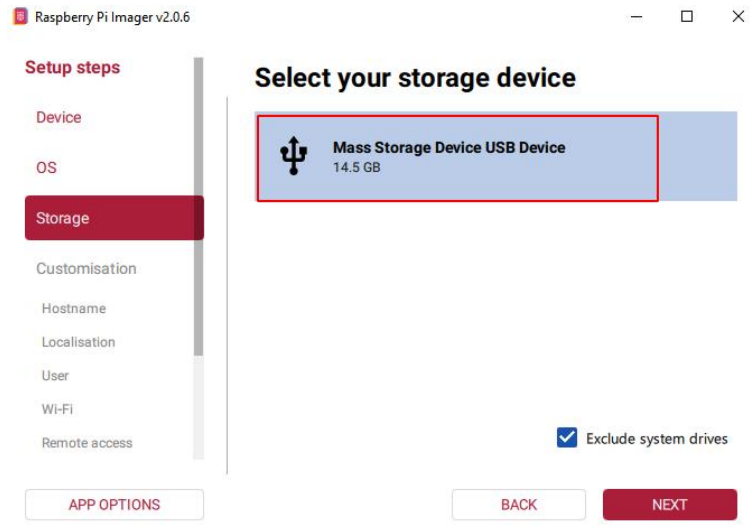
1. Select the Raspberry Pi model, such as Raspberry Pi 5.



2. Select the operating system; both 64-bit and 32-bit versions are compatible.



3. Select the storage device.



4.Customize Settings (e.g., hostname, WiFi, and login credentials).

Notes:

Hostname: Set the hostname

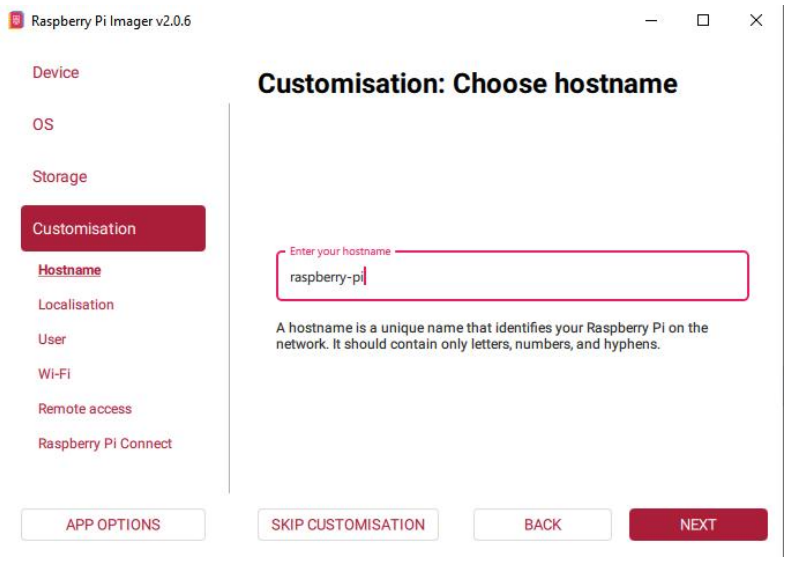
Localisation: Select the corresponding time zone based on your location. We use China as an example here.

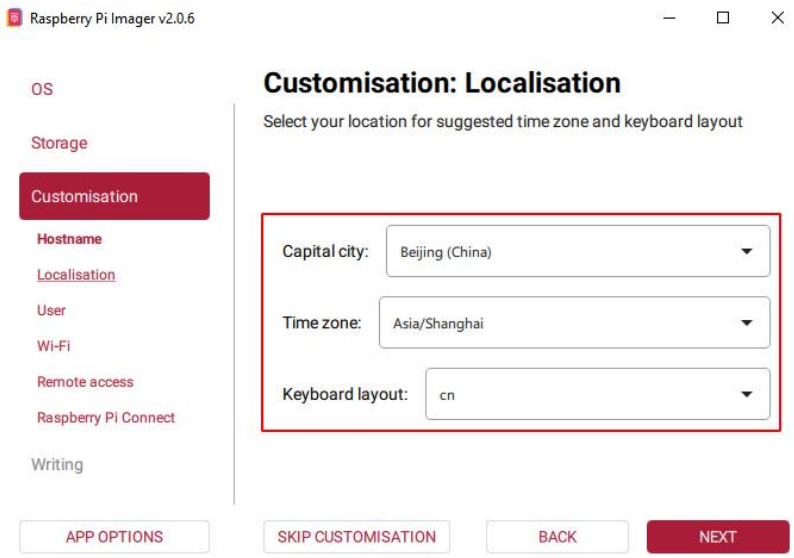
User: Set your username and password. We use ‘adeept’ as an example here.

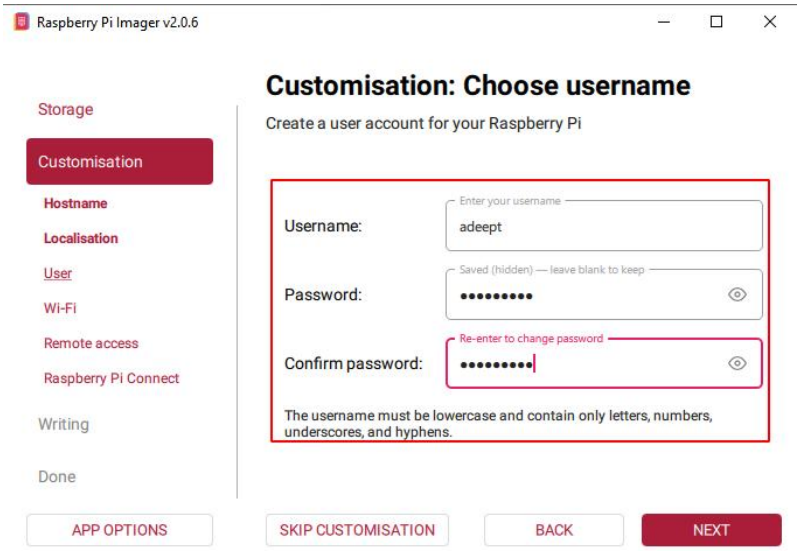
WiFi: Enter your own WiFi details. We connect to the office network ‘Adeept’ as an example here.

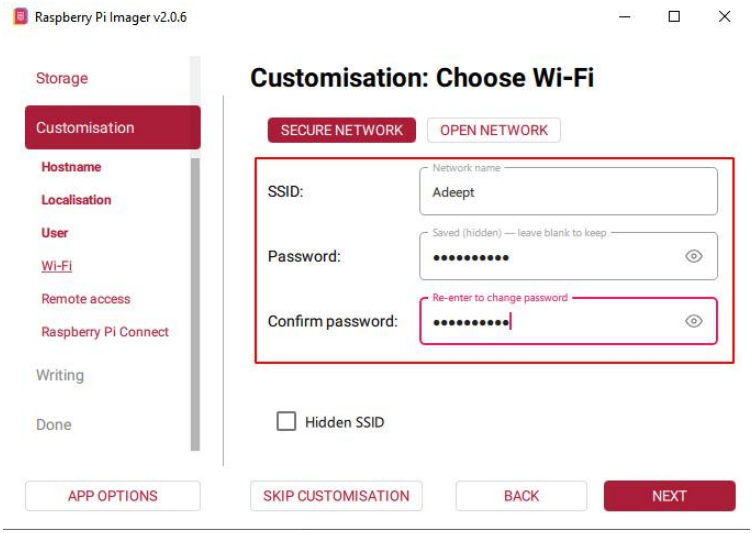
Remote access: Enable SSH to log in to the Raspberry Pi via SSH.

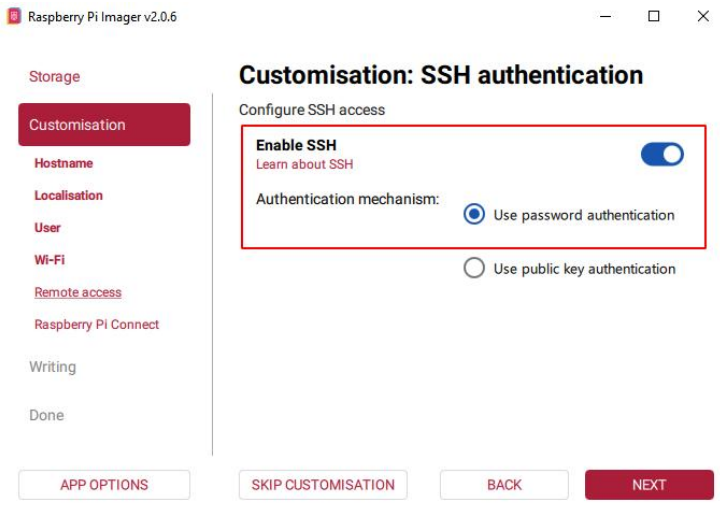
Raspberry Pi Connect: Enable this feature if you need to control the Raspberry Pi remotely. For detailed usage, please refer to the official Raspberry Pi documentation: https://www.raspberrypi.com/documentation/computers/getting-started.html#raspberry-pi-connect

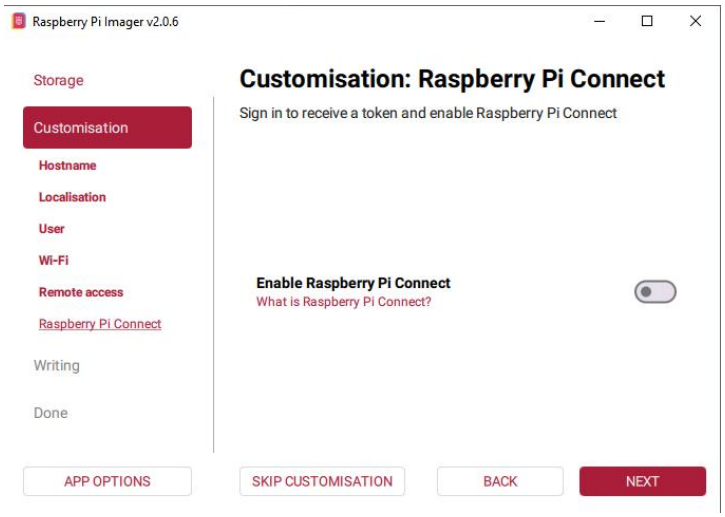



Raspberry Pi Imager v2.0.6
OS
Storage
Customisation
Hostname
Localisation
User
Wi-Fi
Remote access
Raspberry Pi Connect
Writing
Customisation: Localisation
Select your location for suggested time zone and keyboard layout
Capital city:
Beijing (China)
Time zone:
Asia/Shanghai
Keyboard layout:
cn
APP OPTIONS
SKIP CUSTOMISATION
BACK
NEXT

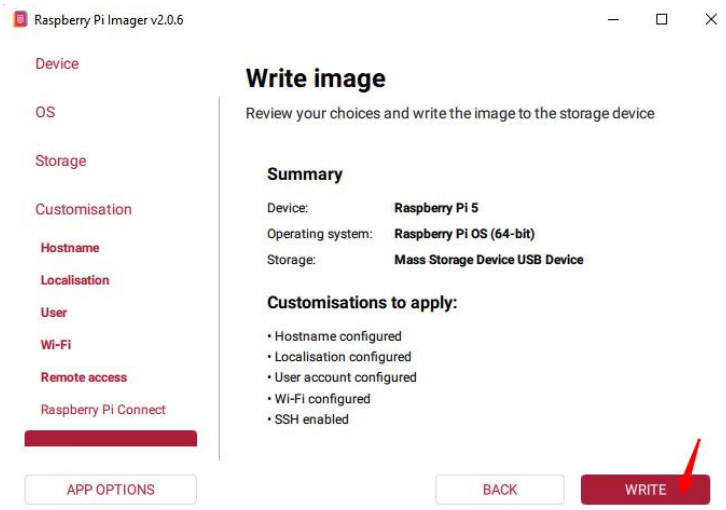

Raspberry Pi Imager v2.0.6
Storage
Customisation
Hostname
Localisation
User
Wi-Fi
Remote access
Raspberry Pi Connect
Writing
Done
Customisation: Choose username
Create a user account for your Raspberry Pi
Username:
Enter your username
adeept
Password:
Saved (hidden) — leave blank to keep
Confirm password:
Re-enter to change password
The username must be lowercase and contain only letters, numbers, underscores, and hyphens.
APP OPTIONS
SKIP CUSTOMISATION
BACK
NEXT

