



# Raspberry Pi 4 Lab

12/27、1/3

資電工程概論



# List



Raspberry Pi 4



Micro SD card



電源變壓線



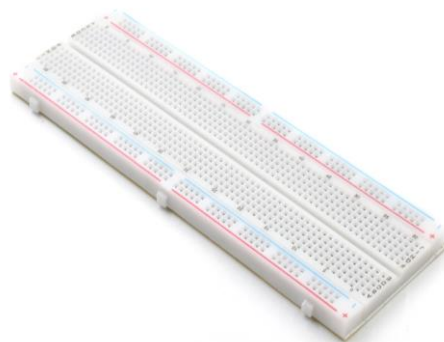
杜邦線



VGA轉HDMI



HC-SR04



830孔 麵包板



USB轉TTL

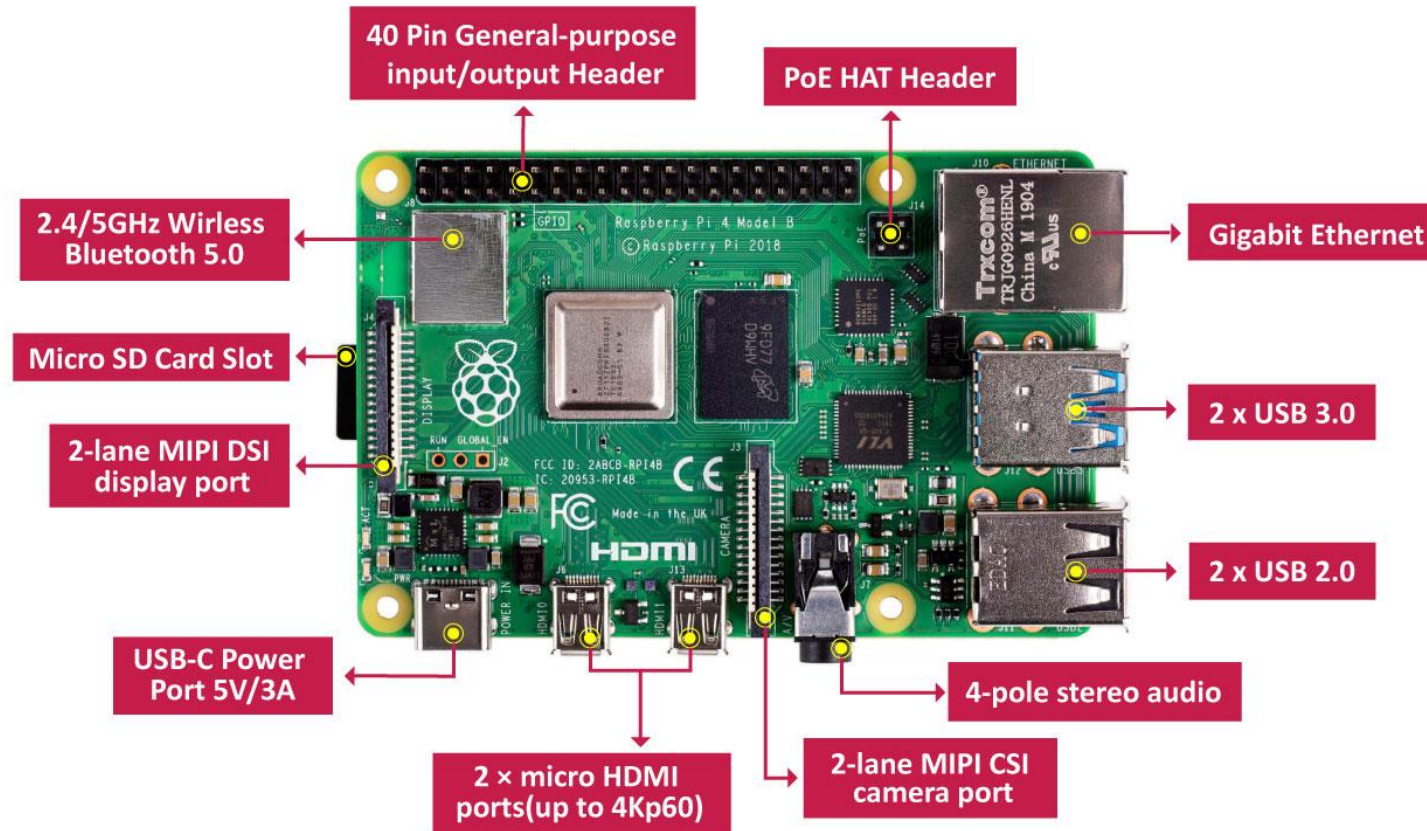


樹莓派HDMI轉接頭























電阻

# Raspberry Pi 4



# Raspberry Pi GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I²C)		DC Power 5v	04
05	GPIO03 (SCL1 , I²C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I²C ID EEPROM)		(I²C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40





# Putty

► <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

## Package files

You probably want one of these. They include versions of all the PuTTY utilities.

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

### MSI ("Windows Installer")

64-bit x86:	<a href="#">putty-64bit-0.76-installer.msi</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>
64-bit Arm:	<a href="#">putty-arm64-0.76-installer.msi</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>
32-bit x86:	<a href="#">putty-0.76-installer.msi</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>

### Unix source archive

.tar.gz:	<a href="#">putty-0.76.tar.gz</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>
----------	-----------------------------------	-----------------------------	-----------------------------

## Alternative binary files

The installer packages above will provide versions of all of these (except PuTTYtel), but you can download standalone binaries one by one if you prefer.

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

### putty.exe (the SSH and Telnet client itself)

64-bit x86:	<a href="#">putty.exe</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>
64-bit Arm:	<a href="#">putty.exe</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>
32-bit x86:	<a href="#">putty.exe</a>	<a href="#">(or by FTP)</a>	<a href="#">(signature)</a>



# UART

## ► PL2303TA driver:

[http://www.prolific.com.tw/US/ShowProduct.aspx?p\\_id=225&pcid=41](http://www.prolific.com.tw/US/ShowProduct.aspx?p_id=225&pcid=41)

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FxH (Fan & Hall)

Search

go

SIO (Smart-IO) > USB to UART/Serial/Printer > PL2303 Windows Driver Download

PL2303 Windows Driver Download

USB to UART RS232 Serial

Brochure

File Name	Release Date	Version	File Size
PL23XX_Prolific_DriverInstaller_v207.zip	2021/10/08	2.0.7	10951.67KB

Windows Driver Installer Setup Program

(For PL2303 HXD, SA, TA, TB, RA GC, GS, GT, GL, GE, GD, GR versions)

Installer version & Build date: 2.0.7 (2021-10-08)

Windows Vista/7/8.1/10 (32 & 64-bit) WDF WHQL Driver: v3.8.40.0 (09/16/2021) / v5.1.0.0 (05/13/2021)

- Windows 10 Certified WHQL Driver (TH1 1507, TH2 1511, RS1 1607, RS2 1703, RS3 1709, RS4 1803, RS5 1809, 19H1 1903, 19H2 1909, 20H1 VB, 21H1 versions)

