

2023-2024 Quality Education Fund Thematic Network - Tertiary Institutes

STEAM Education with Self-directed and Progressive Learning of Engineering Design Process for Problem-solving

透過STEAM教育自主及循序漸進學習以工程設計流程解難

Application of Micro:bit for data logging

迦密中學 Carmel Secondary School

- micro:bit 是一由英國 BBC 開發設計的微型控制器，用於電腦及編程教學。

- micro:bit 包含:

- 2個 控制按鈕 (A及B按鈕)

- 1個 重置按鈕

- 1個 5x5 LED 顯示方陣

- 1個 3軸加速度傳感器

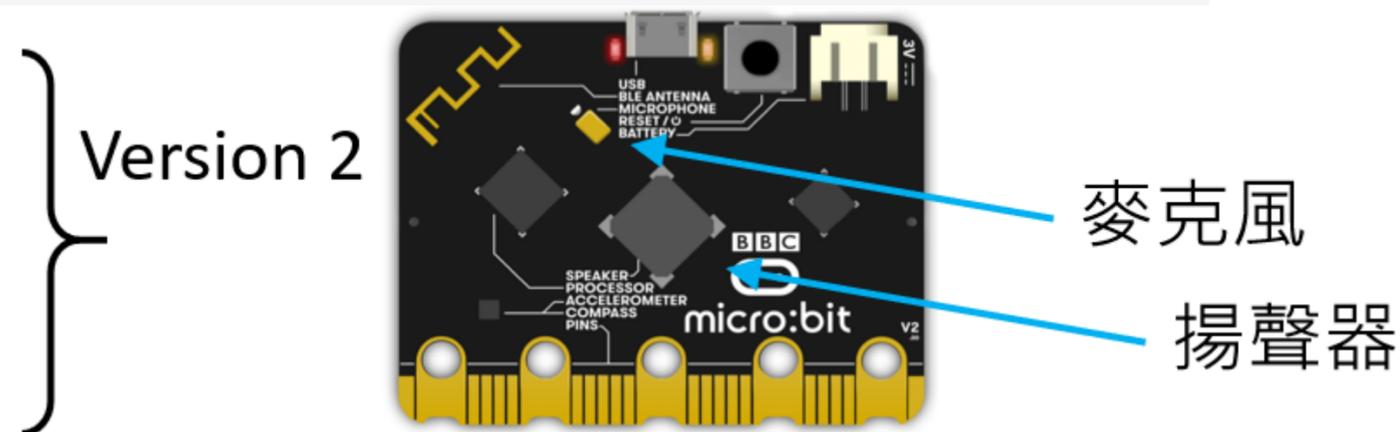
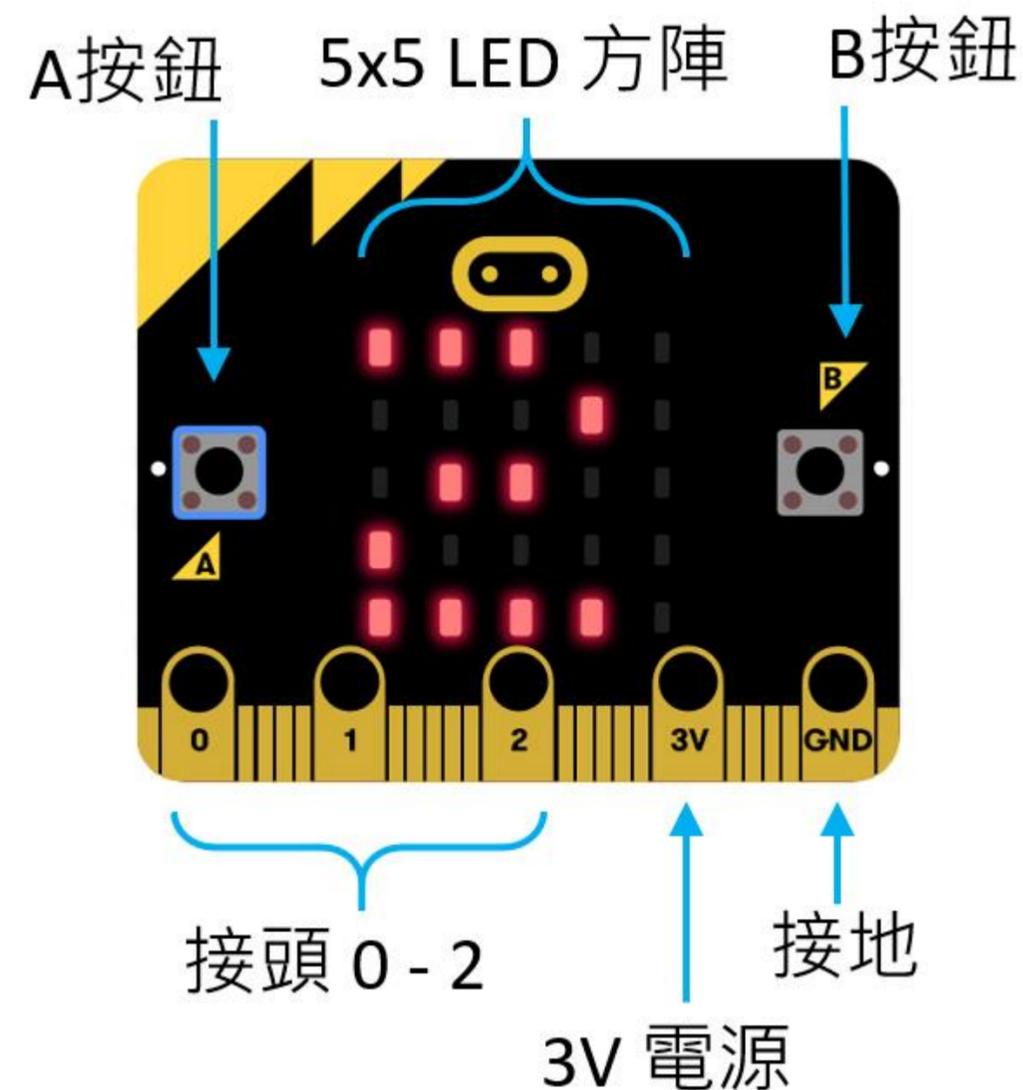
- 1個 3軸磁力儀