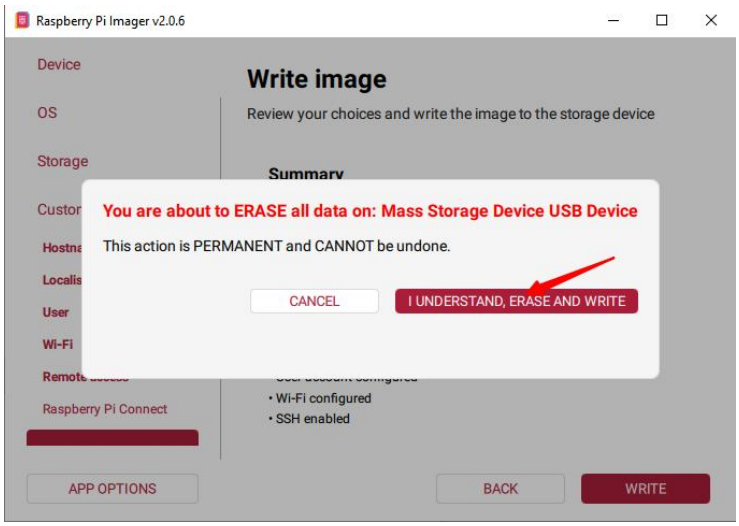

Raspberry Pi Imager v2.0.6
Storage
Customisation
Hostname
Localisation
User
Wi-Fi
Remote access
Raspberry Pi Connect
Writing
Done
Customisation: Choose Wi-Fi
SECURE NETWORK
OPEN NETWORK
SSID:
Network name
Adeept
Password:
Saved (hidden) — leave blank to keep
Confirm password:
Re-enter to change password
Hidden SSID
APP OPTIONS
SKIP CUSTOMISATION
BACK
NEXT

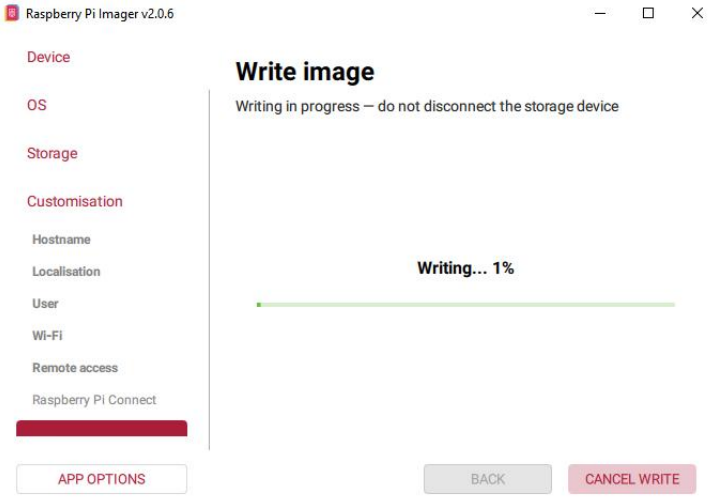


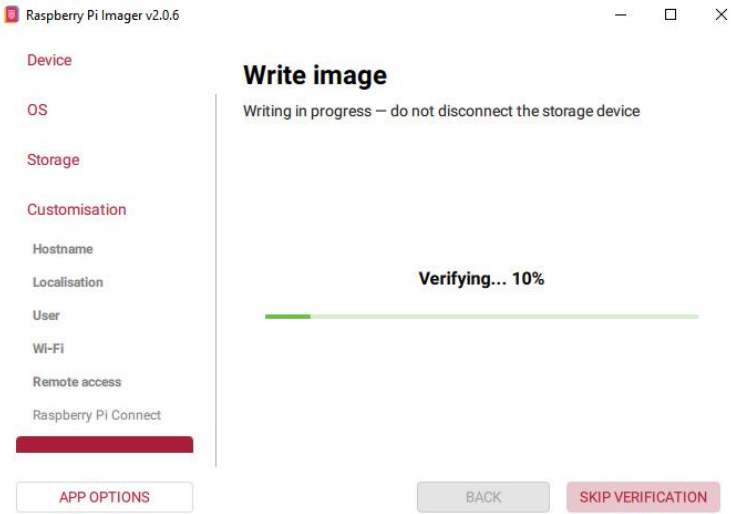


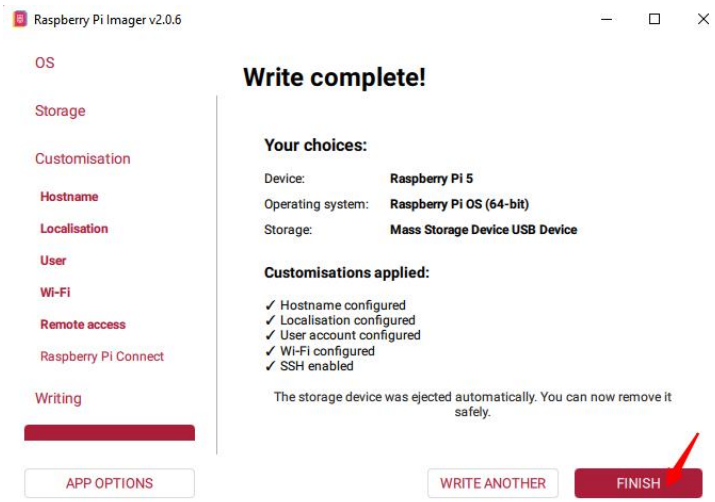
5.Write the image to the microSD card.




Raspberry Pi Imager v2.0.6
Device
OS
Storage
Custor
Hostna
Localis
User
Wi-Fi
Remote
Raspberry Pi Connect
Write image
Review your choices and write the image to the storage device
Summary
You are about to ERASE all data on: Mass Storage Device USB Device
This action is PERMANENT and CANNOT be undone.
CANCEL
I UNDERSTAND, ERASE AND WRITE
• Wi-Fi configured
• SSH enabled
APP OPTIONS
BACK
WRITE

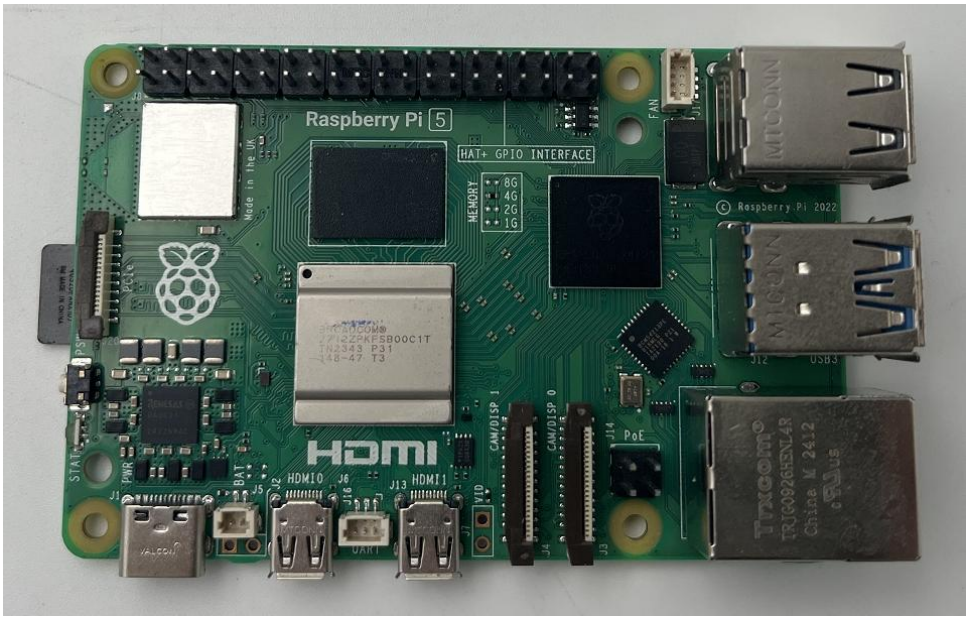

Raspberry Pi Imager v2.0.6
Device
OS
Storage
Customisation
Hostname
Localisation
User
Wi-Fi
Remote access
Raspberry Pi Connect
Write image
Writing in progress — do not disconnect the storage device
Writing... 1%
APP OPTIONS
BACK
CANCEL WRITE


Raspberry Pi Imager v2.0.6
Device
OS
Storage
Customisation
Hostname
Localisation
User
Wi-Fi
Remote access
Raspberry Pi Connect
Write image
Writing in progress — do not disconnect the storage device
Verifying... 10%
APP OPTIONS
BACK
SKIP VERIFICATION



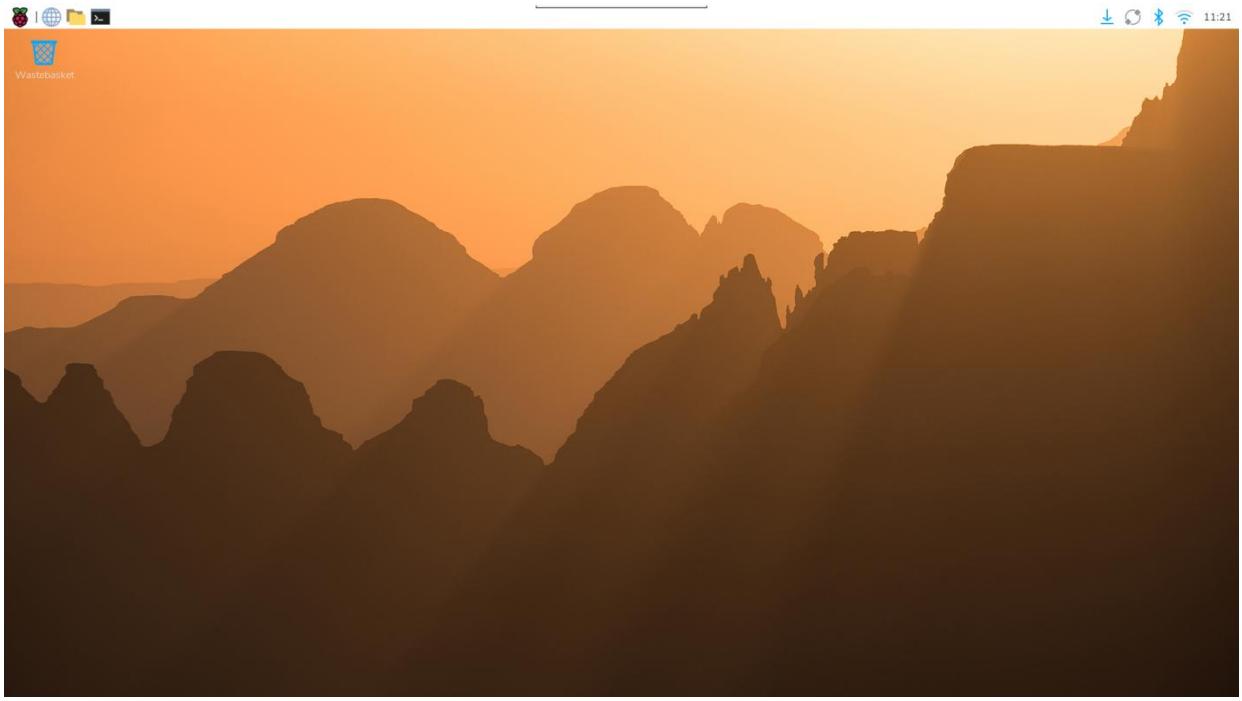
3.3 Start the Raspberry Pi OS

Now, we can take out the SD card and insert it into the "MICRO SD CARD" slot on the Raspberry Pi development board. After that, use a Type-C data cable to supply power to the Raspberry Pi. Then, the Raspberry Pi will start up.