- Windows Vista, 7, 8.1 Certified WHQL Driver

- Compatible with Windows Server 2016, Server2008, 2008R2, 2012, 2012R2, 2016, 2019

- Auto-download driver via Windows Update (Windows 7, 8.1, 10)

Windows XP (32 & 64-bit) WDM WHQL Driver: v3.8.38.0 (12/01/2020)

- Compatible with Windows 2000SP4 & Server2003

Windows XP (32 & 64-bit) WDM WHQL Driver: v5.0.8.1 (07/08/2019)

- Windows XP Certified WHQL Driver

- Compatible with Windows 2000SP4 & Server2003

- Installer Language Support: English (default), Chinese (Traditional and Simplified), Japanese

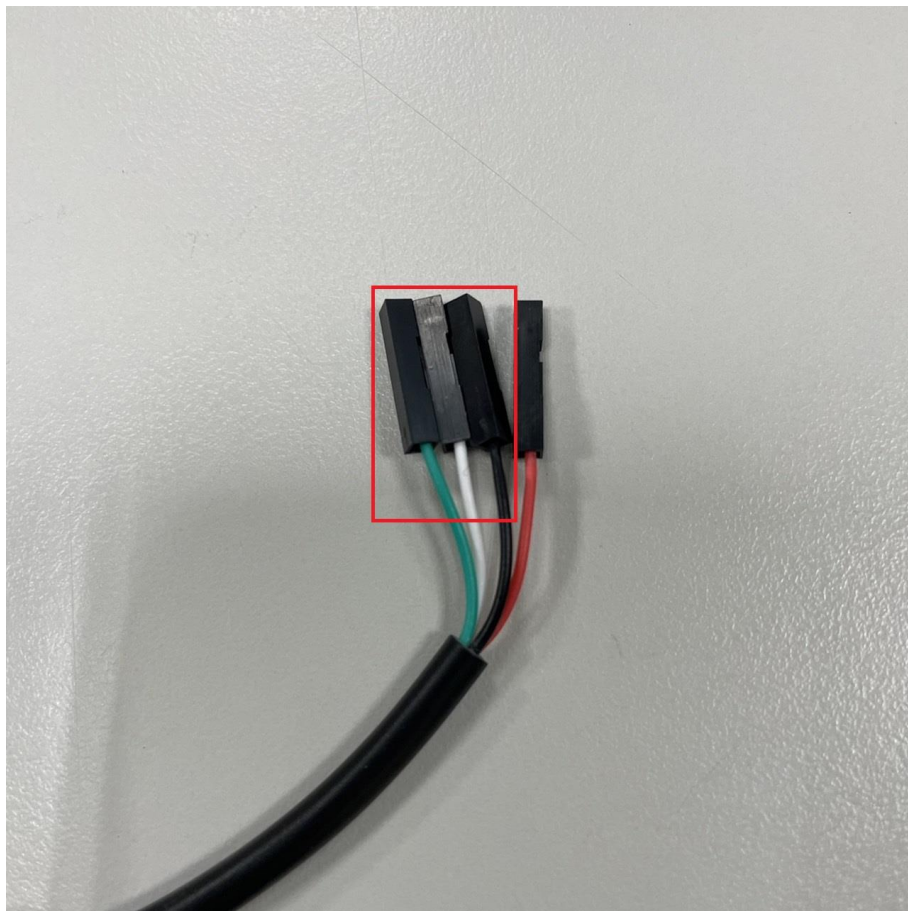
- For Prolific USB VID\_067B&PID\_2303, PID\_2304, PID\_23A3, PID\_23B3, PID\_23C3, PID\_23D3, PID\_23E3, PID\_23F3, PID\_2323..

- Includes Certification Report, User Manual, Driver Release Notes, CheckChipVersion Tool

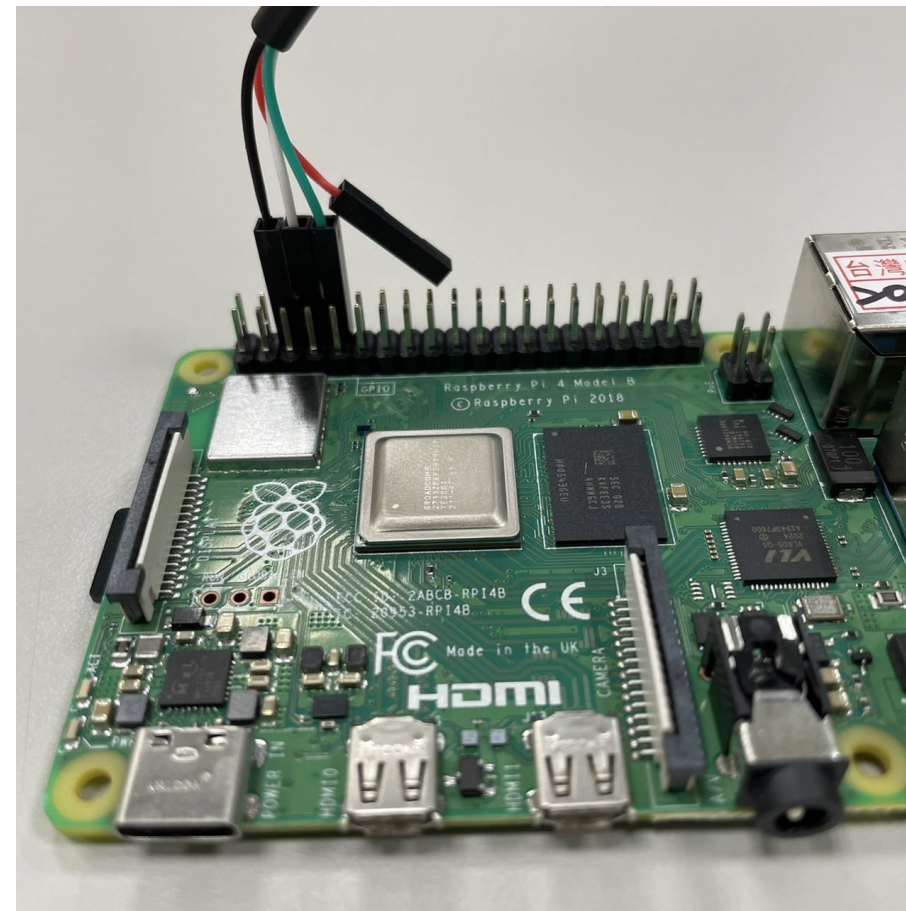
- Installer supports silent install (add "/s" parameter when running program)

	PL23XX_CheckChipVersion_ReadMe	2021/12/15 下午 05:54	文字文件	3 KB
	PL23XX_checkChipVersion_v1020	2021/12/15 下午 05:54	應用程式	208 KB
	PL23XX_DriverInstallerv2.0.7_ReleaseNote	2021/12/15 下午 05:54	文字文件	6 KB
	PL23XX-M_LogoDriver_Setup_v207_20211008	2021/12/15 下午 05:54	應用程式	10,046 KB
	PL2303 Windows Driver Manual v1.23.0	2021/12/15 下午 05:54	Microsoft Edge P...	1,815 KB



