How to install system on Raspberry Pi & Lab 1

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Experiment Kit Description

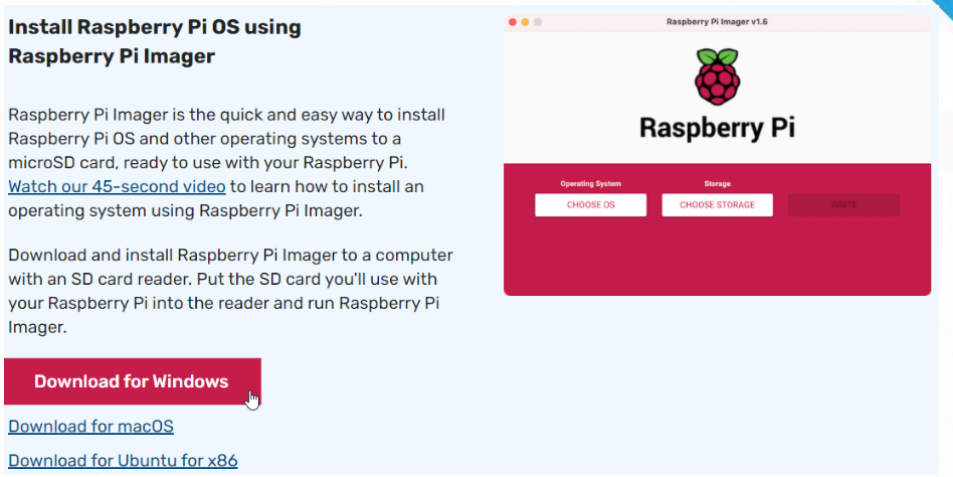
1. Raspberry Pi 5
2. Power Supply for Raspberry Pi 5
3. Debug Module and Cable for Raspberry Pi 5
4. 64GB Memory Card for Raspberry Pi 5
5. Arduino UNO and Transmission Cable
6. Raspberry Pi 5 Dedicated Camera Module
7. 4G Mobile Network Card
8. 8x8 Matrix LED Module
9. MQ-2 Gas Sensor Module
10. Temperature and Humidity Sensor Module
11. NRF24L01 wireless module
12. Human infrared sensor module
13. Ultrasonic sensor module
14. USB network adapter and Ethernet cable
15. Breadboard
16. Dupont wire (male to female) *20 & Dupont wire (male to male) *20

Required Hardware

- Raspberry Pi 5
- SD card
- USB-C Power Supply
- Card reader
- Micro HDMI adapter
- HDMI cable
- Mouse
- Keyboard

