

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

Micro:bit 應用工作坊

香港教育大學 科學與環境學系

Research Assistant

Mr. Poon Tak Yin, Burton

micro:bit 的簡介

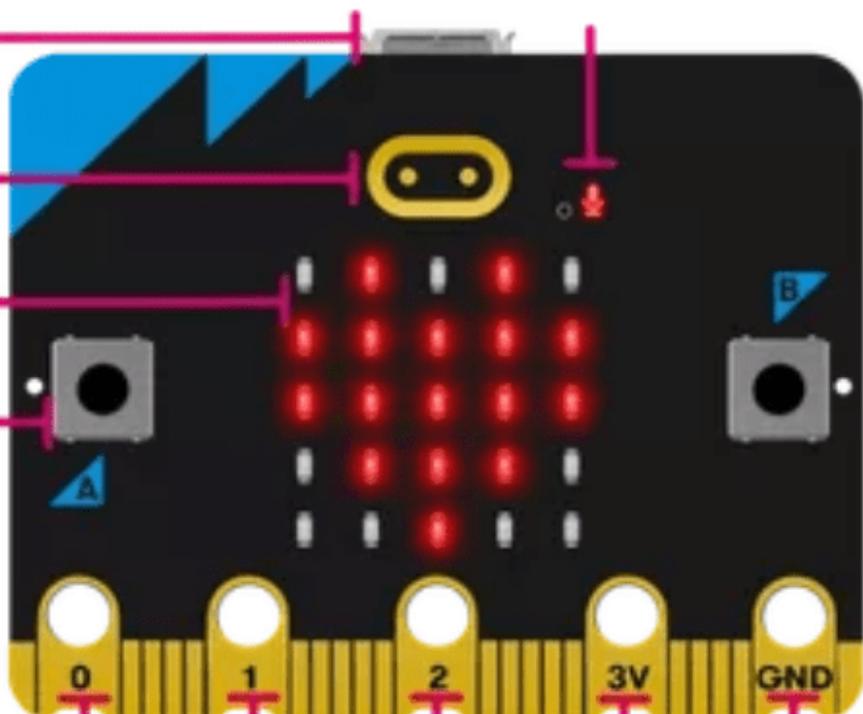
USB mini-A 連接器

咪克風指示燈

觸控感應

25盞LED燈

A/B兩個按鈕



接腳-0

接腳-1

接腳-2

接腳-3V

地線