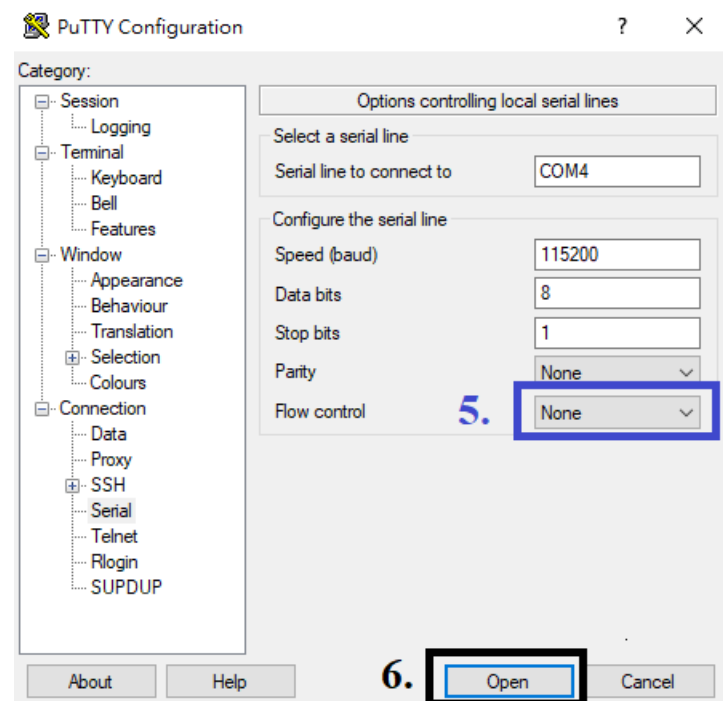
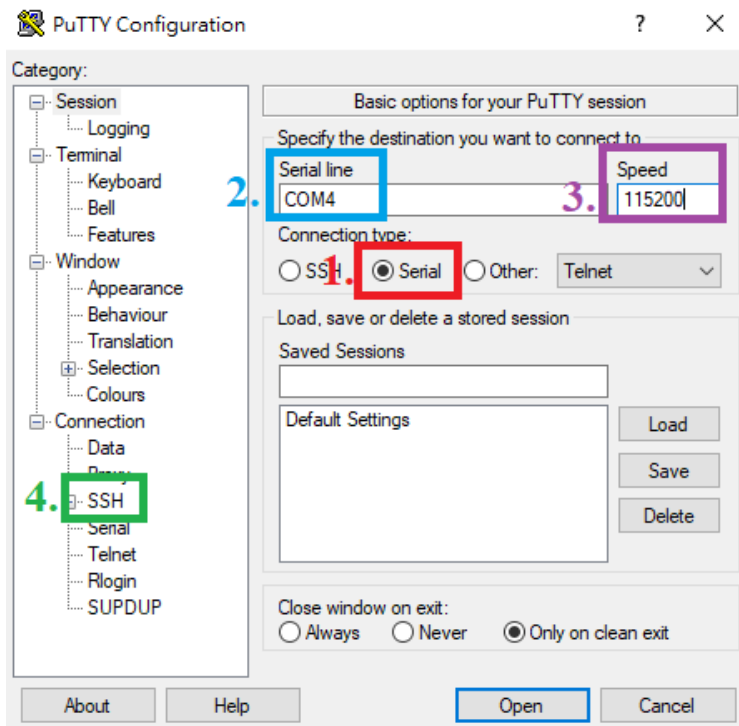
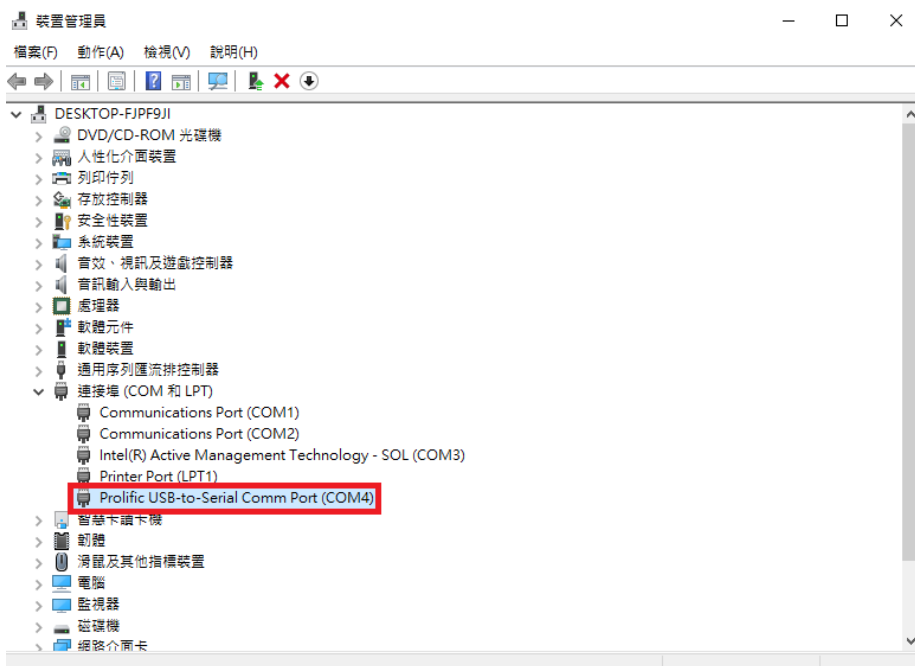


