

用樹莓派實作濕地監控系統

Victor Gau

高雄Python社群



氣溫上升 2°C → 5%物種面臨絕種危機

抗暖化最佳策略 → 保育濕地

保育從在地的濕地做起

高雄市沿海岸線最北行政區

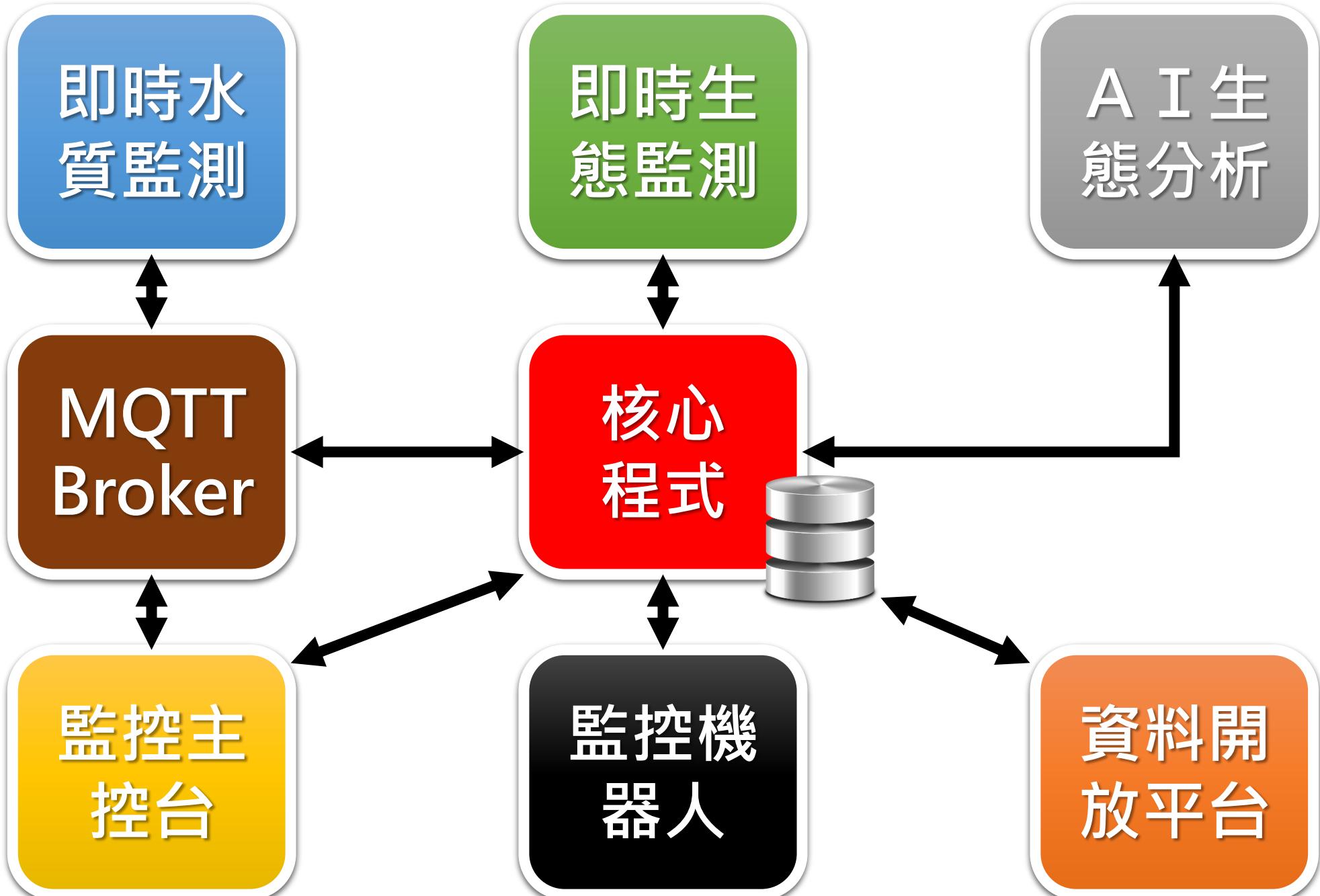


茄萣濕地的維護

- 濕地面積：**171公頃**
- 政府預算目前補助：
 - **一季一次**水質檢測
 - **一季一次**生態採檢
 - **一年20次**鳥類觀測
- 維護人員：約35名志工
(每天2-3名志工輪班)

濕地維護困難點

- 水質檢驗不夠頻繁
- 生物監測不夠全面
- 人力不足
- 領域專家缺乏技術
- 技術專家缺乏資料
- 一般群眾不感興趣



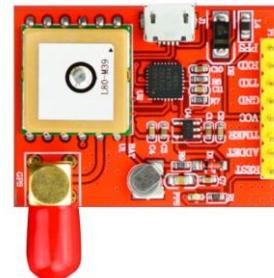
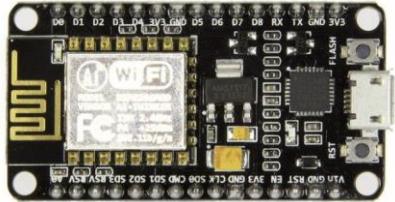
即時水質監測：不只每季

Proof-of-Concept

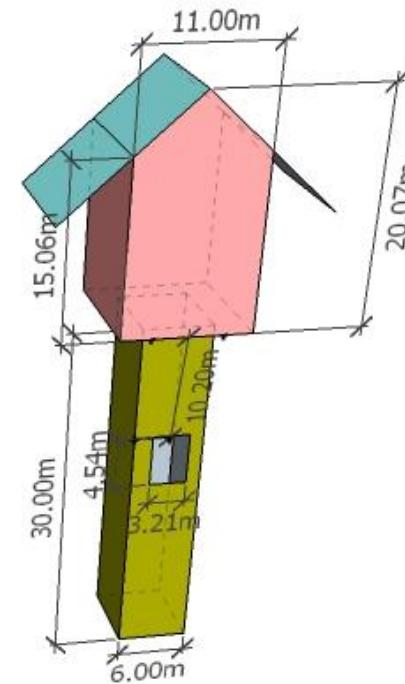
Arduino + NB-iot



ESP8266 + WiFi



實際模型



即時生態監測：隨時隨地

固定式生態監測

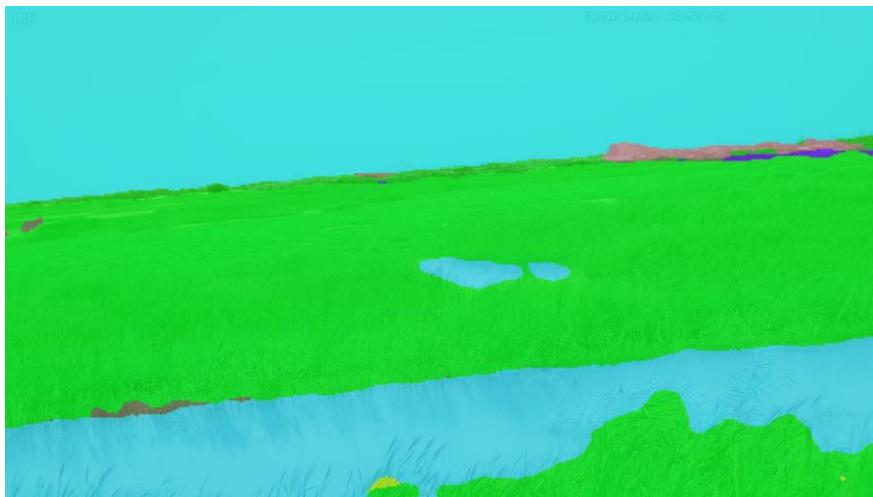


移動式生態監測



AI 生態分析：減少人力

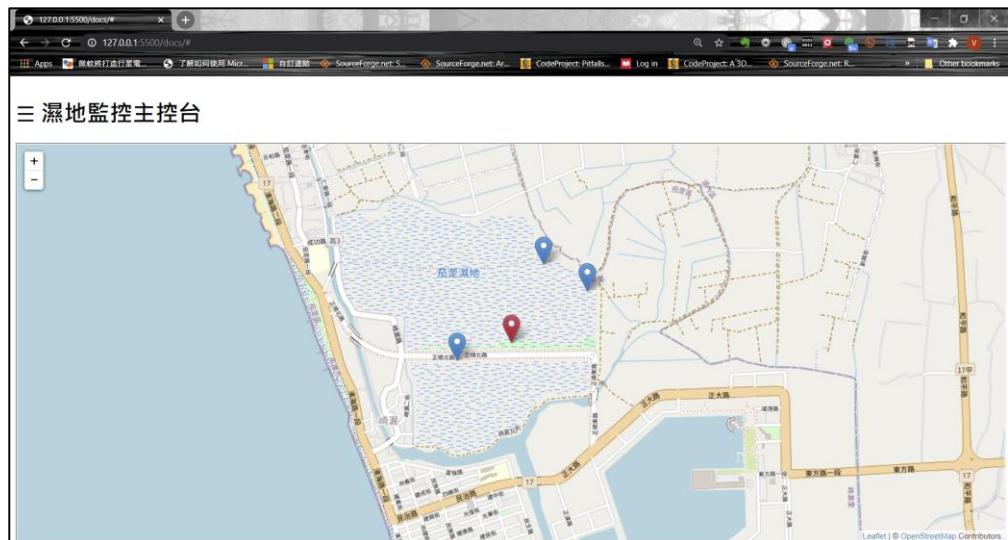
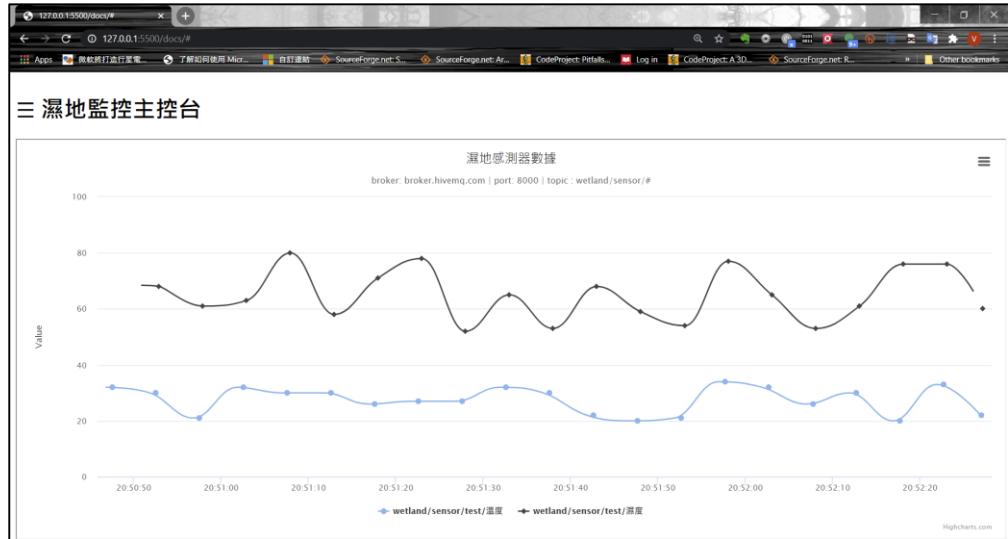
自動水域辨識