無線電天線

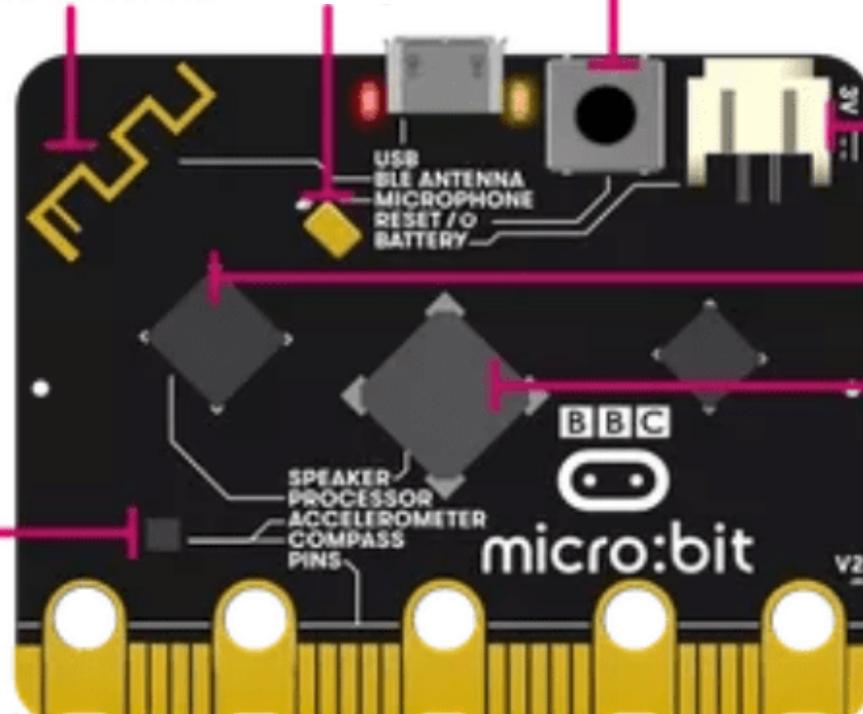
咪克風

重置及電源制

接電池口

處理器

擴音器



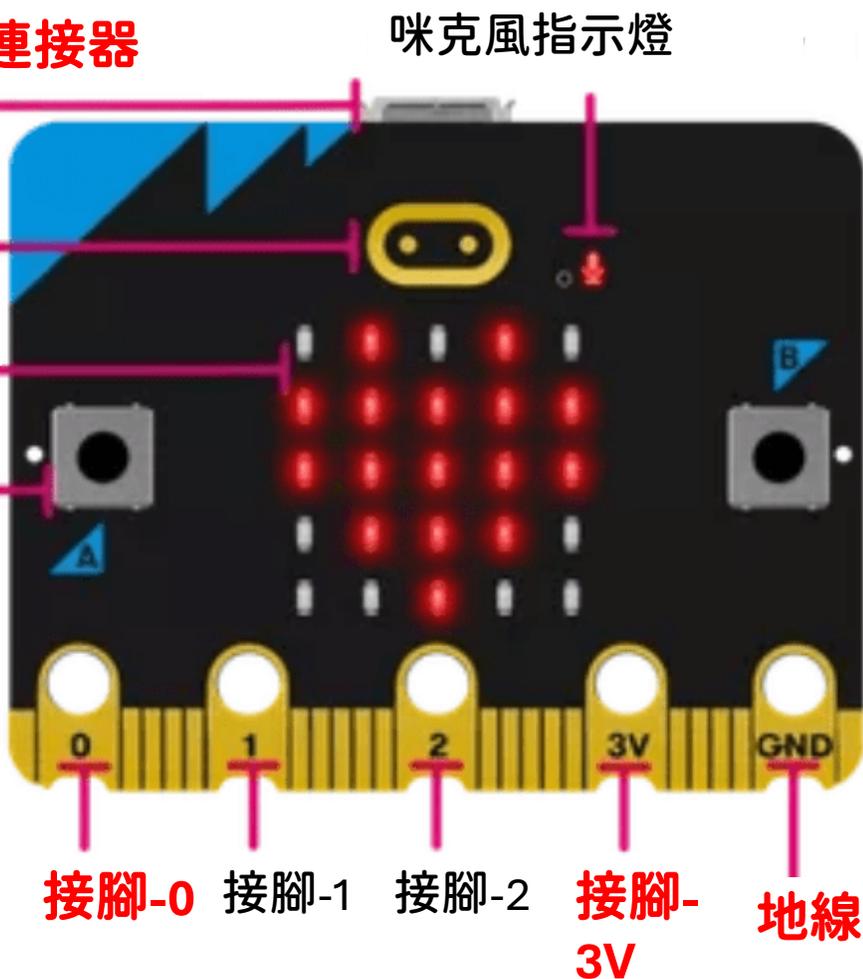
周邊設備的邊緣連接器
指南針與加速度感測器