黑 – Pin6  
白 – Pin8  
綠 – Pin10





# PuTTY Configuration







# Serial Login

- 帳號：pi
- 密碼：raspberrypi

A screenshot of a PuTTY terminal window titled 'COM5 - PuTTY'. The terminal shows a login sequence where the user 'pi' has entered the password 'raspberrypi'. The system responds with the Linux version '5.10.63-v7l+', kernel version '#1459 SMP Wed Oct 6 16:41:57 BST 2021 armv7l', and the Debian GNU/Linux system information. It also displays the standard Debian disclaimer and the last login time. The prompt 'pi@raspberrypi:~\$' is shown at the bottom, indicating a successful login.

```
COM5 - PuTTY
pi
Password:
Linux raspberrypi 5.10.63-v7l+ #1459 SMP Wed Oct 6 16:41:57 BST 2021 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

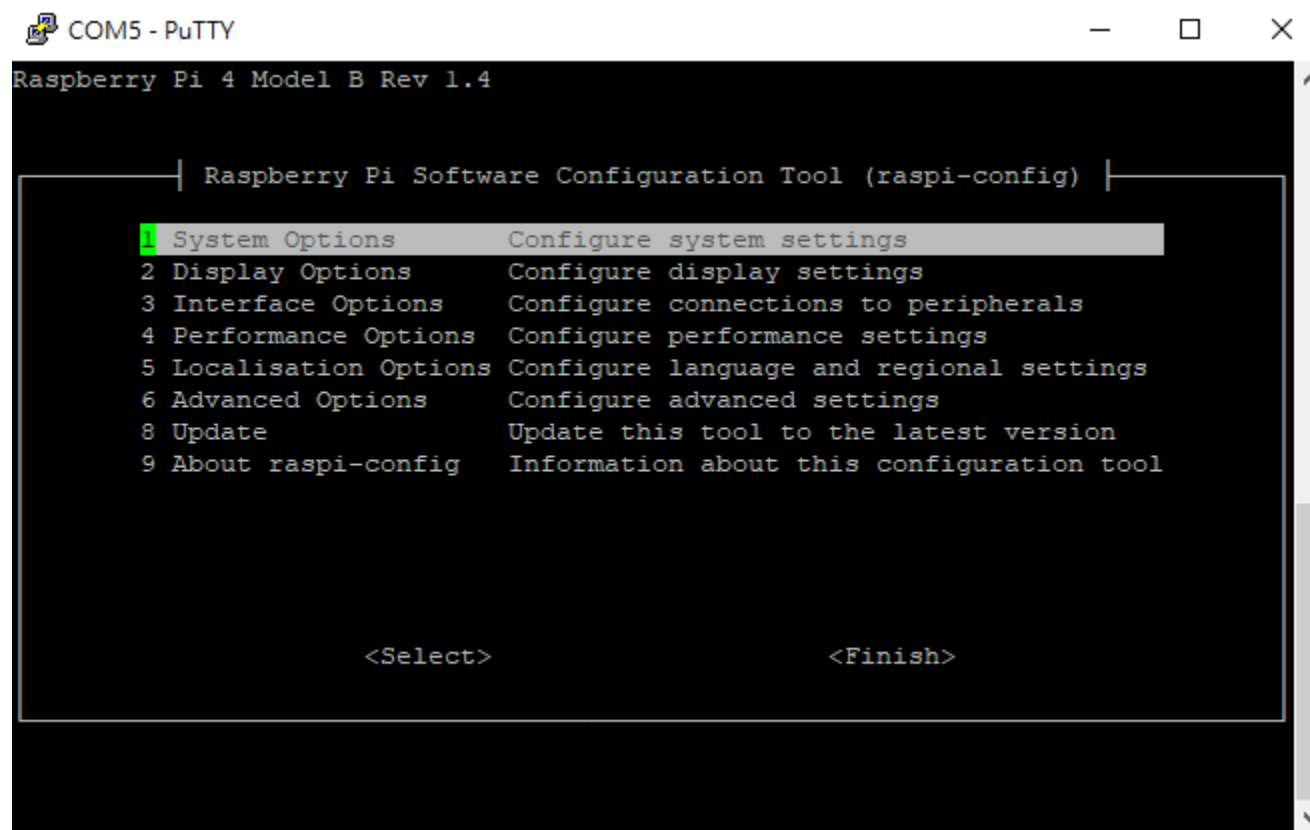
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sat Oct 30 12:48:13 BST 2021 on tty1

Wi-Fi is currently blocked by rfkill.
Use raspi-config to set the country before use.

pi@raspberrypi:~$
```

# Configure WiFi

- ▶ `ifconfig wlan0` : check our device has WiFi Interface wlan0
- ▶ `sudo raspi-config`



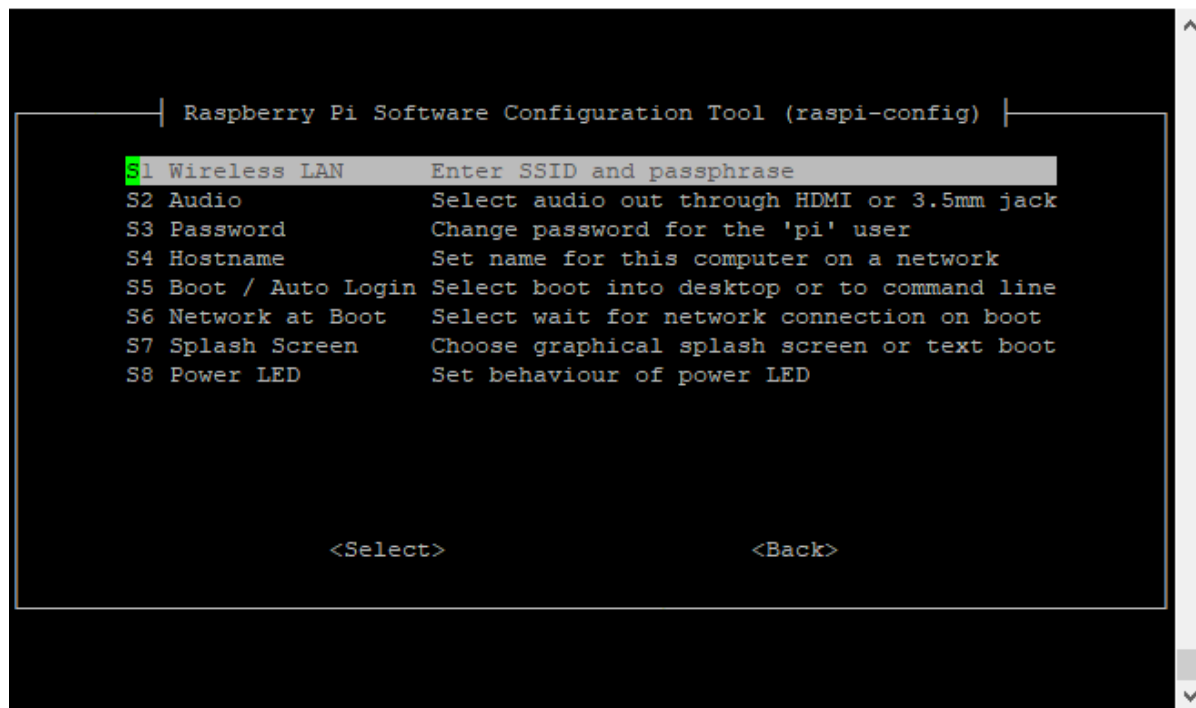
The screenshot shows a terminal window titled "COM5 - PuTTY" with the text "Raspberry Pi 4 Model B Rev 1.4" at the top. The main content is the "Raspberry Pi Software Configuration Tool (raspi-config)" menu. The menu is enclosed in a box and lists the following options:

1	System Options      Configure system settings
2	Display Options     Configure display settings
3	Interface Options   Configure connections to peripherals
4	Performance Options Configure performance settings
5	Localisation Options Configure language and regional settings
6	Advanced Options    Configure advanced settings
8	Update                Update this tool to the latest version
9	About raspi-config   Information about this configuration tool

