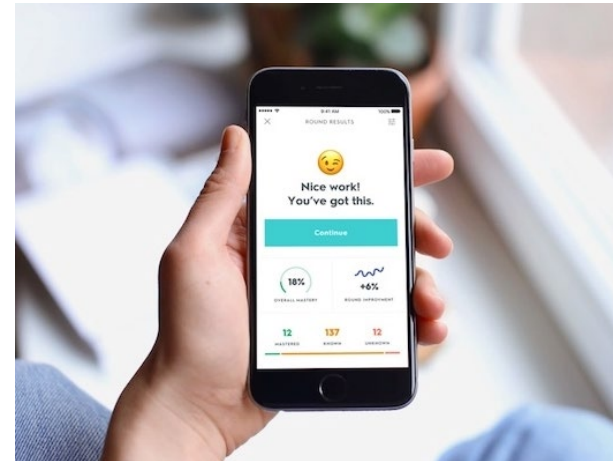


Microbit介紹



國立臺中教育大學 數位內容科技學系

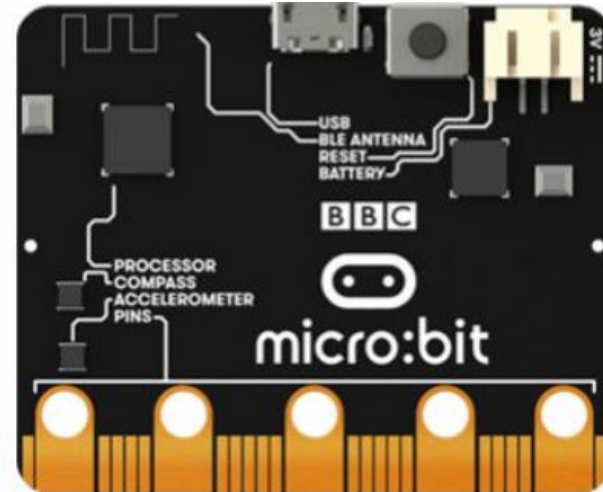
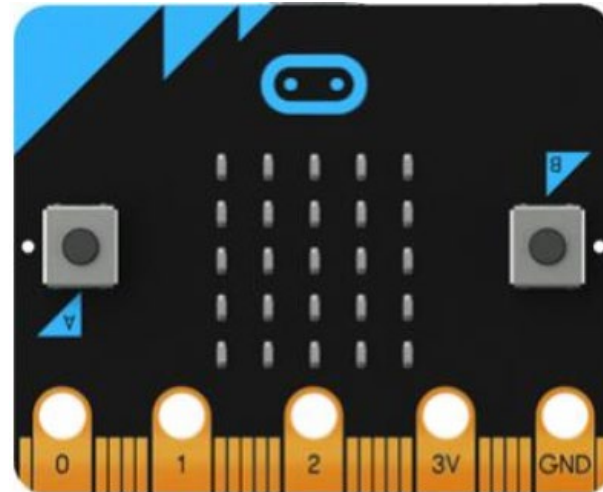
吳智鴻 教授

EMAIL:CHWU@MAIL.NTCU.EDU.TW

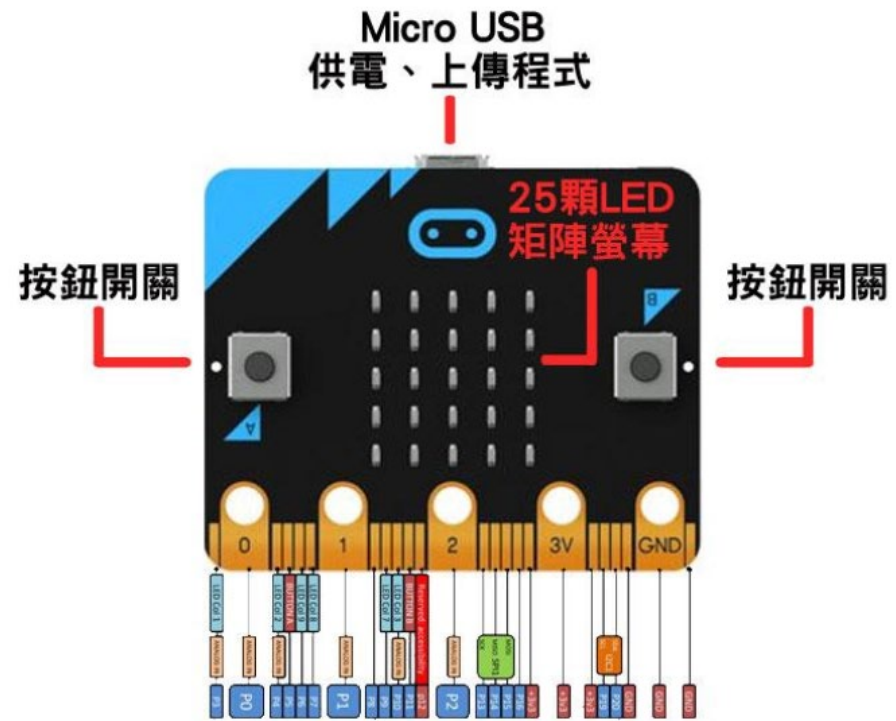
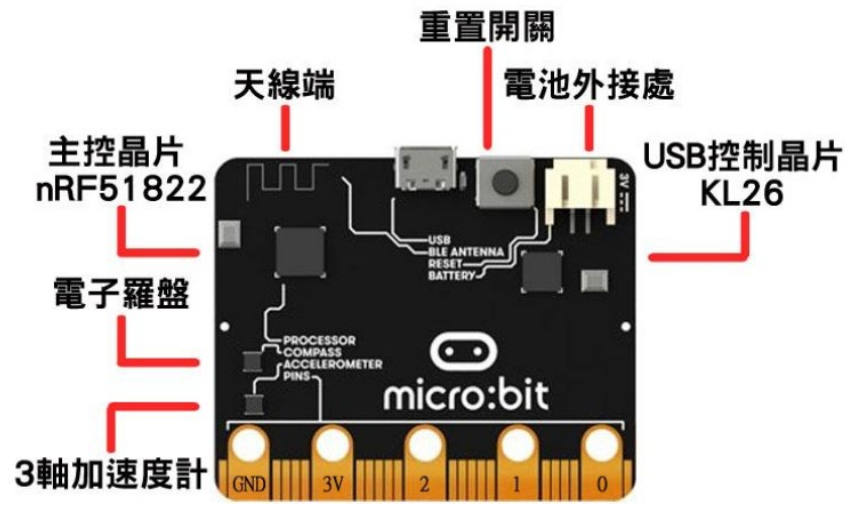
2020

AI、認知、腦波、眼動、線上學習

Micro:bit



Micro:bit的功能



支援的程式語言

1. 積木Block
2. Javascript
3. Python



Microbit的優勢與缺點

一片為教育、為程式教育而生的單晶片。

優勢

- 1.接線簡單。
 - 2.燒錄程式容易。
 - 3.可以脫離電腦運作。
 - 4.使用網頁編程，電腦免安裝軟體，程式也相當於存在雲端。
→只要有電腦，有網路就可學習、修改程式。
 - 5.內建明暗、磁力、溫度、重力加速度值感測器。→可以與科學做結合，擴大應用面。
 - 6.內建藍芽，可與手機溝通。
 - 7.內建 5x5 LED矩陣燈。→這個超有用，一些執行結果可很容易地顯示在這裡，也可做例如 bar 的應用，在程式編寫上就有非常多的可能。(意思是同學必須更花腦筋)
- 就我所知，microbit 也有擴充板，能夠做延伸應用。

缺點

- 1.一定要接電腦、有網路，才能編寫程式。
(這要算優點還是缺點?)實際運作時可以不要電腦也無需網路。
- 2.板子無法與WIFI連接。(可能還需要其他元件才能連結)
- 3.價格偏高。一片microbit可買 3~4 片 arduino UNO。然而想想arduino上如果再加購光敏電阻、磁力感應器、溫度感應器、重力加速度感應器，價錢也應該相差不多了。並且 arduino加上這些元件之後還需處理它們之間的腳位問題、電阻問題…更遑論microbit 本身的處理速度及記憶體都優於 arduino.