If you do not have a spare monitor, please skip to next section "3.4 Remotely log in to the Raspberry Pi OS". If you have a spare monitor, please follow the steps in this section.

After the system is written successfully, take out Micro SD Card and put it into the SD card slot of RPi. Then connect your RPi to the monitor through the HDMI port, attach your mouse and keyboard through the USB ports, attach a network cable to the network port and finally, connect your power supply (making sure that it meets the specifications required by your RPi Module Version. Your RPi should start (power up). Later, after setup, you will need to enter your user name and password to login. After login, you should see the following screen.



Congratulations! You have successfully installed the Raspberry Pi OS operating system on your RPi.

3.4 Remotely log in to the Raspberry Pi OS

Before using SSH to connect to the Raspberry Pi, you need to know the IP address of the Raspberry Pi and use software that supports the SSH protocol.

Remote login to the Raspberry Pi is achieved via the SSH protocol. You can use software with SSH support for remote login. For example, Putty is a common choice. Linux systems and Mac OS both come with built-in SSH functionality. Therefore, users of these systems can also log in to the Raspberry Pi remotely through the terminal.

3.4.1 Obtaining the IP address of the Raspberry Pi

Method 1: Obtain the IP address via the router

Log in to your router and find the hostname you set when flashing the system; it corresponds to the Raspberry Pi's IP address.



Method 2: Obtaining an IP address with an external display

We provide a simple and fast way to get the Raspberry Pi IP address. You need to prepare the following components:

- One Type-C cable: used to supply power to the Raspberry Pi.
- One HDMI cable: used to connect the monitor.
- One mouse: used to operate.
- One monitor
- One Raspberry Pi



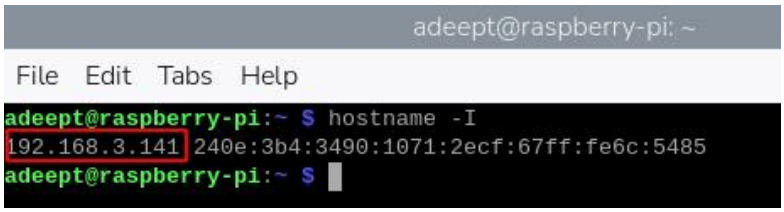
1. Connect the HDMI cable to the HDMI port of the monitor:

2. Turn on the monitor, connect the mouse to a USB port of the Raspberry Pi, and then power the Raspberry Pi with a Type-C data cable; the Raspberry Pi will start up immediately. After entering the system interface, move the mouse cursor to the network icon in the upper right corner, and the Raspberry Pi's IP address will be displayed on the screen (example: 192.168.3.141; each Raspberry Pi has a unique IP address). Be sure to record this IP address, as it will be required for subsequent login to the Raspberry Pi OS.



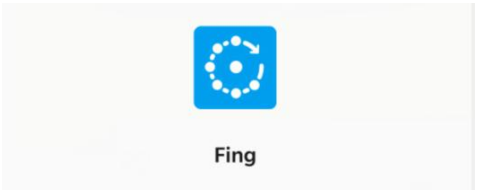
3. You can also check the IP address by opening the command window of the Raspberry Pi and entering the following command. Make sure to write it down.

```
hostname -I
```

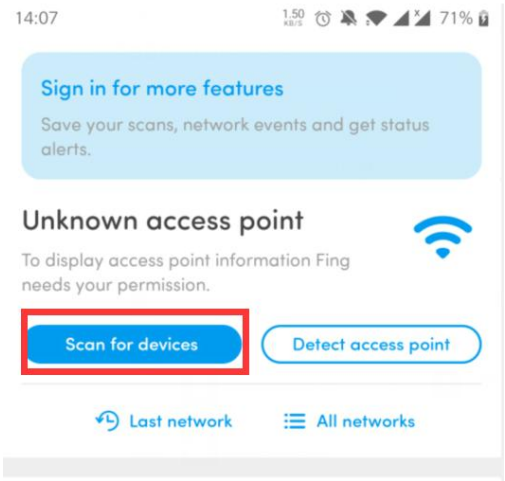


Method 3: Obtaining an IP address with a mobile phone

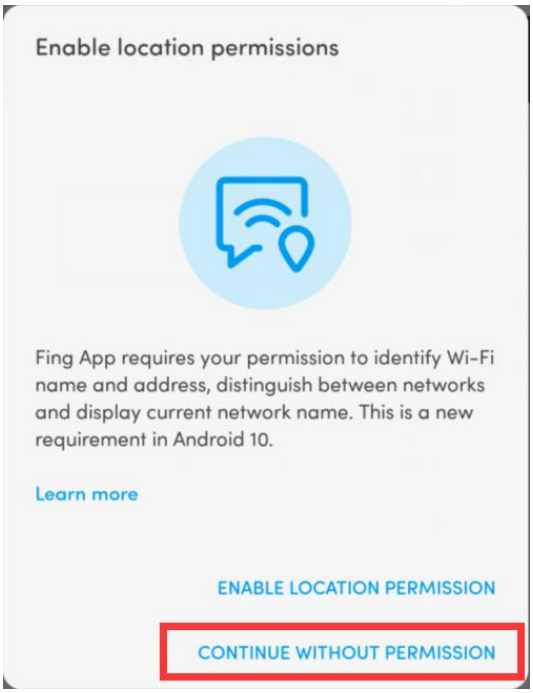
1. You need to download an APP called "**Fing**" on your phone, as shown below:



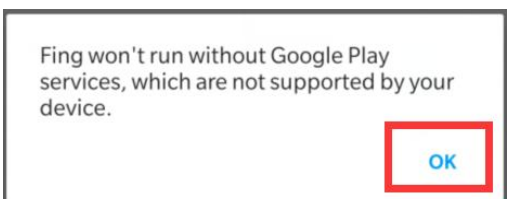
2. After you have completed downloading the "**Fing**" app, your phone and the Raspberry Pi should be on the same local area network, that is, both of them are connected to the same Wi-Fi network. Then, open the "**Fing**" app and click on "**Scan for devices**".



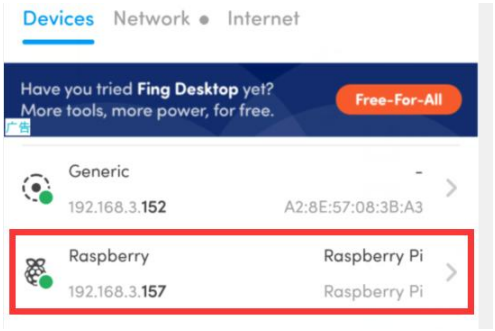
3. Click "**CONTINUE WITHOUT PERMISSION**" :



4. Click "**OK**" :



5.Wait for the scan to finish. In the list of scanned devices, locate the device named "**Raspberry Pi**". You'll be able to see its IP address, 192.168.3.157, in the lower left corner of the relevant interface. Make sure to write down this IP address.



3.4.2 Remotely log in to the Raspberry Pi OS

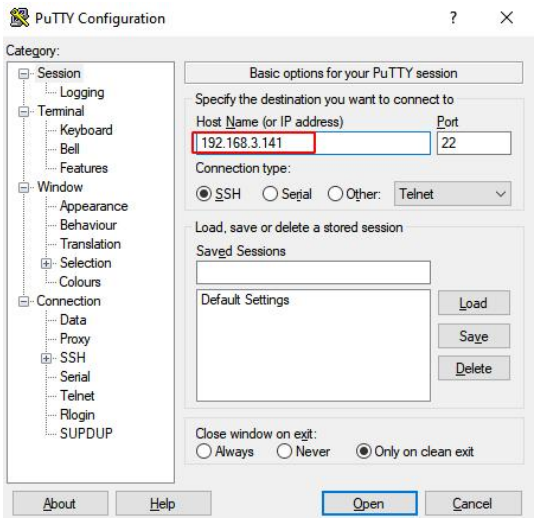
This course will demonstrate how to log in to the Raspberry Pi using PuTTY and VNC. Both Linux systems and Mac OS systems come with the SSH function. You can remotely log in to the Raspberry Pi using the terminal without the need to download any software.

1.PuTTY

You need to download and install **PuTTY** corresponding to your computer OS version, and use it to log in to the Raspberry Pi. **PuTTY** download address: https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html

1. Run PuTTY, enter the IP address of the Raspberry Pi into the Host Name, and click "**Open**".

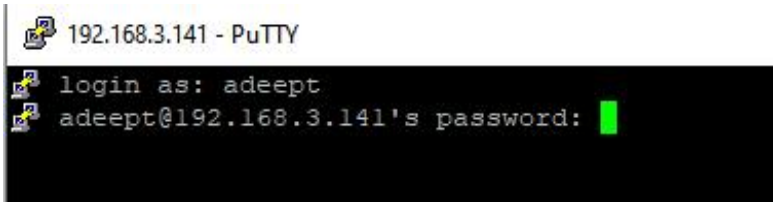
   For example: 192.168.3.141



2. If it prompts Network error: Connection timed out, it means you probably entered the wrong IP address.

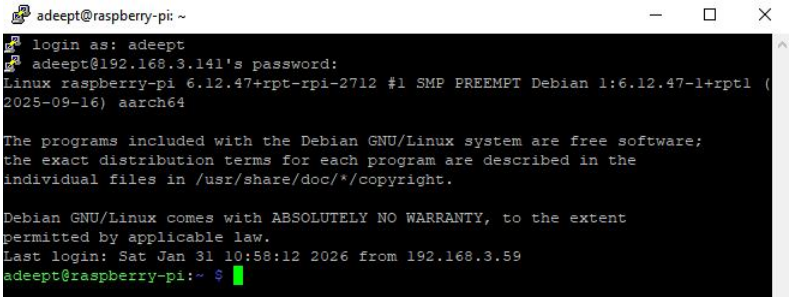
3. When the connection is normal, you will see a security warning. You can safely ignore it and click the "**Yes**" button. You will see this warning when PuTTY connects to a Raspberry Pi that has not been connected before.

4. You will see the usual login prompt now. Log in with the same username and password as those of the Raspberry Pi system. When entering the password, nothing will be shown on the screen.



Note: You need to accurately enter the username and password that you set during this process.