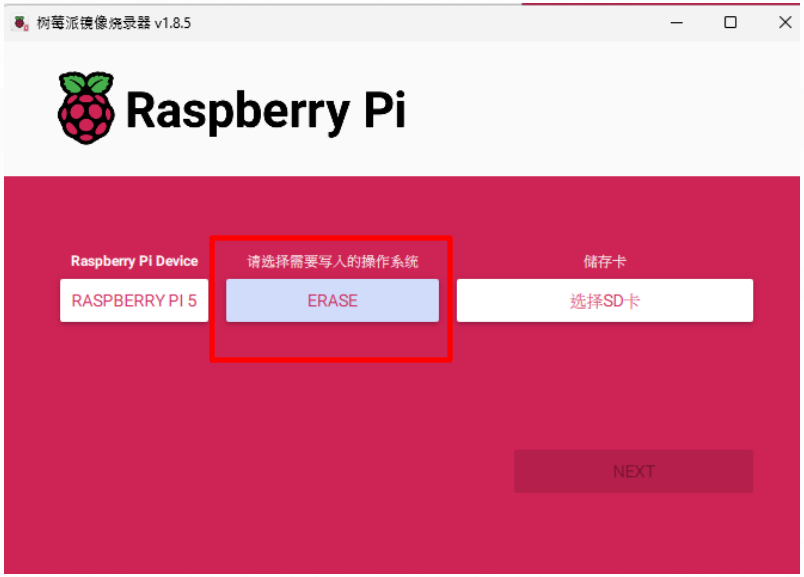
Download Imager

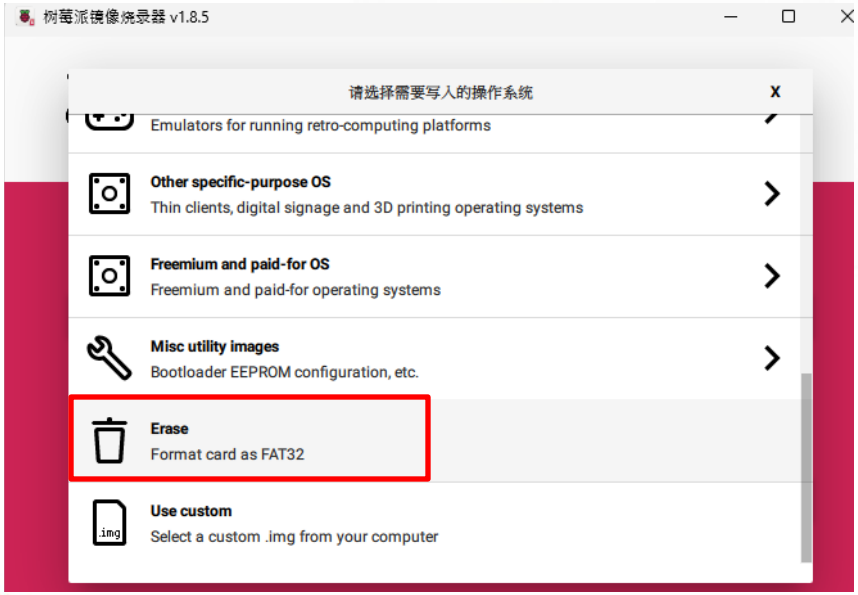
- Use a browser to open the URL: "https://www.raspberrypi.com/software/".
- After entering the page, under the title "Install Raspberry Pi OS using Raspberry Pi Imager", you can see links such as "Download for Windows“.
- After the installation is complete, check "Run Raspberry Pi Imager" and click the "Finish" button below.



Clear SD card contents

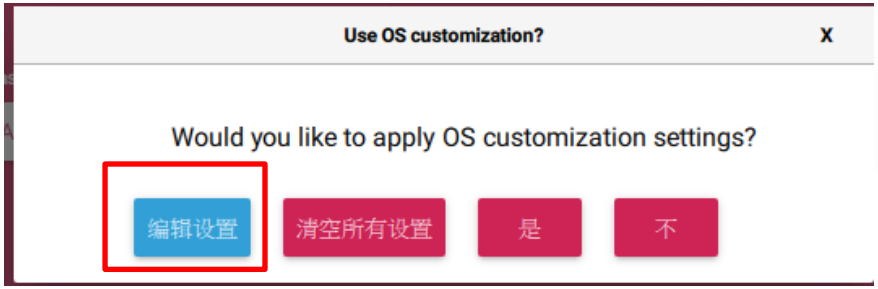
- Select RPI5 ERASE and your SD card.
- Clear the contents of the SD Card to ensure it is clean.

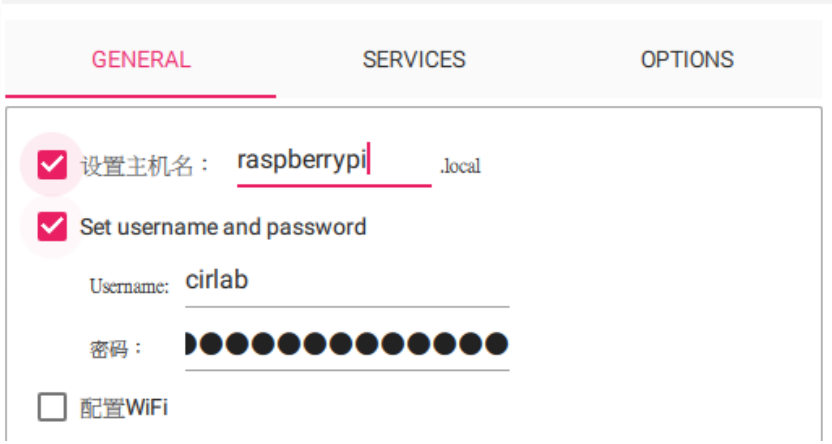




Install system

- them select the operating system to be written to item, please select the first item Raspberry Pi OS (64-bit)
- Set hostname and password in edit settings (編輯設定)