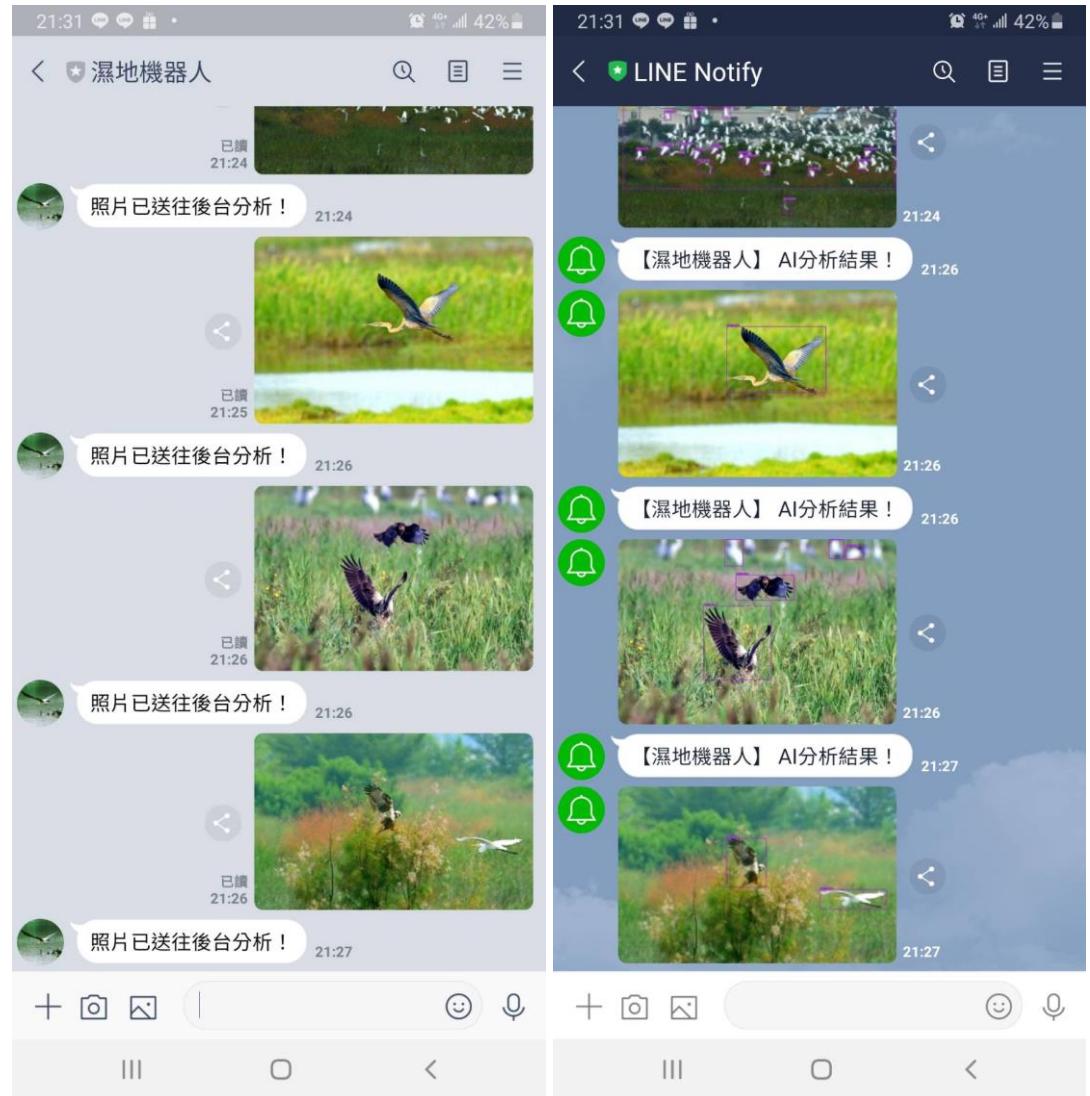
自動鳥類動態偵測



即時監控主控台



即時監控機器人



資料開放平台：分享資料、技術、資訊

victorgau/wetland_opendata: 濕地開放資料平台

github.com/victorgau/wetland_opendata

Apps 微軟將打造行星電... 了解如何使用 Micr... 自訂連結 SourceForge.net: S... SourceForge.net: Ar... CodeProject: Pitfalls... Log in CodeProject: A 3D... SourceForge.net: R... Other bookmarks

濕地開放資料平台

這個平台是準備用來存放我們在茄萣濕地上蒐集的一些資料，我們計畫將資料開放出來做研究的用途。

另外，我們也錄製了一些資料分析的教學，幫助大家上手簡單的資料分析。

資料整理：

- 台灣濕地GPS座標

相關連結：

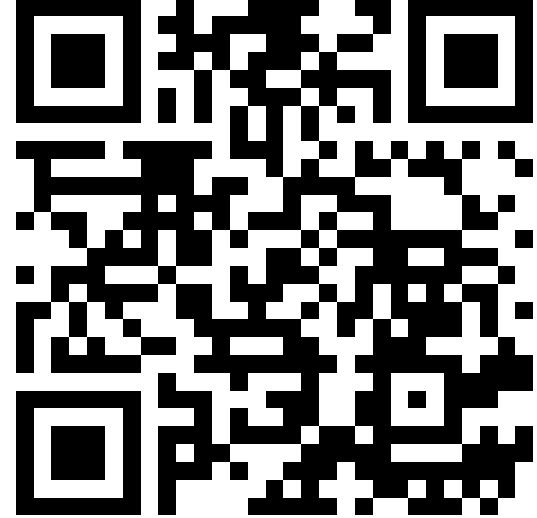
- 國家重要濕地保育計畫
- 濕地環境資料庫

一些教學：

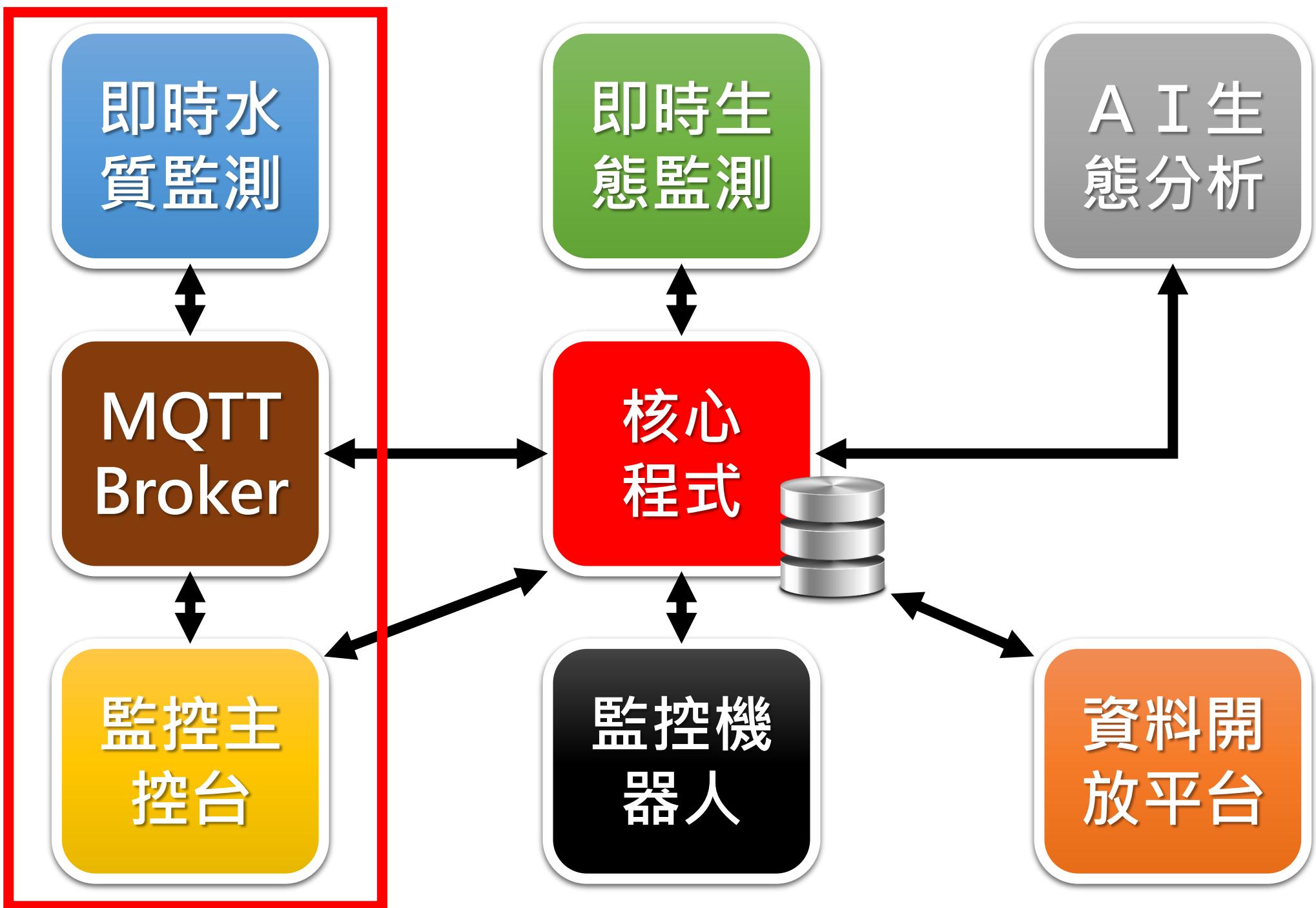
水質感測與相關性分析

Packages

No packages published
Publish your first package



用樹莓派實做看看？

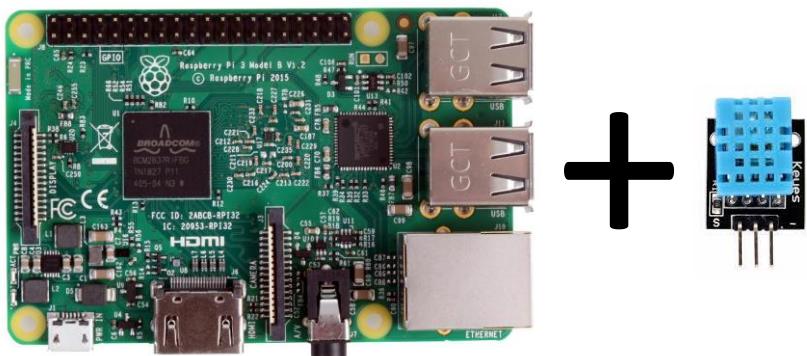


MQTT Broker

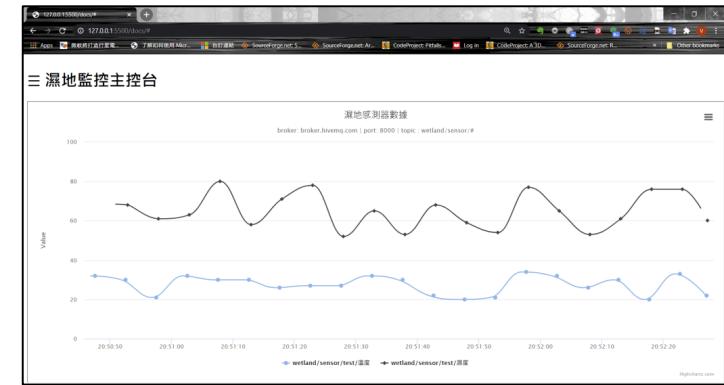


HIVEMQ

MQTT (Publish)



MQTT (Subscribe)



先玩玩MQTT?