- 1組 2.4GHz 無線電模組(用於藍芽傳訊)

- 1個 揚聲器

- 1個 麥克風

- 1個 觸感傳感器

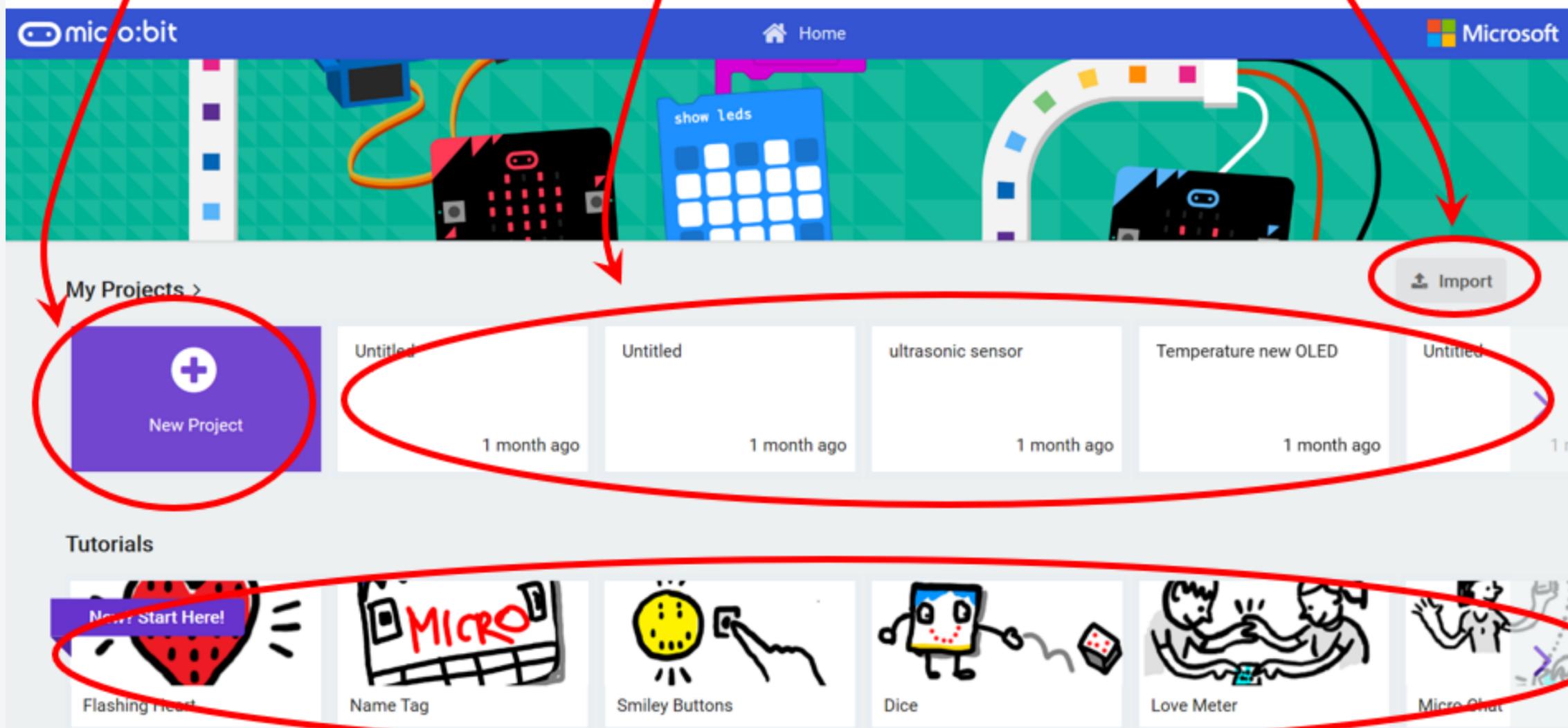


MakeCode 編程平台

開始新的編程項目

之前的編程項目

從電腦載入之前的
編程檔案(.hex)



編程範例

- 我們先以**線上版 MakeCode** 編程：
<https://makecode.microbit.org/>
- 點擊 **“+ New Project”**
- 輸入右面程式碼製作**溫度探測器**

Micro:bit 模擬器, 測試程式

- micro:bit 可輕鬆地通過 microUSB 連接線 與電腦 進行連接， 點擊Download旁邊的**3點**
- **按Connect device**，**按pair**， 選擇要連接的 microbit， 然後**按connect**
- 點擊 **“Download”** 並把檔案儲存至 **“MICROBIT (D:)”** 中(micro:bit 可能出現在不同的硬碟中)

下載程式並在 micro:bit 上運行

Microsoft | micro:bit

Blocks JavaScript

Search...

Basic
Input
more
Music
Led
Radio
Loops
Logic
Variables
Math
Octopus
OLED
RTC1307
ESP8266_IoT
Extensions
Advanced

程式方塊分類

forever
show number temperature (°C)