USB mini-A 連接器

觸控感應

25 盞 LED 燈

A/B 兩個按鈕



無線電天線

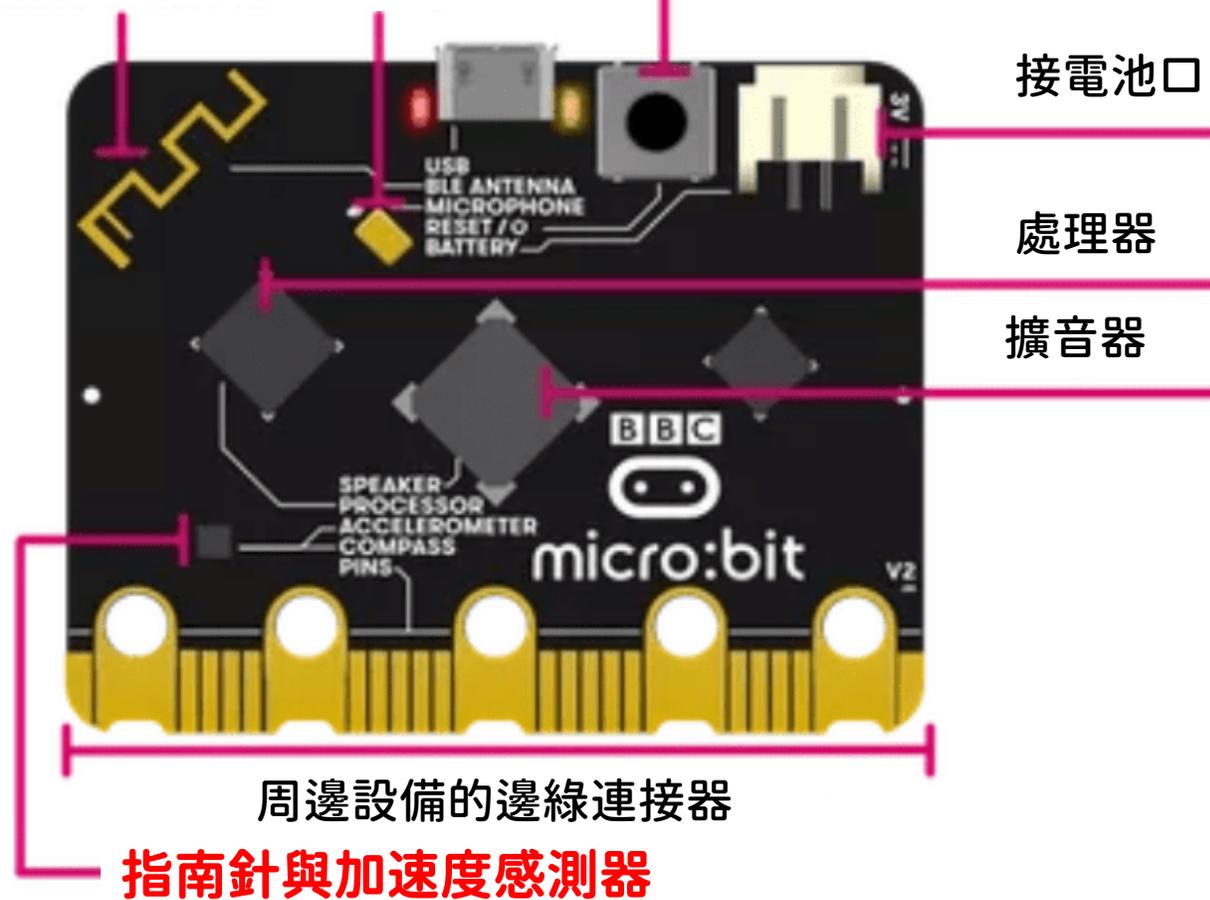
咪克風

重置及電源制

接電池口

處理器

擴音器