測試MQTT

The screenshot shows the homepage of the HiveMQ website. The header features the HiveMQ logo (a yellow bee icon) and the word "HIVEMQ" in white. A navigation bar with links for Product, Cloud, Developers, MQTT, Solutions, Blog, and Company is visible. The main banner has a blue gradient background with a city skyline silhouette at the bottom. It features a large yellow vertical bar containing the text "Reliable Data Movement for Connected Devices". Below this, a paragraph explains that HiveMQ's MQTT broker makes it easy to move data between connected devices. Three call-to-action buttons are present: "Learn more", "Get HiveMQ", and "Contact Us". To the right, a news box titled "Ready for Lift-off" announces a \$9.3 million seed round. At the bottom, a section titled "Develop Efficient IoT Solutions" discusses the challenges of managing data from IoT applications. A diagram of a network of nodes connected by lines is shown next to this text. A cookie consent banner at the bottom states: "This website collects usage data using cookies. For more information about your right of objection and how you can prevent cookies from being stored, see our privacy policy. Learn more" with an "Ok" button.

HiveMQ - Enterprise ready MQTT

hivemq.com

Incognito (2)

Product Cloud Developers MQTT Solutions Blog Company

Reliable Data Movement for Connected Devices

HiveMQ's MQTT broker makes it easy to move data to and from connected devices in an efficient, fast and reliable manner. We make it possible to build connected products that enable new digital businesses.

Learn more Get HiveMQ Contact Us

Ready for Lift-off

HiveMQ Raises 9.3 Million Euro Seed Round to Accelerate Growth and Meet Demand for IoT Connectivity

Develop Efficient IoT Solutions

IoT applications can generate a LOT of data. It is critical to select a technology that is designed to move IoT data across networks and cloud platforms. HiveMQ's MQTT

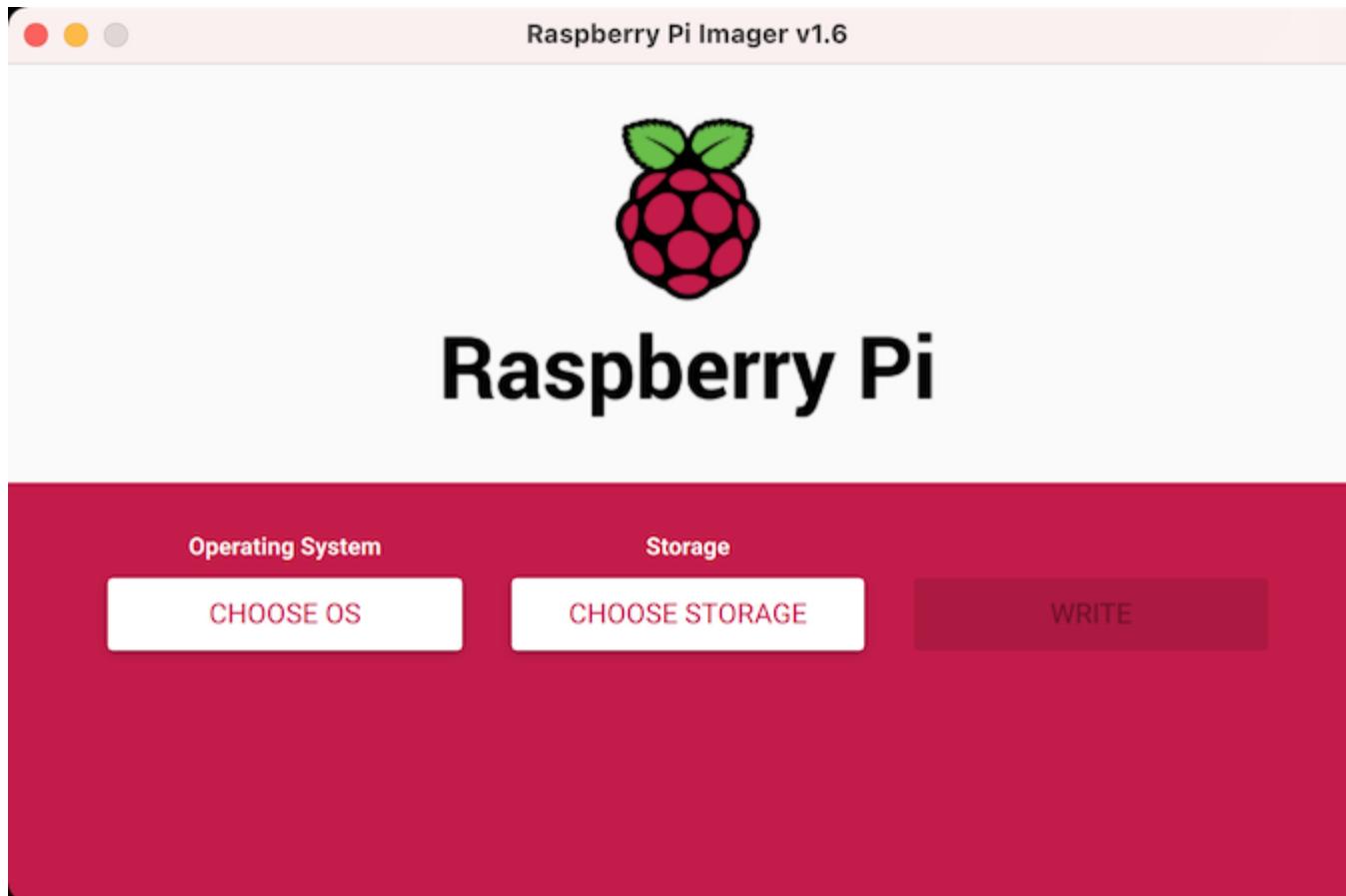
This website collects usage data using cookies. For more information about your right of objection and how you can prevent cookies from being stored, see our privacy policy. Learn more

Ok

怎麼安裝作業系統？

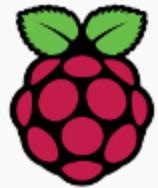
燒錄作業系統至RPi

使用 Raspberry Pi Imager (<https://www.raspberrypi.org/software/>)





Raspberry Pi Imager v1.6.1



Raspberry Pi

Operating System

Storage

CHOOSE OS

CHOOSE STORAGE

WRITE



Raspberry Pi Imager v1.6.1



Operating System



Raspberry Pi OS (32-bit)



A port of Debian with the Raspberry Pi Desktop (Recommended)
Released: 2021-03-04
Online - 1.1 GB download



Raspberry Pi OS (other)

Other Raspberry Pi OS based images



Other general purpose OS

Other general purpose Operating Systems



Media player - Kodi OS

Kodi based Media player operating systems



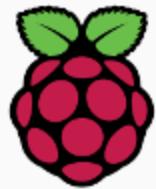
Emulation and game OS

Emulators for running retro computing platforms





Raspberry Pi Imager v1.6.1



Raspberry Pi

Operating System

Storage

RASPBERRY PI OS (32-BIT)

CHOOSE STORAGE

WRITE



Raspberry Pi Imager v1.6.1



Storage

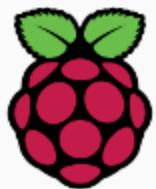


SDHC Card - 32.2 GB

Mounted as D:\, F:\



Raspberry Pi Imager v1.6.1



Raspberry Pi

Operating System

Storage

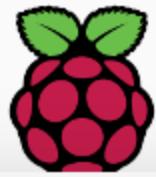
RASPBERRY PI OS (32-BIT)

SDHC CARD

WRITE



Raspberry Pi Imager v1.6.1



Warning

X

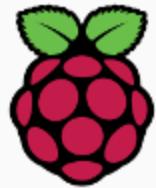
All existing data on 'SDHC Card' will be erased.
Are you sure you want to continue?

NO

YES



Raspberry Pi Imager v1.6.1



Raspberry Pi

Operating System

Storage

RASPBERRY PI OS (32-BIT)

SDHC CARD

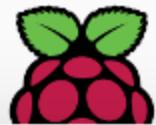
WRITE

Preparing to write... (starting download)