編程平台

Download

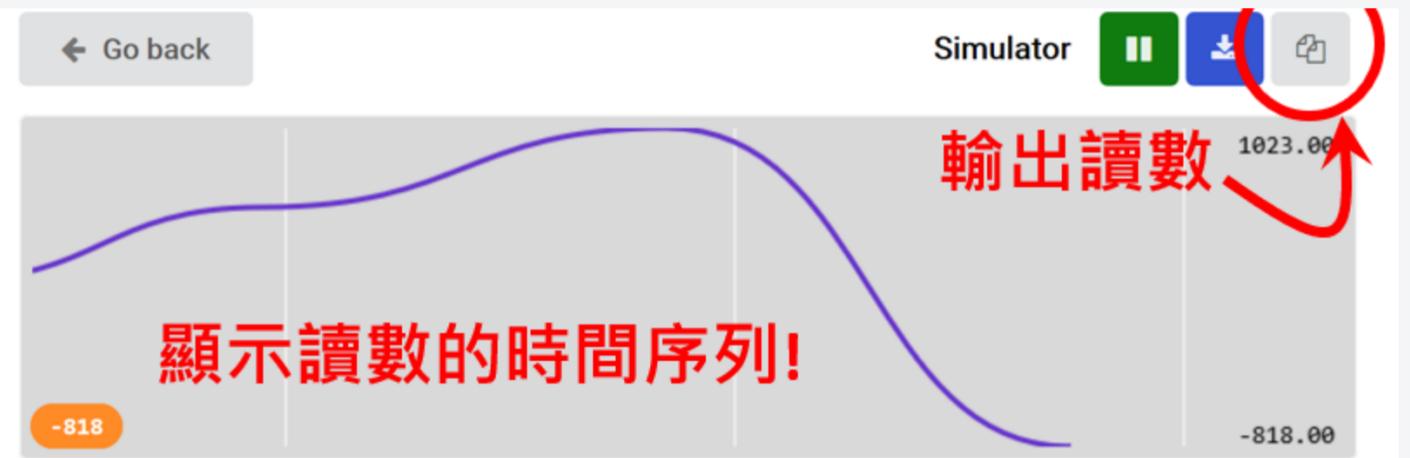
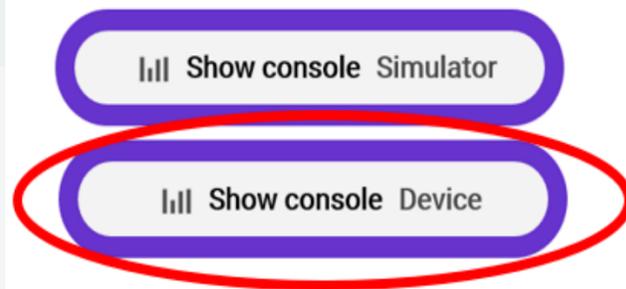
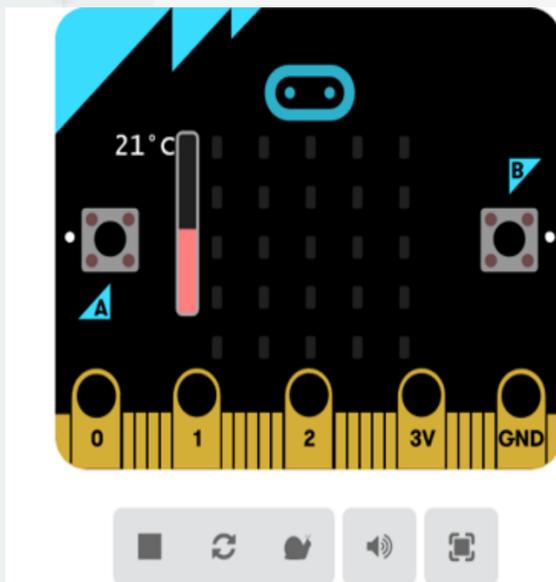
dht11 #2

以 micro:bit 作數據記錄儀

- 我們可以電腦顯示/讀取/記錄傳感器讀數
- 以 **MakeCode** 線下版讀取讀數會比較穩定
- 我們先試試以下的編碼 (Serial 序列):

- 點擊 “**Show console**”(顯示系統監控)