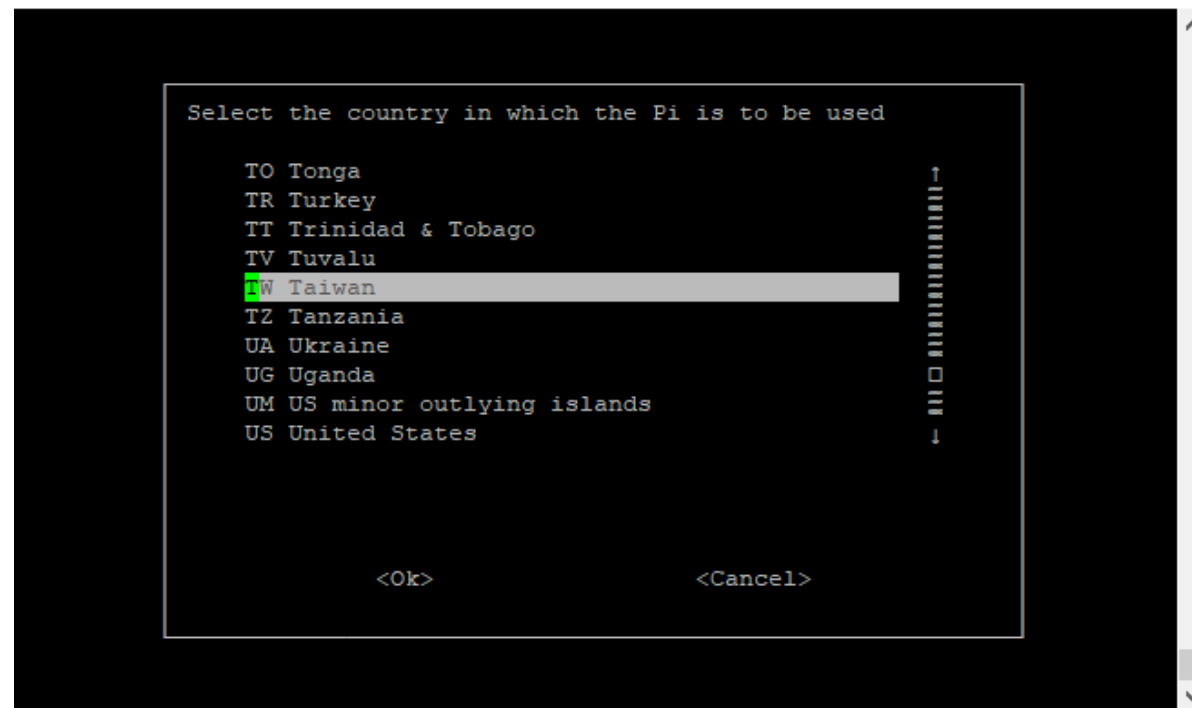
At the bottom of the menu box, there are two options: "<Select>" and "<Finish>".



COM5 - PuTTY

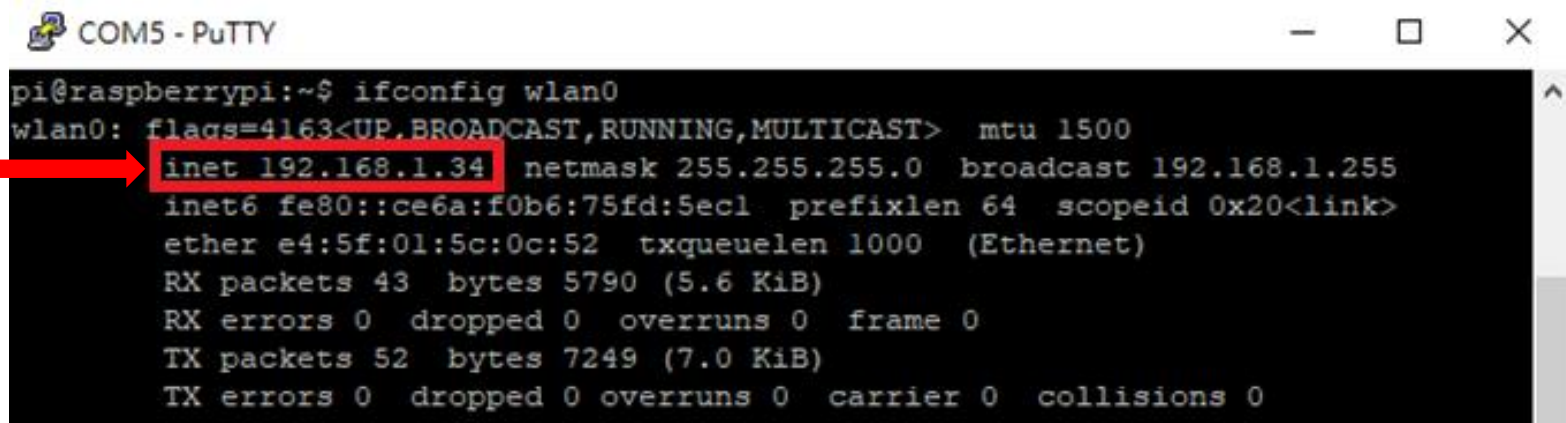


COM5 - PuTTY





樹莓派的IP





# Configure SSH

- `sudo raspi-config`

```
COM6 - PuTTY
Raspberry Pi 4 Model B Rev 1.4

Raspberry Pi Software Configuration Tool (raspi-config)

1 System Options      Configure system settings
2 Display Options     Configure display settings
3 Interface Options   Configure connections to peripherals
4 Performance Options Configure performance settings
5 Localisation Options Configure language and regional settings
6 Advanced Options   Configure advanced settings
8 Update             Update this tool to the latest version
9 About raspi-config Information about this configuration tool

<Select>
```

```
COM6 - PuTTY
Raspberry Pi Software Configuration Tool (raspi-config)

P1 Camera      Enable/disable connection to the Raspberry Pi Camera
P2 SSH         Enable/disable remote command line access using SSH
P3 VNC         Enable/disable graphical remote access using RealVNC
P4 SPI         Enable/disable automatic loading of SPI kernel module
P5 I2C         Enable/disable automatic loading of I2C kernel module
P6 Serial Port Enable/disable shell messages on the serial connection
P7 1-Wire      Enable/disable one-wire interface
P8 Remote GPIO Enable/disable remote access to GPIO pins

<Back>
```

```
Would you like the SSH server to be enabled?

Caution: Default and weak passwords are a security risk
when SSH is enabled!
```