新舊版本Micro:bit的差異

Micro:bit v2的差別

官方總結出8個不同的功能，分別是內置

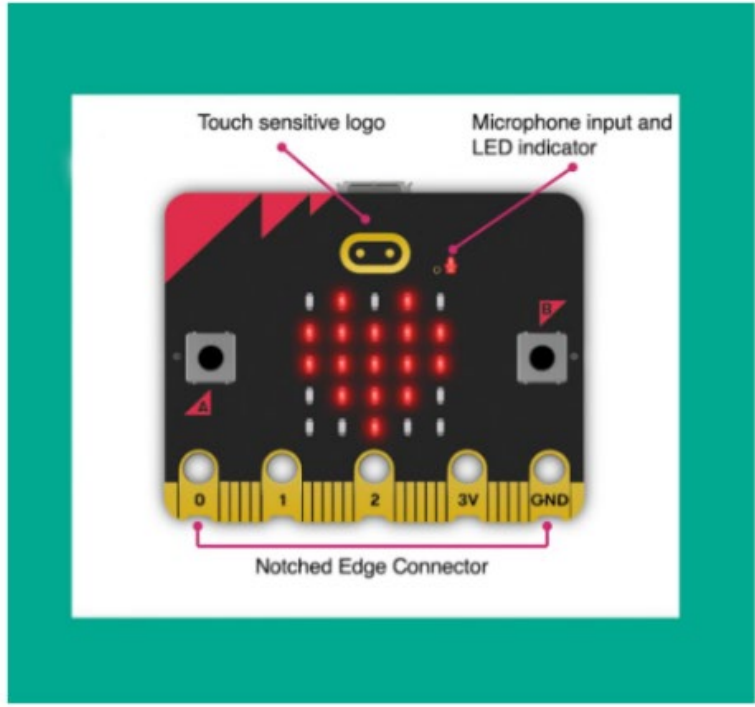
1. 喇叭(Speaker)
2. 麥克風(sound sensor)
3. 觸碰感應器(Touch logo)
4. micro:bit 開關掣
5. 輸出200mA 的pin 腳 (接駁servo 等I/O更穩定)
6. 齒狀pin腳 (方便使用鱷魚夾)
7. 更多LED 指示燈 (了解 micro:bit 的狀態 下載中/電源開關)
8. 顯眼外露的天線 (用 radio /藍牙比較穩定)

另外硬件上(CPU, RAM, Storage) 有所提升

<https://etchk.screenstepslive.com/s/etcsup/m/100313/l/1319435-bbc-micro-bit-v2>

1. 內置喇叭(Speaker)

micro:bit V2 加入了喇叭，有用過micro:bit 接駁外置喇叭的用家會大知道，要加入外置喇叭需要用到特別的線/ 擴充板，壞處是會用到micro:bit 上的 pin 腳，然後對創作有局限性（例如：額外再加入servo）是容易辨認上一代跟V2板的特徵之一。



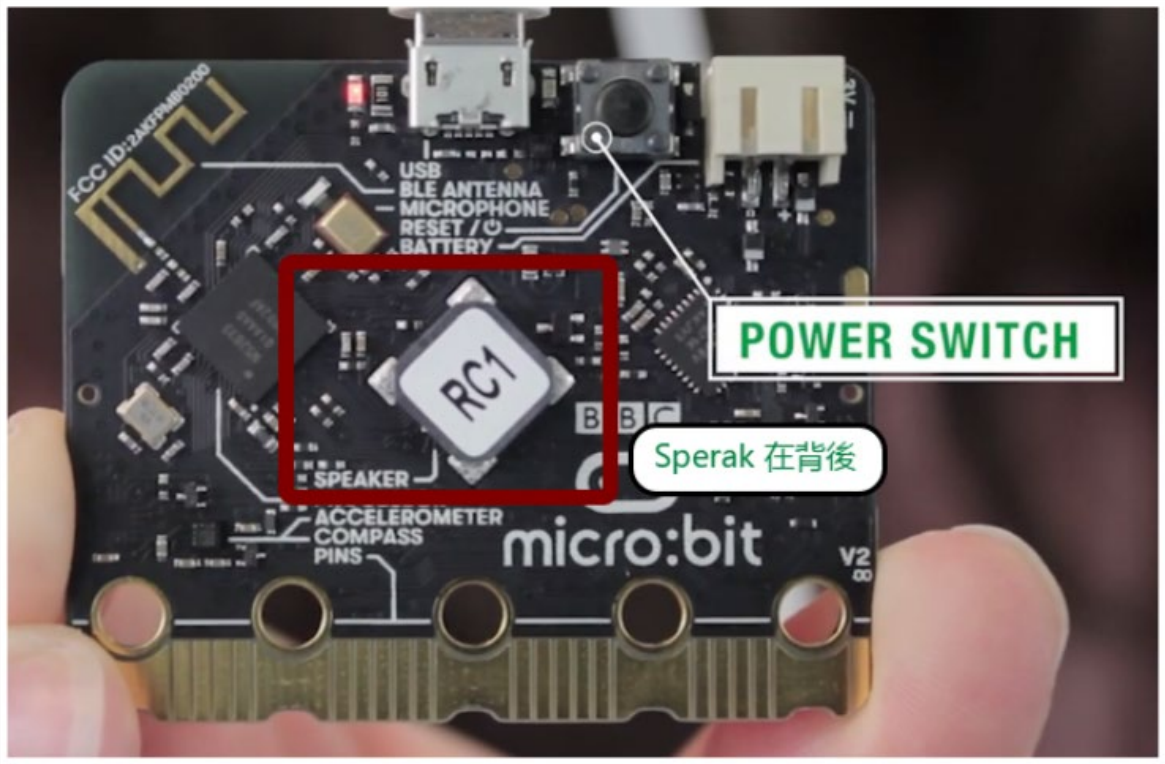
On board speaker

Built in microphone with LED indicator

Touch sensitive logo

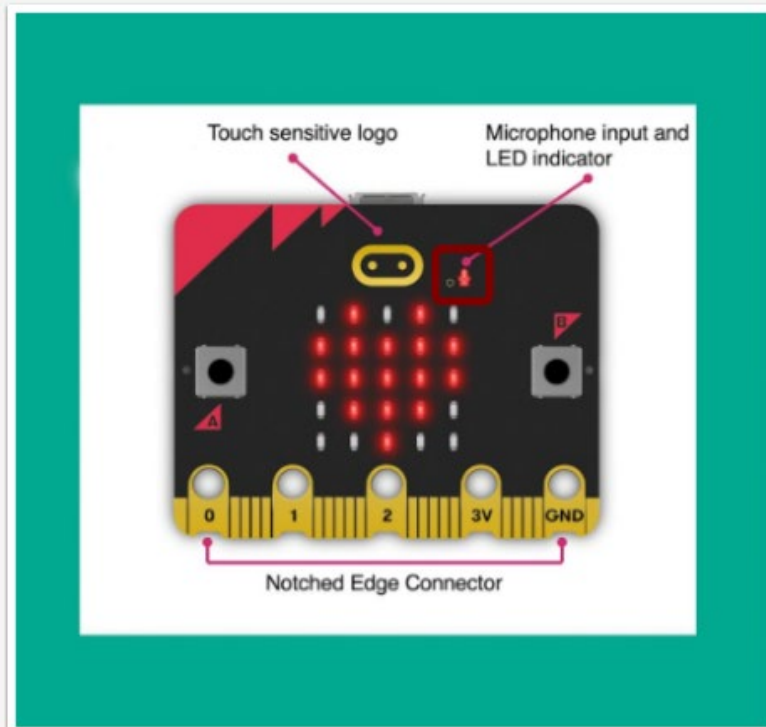
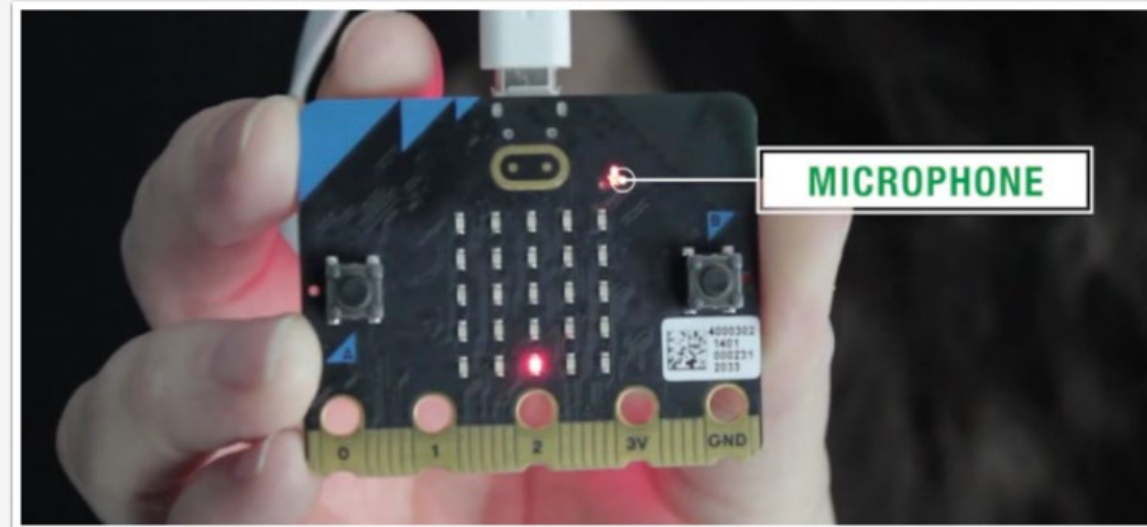
Power on and off