```
forever
  show number temperature (°C)
  serial write line temperature (°C)
  pause (ms) 1000
```



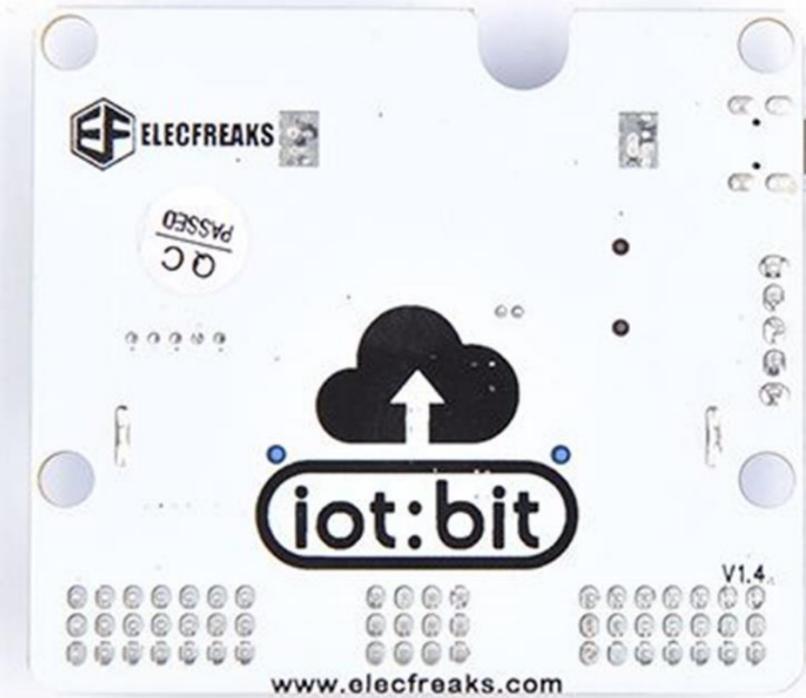
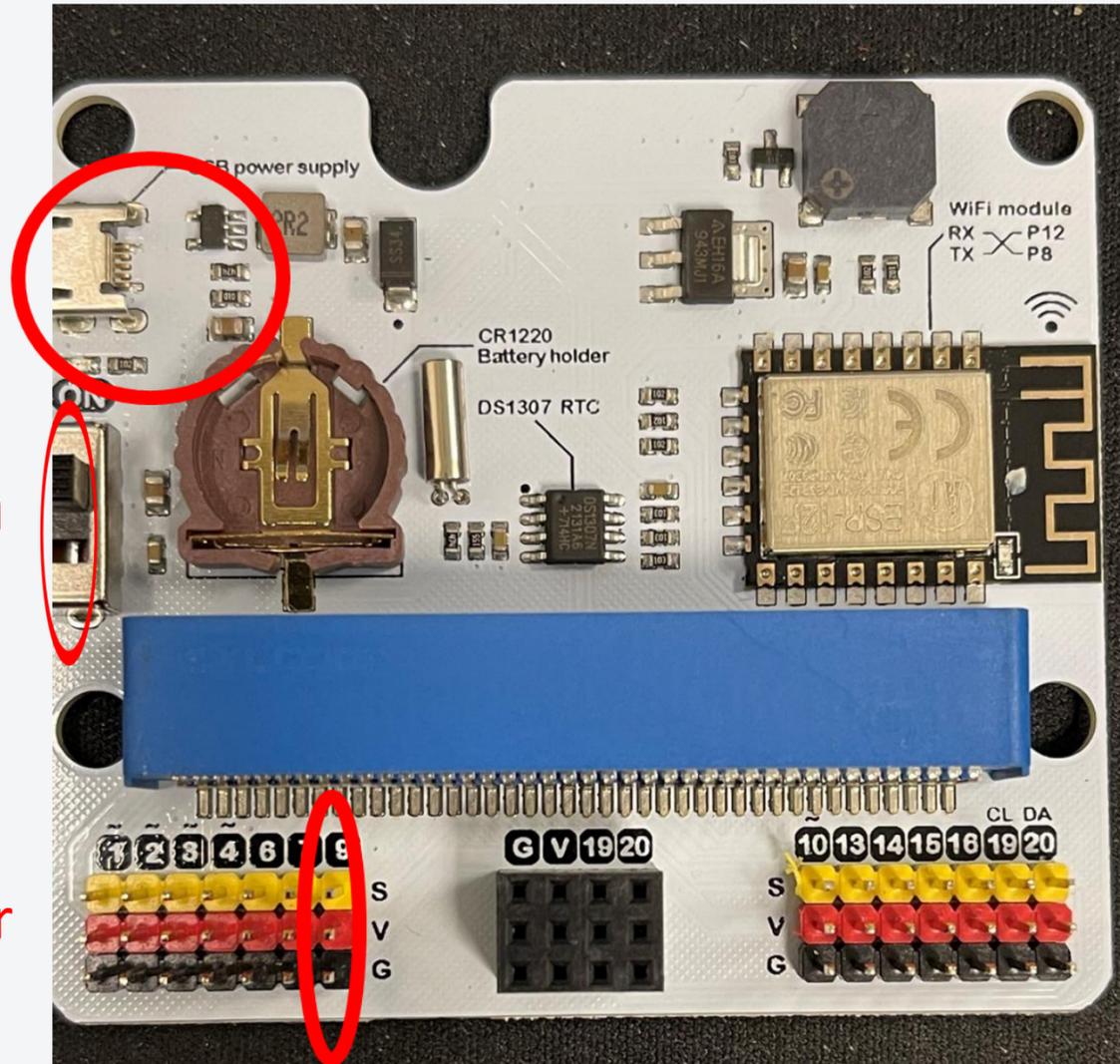
- 我們可以在 “**Show console device**” 右上角的 “**Export data**” 或 “**Copy text**” 下載數據