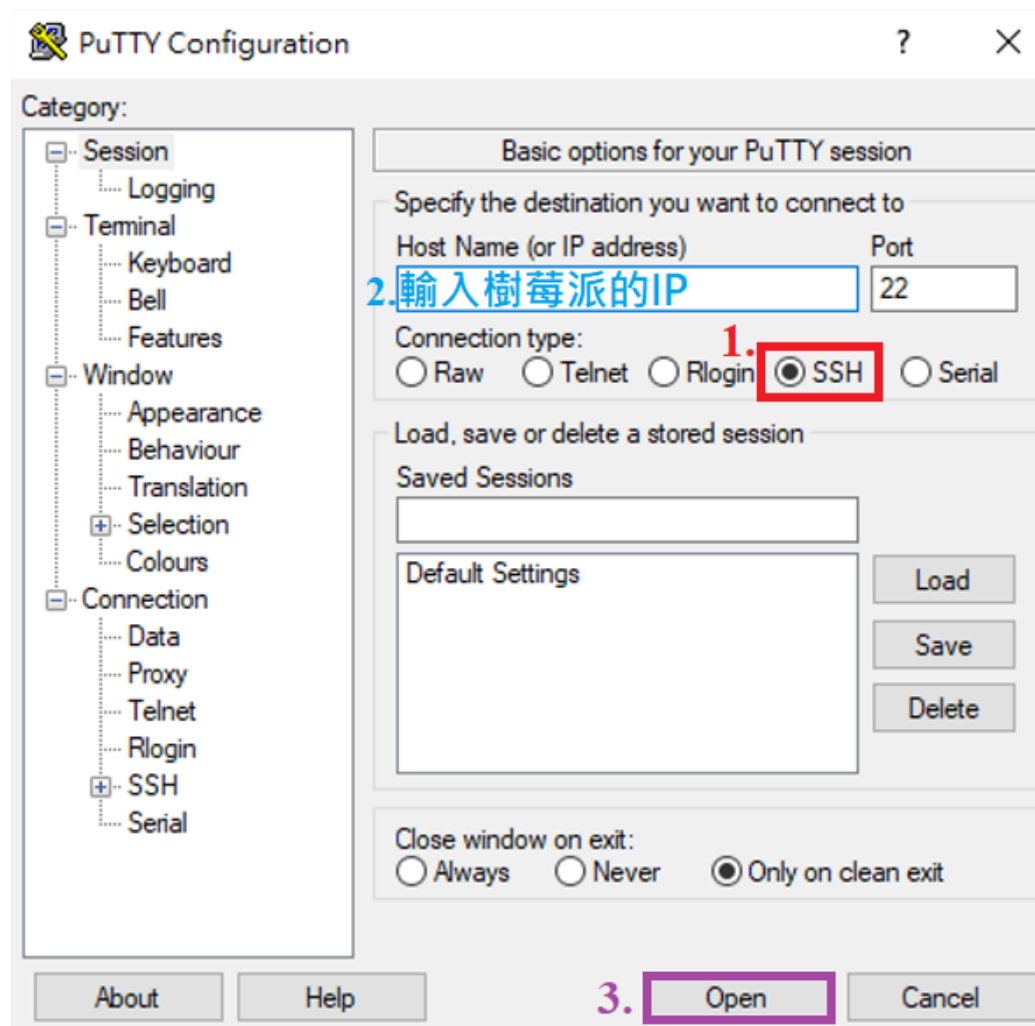
```
<Yes>
```

```
<No>
```





# SSH Connection





# SSH Login

- 帳號：pi
- 密碼：raspberrypi

A terminal window titled 'pi@raspberrypi: ~' showing the SSH login process. The user enters 'pi' for the login name and 'raspberrypi' for the password. The system responds with the Linux version, Debian GNU/Linux version, and a warning about the default password. The prompt then changes to green, indicating a successful login.

```
pi@raspberrypi: ~  
login as: pi  
pi@172.20.10.14's password:  
Linux raspberrypi 5.10.63-v7l+ #1459 SMP Wed Oct 6 16:41:57 BST 2021 armv7l  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Dec 15 11:14:13 2021  
  
SSH is enabled and the default password for the 'pi' user has not been changed.  
This is a security risk - please login as the 'pi' user and type 'passwd' to set  
a new password.  
pi@raspberrypi:~ $
```

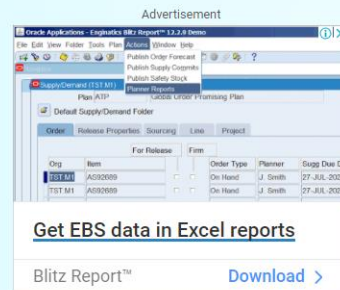
連線成功的話前面指令會變成綠色



# WinSCP

► <https://winscp.net/eng/download.php>

## WinSCP 5.19 Download



WinSCP 5.19 is a major application update. New features and enhancements include:

- A complete list of files that are part of a background transfer can be shown.
- Support for PPK version 3 keys from PuTTY 0.75.
- `Stream` interface in .NET assembly.
- With SFTP protocol files can be streamed to stdout and from stdin in scripting.
- Support SHA-256 fingerprints of TLS/SSL certificates.
- Extension *Synchronize with another remote server*.
- Improved FTP support for VMS servers (and potentially for other non-Unix-like systems).
- Compatibility with Google Cloud Storage when using S3 protocol to access the buckets.
- List of all changes.

**DOWNLOAD WINSCP 5.19.5 (11.3 MB)**

1,494,234 downloads since 2021-11-25



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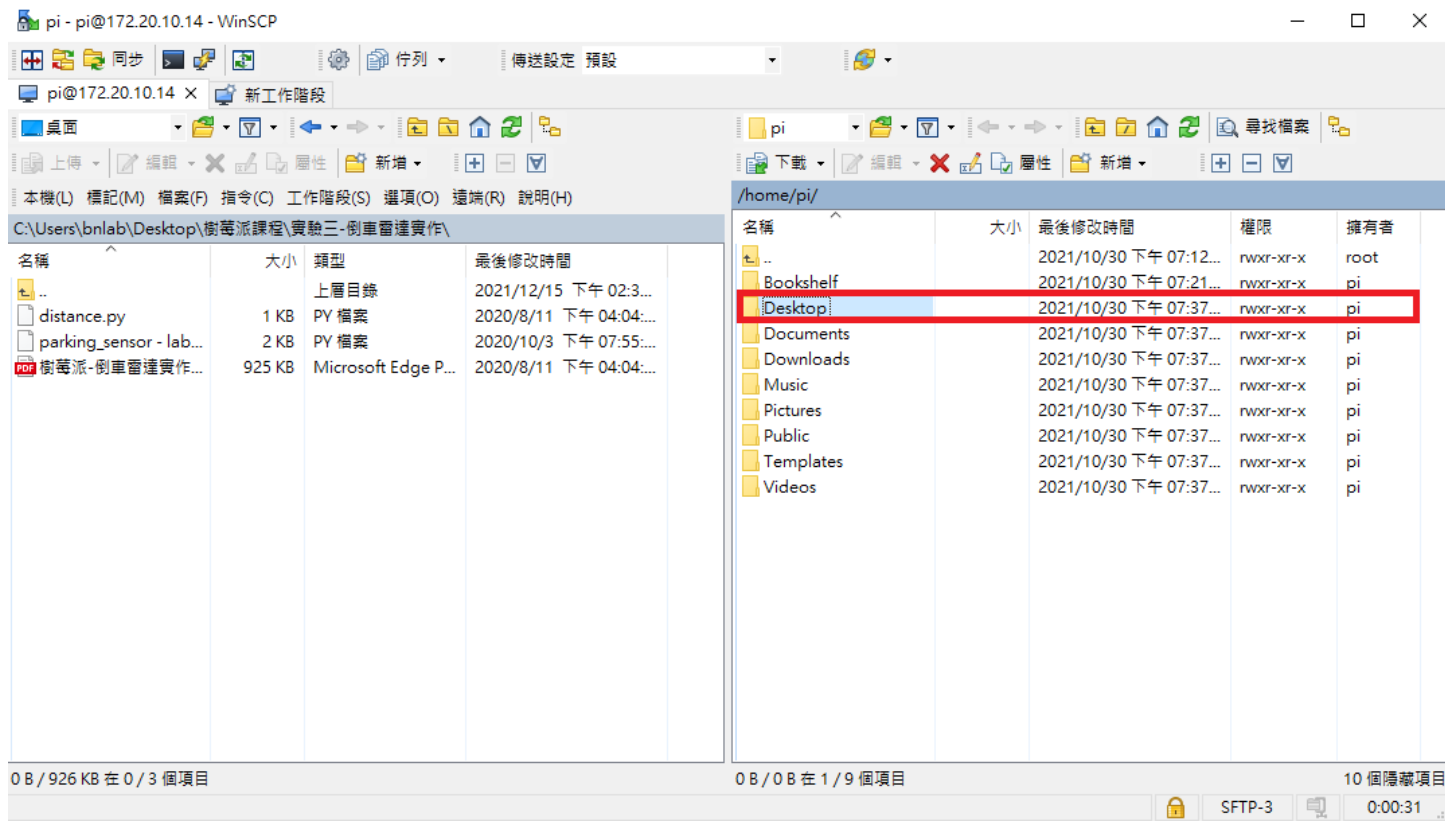