5. You should now have the Raspberry Pi prompt, which will be the same as the prompt on the Raspberry Pi itself.

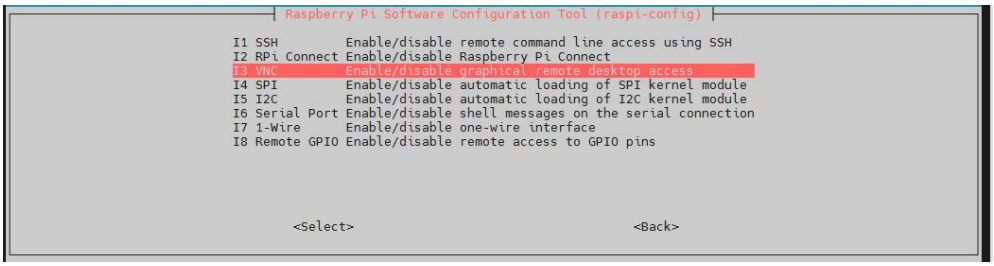


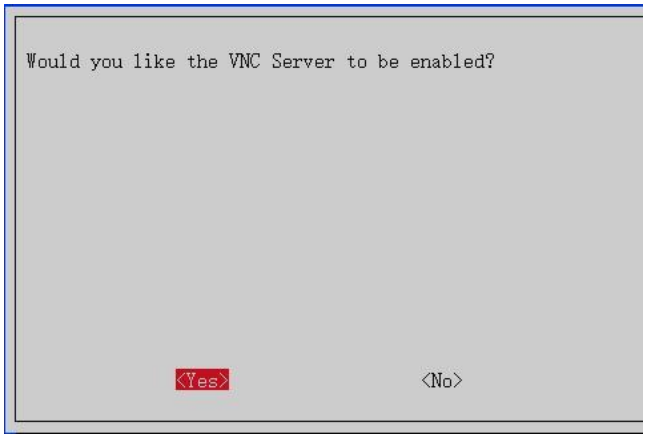
2. VNC

Type the following command. Then, select "**Interface Options**", and among the options, find and select the item related to enabling VNC (for example, the option labeled as something like "**I3 VNC**" which is related to the VNC interface setting). Press **Enter**, then select "**Yes**" and click "**OK**". At this stage, the Raspberry Pi may need to be restarted. Confirm the restart by selecting "**OK**". After that, open the VNC interface.

```
sudo raspi-config
```

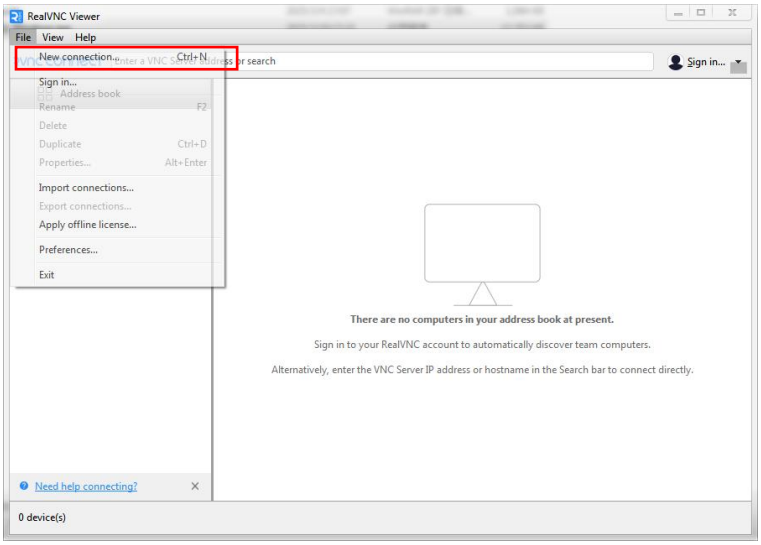
```
adeept@raspberry-pi:~ $ sudo raspi-config
```

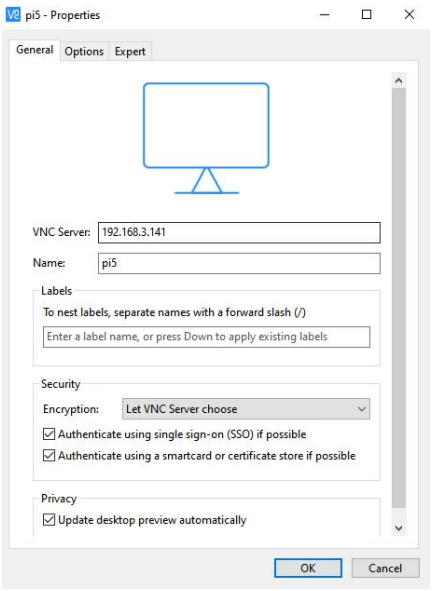




Then download and install VNC Viewer according to your computer system by click following link: https://www.realvnc.com/en/connect/download/viewer/

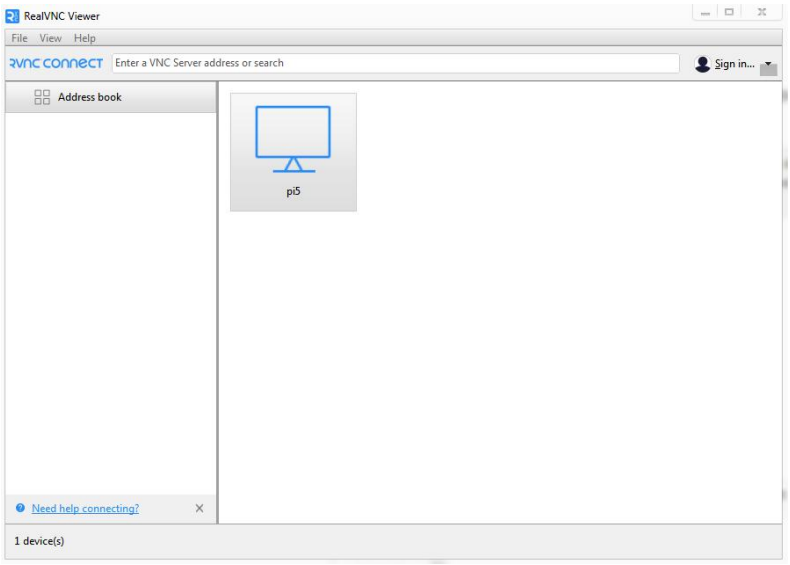
After installation is completed, open VNC Viewer. And click File New Connection. Then the interface is shown below.



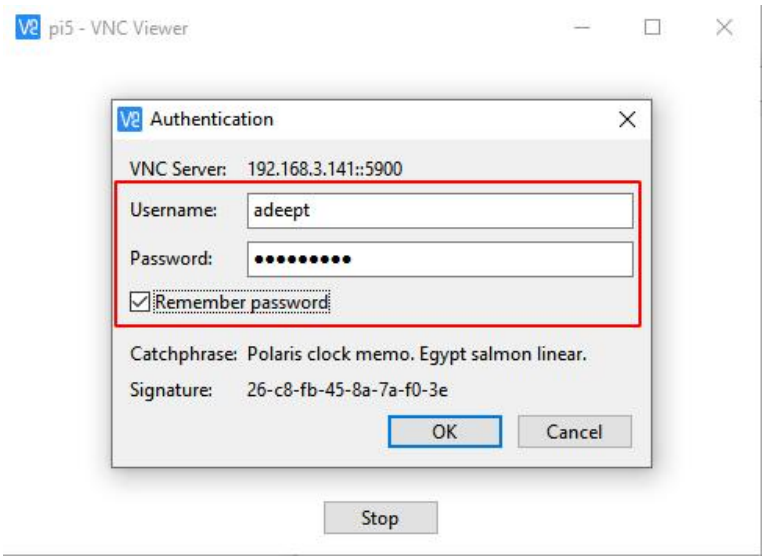


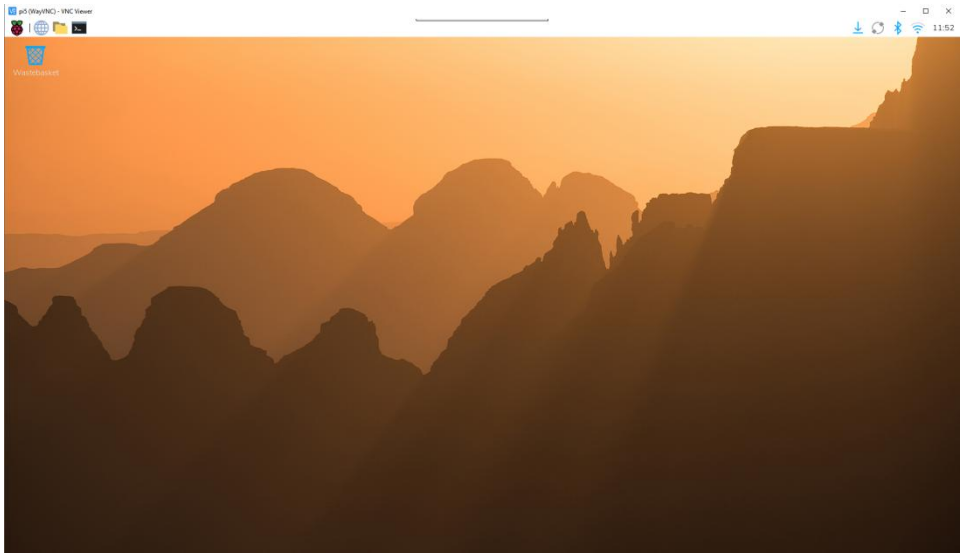
Enter the **IP** address of your Raspberry Pi and fill in a connection name. Then click **OK**.

Then on the VNC Viewer panel, double-click the new connection you just created, and the following dialog box pops up.



Enter your username and password, then click **OK**.





Here, you have logged in to Raspberry Pi successfully by using VNC Viewer

The Raspberry Pi 5, 4B, 3B+, and 3B all integrate a WiFi adaptor. So, if you haven't connected your Raspberry Pi to a WiFi network, you can connect it to a WiFi network wirelessly to control the robot.

3. Windows10, Linux and Mac OS come with SSH function

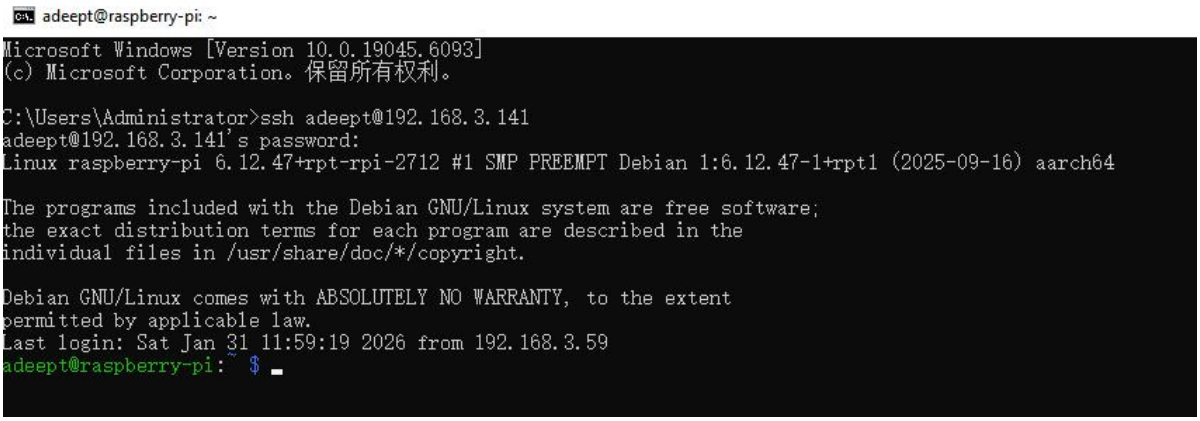
Steps to connect to Raspberry Pi via SSH:

1. Open a console terminal window.

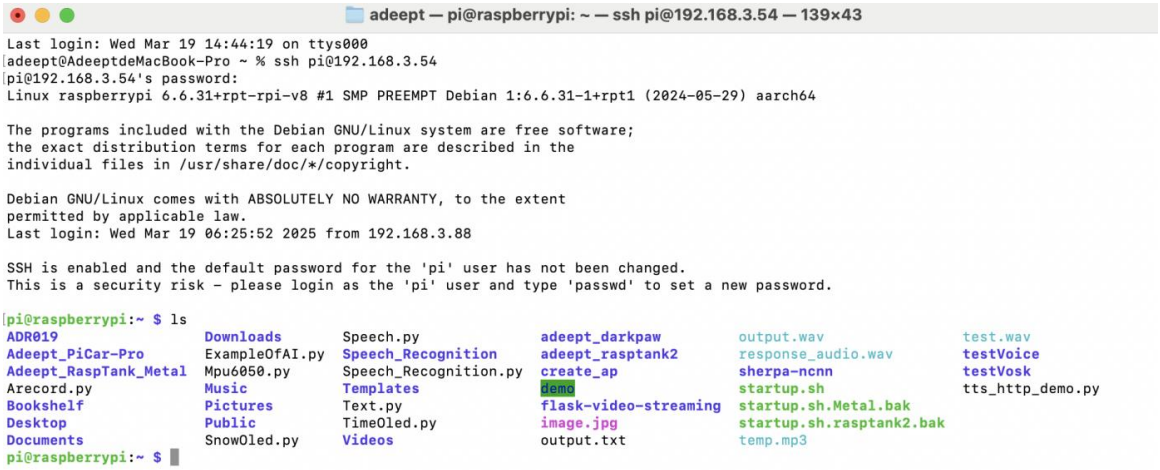
2. Enter the command: ssh <username>@<IP>, replace username and IP with your own username and IP address. We use the username adeept here, then enter the password to log in.

```
ssh adeept@192.168.3.141
```

Windows10



Linux and Mac OS



3.5 Download the Code Program to Control the Robot

- For the power supply of Raspberry Pi, please refer to this official document:

https://www.raspberrypi.com/documentation/computers/raspberry-pi.html#power-supply

- Our Raspberry Pi robot driver board, Adeept Robot HAT V3.3, can directly supply power to the Raspberry Pi through the GPIO pins. However, because the software installation time on the

Raspberry Pi is relatively long, it is not recommended to use battery power when installing software on the Raspberry Pi. The Raspberry Pi robot driver board, Adeept Robot HAT V3.3, or the camera do not need to be installed when installing software on the Raspberry Pi. This does not affect the software installation. But when you run the installed program, you must connect the driver board and the Raspberry Pi camera. Otherwise, it will cause the program to report an error.