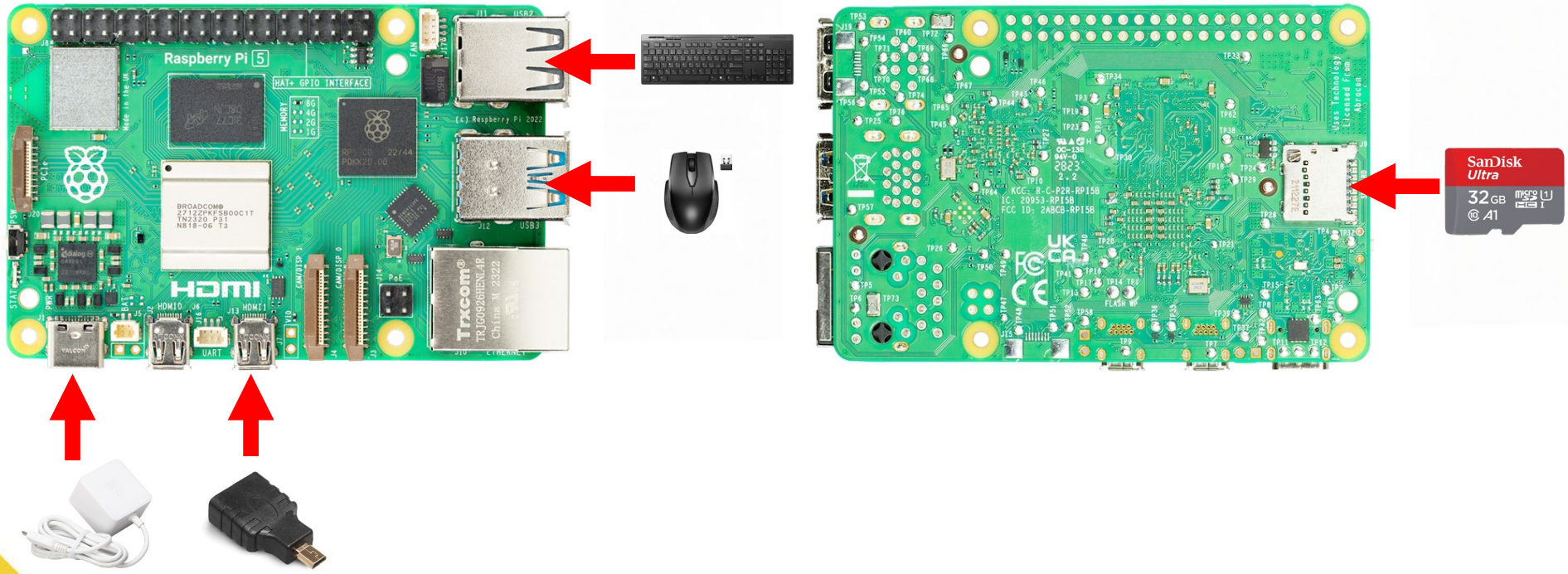




Set it yourself and remember it

Raspberry Pi Device

- Connect HDMI cable (Raspberry Pi to monitor)
- Connect USB keyboard and mouse
- Connect the Raspberry Pi to power



VNC & TeamViewer

- RPI screen display, you need to use an HDMI cable to receive the screen, but TeamViewer and VNC allow the RPI screen to be displayed on the computer through the network.
- VNC requires an IP address, but TeamViewer only needs to be installed and logged in with the same account to connect to RPI from the external network.
- Note: You can only use either VNC or TeamViewer (AnyDesk), not both.
- VNC is suitable for **displaying server** using **Wayland**, while TeamViewer (AnyDesk) is suitable for **X11**.

Display Server Set

(If using VNC, please skip this step ! ! ! ! ! !)

1. Run the raspi-config tool

```
sudo raspi-config
```

2. Navigate to 6 Advanced Options

3. Select A6 Wayland

4. Choose w1 X11

5. Check the display server protocol

```
echo $XDG_SESSION_TYPE
```

6. Reboot

```
sudo reboot
```

TeamViewer

Install TeamViewer in your RPI

1. Use the official website to download the corresponding version of TeamViewer based on the RPI system and hardware. Please note that it is a Full client Version.

https://www.teamviewer.com/tw/download/raspberry-pi/?utm_source=google&utm_medium=cpc&utm_campaign=asean%7Cb%7Cpr%7C22%7Csep%7Ctv-core-download-sn%7Cnew%7Ct0%7C0&utm_content=Operating-Systems&utm_term=teamviewer+raspberry+pi