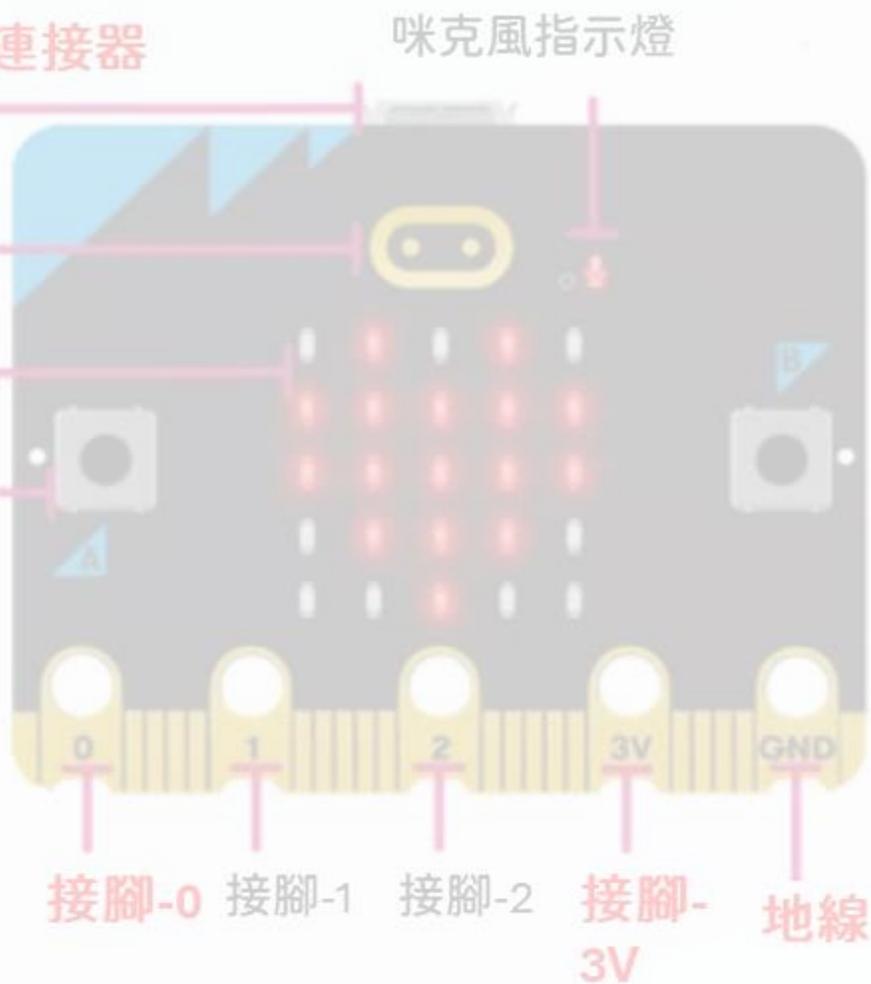


USB mini-A 連接器

觸控感應

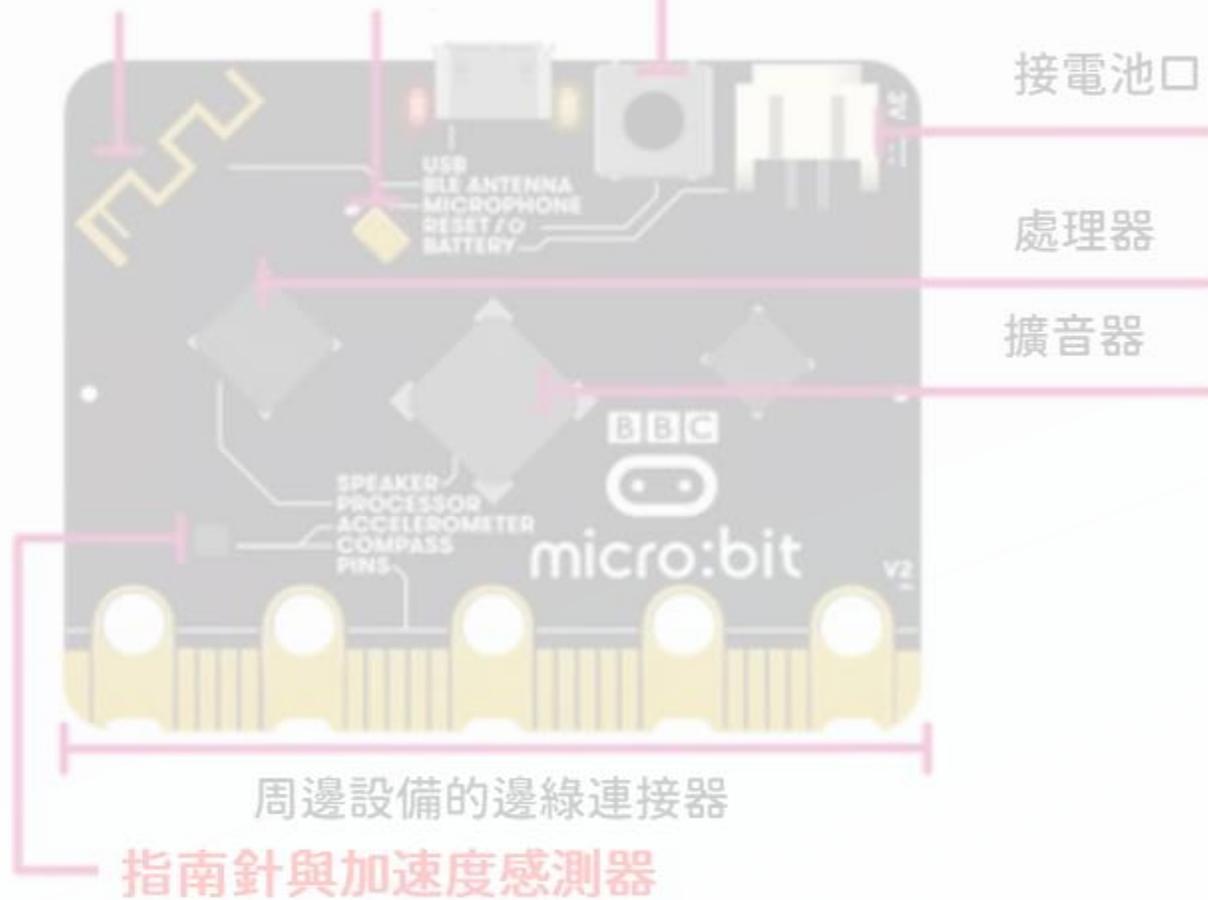
25盞LED燈

A/B兩個按鈕



無線電天線

咪克風