圖片來源: YouTuber - Stu Lowe



2. 內置麥克風(microphone)

micro:bit V2 加入了麥克風(microphone)，功能是可以檢測聲音大小(sound levels)，跟Speaker 一樣是上一代micro:bit 可以接駁外置microphone/擴充板去獲得同樣功能，但會用到pin 腳。



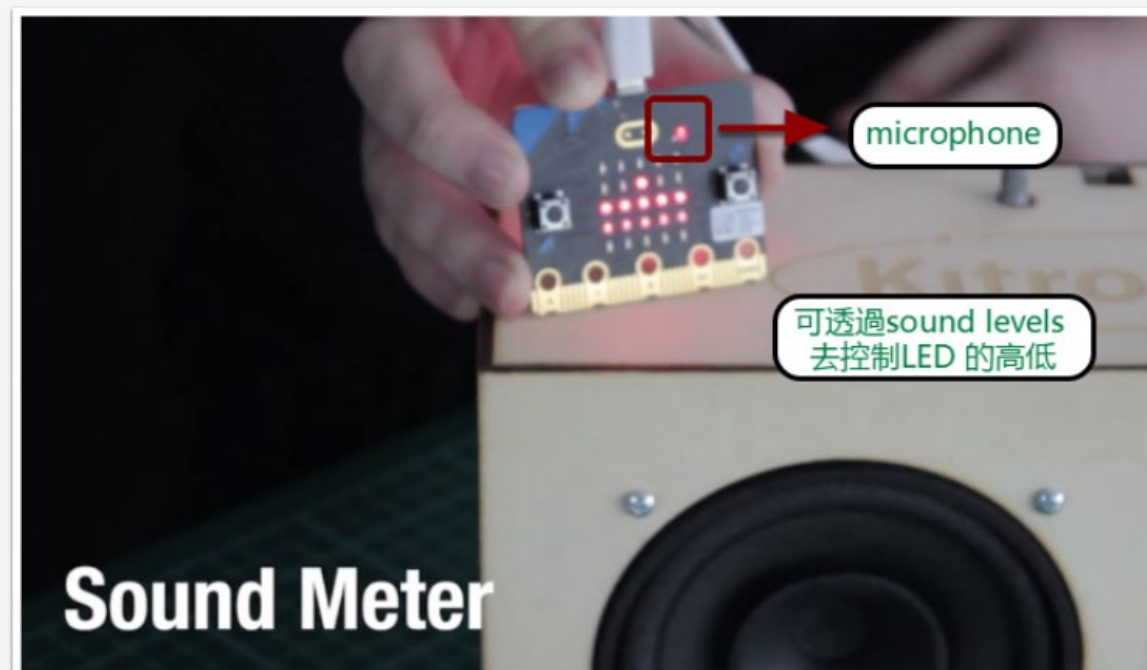
On board speaker

Built in microphone with LED indicator

Touch sensitive logo

Power on and off

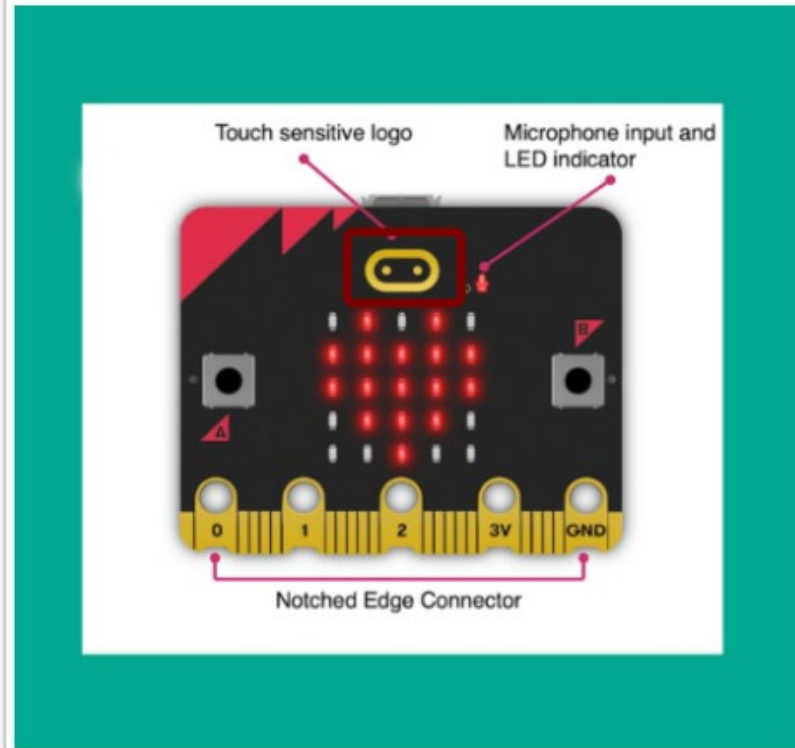
圖片來源: Youtuber - Stu Lowe



Sound Meter

3. 觸碰感應器(Touch logo)

micro:bit V2 加入了 觸碰感應器(Touch logo) ，黃色的logo 最容易分辨V2 跟上一代的分別，而且多了一個 Touch sensor 功能，模仿日常生活出現的觸碰開關。這功能類似是多了一個按鈕，創作上也不在局限於 A 擊 B 擊。