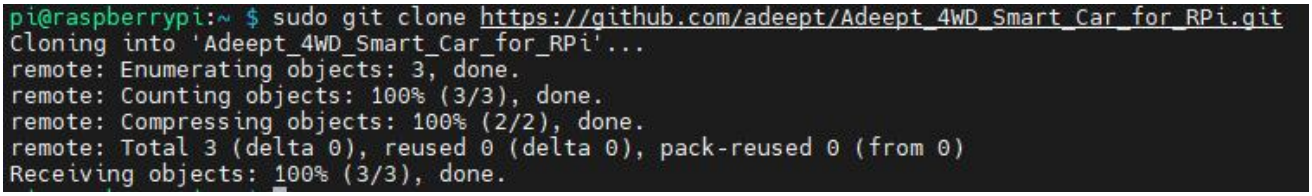
- All the code of our product has been open sourced on GitHub. You need to download it to the Raspberry Pi and install the relevant dependencies before it can run normally.

github address: https://github.com/adeept/Adeept_4WD_Smart_Car_for_RPi

1. Enter the following commands in the console:

```
sudo git clone https://github.com/adeept/Adeept_4WD_Smart_Car_for_RPi.git
```

After the input is complete, Press **Enter** to start downloading the robot program from GitHub. This process will continue for a period of time. Wait patiently for the download to complete.



After the download is complete, a new folder '**Adeept_4WD_Smart_Car_for_RPi**' will appear, in which the product code is stored. You can check the content of the folder through the Linux command '**ls**'.

```
ls
```



3.6 Install the Dependency Library of the Program

- When installing dependent libraries, the installation of some dependent libraries may fail due to network problems or dependent library version issues. For dependent libraries that fail to install, the program will automatically install multiple times.

- After the installation is complete, the Raspberry Pi will automatically restart. At this time, the remote login program of the Raspberry Pi via SSH will be terminated. Please log in again.
- When installing dependent libraries, the installation may fail due to network or regional reasons. If you encounter any problems, please contact us: support@adeept.com

We have prepared a script to install all the dependent libraries that need to be used and set up operations such as turning on the camera and automatically running on startup.

Before that, you need Open I2C and SPI.

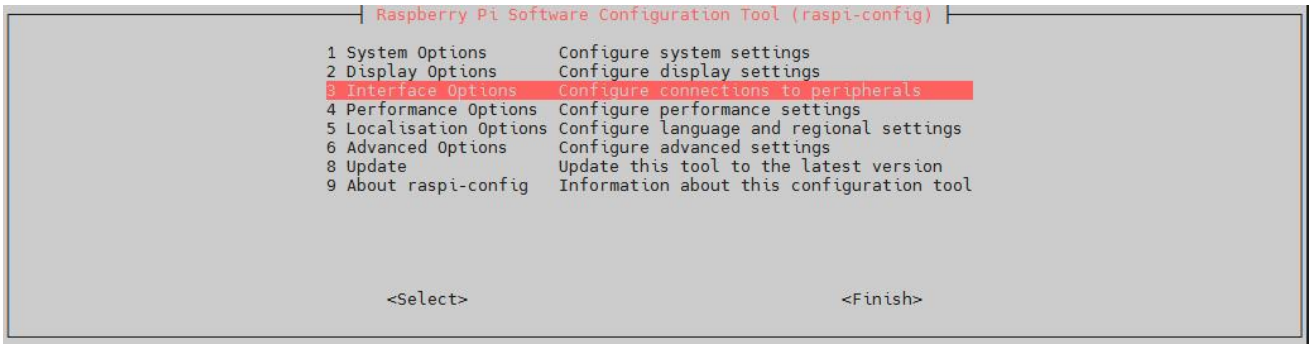
Open I2C:

Enter the following command in the Raspberry Pi:

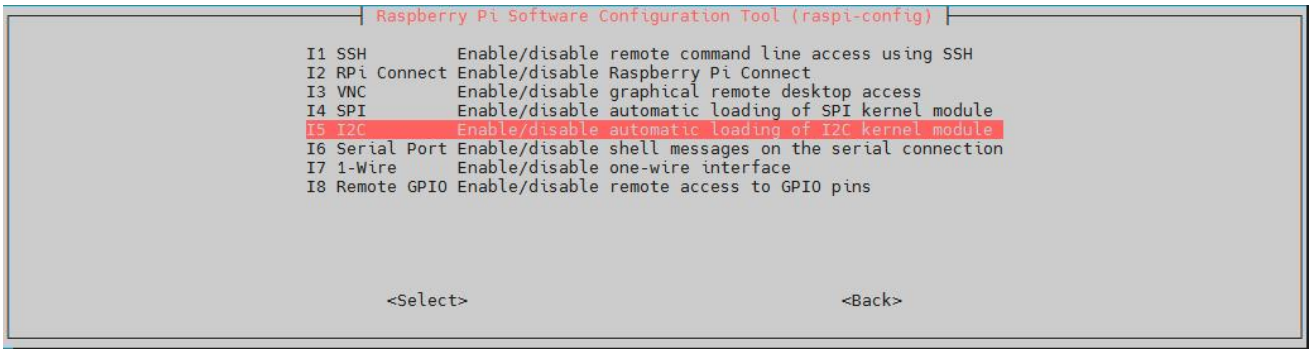
```
sudo raspi-config
```



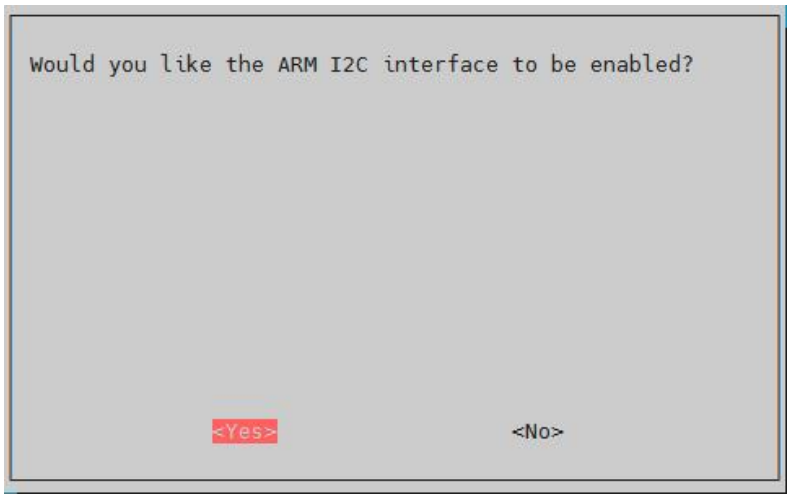
Use the keyboard arrow keys to select "**3 Interface options**" and press "**Enter**".



Select "**I5 I2C**" and press "**Enter**".



Select "**Yes**" and press "**Enter**" to open i2c.



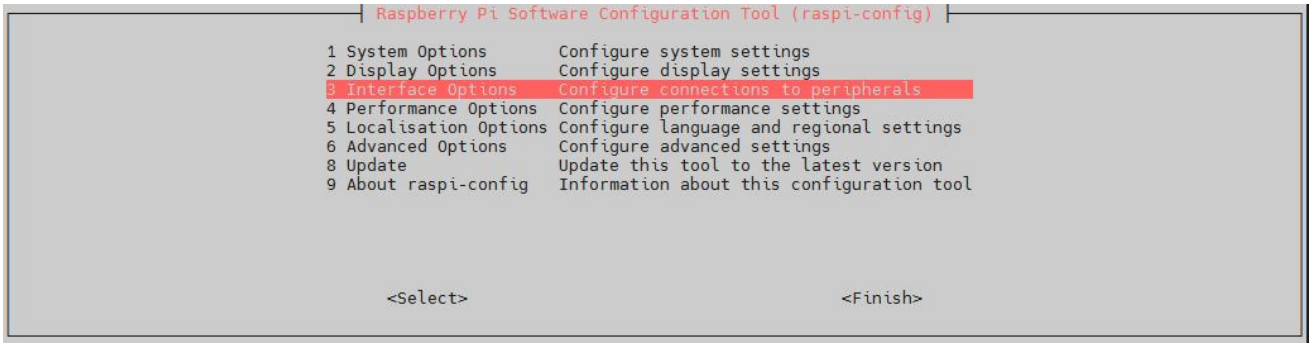
Open SPI:

Enter the following command in the Raspberry Pi:

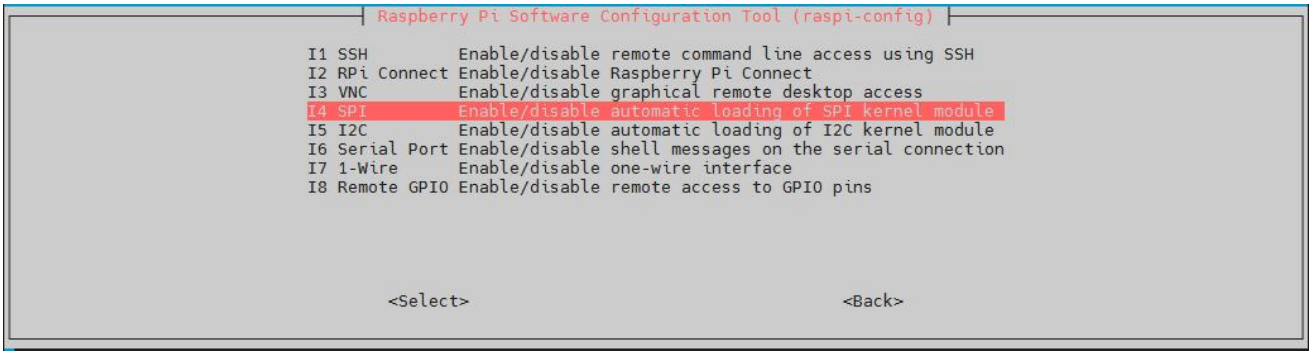
```
sudo raspi-config
```

```
adeept@raspberry-pi:~ $ sudo raspi-config
```

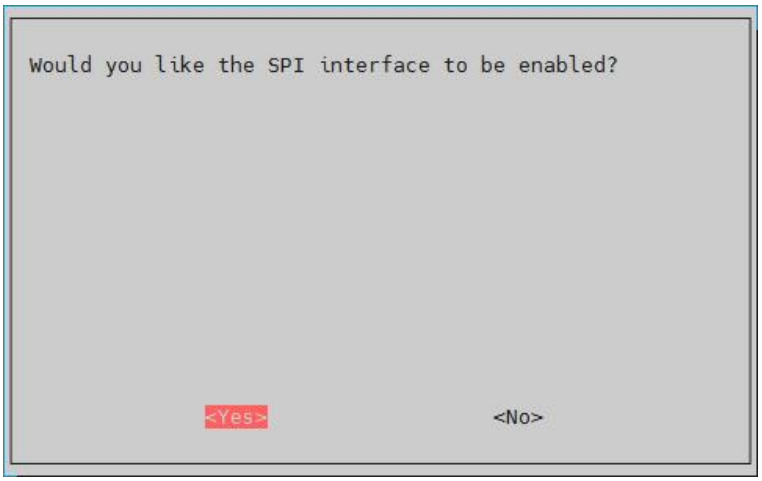
Use the keyboard arrow keys to select "**3 Interface options**" and press "**Enter**".