2. How to check the version in the system and hardware RPI , please enter respectively.

```
uname -a
```

3. You can see that my RPI is armv7l, and the system is debian, so download the corresponding version.

```
cirlab@raspberrypi:~ $ cat /etc/os-release
PRETTY_NAME="Debian GNU/Linux 12 (bookworm)"
NAME="Debian GNU/Linux"
VERSION_ID="12"
VERSION="12 (bookworm)"
VERSION_CODENAME=bookworm
ID=debian
HOME_URL="https://www.debian.org/"
SUPPORT_URL="https://www.debian.org/support"
BUG_REPORT_URL="https://bugs.debian.org/"
cirlab@raspberrypi:~ $ uname -a
Linux raspberrypi 6.6.51+rpt-rpi-2712 #1 SMP PREEMPT Debian 1:6.6.51-1+rpt3 (2024-10-08 aarch64 GNU/Linux
```

TeamViewer

4. This step is the code for how to delete the wrong version if it is installed. If there are no errors or it has not been installed before, skip to step 5.

```
sudo apt-get remove teamviewer
sudo apt autoremove
```

5. Install TeamViewer and the VNC Logo will appear in the upper right corner of RPI.

```
sudo dpkg –i <file name>
sudo apt-get install -f
sudo apt-get install gdebi -f
```

6. Start TeamViewer

```
sudo  teamviewer --daemon start
```

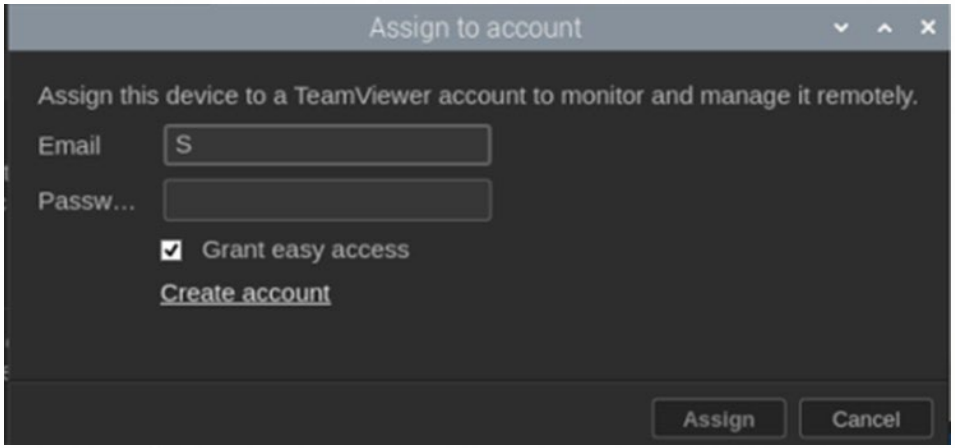
```
cirlab@raspberrypi:~ $ cd Downloads/
cirlab@raspberrypi:~/Downloads $ sudo dpkg -i teamviewer_15.63.4_arm64.deb
Selecting previously unselected package teamviewer.
(Reading database ... 128596 files and directories currently installed.)
Preparing to unpack teamviewer_15.63.4_arm64.deb ...
Unpacking teamviewer (15.63.4) ...
Setting up teamviewer (15.63.4) ...
gpg: directory '/root/.gnupg' created
gpg: keybox '/root/.gnupg/pubring.kbx' created
Processing triggers for gnome-menus (3.36.0-1.1) ...
Processing triggers for mailcap (3.70+nmu1) ...
Processing triggers for desktop-file-utils (0.26-1) ...
Processing triggers for dbus (1.14.10-1~deb12u1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
```

TeamViewer

7. Start TeamViewer on RPI. Your ID and password will be displayed on the screen. Please go to the PC and enter your partner ID and password to connect.