CANCEL WRITE



Raspberry Pi Imager v1.6.1



Write Successful

X

**Raspberry Pi OS (32-bit) has been written to SDHC
Card**

You can now remove the SD card from the reader

CONTINUE

**沒有螢幕、鍵盤？
怎麼設定連線？**

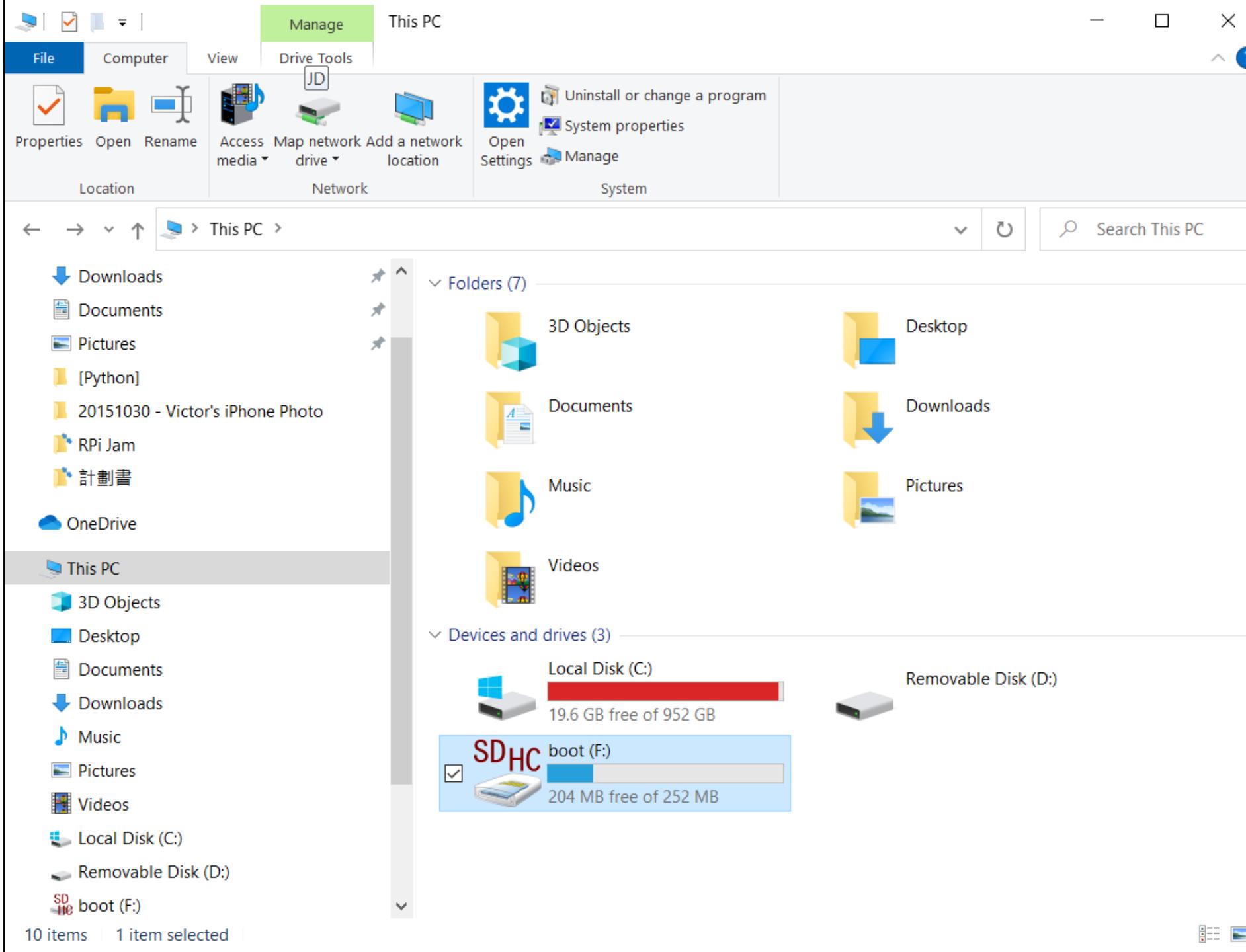
Raspberry Pi Headless Connection

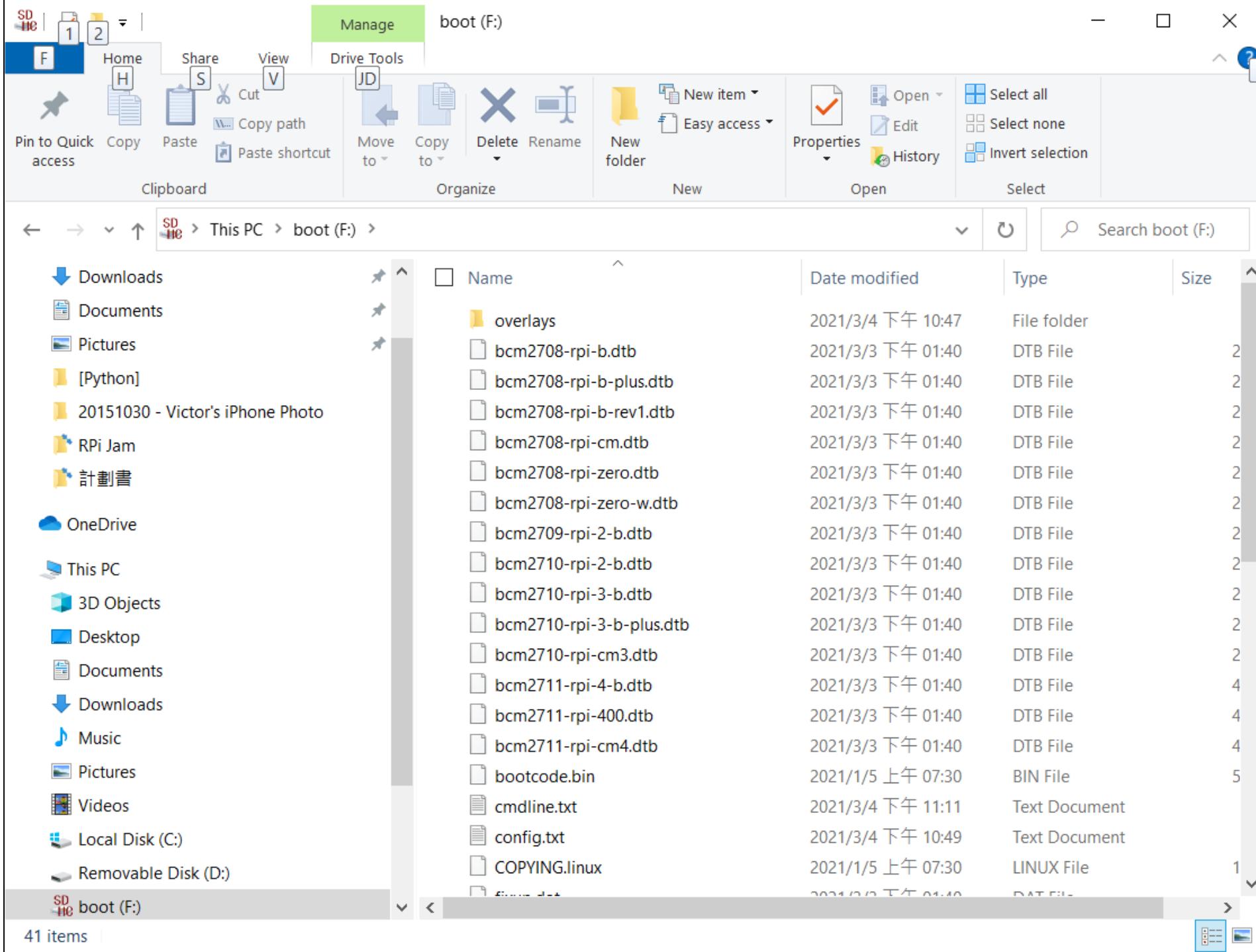
- 設定 wpa_supplicant.conf
- Enable ssh (在boot建立一個 ssh 空白檔)

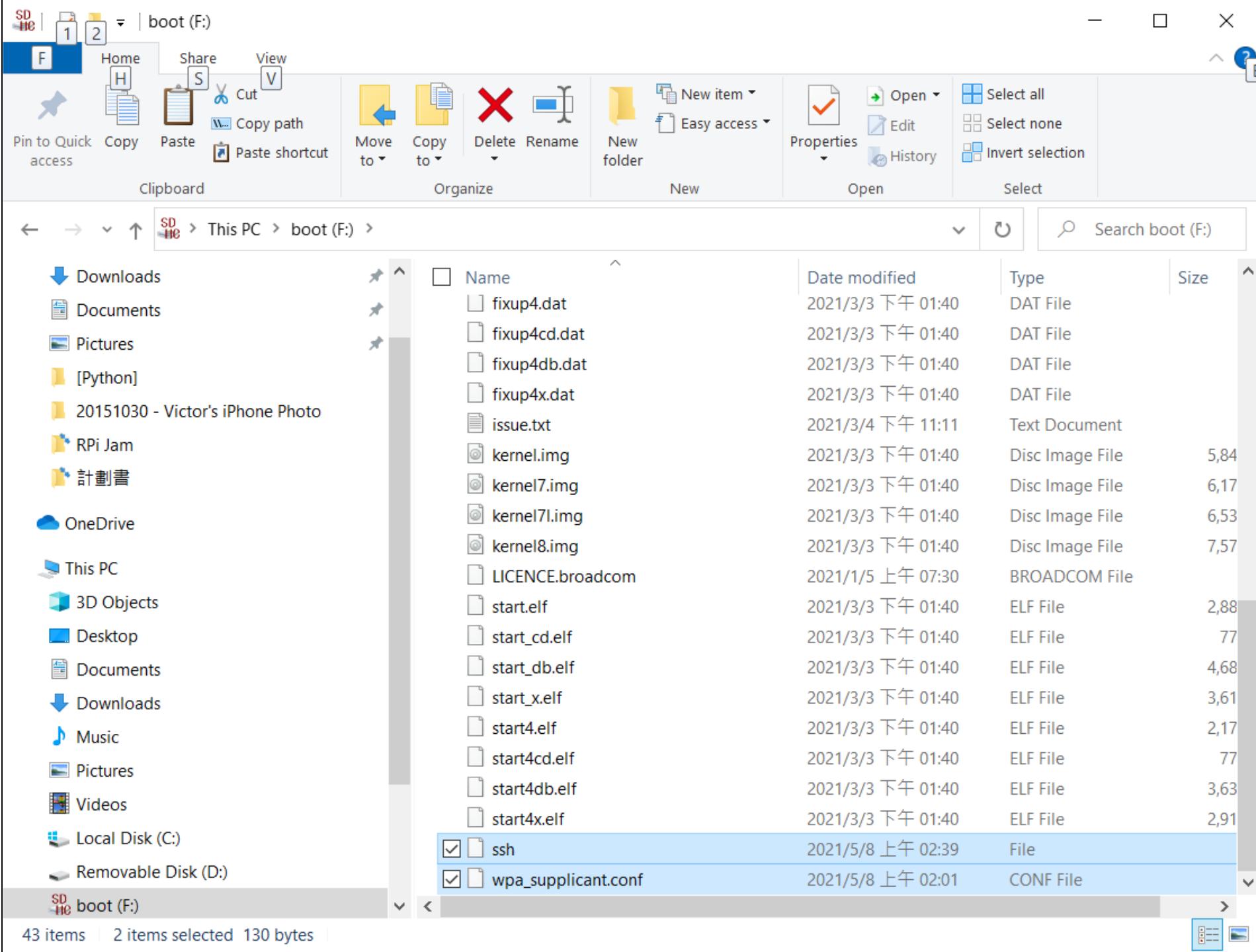
wpa_supplicant.conf 範例：

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=<Insert 2 letter ISO 3166-1 country code here>