Select "**I4 SPI**" and press "**Enter**".



Select "**Yes**" and press "**Enter**" to open SPI.



1. Enter the following code in the console and run the script **setup.py** to install the required dependent libraries.The following operations are automatically completed by the script program. Depending on the network environment, this process may last for tens of minutes or several hours, just wait patiently.

Note: This product has two versions: the Mecanum wheel version and the Ordinary wheel version. Please select the corresponding course according to the version.

Below is an example using Mecanum wheel version.

```
sudo python3 Adeept_4WD_Smart_Car_for_RPi/setup_MecanumWheels.py
```

```
adeept@raspberry-pi:~ $ sudo python3 Adeept_4WD_Smart_Car_for_RPi/setup_MecanumWheels.py
curpath://home/adeept/Adeept_4WD_Smart_Car_for_RPi
Get:1 http://deb.debian.org/debian trixie InRelease [140 kB]
Get:2 http://deb.debian.org/debian trixie-updates InRelease [47.3 kB]
Get:3 http://deb.debian.org/debian-security trixie-security InRelease [43.4 kB]
Get:4 http://deb.debian.org/debian trixie/main armhf Packages [9,237 kB]
Get:5 http://archive.raspberrypi.com/debian trixie InRelease [54.9 kB]
Get:6 http://deb.debian.org/debian trixie/main arm64 Packages [9,607 kB]
Get:7 http://deb.debian.org/debian trixie/main Translation-en [6,484 kB]
```

If it is Ordinary wheel version, please execute the following command:

```
sudo python3 Adeept_4WD_Smart_Car_for_RPi/setup_OrdinaryWheels.py
```

```
adeept@raspberry-pi:~ $ sudo python3 Adeept_4WD_Smart_Car_for_RPi/setup_OrdinaryWheels.py
curpath://home/adeept/Adeept_4WD_Smart_Car_for_RPi
Get:1 http://deb.debian.org/debian trixie InRelease [140 kB]
Get:2 http://deb.debian.org/debian trixie-updates InRelease [47.3 kB]
Get:3 http://deb.debian.org/debian-security trixie-security InRelease [43.4 kB]
Get:4 http://deb.debian.org/debian trixie/main arm64 Packages [9,607 kB]
Get:5 http://archive.raspberrypi.com/debian trixie InRelease [54.9 kB]
Get:6 http://deb.debian.org/debian trixie/main armhf Packages [9,237 kB]
0% [4 Packages store 0 B] [6 Packages 3,437 kB/9,237 kB 37%]
```

2. After the installation is complete, the console will show text:

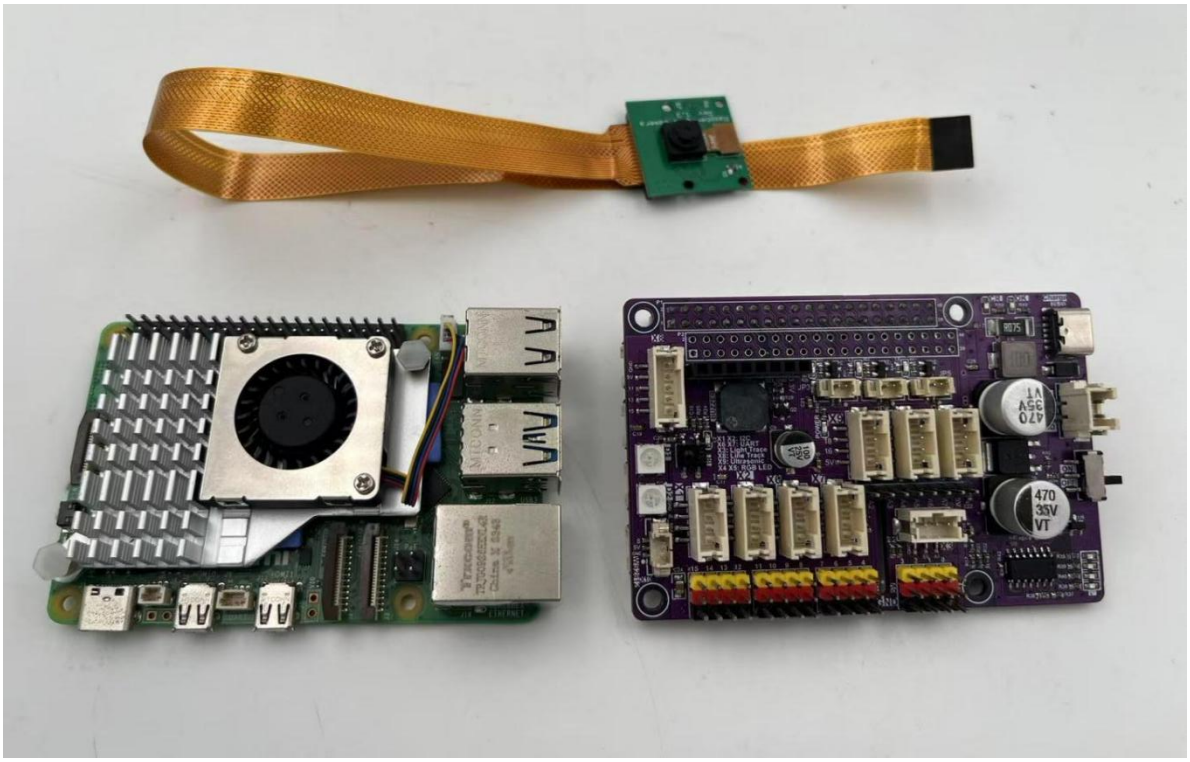
```
Successfully installed adafruit-circuitpython-ads7830-1.0.6
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager, possibly
 rendering your system unusable. It is recommended to use a virtual environment instead: https://pip.pypa.io/warnings/venv. Use the --root-u
ser-action option if you know what you are doing and want to suppress this warning.
Service file created: /etc/systemd/system/wifi-hotspot-manager.service
Created symlink '/etc/systemd/system/multi-user.target.wants/wifi-hotspot-manager.service' → '/etc/systemd/system/wifi-hotspot-manager.servi
ce'.
Service wifi-hotspot-manager.service has been enabled and started
Service file created: /etc/systemd/system/Adeept_Robot.service
Created symlink '/etc/systemd/system/multi-user.target.wants/Adeept_Robot.service' → '/etc/systemd/system/Adeept_Robot.service'.
Service Adeept_Robot.service has been enabled and started
The program in Raspberry Pi has been installed, disconnected and restarted.
You can now power off the Raspberry Pi to install the camera and driver board (Robot HAT).
After turning on again, the Raspberry Pi will automatically run the program to set the servos port signal to turn the servos to the middle p
osition, which is convenient for mechanical assembly.
restarting...
```

After the installation is complete, the Raspberry Pi will automatically disconnect the SSH connection and restart. At this time, if you are using a Raspberry Pi connected by software such as Putty, there will be an error message such as Network error: Software caused connection abort, which is normal, just close the window, Then reconnect to the Raspberry Pi via SSH.

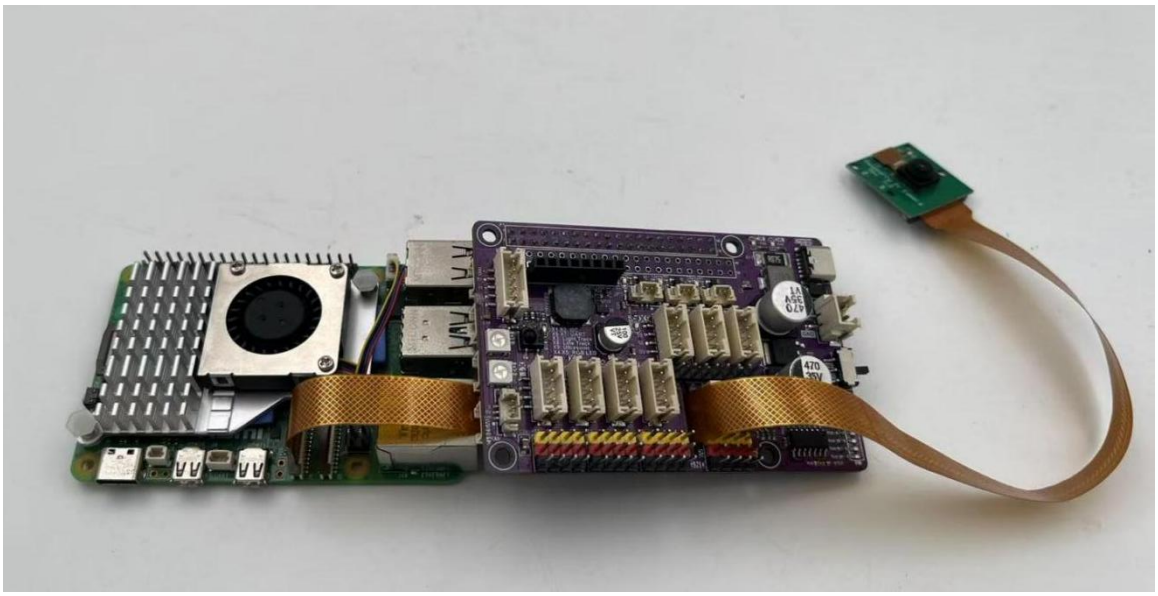
3.7 Check whether the dependent library is installed successfully

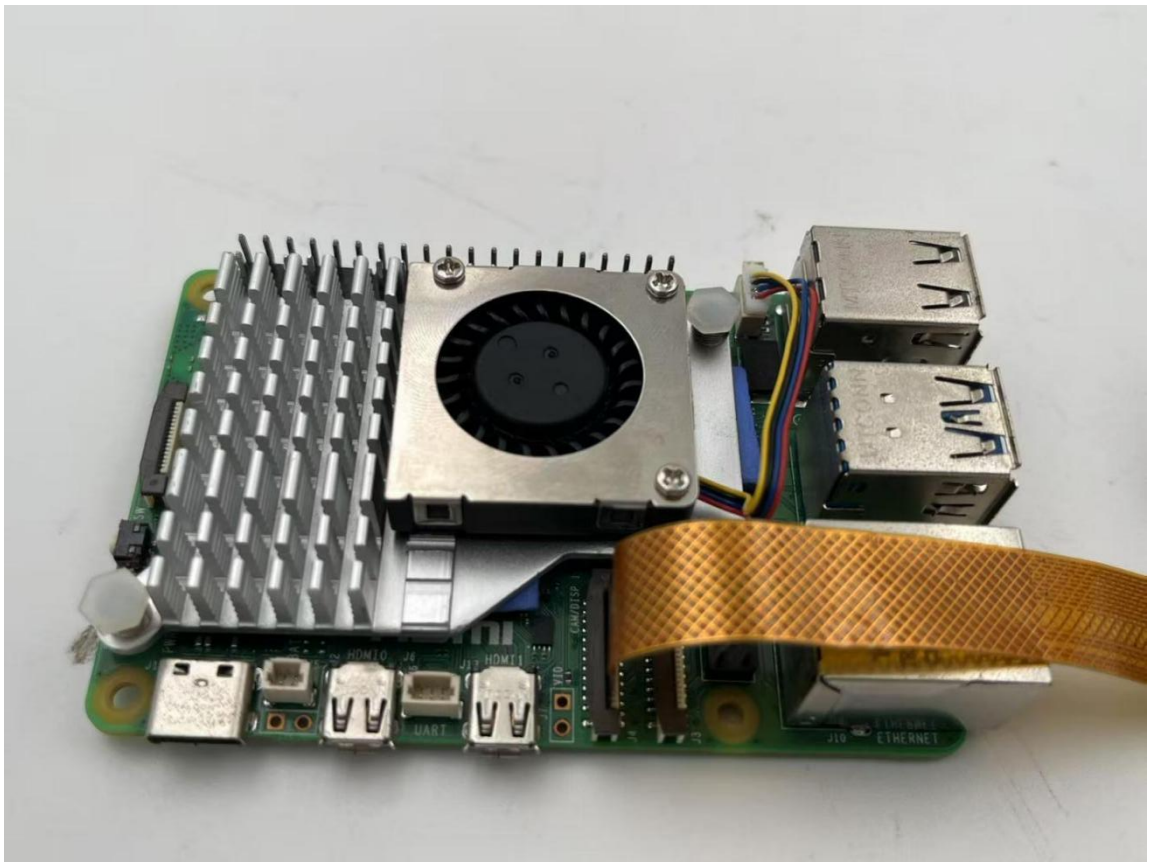
The picture below uses a Raspberry Pi 5, so you need to use the corresponding Raspberry Pi 5 camera cable.