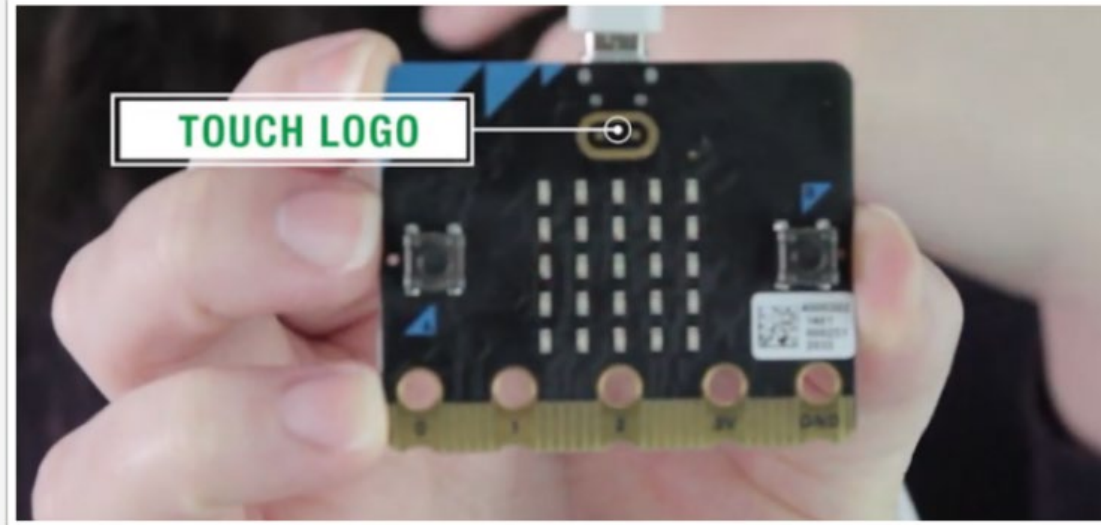
On board speaker

**Built in microphone
with LED indicator**

Touch sensitive logo

Power on and off

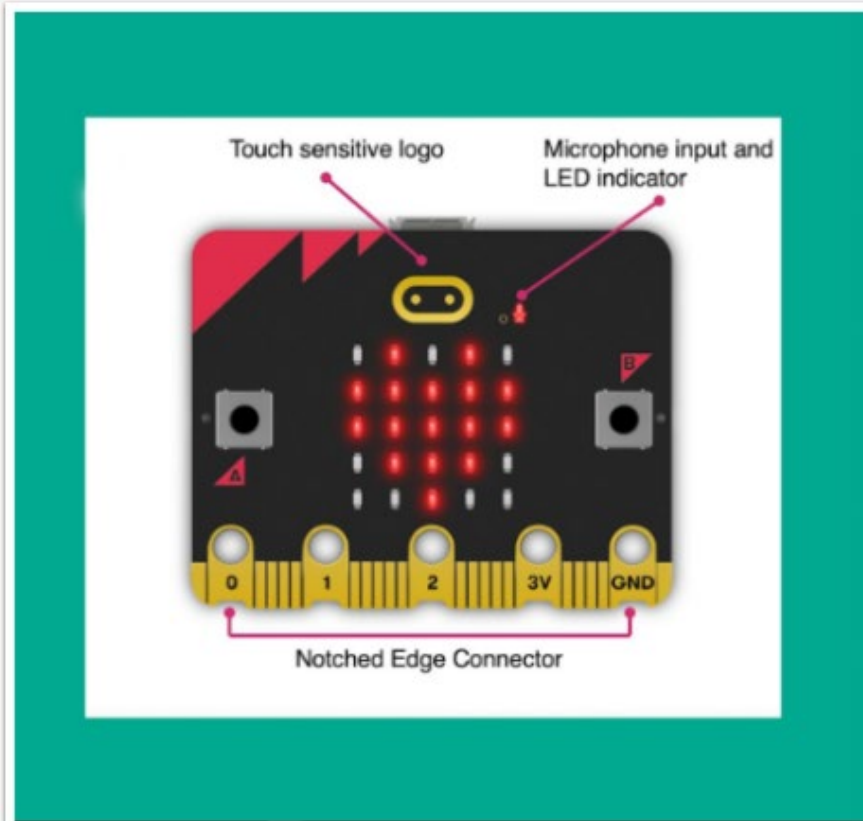
圖片來源: YouTuber - Stu Lowe



4. micro:bit 開關掣

這功能不同多說，就算接駁電源也可以關閉micro:bit 達到節省電源的功能，因為長亮著LED也很耗電！

micro:bit V2 已經把reset 掣 加入 電源開關功能，長按reset 數秒 可以令 micro:bit 開關。



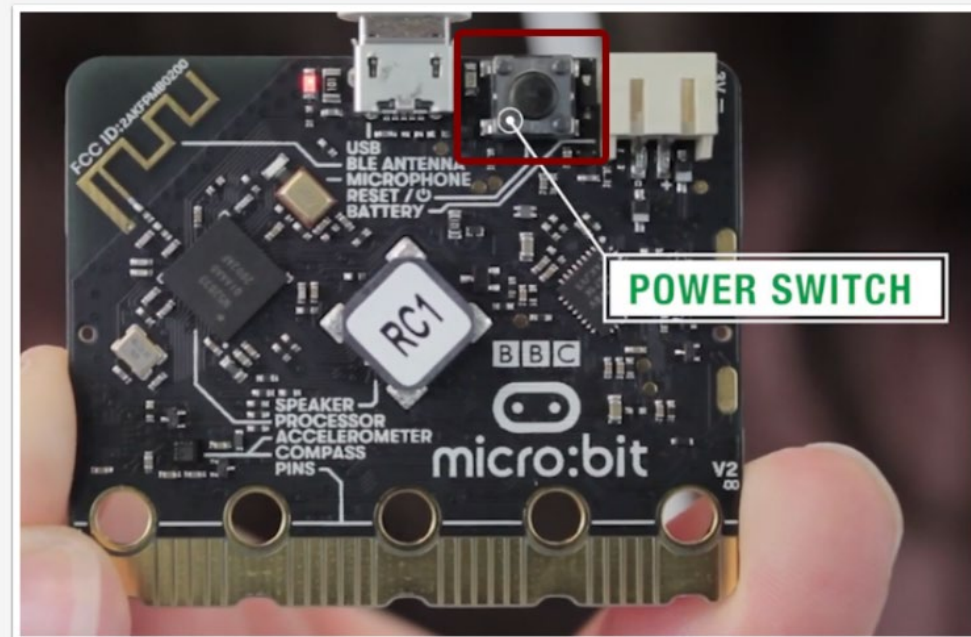
On board speaker

Built in microphone
with LED indicator

Touch sensitive logo

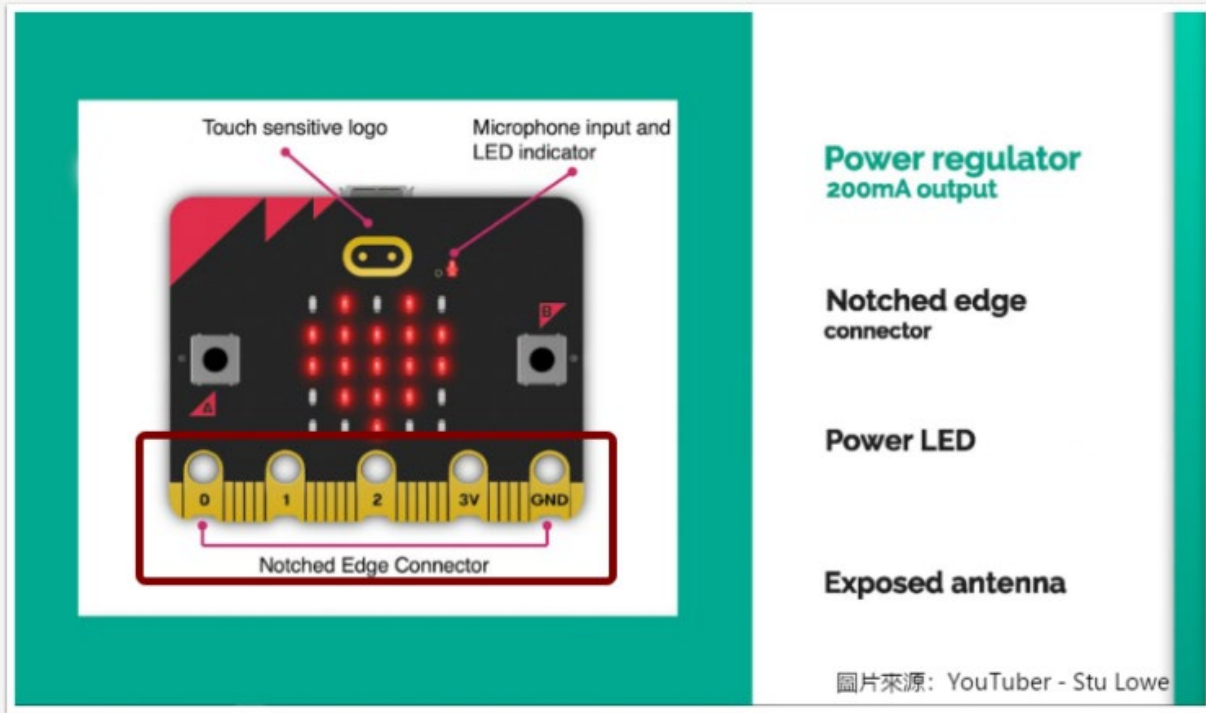
Power on and off

圖片來源：YouTuber - Stu Lowe



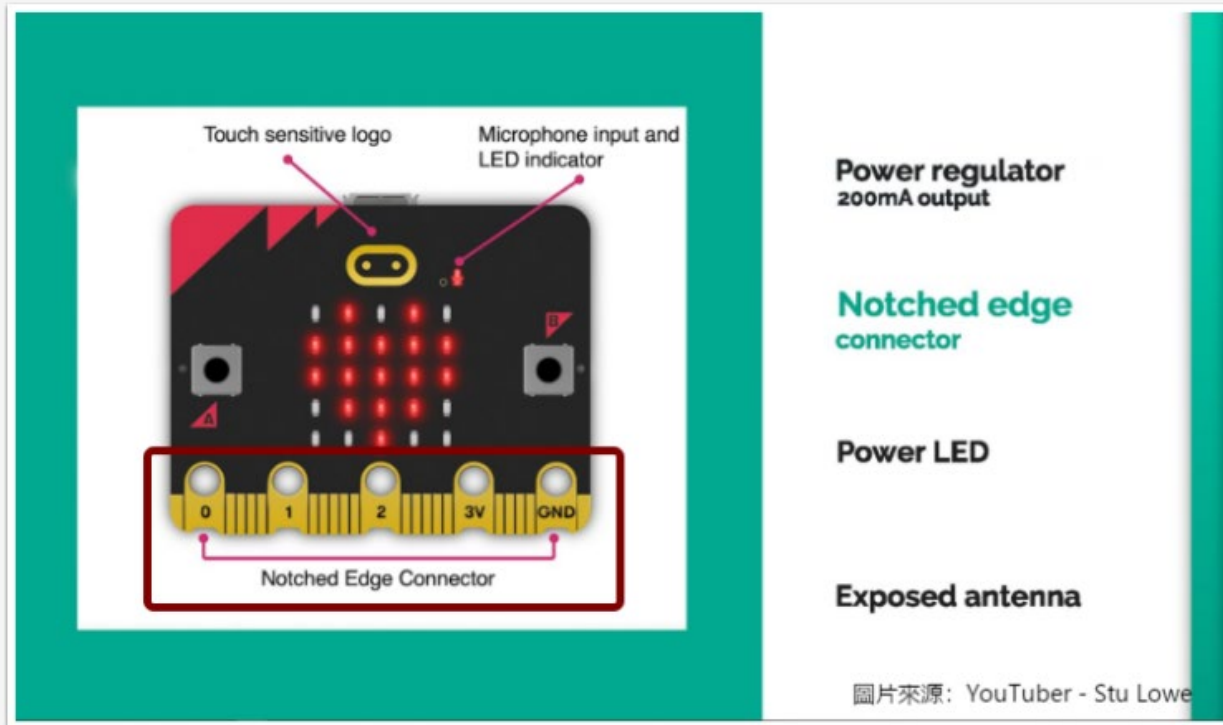
5. 輸出200mA 的pin 腳

比上一代的pin 腳 電流輸出更大，對直接接駁servo 等I/O更穩定，上一代接駁 servo 有時會出現微微震動，代表供電不穩定/比較弱，所以V2 可以改善這個問題。