network={
    ssid="<Name of your wireless LAN>"
    psk="<Password for your wireless LAN>"
}
```







怎麼連上RPi?

連線RPi

- 使用 ssh 連線 RPi (預設域名: raspberrypi.local)
 - 使用 putty 或作業系統內建的 ssh
 - 譬如: ssh pi@raspberrypi.local
 - username: pi
 - password: raspberry

Command Prompt - ssh pi@raspberrypi.local

- □ ×

Microsoft Windows [Version 10.0.19042.928]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Victor>ssh pi@raspberrypi.local
The authenticity of host 'raspberrypi.local (fe80::9af0:d339:bd0b:be1f%15)' can't
be established.
ECDSA key fingerprint is SHA256:68+DVCgvLON200Tn3auU/QTP3rCGxp0lC1THFJbQBcU.
Are you sure you want to continue connecting (yes/no)?

Command Prompt - ssh pi@raspberrypi.local

- □ ×

Microsoft Windows [Version 10.0.19042.928]
(c) Microsoft Corporation. All rights reserved.

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The authenticity of host 'raspberrypi.local (fe80::9af0:d339:bd0b:be1f%15)' can't
be established.
ECDSA key fingerprint is SHA256:68+DVCgvLON200Tn3auU/QTP3rCGxp01C1THFJbQBcU.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'raspberrypi.local, fe80::9af0:d339:bd0b:be1f%15' (ECDSA)
to the list of known hosts.
pi@raspberrypi.local's password:

Command Prompt - ssh pi@raspberrypi.local

- □ ×

The authenticity of host 'raspberrypi.local (fe80::9af0:d339:bd0b:be1f%15)' can't be established.

ECDSA key fingerprint is SHA256:68+DVCgvLON200Tn3auU/QTP3rCGxp01C1THFJbQBcU.

Are you sure you want to continue connecting (yes/no)? yes

Warning: Permanently added 'raspberrypi.local, fe80::9af0:d339:bd0b:be1f%15' (ECDSA) to the list of known hosts.

pi@raspberrypi.local's password:

Linux raspberrypi 5.10.17-v7+ #1403 SMP Mon Feb 22 11:29:51 GMT 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: Thu Mar 4 23:11:26 2021

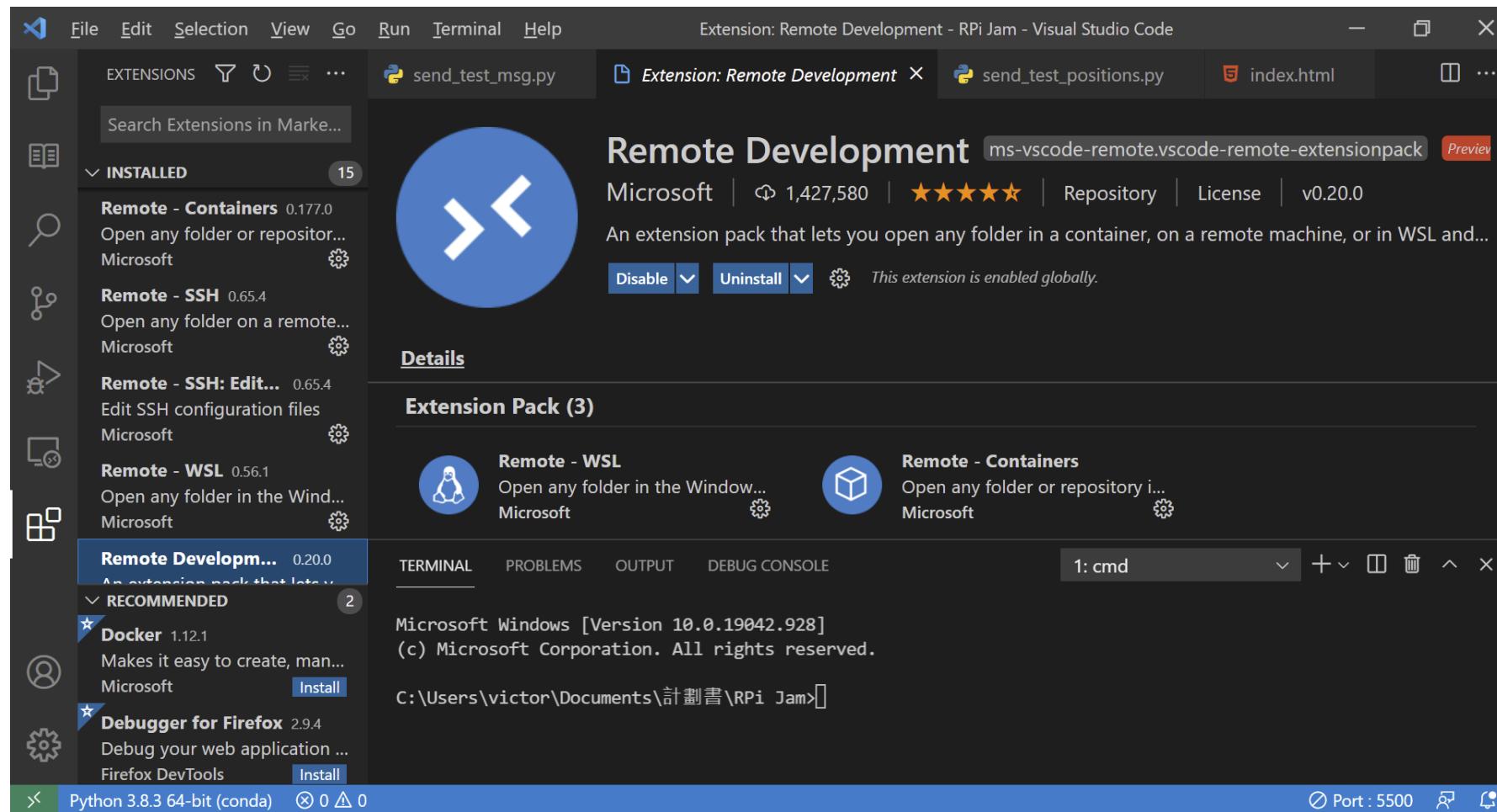
SSH is enabled and the default password for the 'pi' user has not been changed. This is a security risk - please login as the 'pi' user and type 'passwd' to set a new password.

pi@raspberrypi:~ \$

遠端開發？

Raspberry Pi Remote Development

“Remote SSH needs a Raspberry Pi 3 or 4. It is not supported on older Raspberry Pis, or on Raspberry Pi Zero.”





EXTENSIONS ⚡ ⏪ ⏴ ⏵

Search Extensions in Market...

INSTALLED

Remote - Containers 0.177.0

Open any folder or repository...

Microsoft

Remote - SSH 0.65.4

Open any folder on a remote...

Microsoft

Remote - SSH: Edit... 0.65.4

Edit SSH configuration files

Microsoft

Remote - WSL 0.56.1

Open any folder in the Wind...

Microsoft

Remote Develop... 0.20.0

An extension pack that lets you...

RECOMMENDED 2

Docker 1.12.1

Makes it easy to create, man...

Microsoft

Install

Debugger for Firefox 2.9.4

Debug your web application ...

Firefox DevTools

Install



New WSL Window

Remote-WSL

New WSL Window using Distro...

Open Folder in WSL...

Reopen Folder in WSL

Getting Started with WSL

Connect Current Window to Host...

Remote-SSH

Connect to Host...

Open SSH Configuration File...

Getting Started with SSH

Reopen in Container

Remote-Containers

**Remote - WSL**

Open any folder in the Window...

**Remote - Containers**

Open any folder or repository i...



TERMINAL

PROBLEMS

OUTPUT

DEBUG CONSOLE

1: cmd

▼ + ▼ □ ✎ ^ X

Microsoft Windows [Version 10.0.19042.928]

(c) Microsoft Corporation. All rights reserved.

C:\Users\victor\Documents\計劃書\RPi Jam>



EXTENSIONS



Select configured SSH host or enter user@host

Search Extensions in Market...

INSTALLED

Remote - Containers 0.177.0

Open any folder or repository...

Microsoft

**Remote - SSH** 0.65.4

Open any folder on a remote...

Microsoft

**Remote - SSH: Edit...** 0.65.4

Edit SSH configuration files

Microsoft

**Remote - WSL** 0.56.1

Open any folder in the Wind...

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An extension pack that integ...



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Makes it easy to create, man...

Microsoft

Install

Debugger for Firefox 2.9.4

Debug your web application ...

Firefox DevTools

Install

pi@raspberrypi.local

> pi@raspberrypi.local

+ Add New SSH Host...

Configure SSH Hosts...

Disable

Uninstall



This extension is enabled globally.

Details

Extension Pack (3)

**Remote - WSL**

Open any folder in the Window...

Microsoft

**Remote - Containers**

Open any folder or repository i...

Microsoft

TERMINAL

PROBLEMS

OUTPUT

DEBUG CONSOLE

1: cmd



Microsoft Windows [Version 10.0.19042.928]

(c) Microsoft Corporation. All rights reserved.

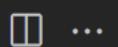
C:\Users\victor\Documents\計劃書\RPi Jam>





Welcome X

Select the platform of the remote host "raspberrypi.local"



Linux

Start

Windows

New file

macOS

Open folder... or clone repository...

Tools and languages

Install support for JavaScript, Python, Java, PHP, Azure, Docker and more



Recent

RPi Jam C:\Users\victor\Documents\計劃書
code [SSH: 192.168.50.199] /home/pi
network C:\Users\victor\GitHub
pi [SSH: 192.168.50.170] /home
wetland_dashboard C:\Users\victor\GitHub

More... (Ctrl+R)

Settings and keybindings

Install the settings and keyboard shortcuts of Vim, Sublime, Atom and other editors



Color theme

Make the editor and your code look the way you love



Learn

Find and run all commands

Rapidly access and search commands from the Command Palette (Ctrl+Shift+P)



Help

Printable keyboard cheatsheet
Introductory videos
Tips and Tricks
Product documentation
GitHub repository

Interface overview

Get a tour of the interface  Setting up SSH Host raspberrypi.local: (details) Initializing VS Code Server

Welcome X Enter password for pi@raspberrypi.local
Start Press 'Enter' to confirm your input or 'Escape' to cancel

New file
Open folder... or clone repository...

Recent

- RPi Jam C:\Users\victor\Documents\計劃書
- code [SSH: 192.168.50.199] /home/pi
- network C:\Users\victor\GitHub
- pi [SSH: 192.168.50.170] /home
- wetland_dashboard C:\Users\victor\GitHub

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TERMINAL PORTS PROBLEMS OUTPUT Remote - SSH

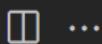
```
[03:25:00.551] Running script with connection command: ssh -T -D 61008 "pi@raspberrypi.local" bash
[03:25:00.555] Terminal shell path: C:\WINDOWS\System32\cmd.exe
[03:25:01.008] > pi@raspberrypi.local's password: ]0;C:\WINDOWS\System32\cmd.exe
[03:25:01.008] Got some output, clearing connection timeout
[03:25:01.009] Showing password prompt
```

Setting up SSH Host raspberrypi.local: (details) Initializing VS Code Ser...



Welcome X

Enter password for pi@raspberrypi.local



Start

Press 'Enter' to confirm your input or 'Escape' to cancel



New file

Open folder... or clone repository...



Recent

RPi Jam C:\Users\victor\Documents\計劃書
code [SSH: 192.168.50.199] /home/pi
network C:\Users\victor\GitHub
pi [SSH: 192.168.50.170] /home
wetland_dashboard C:\Users\victor\GitHub

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TERMINAL PORTS PROBLEMS OUTPUT

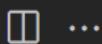
Remote - SSH

```
[03:25:00.551] Running script with connection command: ssh -T -D 61008 "pi@raspberrypi.local" bash
[03:25:00.555] Terminal shell path: C:\WINDOWS\System32\cmd.exe
[03:25:01.008] > pi@raspberrypi.local's password: ]0;C:\WINDOWS\System32\cmd.exe
[03:25:01.008] Got some output, clearing connection timeout
[03:25:01.009] Showing password prompt
```

Setting up SSH Host raspberrypi.local: (details) Initializing VS Code Ser...



Welcome X



Start

[New file](#)[Open folder... or clone repository...](#)

Recent

RPi Jam C:\Users\victor\Documents\計劃書

code [SSH: 192.168.50.199] /home/pi

network C:\Users\victor\GitHub

pi [SSH: 192.168.50.170] /home

wetland_dashboard C:\Users\victor\GitHub

More... (Ctrl+R)



Customize

Tools and languages

Install support for [JavaScript](#), [Python](#), [Java](#), [PHP](#), [Azure](#), [Docker](#) and more

Settings and keybindings

Install the settings and keyboard shortcuts of [Vim](#), [Sublime](#), [Atom](#) and other editors

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Make the editor and your code look the way you love

Learn

TERMINAL

PORTS

PROBLEMS

OUTPUT

DEBUG CONSOLE

Remote - SSH