iot:bit

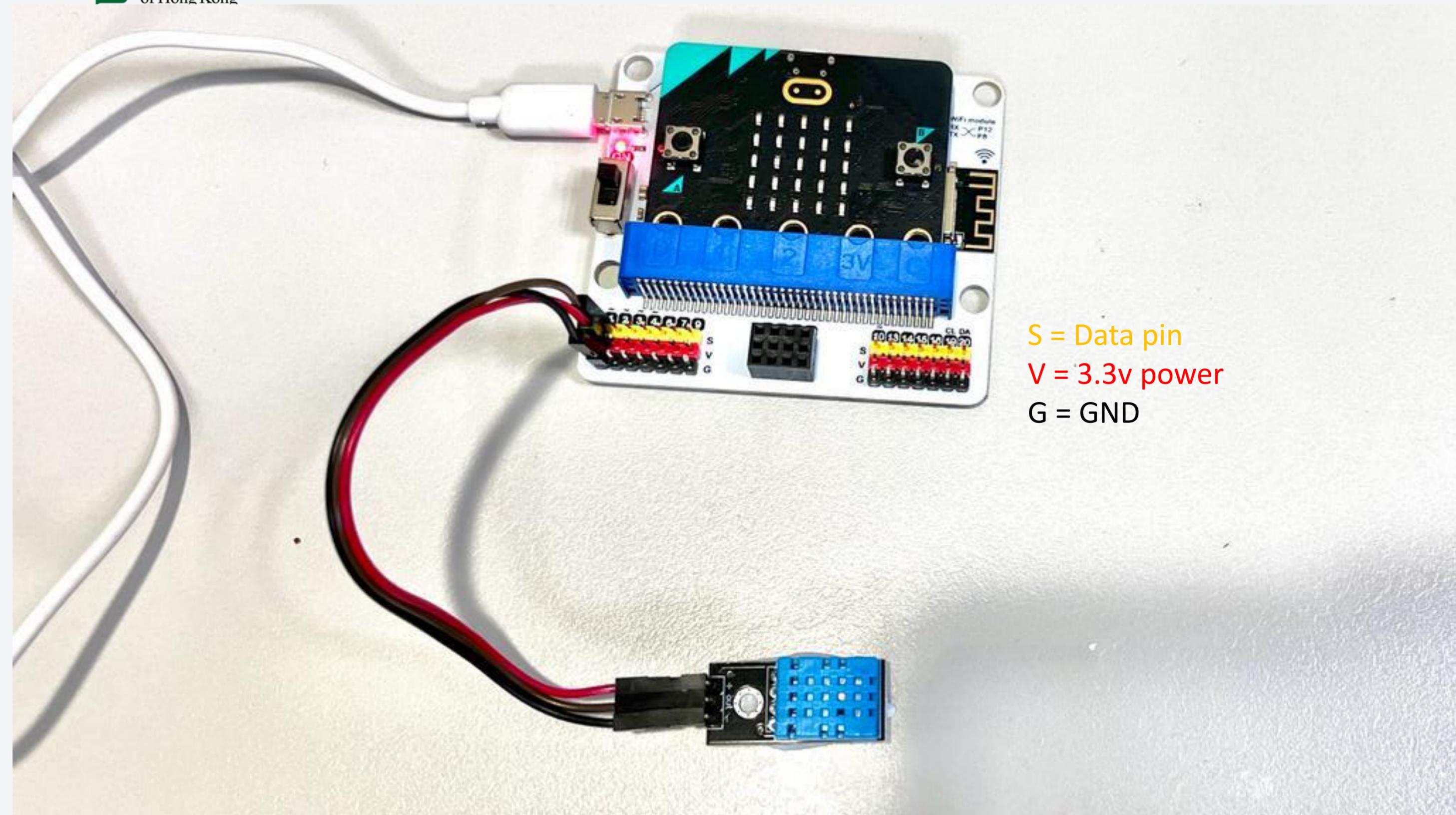
Power supply for
iot:bit

Switch

S = Data pin
V = 3.3v power
G = GND



DHT11

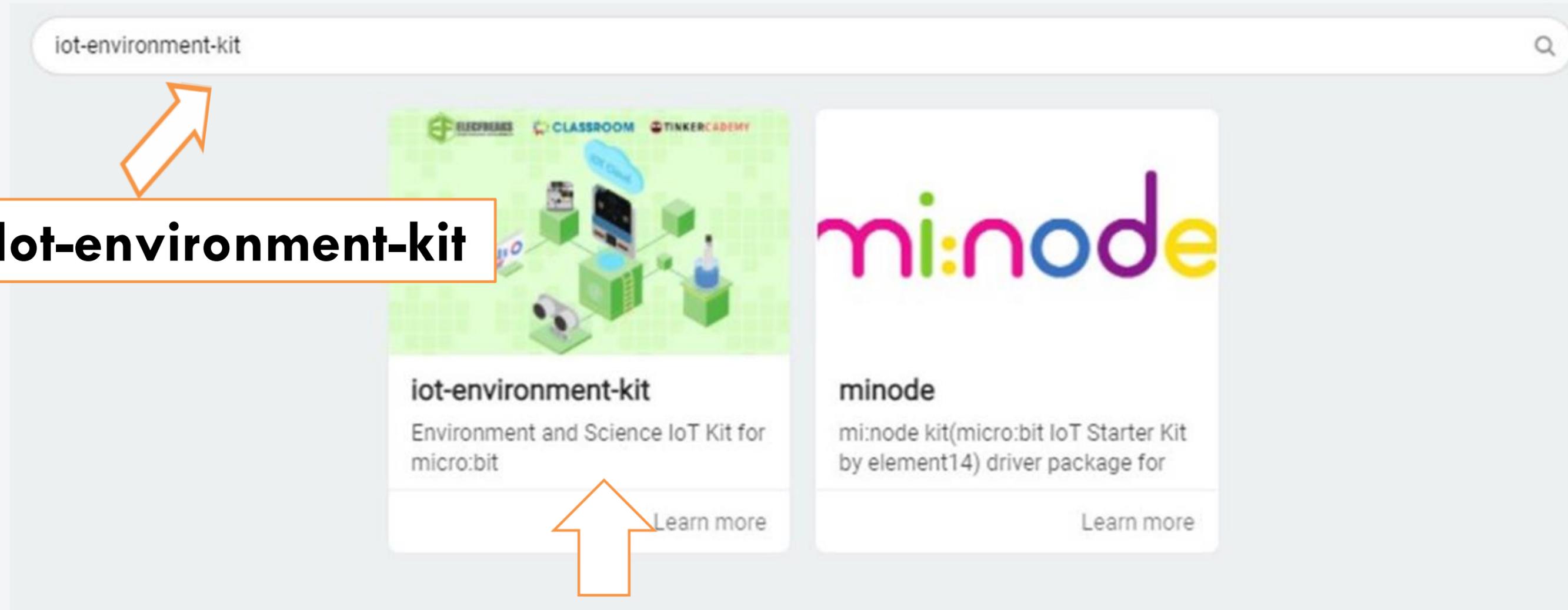
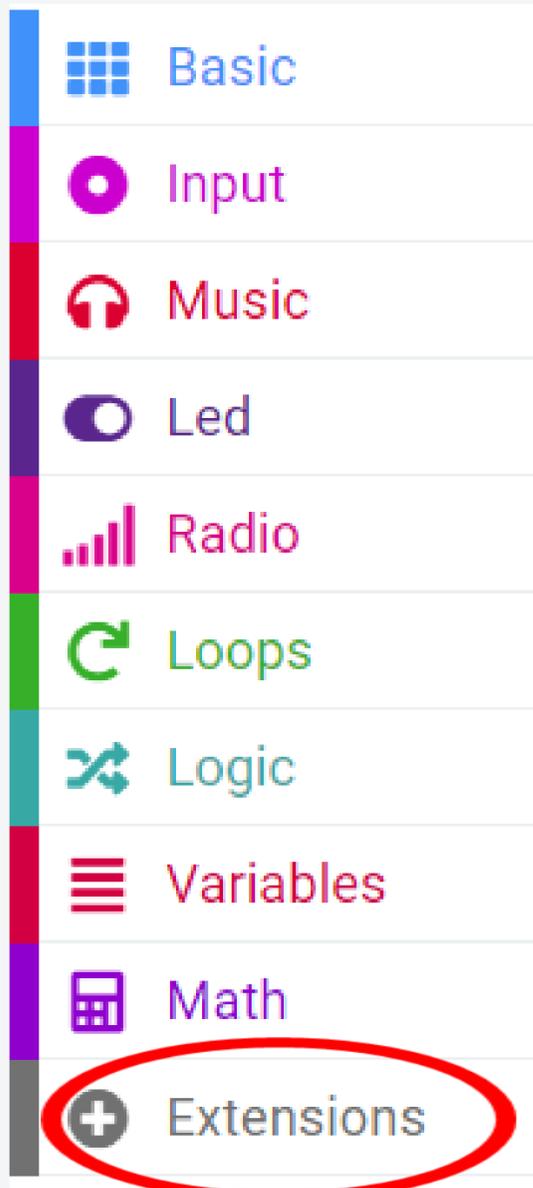


S = Data pin

V = 3.3v power

G = GND

MakeCode extensions



iot:bit WiFi setting

拖入這些block。
然後輸入 Wi-Fi 名稱和密碼。

```
on start
  set ESP8266 RX P8 TX P12 Baud rate 115200
  connect Wifi SSID = "IoT" KEY = "eduhk+IoT+2018"
  if Wifi connected true then
    show icon
```

```
forever
  connect thingspeak
  set data to send ThingSpeak
  Write API key = ""
  Field 1 = value of dht11 temperature(°C) at pin P1
  Field 2 = value of dht11 humidity(0~100) at pin P1
  Upload data to ThingSpeak
  pause (ms) 5000
```