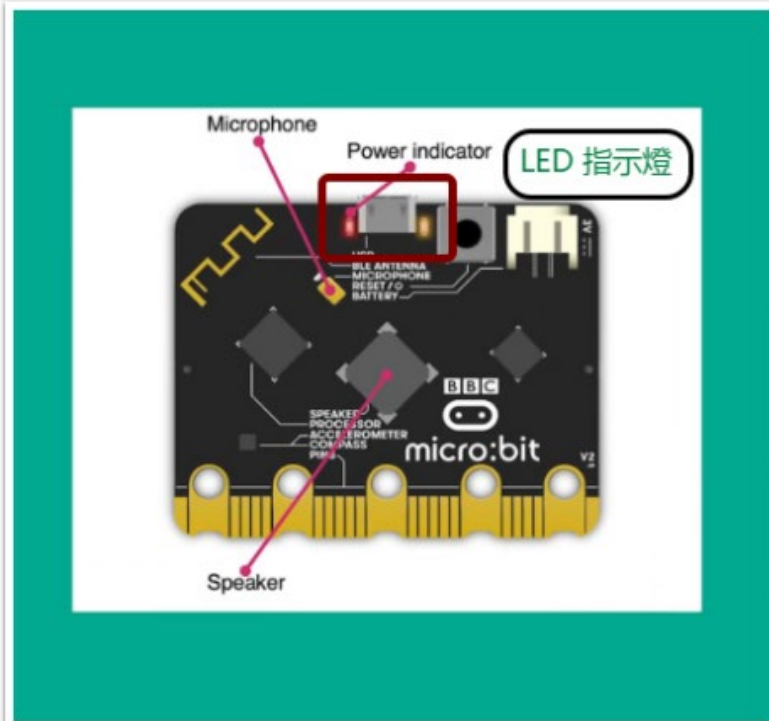
6. 齒狀pin腳

用過上一代micro:bit 都知道，夾鱷魚夾的時候很容易移位，嚴重會導致短路的情況，這代V2加入齒狀pin腳，使用鱷魚夾時穩固一點。是容易辨認上一代跟V2板的特徵之一。



7. 更多LED 指示燈 (了解micro:bit 的狀態 下載中/電源開關)

背後會有更閃爍的指示燈來提示micro:bit 的狀態，跟上一代一樣在下載中也會閃著指示燈，而V2的指示燈更容易令用家知道現在micro:bit 是否在運作中還是沒有電源? 通常在上一代我們會特意編程前方的LED去辨識。



LED 指示燈

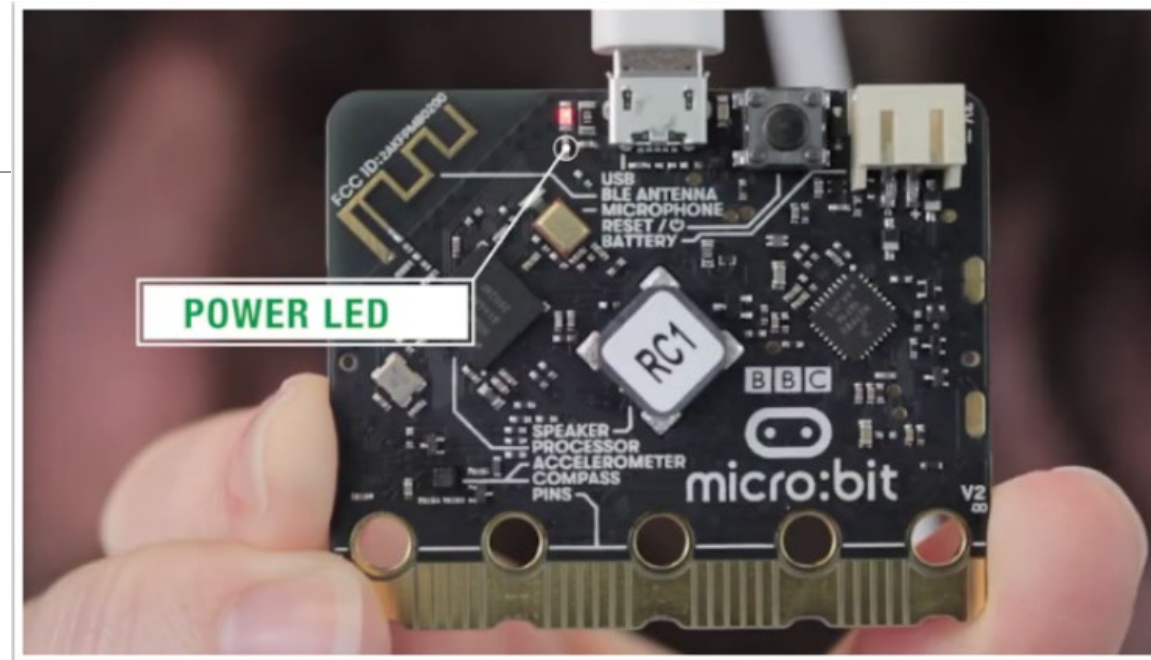
Power regulator
200mA output

Notched edge
connector

Power LED

Exposed antenna

圖片來源: YouTuber - Stu Lowe



8. 顯眼外露的天線

上一代的micro:bit的天線是隱藏的，V2特別把天線弄成黃色，功能上加強了radio和藍牙的穩定性，是容易辨認上一代跟V2板的特徵之一。

硬件規格提升

對於使用複雜的操控機械的編程或許是好事，例如：編程fischertechnik，強大的CPU令處理多邏輯運算的編程更準確，然後RAM跟Storage的提升對於學校環境的使用影響不大。