```
[03:26:05.426] [Forwarding server 61041] Got connection 1
[03:26:05.470] [Forwarding server 61041] Got connection 2
```

ⓘ You selected "linux" as the remote platform - this will be stored in the setting "remote.SSH.remotePlatform" and can be changed there if needed.

Source: Remote - SSH (Extension)

Don't Show Again

EXPLORER ...

NO FOLDER OPENED

Connected to remote.

Open Folder

You can clone a repository locally.

Clone Repository

To learn more about how to use git and source control in VS Code [read our docs](#).

> OUTLINE

Welcome X

Start

New file

Open folder... or [clone repository...](#)

Recent

RPi Jam C:\Users\victor\Documents\計劃書
code [SSH: 192.168.50.199] /home/pi
network C:\Users\victor\GitHub
pi [SSH: 192.168.50.170] /home
wetland_dashboard C:\Users\victor\GitHub

[More...](#) (Ctrl+R)

Customize

Tools and languages

Install support for [JavaScript](#), [Python](#), [Java](#), [PHP](#), [Azure](#), Do...

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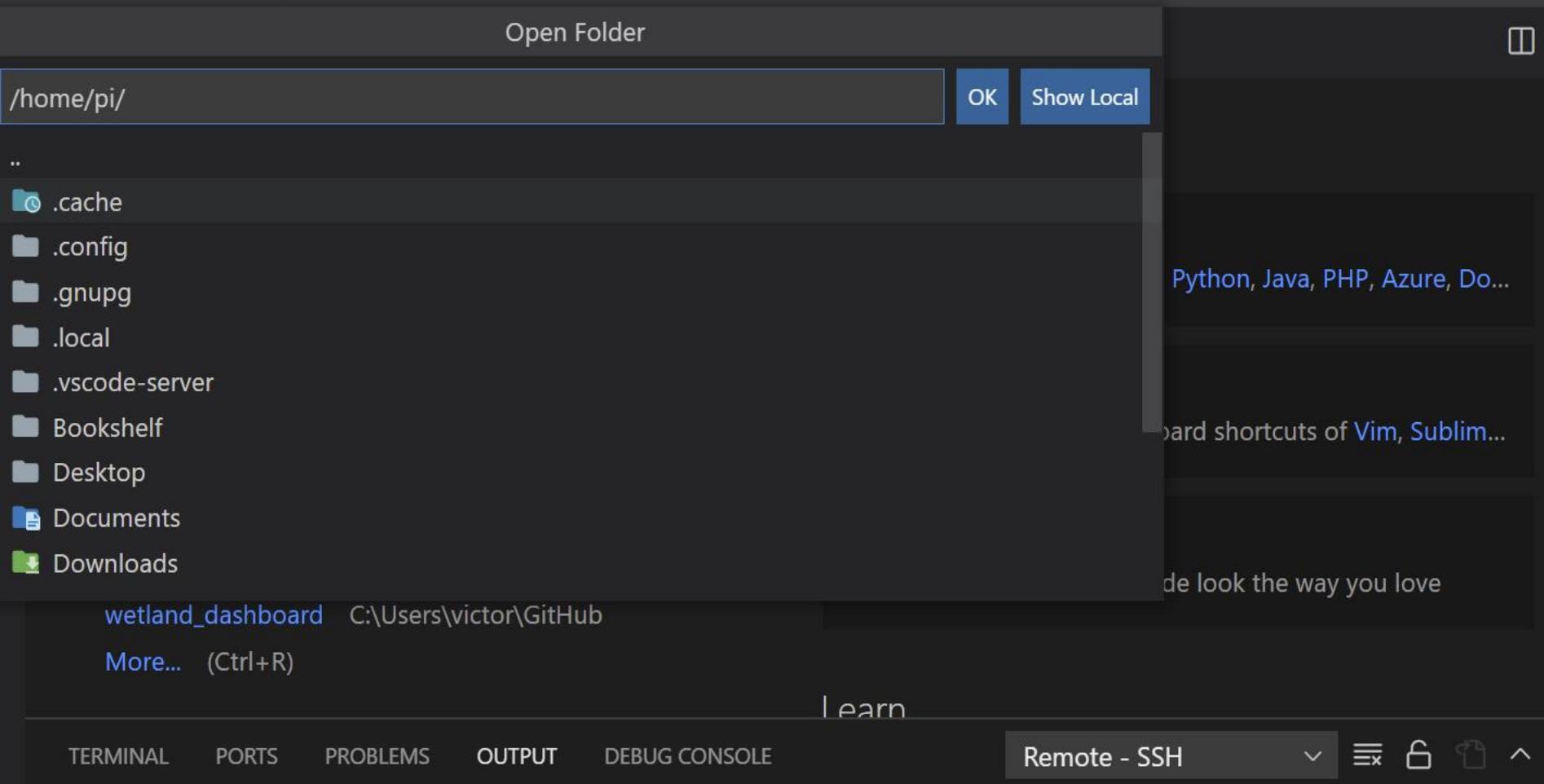
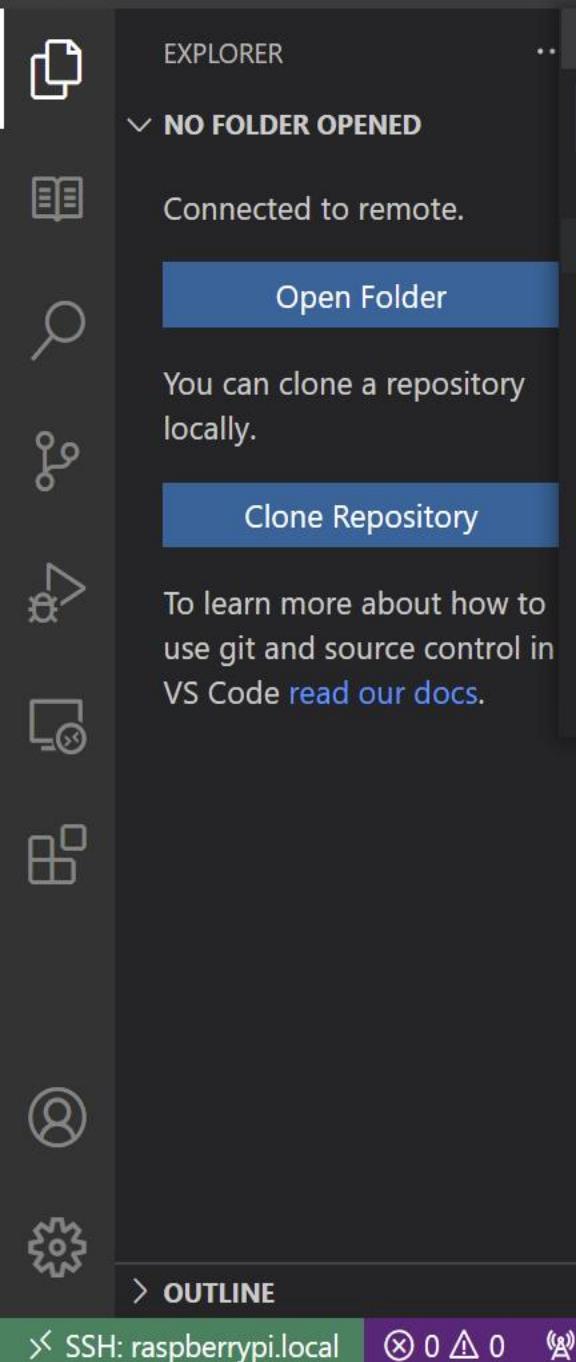
Learn

TERMINAL PORTS PROBLEMS OUTPUT DEBUG CONSOLE

Remote - SSH

[03:26:05.426] [Forwarding server 61041] Got connection 1
[03:26:05.470] [Forwarding server 61041] Got connection 2

SSH: raspberrypi.local ⊗ 0 Δ 0 ⚡ 0

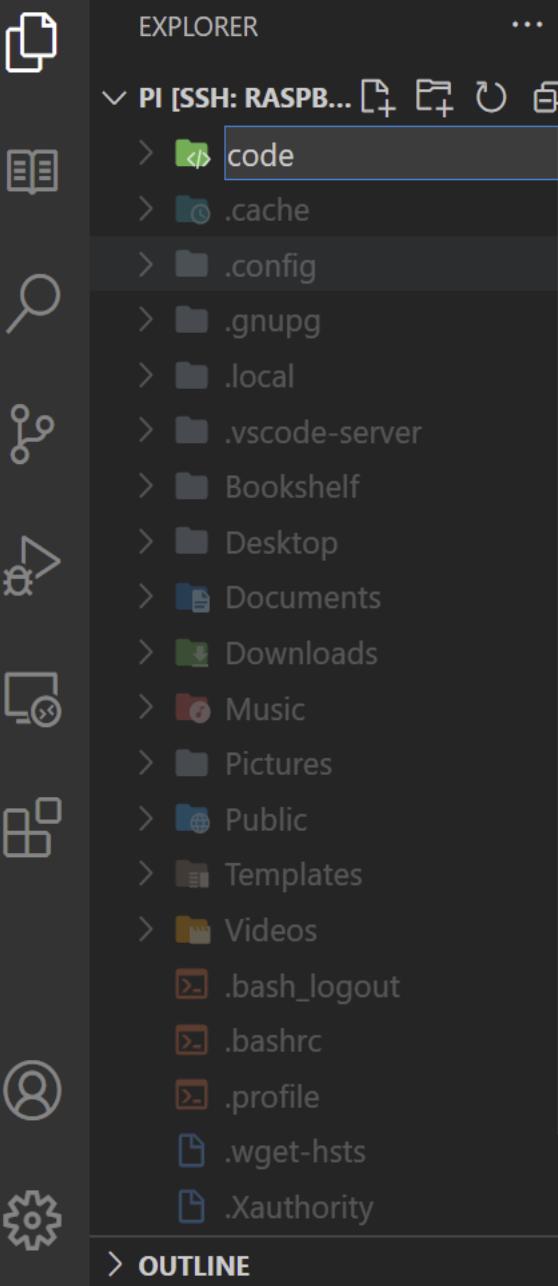


Learn

TERMINAL PORTS PROBLEMS OUTPUT DEBUG CONSOLE

Remote - SSH      