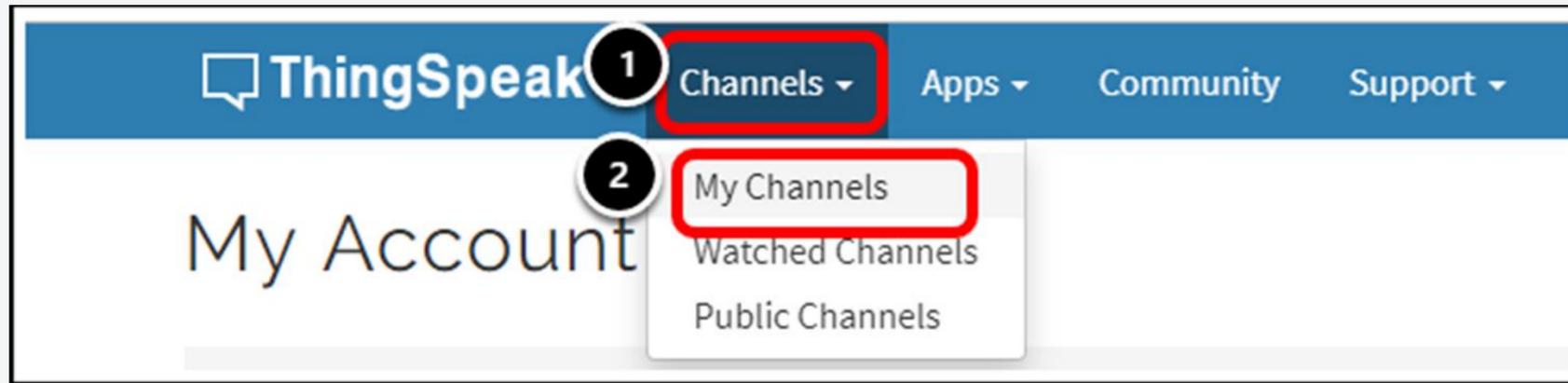
ThingSpeak Set Up

Step 1: 登入

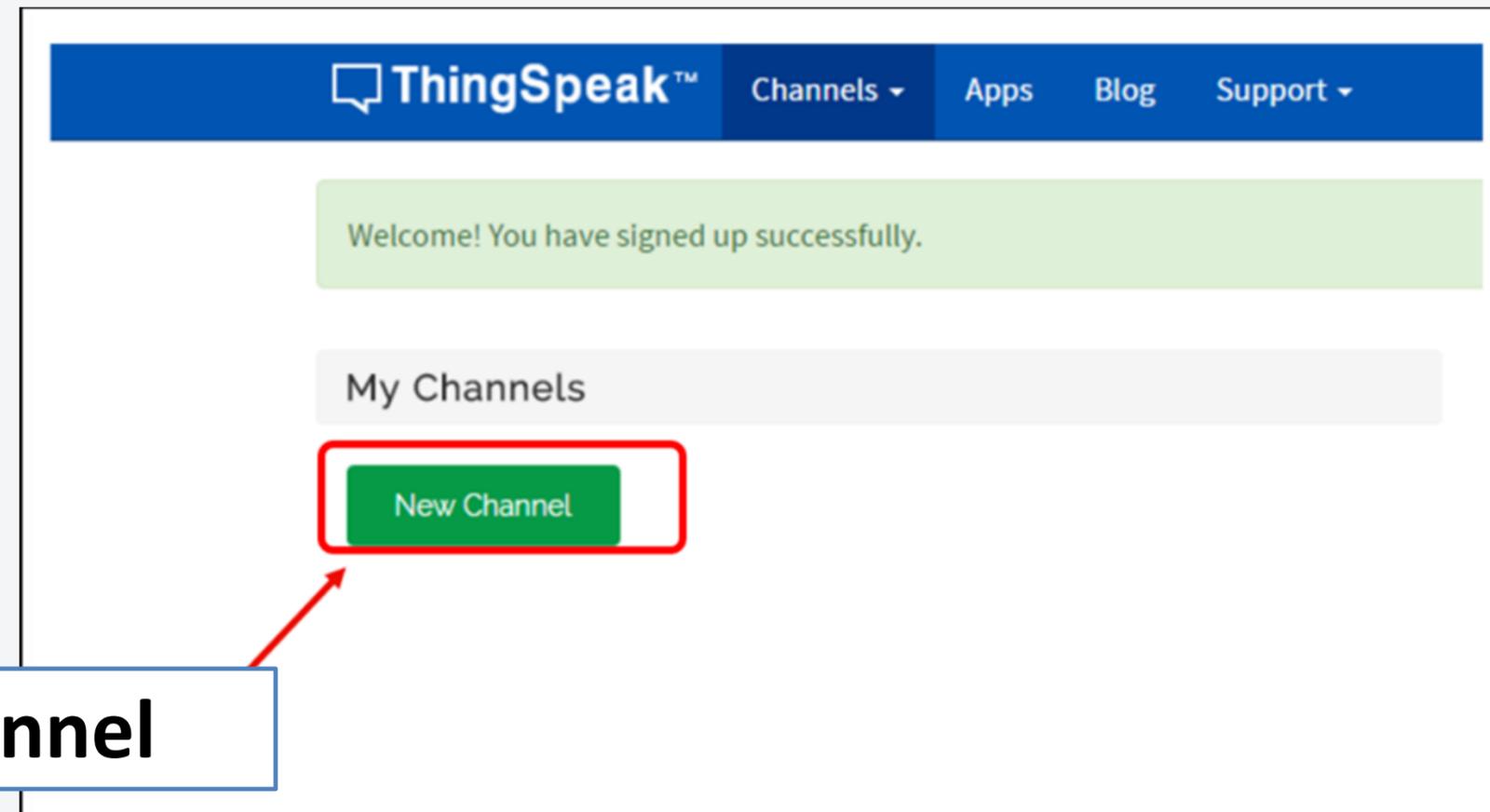
<https://thingspeak.com>

The screenshot shows the ThingSpeak website's sign-up page. The navigation bar includes 'Channels', 'Apps', 'Community', 'Support', 'Commercial Use', 'How to Buy', 'Sign In', and 'Sign Up'. The main heading is 'Sign up for ThingSpeak'. Below this, there is a paragraph explaining the free account options and the requirement to create a MathWorks account. The 'Create MathWorks Account' section contains a form with the following fields: 'Email Address' (with a red error message 'Missing required information'), 'Location' (set to 'United States'), 'First Name', and 'Last Name'. A blue information icon next to the email field provides a tip: 'To access your organization's MATLAB license, use your school or work email.' To the right of the form is a diagram illustrating the data flow: 'SMART CONNECTED DEVICES' send data to a cloud labeled 'DATA AGGREGATION AND ANALYTICS ThingSpeak', which then connects to a 'MATLAB' computer for 'ALGORITHM DEVELOPMENT SENSOR ANALYTICS'.