# WinSCP Login

- ▶ 主機名稱：樹莓派的IP位址
- ▶ 使用者名稱：pi
- ▶ 密碼：raspberry



- ▶ 連線成功後，左邊視窗是使用WinSCP的電腦，右邊視窗是樹梅派
- ▶ 右邊視窗點選Desktop資料夾

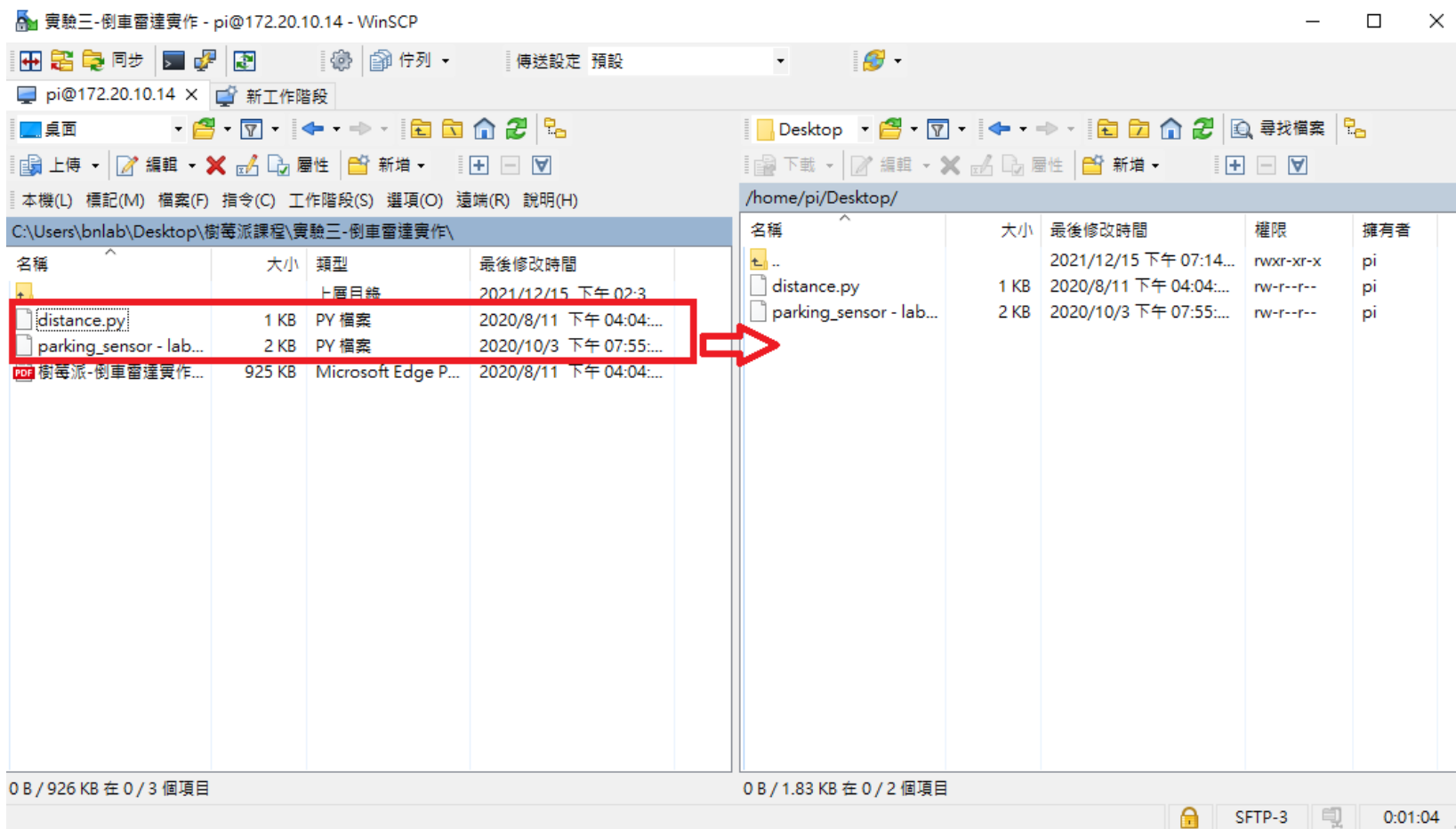






# Input the file

- 用滑鼠直接把檔案從左邊拉到右邊





# Check the file in Raspberry

- ▶ `cd Desktop/`
- ▶ `ls`

```
pi@raspberrypi: ~/Desktop
login as: pi
pi@172.20.10.14's password:
Linux raspberrypi 5.10.63-v71+ #1459 SMP Wed Oct 6 16:41:57 BST 2021 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Dec 15 11:14:13 2021

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.

pi@raspberrypi:~ $ cd Desktop/
pi@raspberrypi:~/Desktop $ ls
distance.py  'parking sensor - lab.py'
```