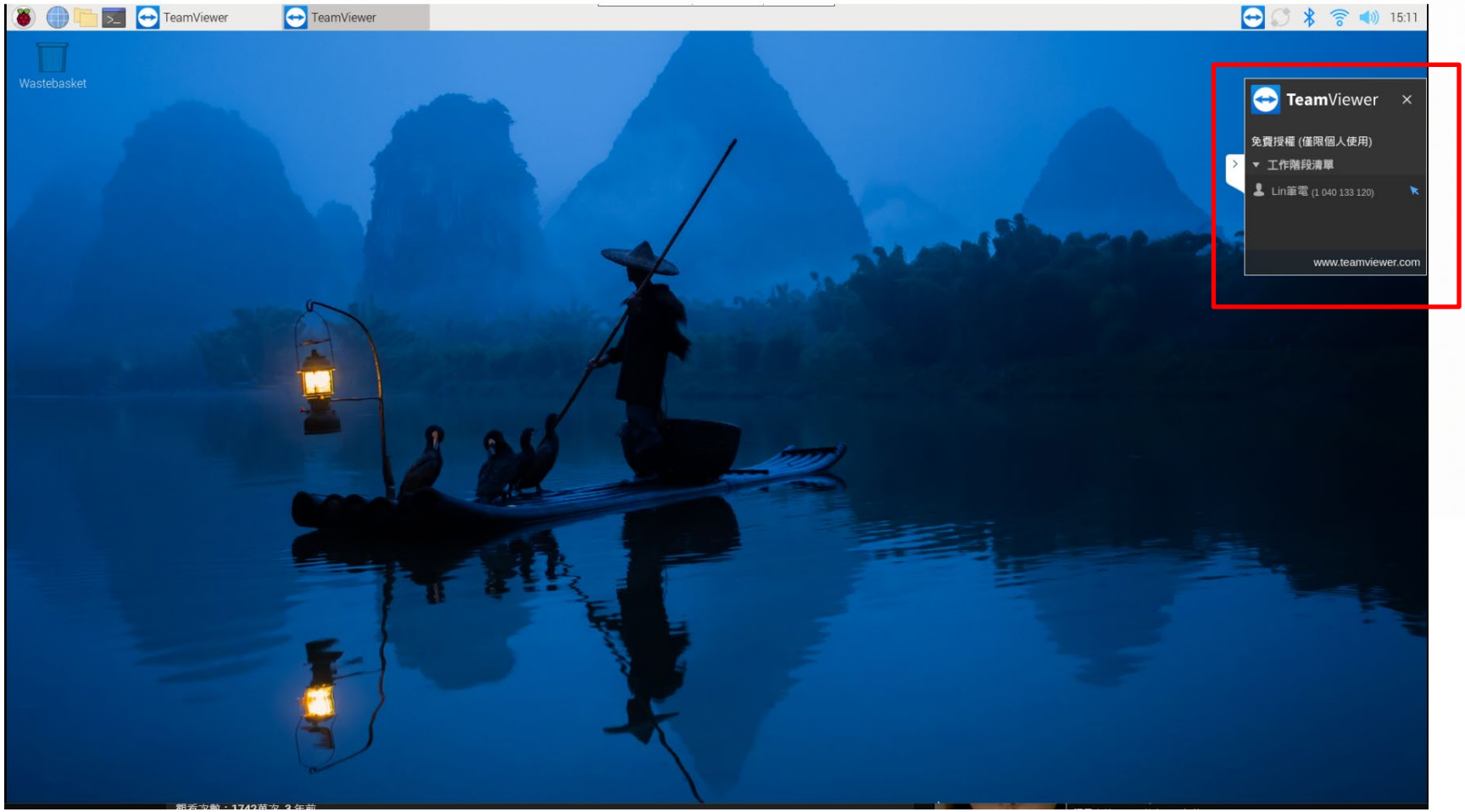
TeamViewer

8. But because there will be a random password, you need to assign the RPI to your account to grant easy access.



TeamViewer

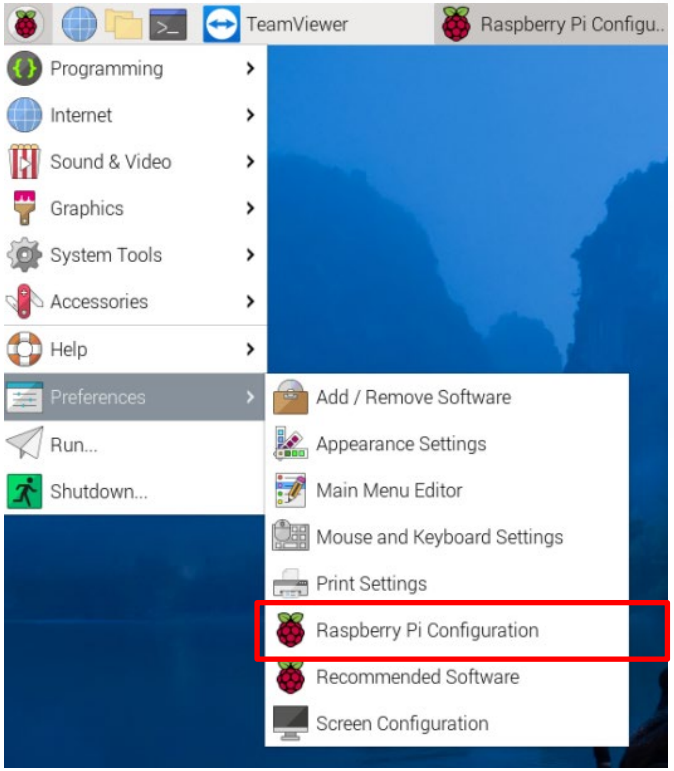
If the RPI is connected correctly, the RRI will appear as shown in the picture.