If you are using a Raspberry Pi 3B, 3B+, 4B. You will need to use the black camera cable. Black ribbon cable is included in the kit.



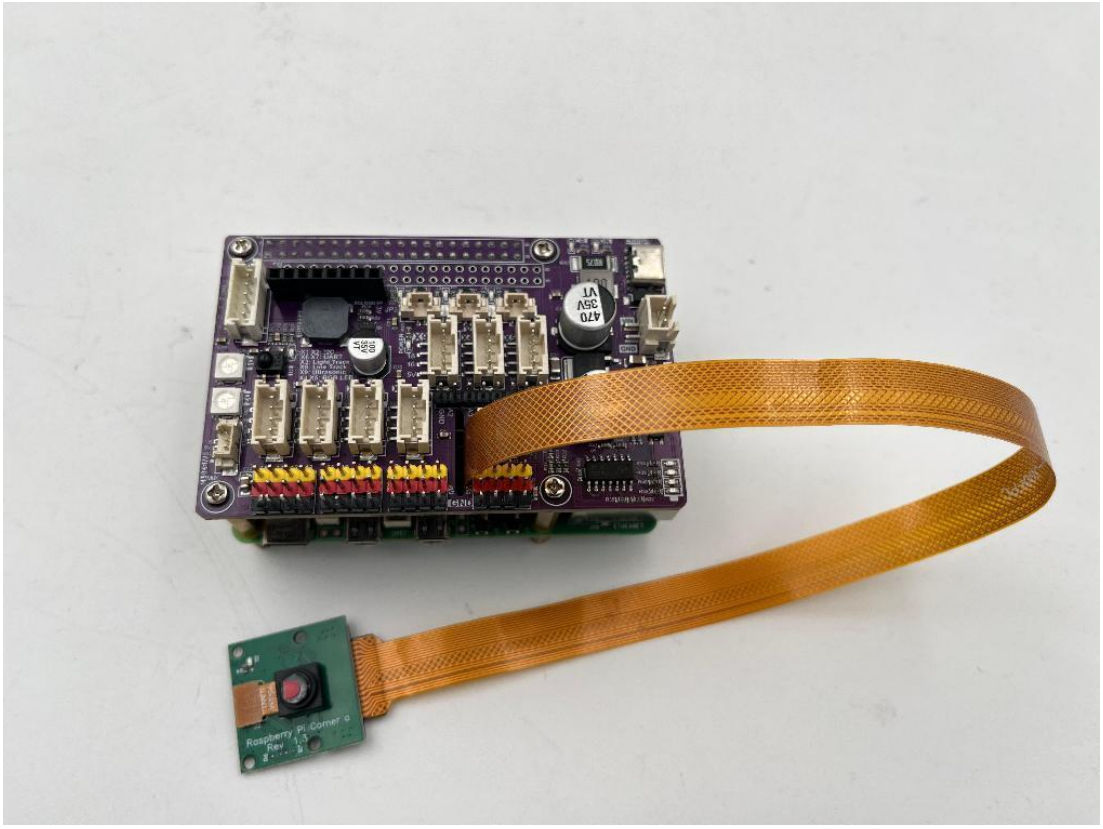
1. Install the camera cable, contact the metal surface of the cable with the metal surface of the Raspberry Pi (the same applies to installing the camera).





2.Install Adeept Robot HAT V3 and camera, and connect the Raspberry Pi power supply.

Note: If you are using a Raspberry Pi 5 or have connected many sensors to the expansion board, powering via a Type-C cable may cause insufficient power supply. Please use two 3.7V 18650 batteries for power supply.



3.After the Raspberry Pi is turned on (about 1-2minutes), you can access the Raspberry Pi with a browser. When no error message appears when the "WebServer.py" program is running, the dependent library is installed successfully.

- If the program does not run when the robot boots up, try connecting to the Raspberry Pi via SSH and then manually run "WebServer.py" and check for errors. Refer to the **Q&A** below or email us for help at support@adeept.com.

Before manually running "WebServer.py", you need to end the program possibly auto run in the back end to release resources.

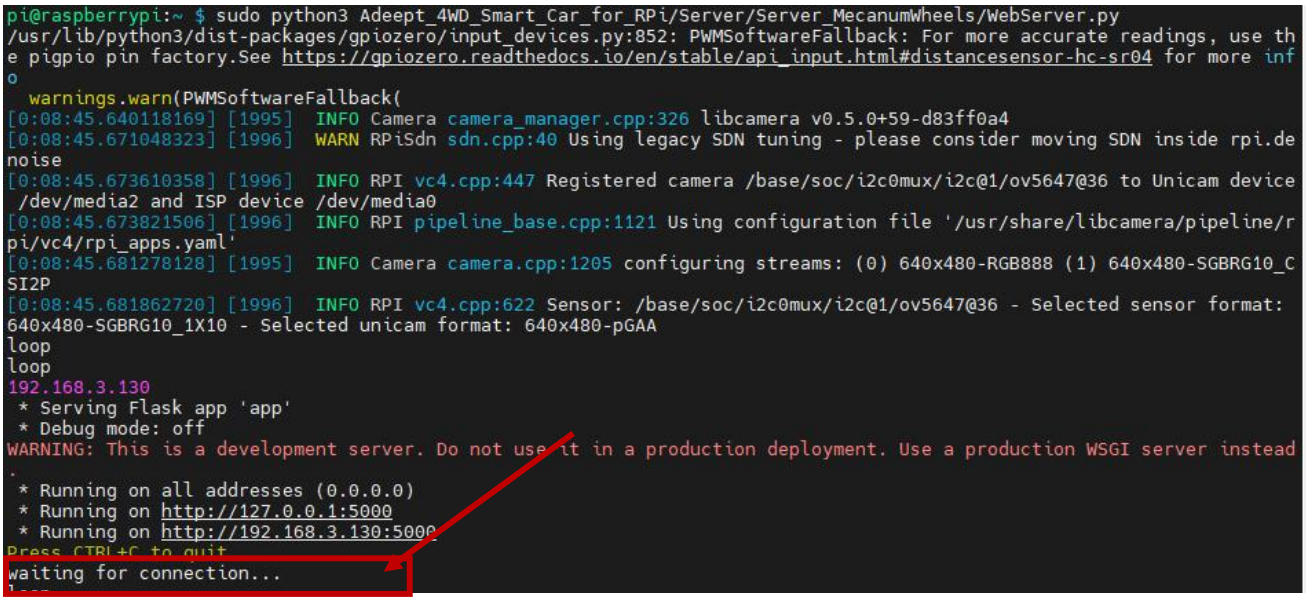
```
sudo killall python3
```

```
pi@raspberrypi:~ $ sudo killall python3
```

Use the following command to run "WebServer.py" .If it is Mecanum wheels, run Adeept_4WD_Smart_Car_for_RPi/Server/Server_MecanumWheels/WebServer.py,if it is Ordinary wheels, run Adeept_4WD_Smart_Car_for_RPi/Server/Server_OrdinaryWheels/WebServer.py.

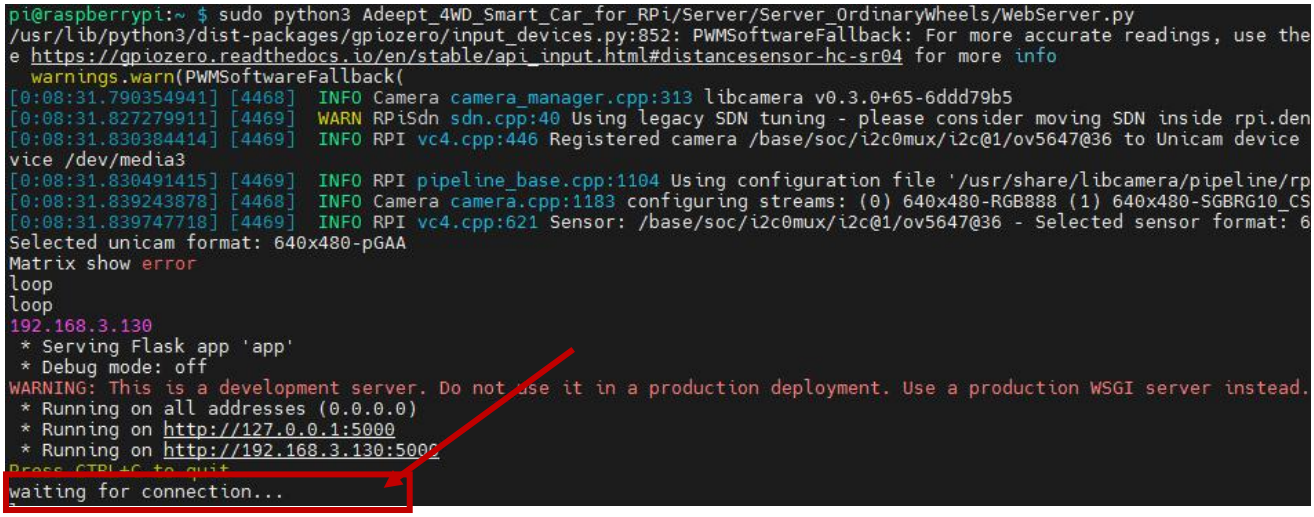
Below is an example using Mecanum wheels.

```
sudo python3
Adeept_4WD_Smart_Car_for_RPi/Server/Server_MecanumWheels/WebServer.py
```



If it is Ordinary wheel version, please execute the following command:

```
sudo python3
Adeept_4WD_Smart_Car_for_RPi/Server/Server_OrdinaryWheels/WebServer.py
```



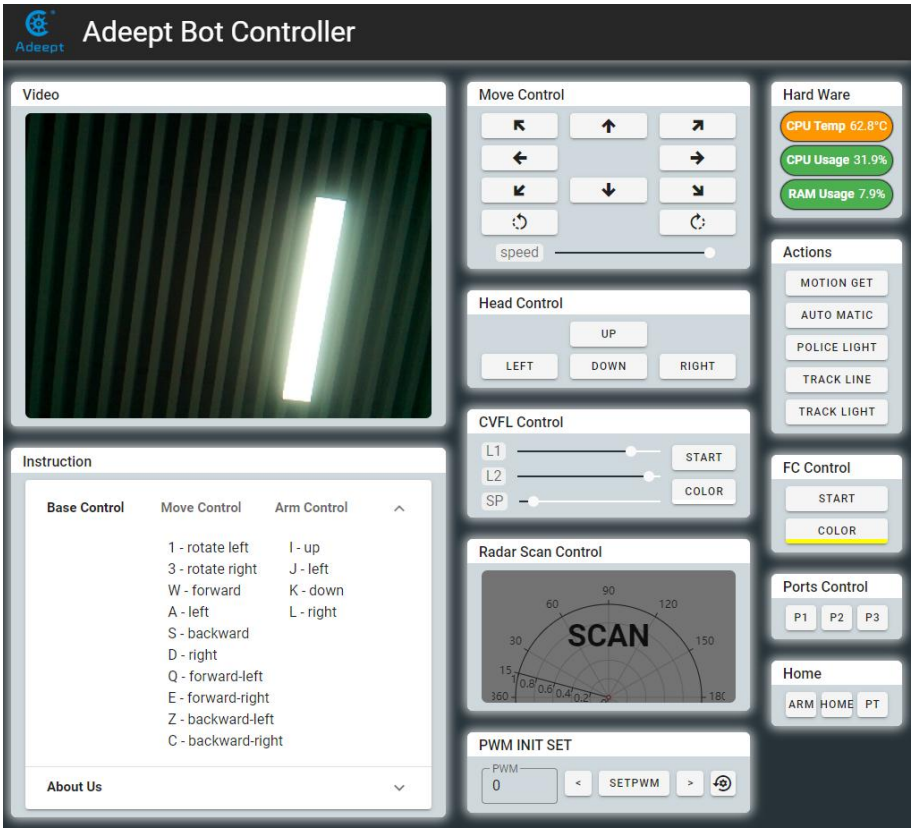
After running the command, more warning messages will appear, which is normal. "**waiting for connection...**" appears at the end of the running result, indicating that the program ran successfully.