ThingSpeak Set Up



Step 2: 登入“ThingSpeak”後，
點擊頻道並選擇“**My Channels**”



Step 3: Click New Channel

ThingSpeak Set Up

Private View Public View **Channel Setting** Sharing API Keys Data Import / Exp

Channel Settings

Percentage Complete 30%

Channel ID 2139603

Name **dht11**

Description

Field 1 **temp**

Field 2 **humid**

Save Channel

He

Chan
can h
in a c

Cha

Step 4: 輸入Channel名稱，並在“Field”中新增名稱以記錄數據，然後Save Channel

ThingSpeak Set Up

Private View Public View Channel Settings Sharing **API Keys** Data Import

Write API Key

Key

[Generate New Write API Key](#)

Read API Keys

Key

Note

[Save Note](#) [Delete API Key](#)

Step 5: Copy API Key

ThingSpeak Set Up



The image shows a screenshot of the Makecode environment with the following blocks:

- forever** (blue loop block)
- connect thingspeak** (green block)
- set data to send ThingSpeak** (green block containing:
 - Write API key =** "2SG9P7UL2CSAHXQF" (text field with a red border)
 - Field 1 =** value of dht11 temperature(°C) at pin P1
 - Field 2 =** value of dht11 humidity(0~100) at pin P1
- Upload data to ThingSpeak** (green block)
- pause (ms)** 5000 (blue block)

Step 5: Paste API Key in Makecode

ThingSpeak Set Up

Private View Public View Channel Settings Sharing API Keys Data Import / Export

+ Add Visualizations + Add Widgets Export recent data

MATLAB Analysis MATLAB Visualization

Channel 4 of 4 < >

Channel Stats
Created: 7.months.ago
Last entry: 22.days.ago
Entries: 0

Field 1 Chart

dht11

temp

Date

ThingSpeak.com

Field 2 Chart

dht11

humid

Date

ThingSpeak.com

Step 6: Click Private View 睇結果

ThingSpeak Set Up

Private View Public View Channel Settings Sharing API Keys **Data Import / Export**

Import

Upload a CSV file to import data into this channel.

File

Time Zone

Export

Download all of this Channel's feeds in CSV format.

Time Zone

Step 7: Click Download

ThingSpeak Set Up

Want to clear all feed data from this Channel?

Clear Channel

Want to delete this Channel?

Delete Channel

係Channel Settings 可以Clear Data,
或者將成個 Channel delete

ThingSpeak Public View Sharing

testing

Channel ID: 1281894

Author: mwa0000020852618

Access: Public

Private View

Public View

Channel Settings

Sharing

API Keys

Data Import / Export

Channel Sharing Settings

- Keep channel view private
- Share channel view with everyone
- Share channel view only with the following users:

Email
Address

Enter email here

Add User

Help

ThingSpeak allows you to control who can view the data in your channel. Irrespective of the settings on this tab, reading data from or writing data to the fields of a channel requires the appropriate API key for the channel.

Channel Sharing Settings

- **Keep channel view private:** Selecting this option keeps your channel private. Only you will be able to see the channel view.
- **Share channel view with everyone:** Selecting this option makes the public view of your channel viewable by anyone browsing the ThingSpeak website.
- **Share channel view only with the following users:** Selecting this option shares the private view of your channel only with specific ThingSpeak users.