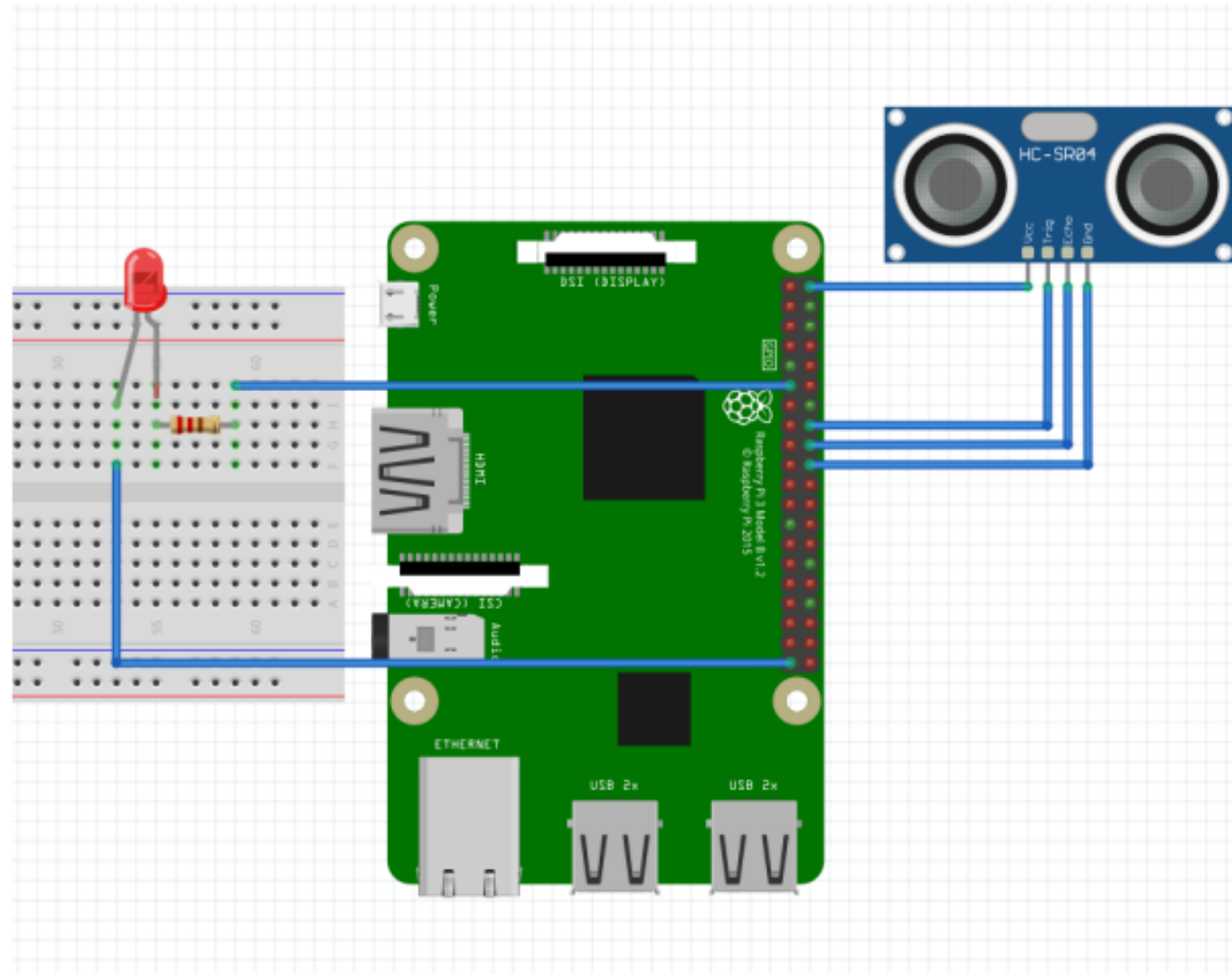


# Commands in terminal

- ▶ ls : list files in the direction
- ▶ cd : change directory to other directory
- ▶ rm : delete file
- ▶ sudo reboot : restart the system
- ▶ sudo shutdown : shutdown the system
  - ▶ e.g., sudo shutdown now : shutdown the system immediately
- ▶ paste : 滑鼠右鍵

# Sensor

- ▶ HC-SR04
  - ▶ VCC – Pin 2
  - ▶ Trig – Pin 16
  - ▶ Echo – Pin 18
  - ▶ Gnd – Pin 20

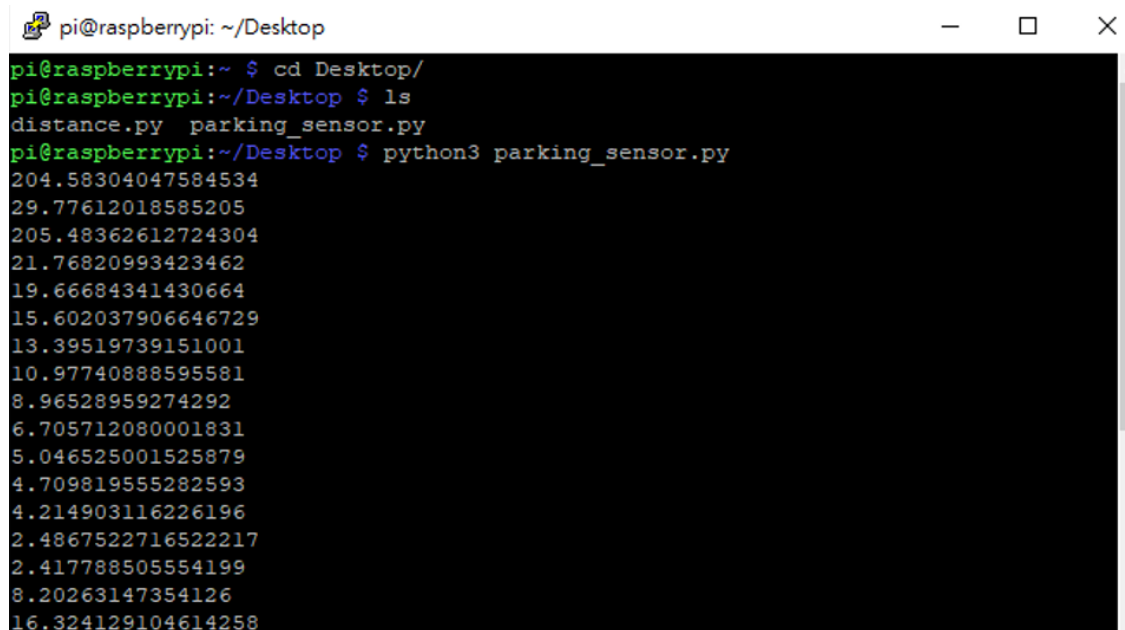


# Commands

## ▶ python3 parking\_sensor.py

▶ Tip：輸入python3+空白格後，輸入檔案的開頭字母，接著按tab鍵可以直接跳出檔案名稱。

▶ 根據測到的距離，LED燈閃爍的頻率距離越近越快。



```
pi@raspberrypi: ~/Desktop
pi@raspberrypi:~ $ cd Desktop/
pi@raspberrypi:~/Desktop $ ls
distance.py  parking_sensor.py
pi@raspberrypi:~/Desktop $ python3 parking_sensor.py
204.58304047584534
29.77612018585205
205.48362612724304
21.76820993423462
19.66684341430664
15.602037906646729
13.39519739151001
10.97740888595581
8.96528959274292
6.705712080001831
5.046525001525879
4.709819555282593
4.214903116226196
2.4867522716522217
2.417788505554199
8.20263147354126
16.324129104614258
```

▶ 按兩次ctrl + c 結束程式。





# Delete file

▶ `rm -rf *`

▶ 若執行失敗，將指令中的“-”改用手動輸入。