黃色顯眼外露的天線

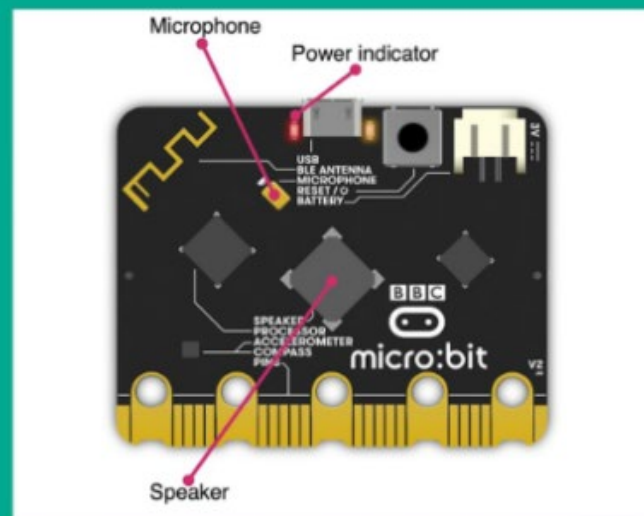
Power regulator
200mA output

Notched edge
connector

Power LED

Exposed antenna

圖片來源：YouTuber - Stu Lowe



64MHz CPU
4x performance

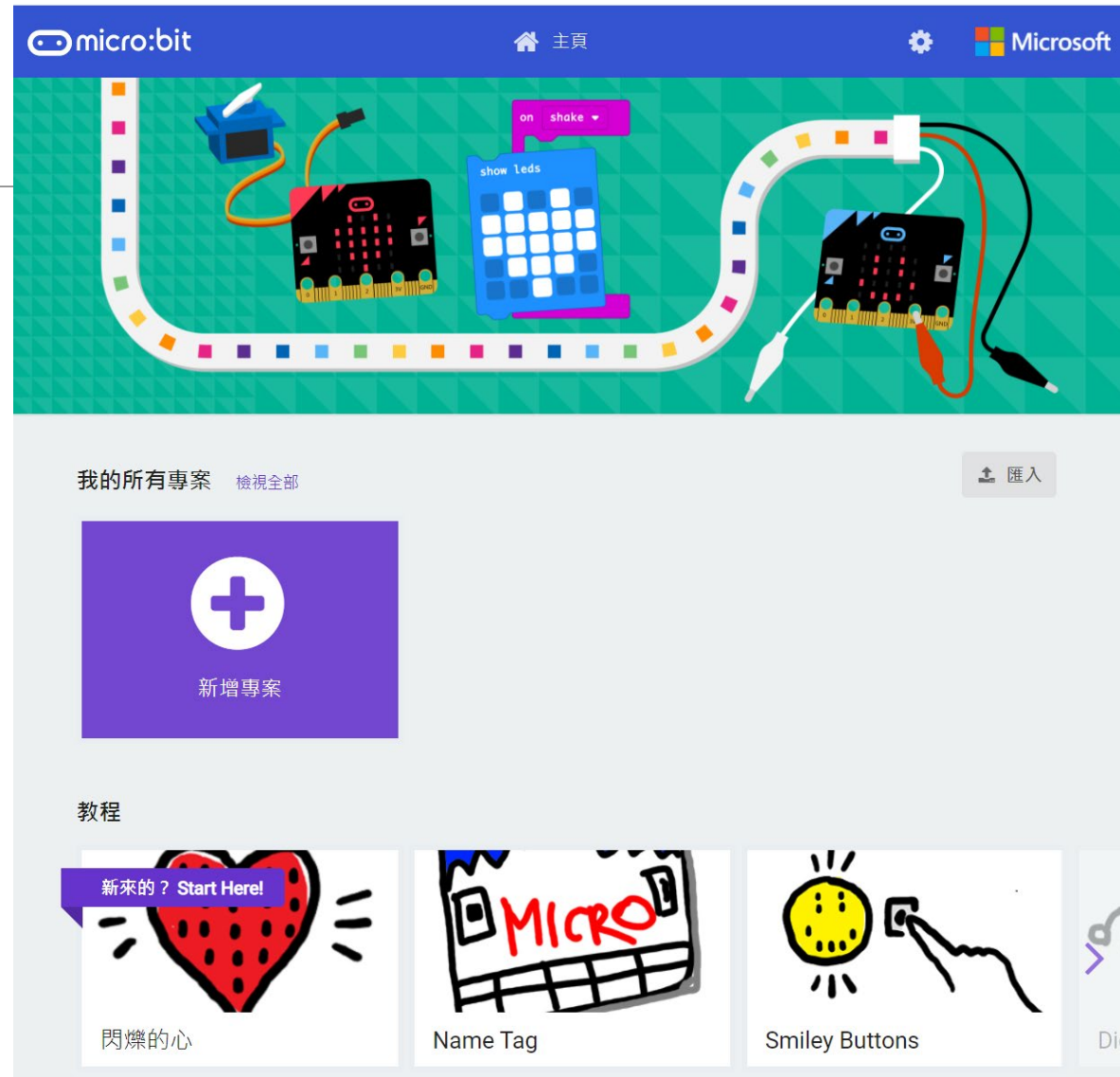
64KB RAM
double memory

512KB Storage
double storage

圖片來源：YouTuber - Stu Lowe

教學網站

線上教學網站 <https://makecode.microbit.org/>



The screenshot shows the MakeCode Microbit website interface. At the top, there is a blue navigation bar with the "micro:bit" logo on the left, a home icon and "主頁" in the center, and a settings gear icon and the Microsoft logo on the right. Below the navigation bar is a large green banner featuring a white ribbon with colorful squares. On the ribbon, there are two Microbit boards connected to various sensors and a keyboard. One board has a "show leds" block, and another has an "on shake" block. Below the banner, there is a section titled "我的所有專案" (All my projects) with a "檢視全部" (View all) link and an "匯入" (Import) button. Underneath is a purple button with a white plus sign and the text "新增專案" (Add project). Below that is a "教程" (Tutorials) section with three cards: "閃爍的心" (Flashing heart) with a red heart icon and a "新來的? Start Here!" (New? Start Here!) banner, "Name Tag" with a "MICRO" name tag icon, and "Smiley Buttons" with a yellow smiley face icon. A partial "Dic" card is visible on the right.

<https://makecode.microbit.org/>

micro:bit 閃爍的心

2

離開教程

Microsoft

放置顯示 指示燈 在重複無限次 裡面，然後畫一顆心。

Basic

show leds

forever

forever

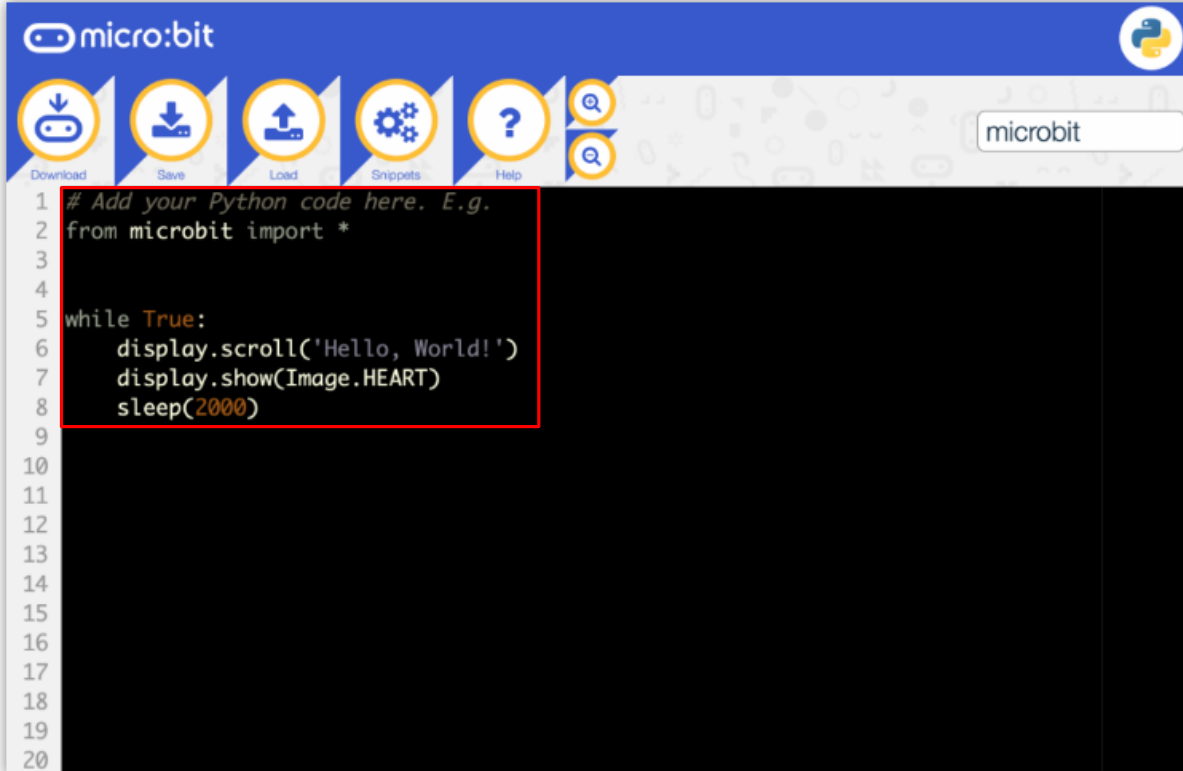
下載

Python 程式編輯器

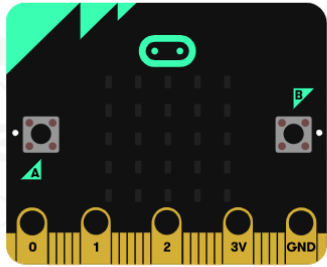
我們的 Python 程式編輯器非常棒，可以讓那些想要精進程式設計能力的人更上一層樓。像是程式片語快速選單、一堆預建的圖片、音樂供你使用，讓你在編程的路上更順暢無阻。由全球Python社群所提供。