Datalogger

Add this Extension

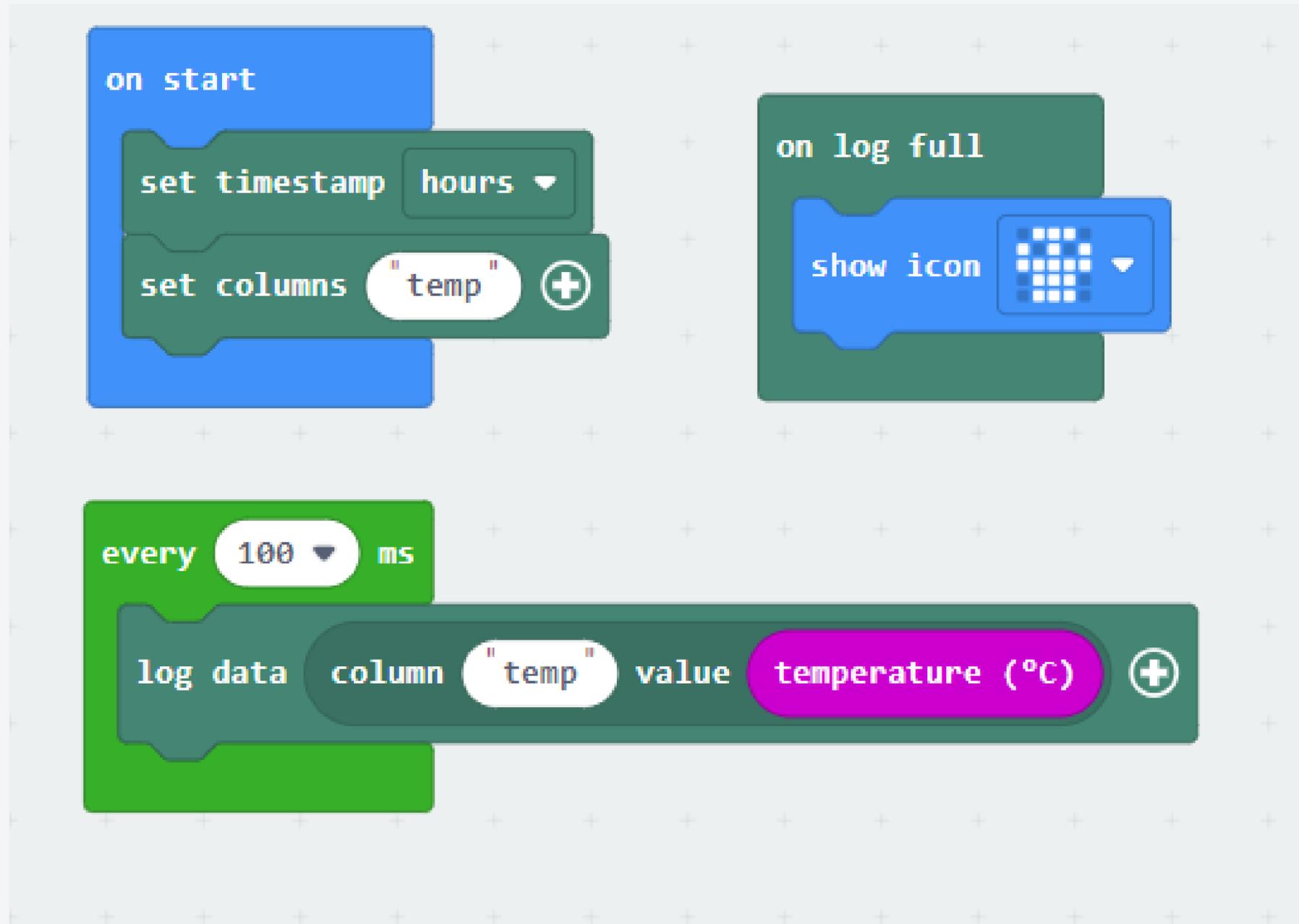
Recommended



Works with micro:bit V2 only

datalogger
Data logging to flash memory.
micro:bit (V2) only.

[Learn More](#)



```
on start
  set timestamp hours
  set columns "temp"
on log full
  show icon [grid icon]
every 100 ms
  log data column "temp" value temperature (°C)
```

The image shows a Scratch script for the datalogger extension. It starts with an 'on start' block containing two 'set' blocks: 'set timestamp' set to 'hours' and 'set columns' set to '"temp"'. This is followed by an 'on log full' block containing a 'show icon' block with a grid icon selected. Finally, there is an 'every 100 ms' loop block containing a 'log data' block with 'column' set to '"temp"' and 'value' set to 'temperature (°C)'.

Datalogger

睇data

> MICROBIT (E:) ▼ ↻

Name	Date modified	Type	Size
 ASSERT.TXT	22/03/2016 16:30	Text Document	1 KB
 DETAILS.TXT	22/03/2016 16:30	Text Document	1 KB
 MICROBIT.HTM	22/03/2016 16:30	Chrome HTML Do...	1 KB
 MY_DATA.HTM	22/03/2016 16:30	Chrome HTML Do...	124 KB

micro:bit

micro:bit data log

Download Copy Update data... Clear log... Visual preview

This is the data on your micro:bit. To analyse it and create your own graphs, transfer it to your computer. You can copy and paste your data, or download it as a CSV file which you can import into a spreadsheet or graphing tool. [Learn more about micro:bit data logging.](#)

Time (hours)	temp
0.00	24
0.00	24
0.00	24
0.00	24

Datalogger Clear data

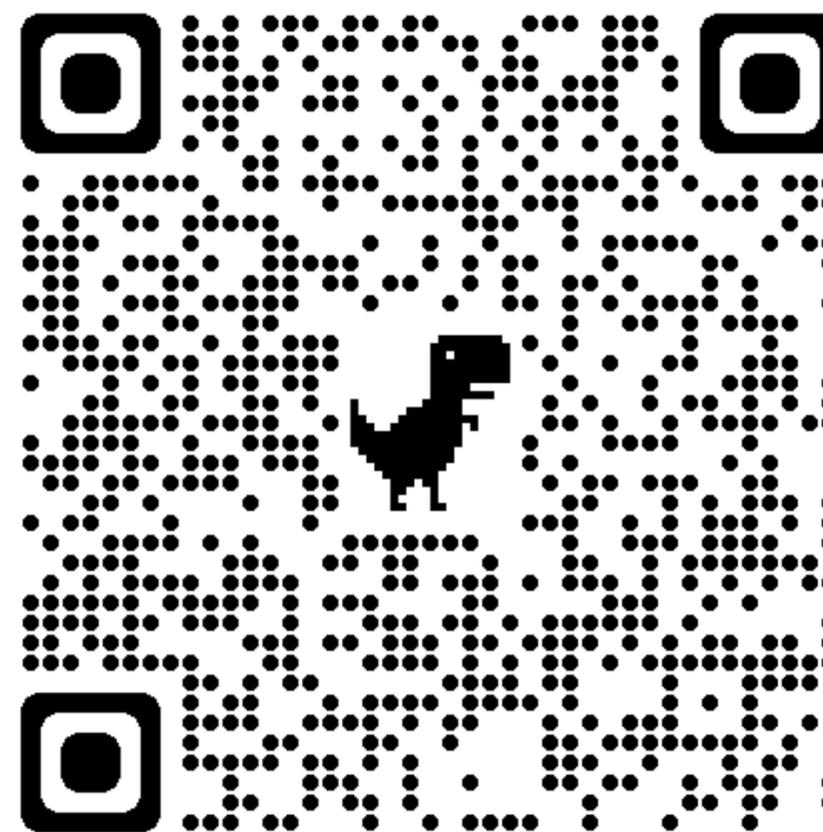
將hex file拖入microbit內，傳送
完成後需要馬上斷開連線。

The screenshot illustrates the process of downloading a hex file and transferring it to a Microbit. The top part shows a web browser's download menu where the 'Download as File' option is highlighted. Below this, two file explorer windows are shown. The left window displays the 'Downloads' folder, with a file named 'microbit-Untitled (4).hex' selected. The right window shows the 'MICROBIT (E:)' drive, which contains several files: 'ASSERT.TXT', 'DETAILS.TXT', 'FAIL.TXT', 'MICROBIT.HTM', and 'MY_DATA.HTM'. A Chrome browser icon is being dragged into the MICROBIT drive, with a tooltip indicating 'Move to MICROBIT (E:)'. The text overlay explains that the hex file should be dragged into the microbit and that the connection should be disconnected immediately after the transfer is complete.

School-based PD Workshop - Application of Micro:bit for Data logging

**Speaker: Ms. Lam Hong Ching Anastasia
Research Assistant I**

請掃描以下二維碼填寫意見表，
謝謝！



https://docs.google.com/forms/d/e/1FAIpQLSeXUO1F_9gb2fLFU_GfMWFppuNIrn2RK5FK8U840TVYRavP3w/viewform