```
[03:26:05.426] [Forwarding server 61041] Got connection 1  
[03:26:05.470] [Forwarding server 61041] Got connection 2
```



EXPLORER ...

PI [SSH: RASP... code .cache .config .gnupg .local .vscode-server Bookshelf Desktop Documents Downloads Music Pictures Public Templates Videos .bash_logout .bashrc .profile .wget-hsts .Xauthority

> OUTLINE

Welcome

Start

New file
Open folder... or clone repository...

Recent

RPi Jam C:\Users\victor\Documents\計劃書
code [SSH: 192.168.50.199] /home/pi
network C:\Users\victor\GitHub
pi [SSH: 192.168.50.170] /home
wetland_dashboard C:\Users\victor\GitHub

More... (Ctrl+R)

Help

Printable keyboard cheatsheet
Introductory videos
Tips and Tricks
Product documentation
GitHub repository

Customize

Tools and languages
Install support for JavaScript, Python, Java, PHP, Azure, Do...

Settings and keybindings
Install the settings and keyboard shortcuts of Vim, Sublim...

Color theme
Make the editor and your code look the way you love

Learn

Find and run all commands
Rapidly access and search commands from the Command...

Interface overview
Get a visual overlay highlighting the major components of...



EXPLORER

...

Welcome X

...

PI [SSH: RASP... D E+ ⌂ ⌂

- > .cache
- > .config
- > .gnupg
- > .local
- > .vscode-server
- > Bookshelf

code



hello.py

- > Desktop
- > Documents
- > Downloads
- > Music
- > Pictures
- > Public
- > Templates
- > Videos

.bash_logout

.bashrc

.profile

.wget-hsts

> OUTLINE

Start

[New file](#)[Open folder... or clone repository...](#)

Recent

RPi Jam C:\Users\victor\Documents\計劃書

code [SSH: 192.168.50.199] /home/pi

network C:\Users\victor\GitHub

pi [SSH: 192.168.50.170] /home

wetland_dashboard C:\Users\victor\GitHub

[More... \(Ctrl+R\)](#)

Help

[Printable keyboard cheatsheet](#)[Introductory videos](#)[Tips and Tricks](#)[Product documentation](#)[GitHub repository](#)

Customize

Tools and languages

Install support for [JavaScript](#), [Python](#), [Java](#), [PHP](#), [Azure](#), Do...

Settings and keybindings

Install the settings and keyboard shortcuts of [Vim](#), [Sublime...](#)

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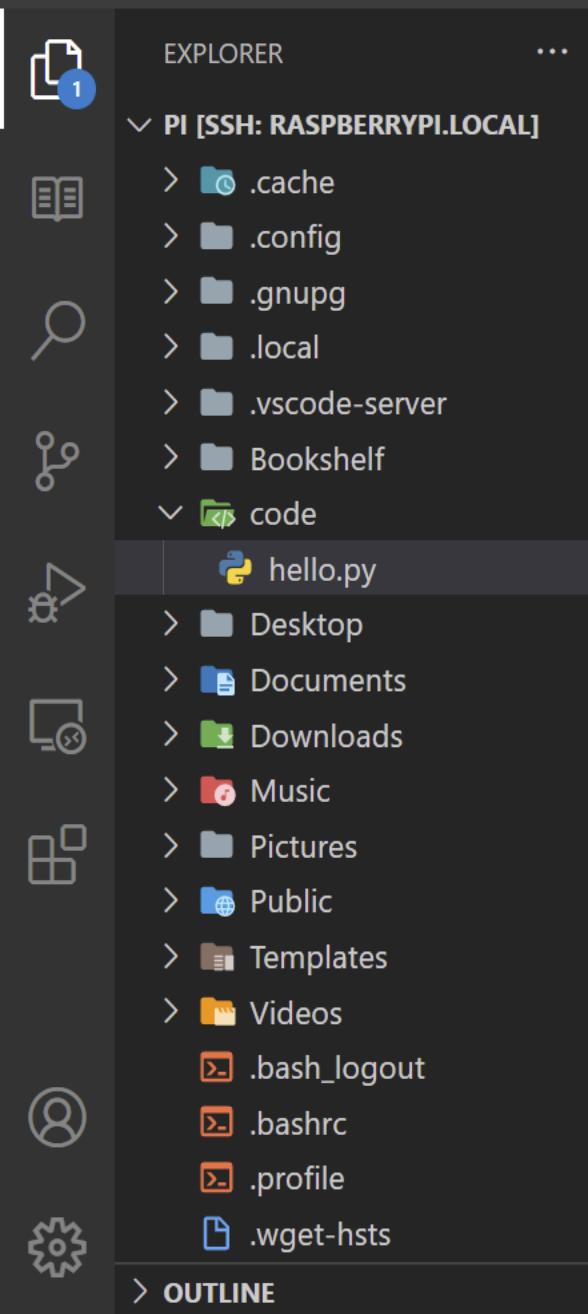
Learn

Find and run all commands

Rapidly access and search commands from the Command...

Interface overview

Get a visual overlay highlighting the major components of...



Welcome

code > hello.py

```
1 print("Hello World!")
```



EXTENSION... ⌂ ⌂ ⌂ ...

python

★ **Python** 2021.4.765268190
Linting, Debugging (multi-thr...)
M Install in SSH: raspber ⚠️ 🔒

Python for VSCode 0.2.3
Python language extension f...
Thomas Haakon Town... [Install](#)

Python Extension P... 1.6.0
Popular Visual Studio Code e...
Don Jayamanne [Install](#)

Python Indent 1.14.2
Correct python indentation.
Kevin Rose [Install](#)

Python Test Explor... 0.6.8
Run your Python tests in the ...
Little Fox Team [Install](#)

Python Docstring ... 0.5.4
Automatically generates data...
Nils Werner [Install](#)

AREPL for python 2.0.2
real-time python scratchpad
Almenon [Install](#)

Welcome hello.py

code > hello.py
1 print("Hello World!")

⋯



EXTENSION... ⌂ ⌂ ⌂ ...

hello.py

Extension: Python X

...

python

★ **Python** 2021.4.765268190
Linting, Debugging (multi-threaded, remote), Intellisense, Jupyter Notebooks, code formatting, refactoring, variable explorer, test explorer, and more!
Install in SSH: raspberrypi.local

Python for VSCode 0.2.3
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Almenon [Install](#)



Python ms-python.python

Microsoft | 35,371,152 | ★★★★★ | Repository | License | v2021.4.765268190

Linting, Debugging (multi-threaded, remote), Intellisense, Jupyter Notebooks, code formatting, refactoring, variable explorer, test explorer, and more!

[Install in SSH: raspberrypi.local](#) [Uninstall](#) [⚙️](#) [⚠️](#) *Install the extension on 'SSH: raspberrypi.local' to enable.*

This extension is recommended based on the files you recently opened.

[Details](#) [Feature Contributions](#) [Changelog](#) [Dependencies](#)

Python extension for Visual Studio Code

A Visual Studio Code extension with rich support for the [Python language](#) (for all actively supported versions of the language: >=3.6), including features such as IntelliSense, linting, debugging, code navigation, code formatting, refactoring, variable explorer, test explorer, and more!

Additionally, the Python extension gives you an optimal and feature-rich experience for working with Jupyter notebooks through the [Jupyter extension](#).

Quick start

Step 1: Install a supported version of Python on your system. (note: that the system install of Python on macOS is not supported)





EXTENSION... ⌂ ⌂ ⌂ ...

hello.py

Extension: Python X

...

python

★ **Python** 2021.4.765268190
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Microsoft **Installing** 🔒

Python for VSCode 0.2.3
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Installing **Uninstall** 🔒

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Quick start



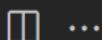
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EXTENSION... ⌂ ⌂ ⌂ ⌂ ⌂

hello.py

Extension: Python X



python

Python 2021.4.765268190
Linting, Debugging (multi-threaded, remote), Intellisense, Jupyter Notebooks, code formatting, refactoring, variable explorer, test explorer, and more!
Microsoft ⓘ ⚙️

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Uninstall ⚙️ ⓘ

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EXTENSION... ⌂ ⌂ ⌂ ...

hello.py

Extension: Python X

...

python

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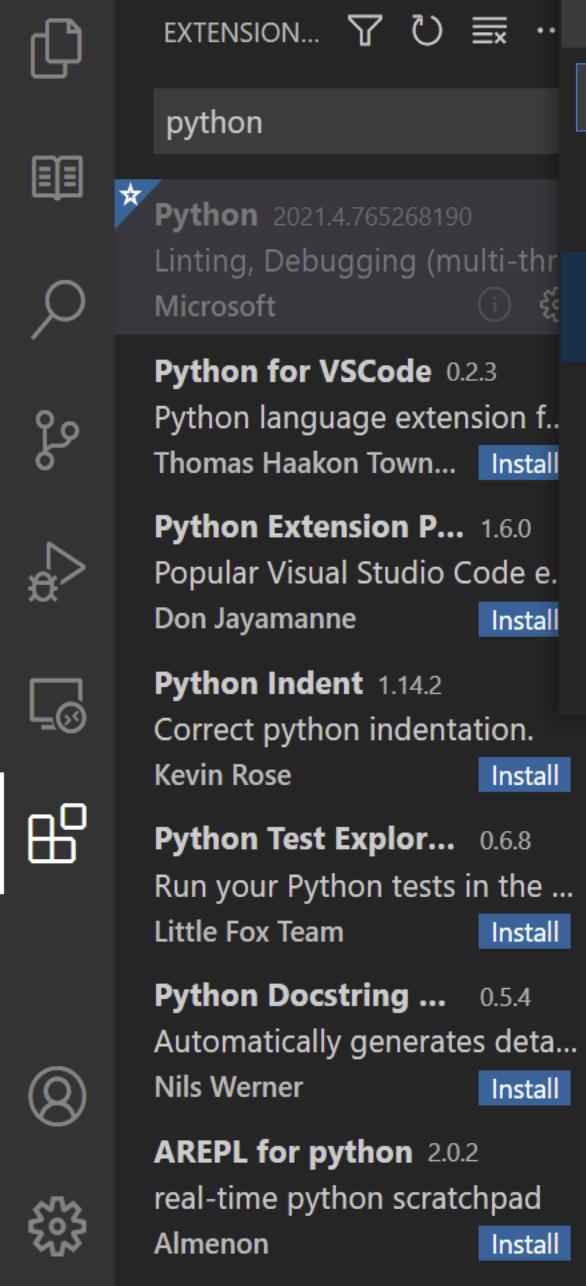
✖ No Python interpreter is selected. You need to select a Python interpreter to enable features such as IntelliSense, linting, and debugging.

Source: Python (Extension)

Select Python Interpreter

Quick start

Step 1: Install a supported version of Python on your system. (note: that the system install of Python on macOS is not supported)



EXTENSION... ⚡ ⏪ ⏴ ..

Select Interpreter

Current: C:\Users\victor\Anaconda3\pythonw.exe

Enter interpreter path...

Enter path or find an existing interpreter

Python 2.7.16 32-bit
/usr/bin/python

Python 2.7.16 32-bit
/bin/python

Python 3.7.3 32-bit
/usr/bin/python3

Python 3.7.3 32-bit
/bin/python3

License | v2021.4.765268190
Notebooks, code formatting, refa...
d locally.

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A Visual Studio Code extension with rich support for the [Python language](#) (for all actively supported versions of the language: >=3.6), including features such as IntelliSense, linting, debugging, code navigation, code formatting, refactoring, variable explorer, test explorer, and more!

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Quick start

Source: Python (Extension)

Select Python Interpreter



EXTENSION... ⌂ ⌂ ⌂ ...

hello.py

Extension: Python X

...



python

★ **Python** 2021.4.765268190
Linting, Debugging (multi-threaded, remote), Intellisense, Jupyter Notebooks, code formatting, refactoring, variable explorer, test explorer, and more!
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Select Python Interpreter

Quick start

Step 1: Install a supported version of Python on your system. (note: that the system install of Python on macOS is not supported)



EXPLORER

...

hello.py

send_test_msg.py X

> □ ...

PI [SSH: RASPBERRypi.LOCAL]

- > .cache
- > .config
- > .gnupg
- > .local
- > .pylint.d
- > .vscode
- > .vscode-server
- > Bookshelf
- ✓ code
 - hello.py
 - send_test_msg.py
- > Desktop
- > Documents
- > Downloads
- > Music
- > Pictures
- > Public
- > Templates
- > Videos
- > .bash_logout
- > OUTLINE

code > send_test_msg.py > ...