來寫個程式吧

官方參考文件



```
1 # Add your Python code here. E.g.
2 from microbit import *
3
4
5 while True:
6     display.scroll('Hello, World!')
7     display.show(Image.HEART)
8     sleep(2000)
9
10
11
12
13
14
15
16
17
18
19
20
```



Make the screen **show an icon** of a Heart.

```
basic.show_icon(IconNames.HEART)
```

基本

基本

顯示 圖示 icon

在 LED 屏幕上繪製出所選擇的圖示。

`basic.show_icon(icon, interval)` ? |||

icon - 預先定義的圖示 id

interval - 顯示圖示的時間長度 (毫秒)。預設值為 600。

清空 畫面

清除 LED 屏幕上顯示的數字、文字等訊息，相當於關閉所有的指示燈。

run code 重複無限次

不斷的執行包含在裡頭的程式。

暫停 100 毫秒

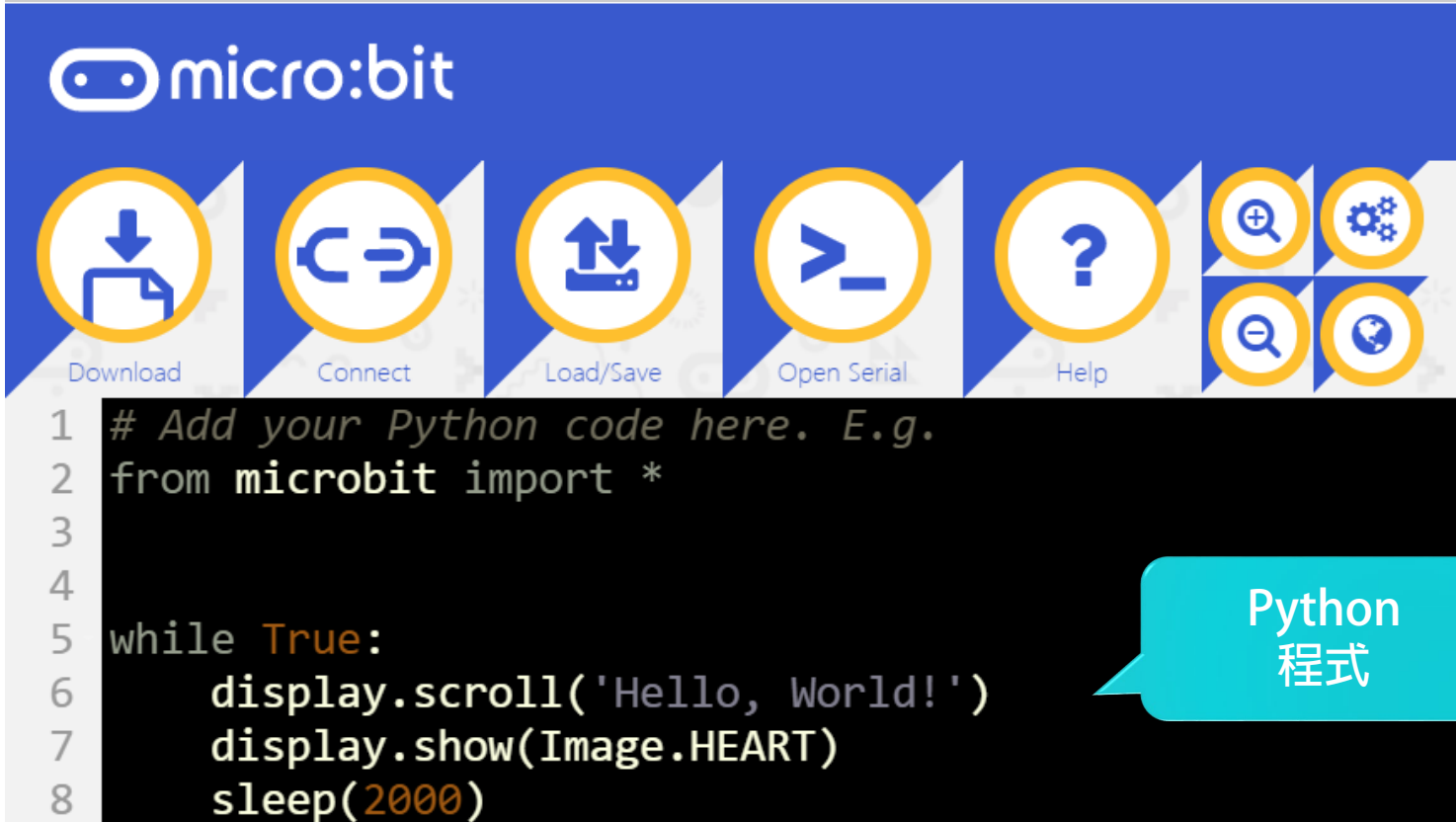
暫停所指定的一段時間，單位為 ms (毫秒，1秒 = 1000 毫秒)

Python
程式指令說明

↓ 下載



用python完成第一個micro:bit程式



micro:bit

Download Connect Load/Save Open Serial Help

```
1 # Add your Python code here. E.g.
2 from microbit import *
3
4
5 while True:
6     display.scroll('Hello, World!')
7     display.show(Image.HEART)
8     sleep(2000)
```

完成一個程式
在Micro:bit上面顯示

1. Hello, world!
2. 顯示心型圖案
3. 停留2000豪秒

Python
程式

Exercise#1

修改顯示為你的學號

修改顯示圖片為 開心（上網搜尋有哪些內建圖型可以用）

設定停留時間為0.5s

Mircro:bit+Python

線上教學文件

- Buttons
- Input/Output
- Music
- Random
- Movement
- Gestures
- Direction
- Storage
- Speech
- Network
- Radio
- Next Steps
- Hello, World!
- Images
 - DIY Images
 - Animation
- Buttons
- Input/Output
- Music
- Random
- Movement
- Gestures
- Direction
- Storage
- Speech
- Network
- Radio
- Next Steps
- API REFERENCE
 - micro:bit Micropython API
 - Microbit Module
- Read the Docs v: latest

Docs » Introduction » Images

[Edit on GitHub](#)

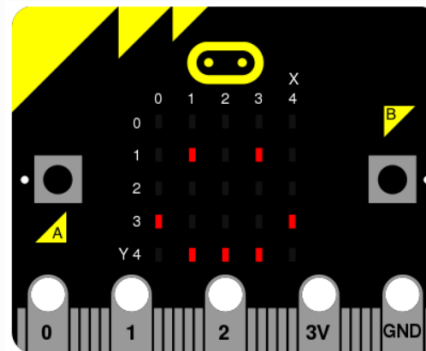
Images

MicroPython is about as good at art as you can be if the only thing you have is a 5x5 grid of red LEDs (light emitting diodes - the things that light up on the front of the device). MicroPython gives you quite a lot of control over the display so you can create all sorts of interesting effects.

MicroPython comes with lots of built-in pictures to show on the display. For example, to make the device appear happy you type:

```
from microbit import *
display.show(Image.HAPPY)
```

I suspect you can remember what the first line does. The second line uses the `display` object to `show` a built-in image. The happy image we want to display is a part of the `Image` object and called `HAPPY`. We tell `show` to use it by putting it between the parenthesis (`(` and `)`).