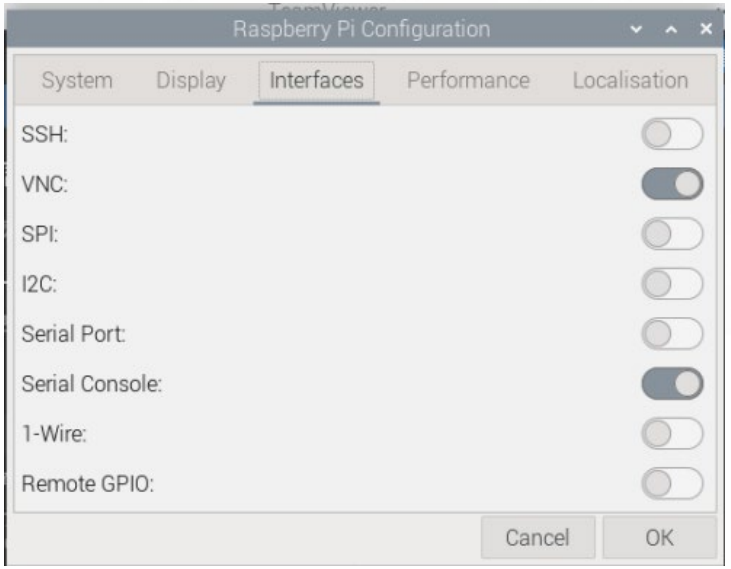


VNC

1. Enable VNC Server

- From the top-left corner of your Raspberry Pi desktop, click on the **Raspberry Pi menu**.
- Navigate to **Preferences** > **Raspberry Pi Configuration**.
- Under the **Interfaces** tab, enable **VNC** and click **OK**





VNC

2. Get Raspberry Pi's IP Address

- Click on the Wi-Fi icon at the top-right of the screen.
- Your Raspberry Pi's IP address will be displayed in the Wi-Fi settings.

3. Install VNC Viewer on Windows

- Download and install VNC Viewer from RealVNC.

https://www.realvnc.com/en/connect/download/viewer/windows/?lai_vid=yAmyOqmXEFLN&lai_sr=5-9&lai_sl=l&lai_p=1

- Open VNC Viewer, enter the Raspberry Pi's IP address, and connect.
- Enter the VNC password to access the Raspberry Pi's desktop.

Lab 1

Components used:

1. Rpi 5 & its power supply adapter
2. HC-SR51 ultrasonic sensor
3. Resistors
4. Breadboard & Wire
5. LED
6. Push Button

Lab 1

Task 1:

Create an LED flashing system using button.

Step 1: Turn on the LED for 1 second, then turn it off for 3 seconds.

Step 2: Repeat this sequence until an interrupt occurs.

You can initiate an interrupt mechanism by pressing the provided button.

Task 2:

The detecting range of HC-SR51 (Near-Infrared for motion detection sensor/Pyroelectric Infrared Detector, PIR) is around 120 degrees.

Construct a circuit capable of detecting approaching objects. Upon detecting an object, flash two LEDs in alternation at a periodic rate of 2 seconds. Turn on one LED while the other is off, and vice versa.

Lab 1

The lab report should include the following:

Video

Code

Problems Encountered

End the report with a section called “Problems Encountered:” where you can describe missing features, problems with your codes, or difficulties encountered with using ssh/scp or other Unix commands. If there were no problems, write “None”.

Deadline : 03/19

Submission Email : 61275068h@ntnu.edu.tw