```
1  # -*- coding: utf-8 -*-
2
3  # 如果沒有安裝 paho-mqtt 記得 pip install paho-mqtt
4  import paho.mqtt.client as mqtt
5  import time
6  import random
7
8  n = 1
9
10 # broker = "iot.eclipse.org"
11 broker = "broker.hivemq.com"
12 client = mqtt.Client("client_"+str(random.random()))
13 client.connect(broker)
14
15 while True:
```

TERMINAL

PORTS

PROBLEMS

OUTPUT

DEBUG CONSOLE

1: Python

+ ↻ □ 🗑 ^ ×

```
pi@raspberrypi:~ $ /usr/bin/python3 /home/pi/code/hello.py
Hello World!
pi@raspberrypi:~ $
```



EXPLORER ...

PI [SSH: RASPBERRYPI.LOCAL]

- > .cache
- > .config
- > .gnupg
- > .local
- > .pylint.d
- > .vscode
- > .vscode-server
- > Bookshelf
- ✓ code

 - hello.py
 - send_test_msg.py 1

- > Desktop
- > Documents
- > Downloads
- > Music
- > Pictures
- > Public
- > Templates
- > Videos
- > .bash_logout

> OUTLINE

hello.py send_test_msg.py 1 X

```
code > send_test_msg.py > ...
1  # -*- coding: utf-8 -*-
2
3  # 如果沒有安裝 paho-mqtt 記得 pip install paho-mqtt
4  import paho.mqtt.client as mqtt
5  import time
6  import random
7
8  n = 1
9
10 # broker = "iot.eclipse.org"
11 broker = "broker.hivemq.com"
12 client = mqtt.Client("client_"+str(random.random()))
13 client.connect(broker)
14
15 while True:
```

TERMINAL PORTS PROBLEMS 1 OUTPUT DEBUG CONSOLE

pi@raspberrypi:~ \$ /usr/bin/python3 /home/pi/code/hello.py
Hello World!
pi@raspberrypi:~ \$ which pip3
/usr/bin/pip3
pi@raspberrypi:~ \$ pip3 install paho-mqtt

1: Python

+



EXPLORER ...

PI [SSH: RASPERRYPI.LOCAL]

- > .cache
- > .config
- > .gnupg
- > .local
- > .pylint.d
- > .vscode
- > .vscode-server
- > Bookshelf
- > code
- > hello.py
- > send_test_msg.py 1
- > Desktop
- > Documents
- > Downloads
- > Music
- > Pictures
- > Public
- > Templates
- > Videos
- > .bash_logout

> OUTLINE

hello.py send_test_msg.py 1 X

code > send_test_msg.py > ...

```
1 # -*- coding: utf-8 -*-
2
3 # 如果沒有安裝 paho-mqtt 記得 pip install paho-mqtt
4 import paho.mqtt.client as mqtt
5 import time
6 import random
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9
10 # broker = "iot.eclipse.org"
11 broker = "broker.hivemq.com"
12 client = mqtt.Client("client_"+str(random.random()))
13 client.connect(broker)
14
15 while True:
|
```

TERMINAL PORTS PROBLEMS 1 OUTPUT DEBUG CONSOLE

1: Python

v + - x

```
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting paho-mqtt
  Downloading https://www.piwheels.org/simple/paho-mqtt/paho_mqtt-1.5.1-py3-none-any.whl (74kB)
    100% |██████████| 81kB 143kB/s
Installing collected packages: paho-mqtt
Successfully installed paho-mqtt-1.5.1
pi@raspberrypi:~ $
```

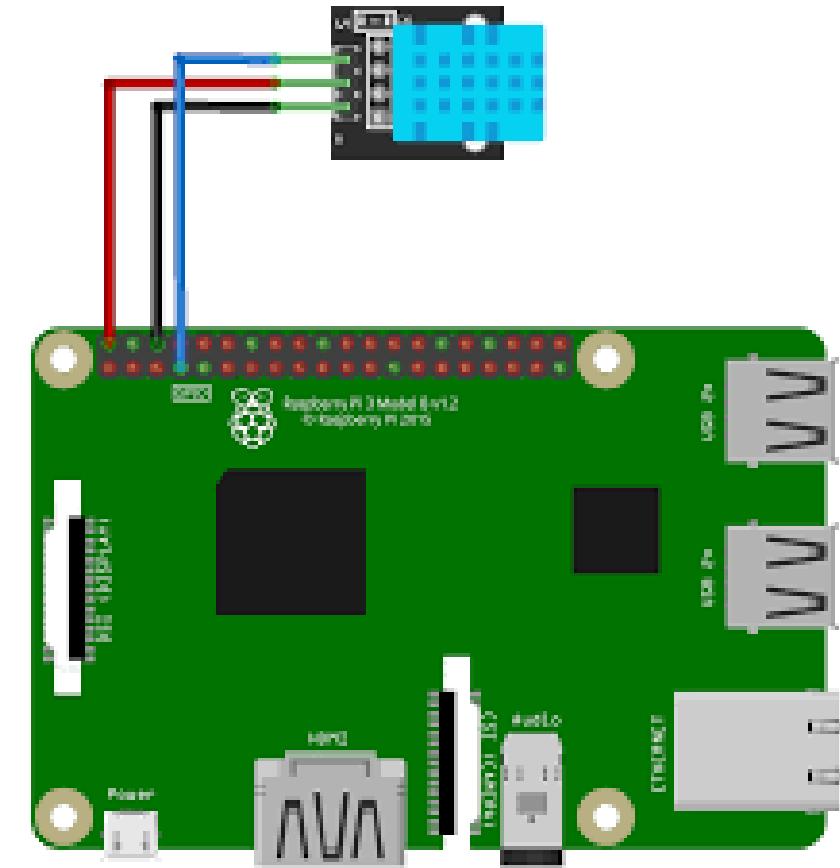
插個感測器？
量量溫度跟濕度？

讀取DHT11溫濕度感測器

安裝必要套件：

```
pip3 install adafruit-circuitpython-dht
```

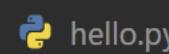
```
sudo apt-get install libgpiod2
```





EXPLORER

...



hello.py



send_test_msg.py



dht_simpletest.py X



PI [SSH: RASPBERRYPI.LOCAL]

> .cache

> .config

> .gnupg

> .local

> .pylint.d

> .vscode

> .vscode-server

> Bookshelf

v code

dht_simpletest.py

hello.py

send_test_msg.py

> Desktop

> Documents

> Downloads

> Music

> Pictures

> Public

> Templates

> Videos

> Local History

> OUTLINE

code > dht_simpletest.py > ...

```
1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 import time
5 import board
6 import adafruit_dht
7
8 # Initial the dht device, with data pin connected to:
9 dhtDevice = adafruit_dht.DHT11(board.D4)
10
11 # you can pass DHT22 use_pulseio=False if you wouldn't like to use pulseio.
12 # This may be necessary on a Linux single board computer like the Raspberry Pi,
13 # but it will not work in CircuitPython.
14 # dhtDevice = adafruit_dht.DHT22(board.D18, use_pulseio=False)
15
```

TERMINAL

PORTS

PROBLEMS

OUTPUT

DEBUG CONSOLE

1: Python



During handling of the above exception, another exception occurred:

Traceback (most recent call last):

File "/home/pi/code/dht_simpletest.py", line 31, in <module>
 time.sleep(2.0)

KeyboardInterrupt

pi@raspberrypi:~ \$





EXPLORER ...

PI [SSH: RASPBERRYPI.LOCAL]

- / .cache
- > .config
- > .gnupg
- > .local
- > .pylint.d
- > .vscode
- > .vscode-server
- > Bookshelf
- > code
 - hello.py
 - dht_simpletest.py
 - send_test_msg.py
- > Desktop
- > Documents
- > Downloads
- > Music
- > Pictures
- > Public
- > Templates
- > Videos
- > Local History

> OUTLINE

hello.py send_test_msg.py dht_simpletest.py X

```
code > dht_simpletest.py > {} board
1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 import time
5 import board
6 import adafruit_dht
7
8 # Initial the dht device, with data pin connected to:
9 dhtDevice = adafruit_dht.DHT11(board.D4)
10
11 # you can pass DHT22 use_pulseio=False if you wouldn't like to use pulseio.
12 # This may be necessary on a Linux single board computer like the Raspberry Pi,
13 # but it will not work in CircuitPython.
14 # dhtDevice = adafruit_dht.DHT22(board.D18, use_pulseio=False)
15
```

TERMINAL PORTS PROBLEMS OUTPUT DEBUG CONSOLE 1: Python ▾ + ▾ ×

```
pi@raspberrypi:~ $ /usr/bin/python3 /home/pi/code/dht_simpletest.py
Temp: 77.0 F / 25.0 C    Humidity: 51%
Temp: 77.0 F / 25.0 C    Humidity: 51%
Temp: 77.0 F / 25.0 C    Humidity: 53%
Temp: 77.0 F / 25.0 C    Humidity: 53%
Checksum did not validate. Try again.
```

讓程式開機後自動執行？

設定程式在RPi開機後自動執行

```
mkdir /home/pi/.config/autostart
```

編輯 .desktop 檔，放入 autostart 目錄中

```
chmod +x myscript.desktop
```

.desktop 檔 範例：

```
sudo reboot
```

```
[Desktop Entry]
Type=Application
Name=DHT11
Exec=/usr/bin/python3 /home/pi/code/dht11_mqtt.py
```

A photograph of several students sitting at a long wooden table in a classroom or study area. They are all looking towards the right side of the frame, presumably at a teacher or presentation. Each student has a notebook and a pen, and they are all writing in their notebooks. The background is blurred, showing a large window with a view of a city skyline.

Q & A



THANK YOU