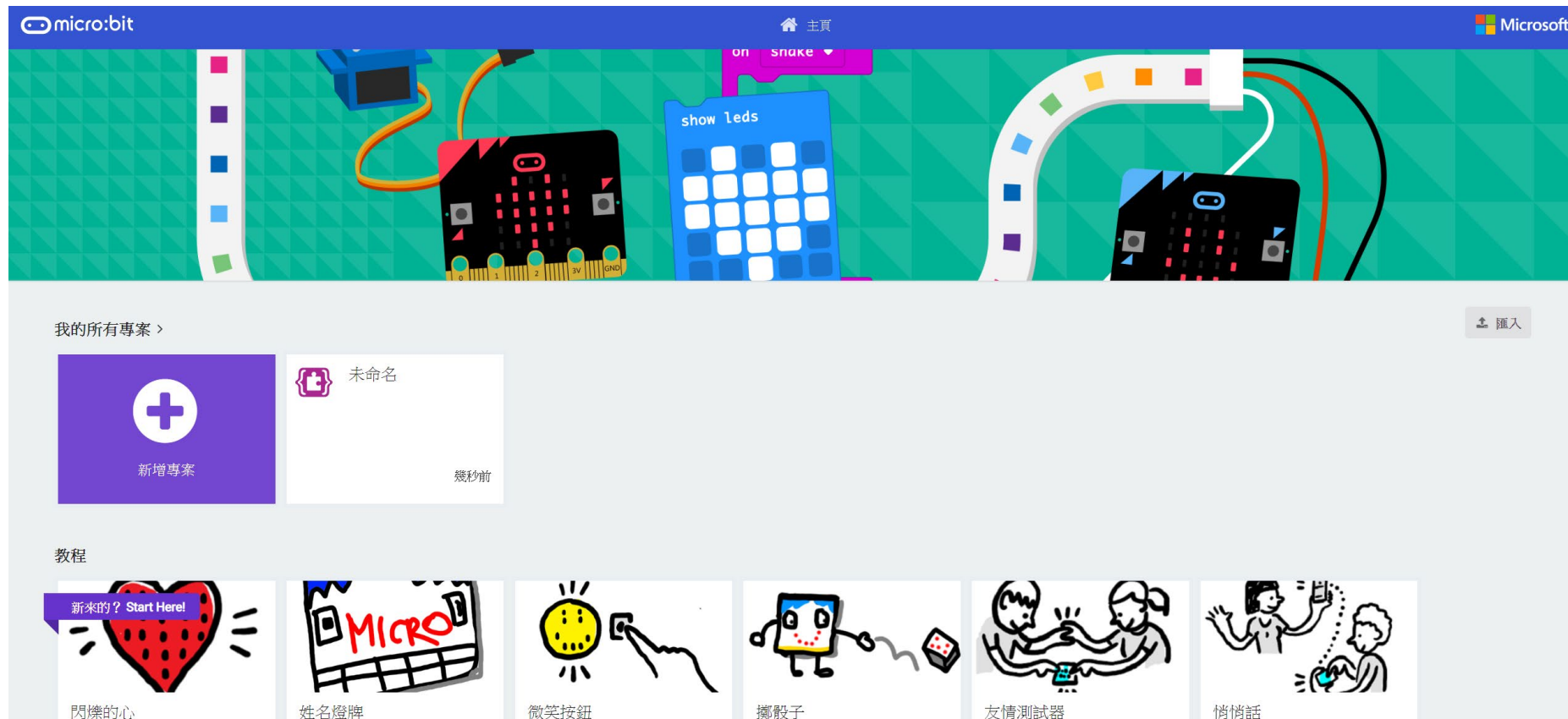
Here's a list of the built-in images:

- `Image.HEART`
- `Image.HEART_SMALL`

<https://microbit-micropython.readthedocs.io/en/latest/tutorials/images.html>

MakeCode

<https://makecode.microbit.org/#>



The screenshot shows the MakeCode website interface for Microbit. At the top, there is a blue header with the 'micro:bit' logo on the left, a home icon and '主頁' (Home) text in the center, and the Microsoft logo on the right. Below the header is a large banner image featuring a Microbit board, a blue keyboard, and a white USB cable. The main content area is titled '我的所有專案 >' (My Projects >) and includes a '新增專案' (Add Project) button with a plus sign icon and a '匯入' (Import) button with an upload icon. Below this, there is a '教程' (Tutorials) section with six cards, each with an illustration and a title: '閃爍的心' (Flashing Heart) with a heart icon, '姓名燈牌' (Name Light Sign) with a 'MICRO' sign icon, '微笑按鈕' (Smile Button) with a smiley face icon, '擲骰子' (Rolling Dice) with a die icon, '友情測試器' (Friendship Tester) with an icon of two people, and '悄悄話' (Whisper) with an icon of two people talking.

我已經完成的Project & Tutorials

The screenshot displays the Microsoft MakeCode website interface. At the top, there is a blue navigation bar with the 'micro:bit' logo on the left, a 'Home' link in the center, and the Microsoft logo on the right. Below the navigation bar is a large banner image featuring a micro:bit board connected to a blue keyboard and a white USB cable. The main content area is divided into two sections: 'My Projects' and 'Tutorials'. The 'My Projects' section is highlighted with a red border and contains a 'New Project' button (a purple square with a white plus sign) and a row of six project cards. Each card includes a project icon, the project name, and the time since it was last updated. The 'Tutorials' section below it features a row of six tutorial cards, each with a colorful illustration and the tutorial title. The first tutorial card, 'Flashing Heart', has a 'New? Start Here!' badge.

micro:bit Home Microsoft

My Projects

Import

Project Name	Time Ago
New Project	-
Coin Flipper	42 minutes ago
Rock Paper Scissors	46 minutes ago
Writing Code	52 minutes ago
Smiley Buttons	54 minutes ago
Writing Code	55 minutes ago
Micro Chat	an

Tutorials

Tutorial Name
New? Start Here! Flashing Heart
Name Tag
Smiley Buttons
Dice
Love Meter
Micro Chat

Exercise#2

在makecode上面
完成所有教程

教程



Exercise#3

完成剪刀石頭布遊戲，並設計剪刀石頭布圖案（發揮創意，盡可能傳神分數越高）。
程式碼 & 執行畫面發布在fb社團。

遊戲



剪刀石頭布



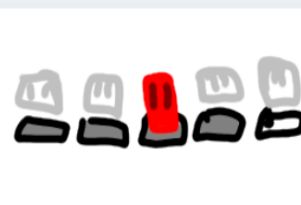
硬幣投擲器



神經反應測試器



魔術按鈕



抓住點點



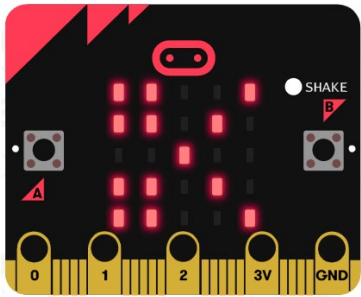
敬禮！



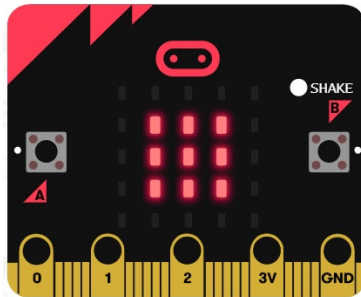
Karel 的 LED 燈

程式碼 & 執行畫面

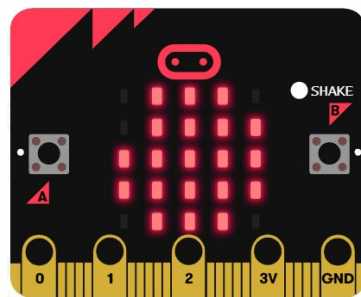
自行設計之畫面



剪刀



石頭



布

```
1 hand=0
2 def on_gesture_shake():
3     global hand
4     hand = randint(1,3)
5     if hand == 1:
6         basic.show_leds("""
7             . # # # .
8             . # # # #
9             # # # # #
10            # # # # #
11            . # # # .
12            """)
13    elif hand == 2:
14        basic.show_leds("""
15            . . . . .
16            . # # # .
17            . # # # .
18            . # # # .
19            . . . . .
20            """)
21    else:
22        basic.show_leds("""
23            # # . . #
24            # # . # .
25            . . # . .
26            # # . # .
27            # # . . #
28            """)
29
30 input.on_gesture(Gesture.Shake, on_gesture_shake)
```

Micro:b it+擴展版

舵機馬達

可以準確控制角度



Exercise

按下A，馬達轉90度



Never Stop
永不放棄

JUST DO IT!