Open the web control interface.

1. Make sure your device is in the same local area network as the Raspberry Pi.

2. Open the browser on the device (chrome browser is recommended to avoid possible browser compatibility issues), enter the IP address of your Raspberry Pi in the address bar, and visit port 5000, for example: 192.168.3.141:5000

3.The web controller will then be loaded into the browser.



4. Under normal conditions, you have successfully configured the Raspberry Pi system and installed all relevant program dependencies. If not, check the successful execution of previous steps or the **Q&A** at the end of the tutorial. For unresolved issues, contact technical support via email.

3.8 Regarding WiFi and Hotspot Configuration

The WiFi has already been preconfigured according to the manual when you flash the Raspberry Pi OS. You can check it with the following command:

Check active WiFi connections:

```
nmcli connection show
```

```
adeept@raspberry-pi:~ $ nmcli connection show
NAME                UUID                                  TYPE      DEVICE
netplan-wlan0-Adeept  08f21236-89b4-318b-b20b-360116db20b4  wifi      wlan0
lo                  6cac9dd4-96d8-4cfc-a389-a9a0657c6f20  loopback  lo
netplan-eth0        75a1216a-9d1a-30cd-8aca-ace5526ec021  ethernet  --
adeept@raspberry-pi:~ $
```

```
systemctl status wifi-hotspot-manager.service
```

```
adeept@raspberry-pi:~ $ systemctl status wifi-hotspot-manager.service
● wifi-hotspot-manager.service - WiFi and Hotspot Manager Service
     Loaded: loaded (/etc/systemd/system/wifi-hotspot-manager.service; enabled; preset: enabled)
     Active: active (exited) since Fri 2026-01-30 17:54:24 CST; 22min ago
 Invocation: fca674ad761149a69f08b03c36c309b1
    Process: 1283 ExecStart=/home/adeept/wifi_hotspot_manager.sh (code=exited, status=0/SUCCESS)
   Main PID: 1283 (code=exited, status=0/SUCCESS)
        CPU: 125ms

Jan 30 17:54:17 raspberry-pi systemd[1]: Starting wifi-hotspot-manager.service - WiFi and Hotspot Manager Service...
Jan 30 17:54:17 raspberry-pi wifi_hotspot_manager.sh[1283]: Waiting for network service to start...
Jan 30 17:54:17 raspberry-pi wifi_hotspot_manager.sh[1283]: Attempting to connect to system preconfigured WiFi: Adeept
Jan 30 17:54:17 raspberry-pi wifi_hotspot_manager.sh[1283]: --
Jan 30 17:54:17 raspberry-pi wifi_hotspot_manager.sh[1283]: DC:90:88:30:04:F8 (connection name: netplan-wlan0-Adeept)
Jan 30 17:54:19 raspberry-pi wifi_hotspot_manager.sh[1340]: Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkM
Jan 30 17:54:24 raspberry-pi wifi_hotspot_manager.sh[1283]: System preconfigured WiFi connected successfully
Jan 30 17:54:24 raspberry-pi systemd[1]: Finished wifi-hotspot-manager.service - WiFi and Hotspot Manager Service.
adeept@raspberry-pi:~ $
```

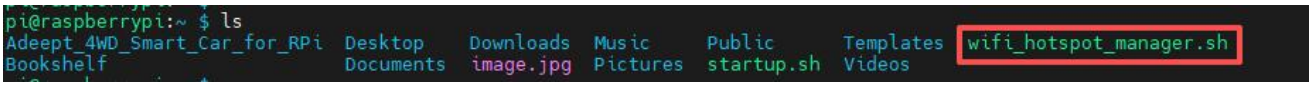
Based on this configuration, we have set up an auto-switch service for WiFi and hotspot modes in the **wifi_hotspot_manager.sh** file. When the Raspberry Pi boots up, it will first attempt to connect to the WiFi configured during OS image flashing. If the connection to this WiFi fails, the Raspberry Pi will automatically enable the hotspot function. The relevant hotspot configuration details are as follows:

Hotspot Name: **Adeept_Robot**

Hotspot Password: **12345678**

Default IP Address: **192.168.4.1**

If you need to modify the configuration of WiFi or Hotspot, please edit the file **/home/pi/wifi_hotspot_manager.sh.**




```
# Configuration parameters - modify these values according to your needs
# SYSTEM_WIFI_CONN="preconfigured"  # Default connection name for Bookworm system
HOTSPOT_SSID="Adeept_Robot"
SYSTEM_WIFI_CONN=$(nmcli connection show | grep -w "wifi" | grep -v "$HOTSPOT_SSID" | awk '{print $1}')  # Default connection name for Bookw
orm and Trixie system
HOTSPOT_PASSWORD="12345678"  # At least 8 characters
HOTSPOT_INTERFACE="wlan0"
WIFI_AP_GATEWAY="192.168.4.1"
```

Note that modifications may cause network errors in the Raspberry Pi system; please operate with caution, and modifications are generally not recommended.

Q&A

- Run "WebServer.py" error**: Could not start camera.**

The Raspberry Pi will automatically run the WebServer.py program. The WebServer.py program will occupy the camera. If you run the camera-related program again, the program will report an error. When you need to run the program manually, you need to stop the automatic running program.

1. Enter in the Raspberry Pi command line: (stop the automatic running program)

```
sudo killall python3
```

2. Enter the Raspberry Pi camera command, Under normal circumstances, the Raspberry Pi will take a photo named **image.jpg**, which can be viewed by entering "**ls**". If an error is reported, please check whether the camera is installed correctly until this command can run successfully. Or the camera may be damaged.

For **Trixie** system:

```
sudo rpicam-jpeg -o image.jpg -n
```

For **Bookworm** system:

```
sudo libcamera-jpeg -o image.jpg -n
```

Note: You need to power off the Raspberry Pi when plugging or unplugging the USB camera, otherwise the camera may be damaged.

- Run "WebServer.py" error**: No Hardware I2C on (scl,sda)=(3, 2).**

It might be due to the fact that the I2C (Inter-Integrated Circuit) interface is not enabled. Please enter the following command on the Raspberry Pi:

```
sudo raspi-config
```

Select **3 Interface options** -> **I5 I2C**, then enable the I2C interface.

- Errors occur with "**permission denied**" prompt when I manually run "**WebServer.py**".

You need to add "**sudo**" to the beginning of or "**WebServer.py**" to run the program. [PATH] is the product folder path.

If it is Mecanum wheels,enter in the Raspberry Pi command line:

```
sudo python3 Adeept_4WD_Smart_Car_for_RPi/Server/Server_MecanumWheels/WebServer.py
```

If it is Ordinary wheels,enter in the Raspberry Pi command line:

```
sudo python3 Adeept_4WD_Smart_Car_for_RPi/Server/Server_OrdinaryWheels/WebServer.py
```

- "**Remote side unexpectedly closed network connection**" shows on a popup window.

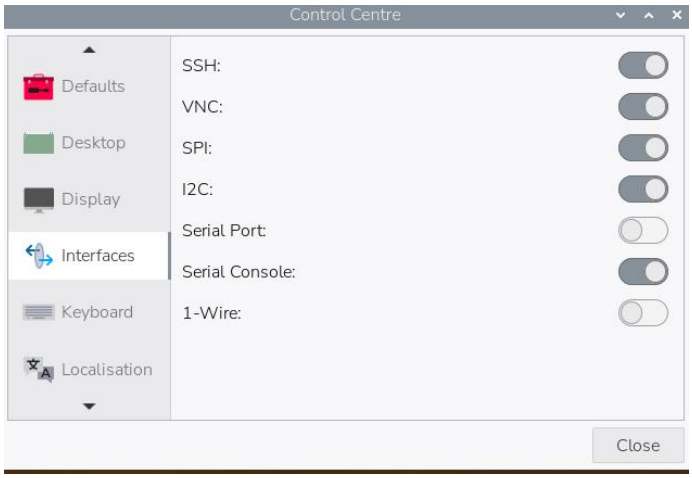
There can be error prompts during installation because the Raspberry Pi will auto reboot after the installation, which will disconnect the board.

- Raspberry Pi failed to connect a WiFi.

Please connect to the Raspberry Pi through the mouse, keyboard, monitor, and then click the WiFi icon in the upper right corner of the Raspberry Pi interface to enter the wifi information.

- I can not connect to the Raspberry Pi terminal via SSH

Please connect the mouse, keyboard, and monitor to the Raspberry Pi. Then, click the main menu in the upper - left corner of the Raspberry Pi interface. Next, select "**preferences**", then select "**Control Contre**", and select "**Interfaces**". Set the SSH bar to "**Enabled**", and then click "**Close**".



- SSH can't connect, error: **WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!**

Enter the following content in the CMD and press **Enter**

ssh-keygen -R <the Raspberry Pi's IP address>

For example:

```
ssh-keygen -R 192.168.3.31
```

Then you can SSH to the Raspberry Pi again

- Can I power the Robot HAT and Raspberry Pi via USB?

For the Raspberry Pi 3B, the output current required for its operation is 2A. While for the Raspberry Pi 4, at least 3A of output current is needed to run stably. As for the latest Raspberry Pi 5, given its performance improvement and potentially more complex computing requirements, the power supply requirements have also increased accordingly. It is recommended to use a power adapter that can provide at least 3.5A of output current. During the software installation and normal testing phases, using USB power supply is feasible. However, when it comes to connecting and debugging high - power modules such as servos and motors, USB power supply is not sufficient. Because these modules consume a large amount of current during operation. If USB power supply is used, it is very likely to cause a voltage drop, making the power supply of the Raspberry Pi unstable, thus affecting the normal operation of the entire system and even potentially damaging the device. Therefore, when operating high - power modules, it is strongly recommended to adopt a battery - powered solution. Battery power supply can not only provide stable and sufficient power, but also effectively reduce potential risks caused by voltage

fluctuations, ensuring that the Raspberry Pi and external high - power modules can work stably and efficiently in coordination.

- no cv2 error occurs when I manually run "**WebServer.py**"

OpenCV is not installed correctly. Type the command in the Raspberry Pi to manually install OpenCV.

```
sudo apt-get install -y python3-opencv
```