USB mini-A 連接器

觸控感應

25 盞 LED 燈

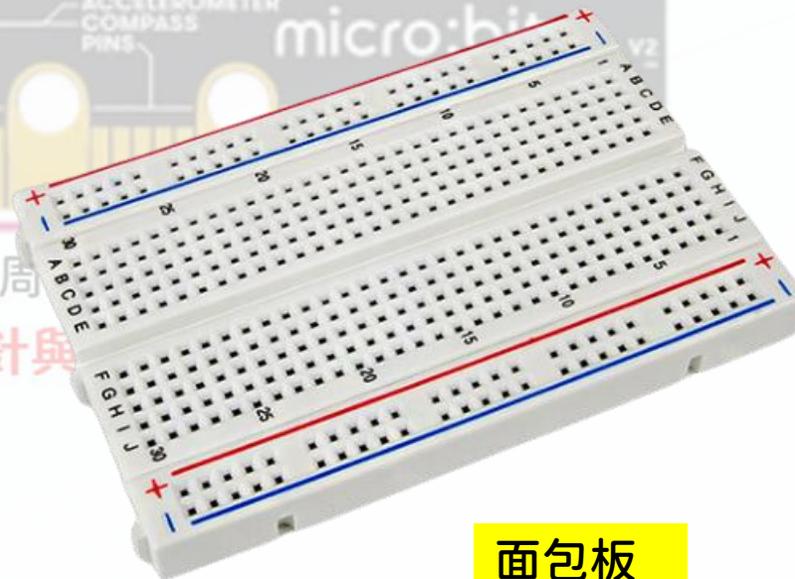
A/B 兩個按鈕



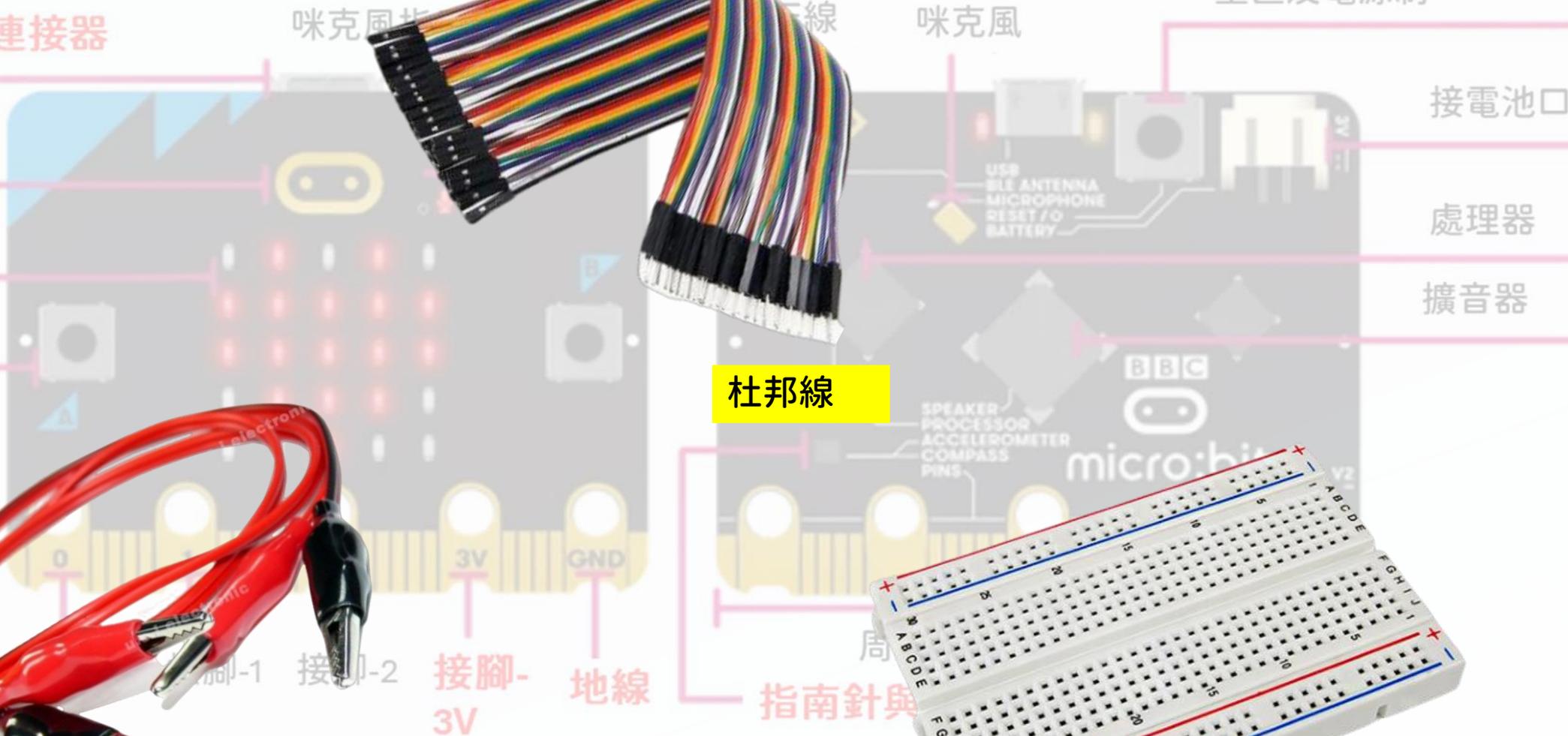
鱷魚夾



杜邦線

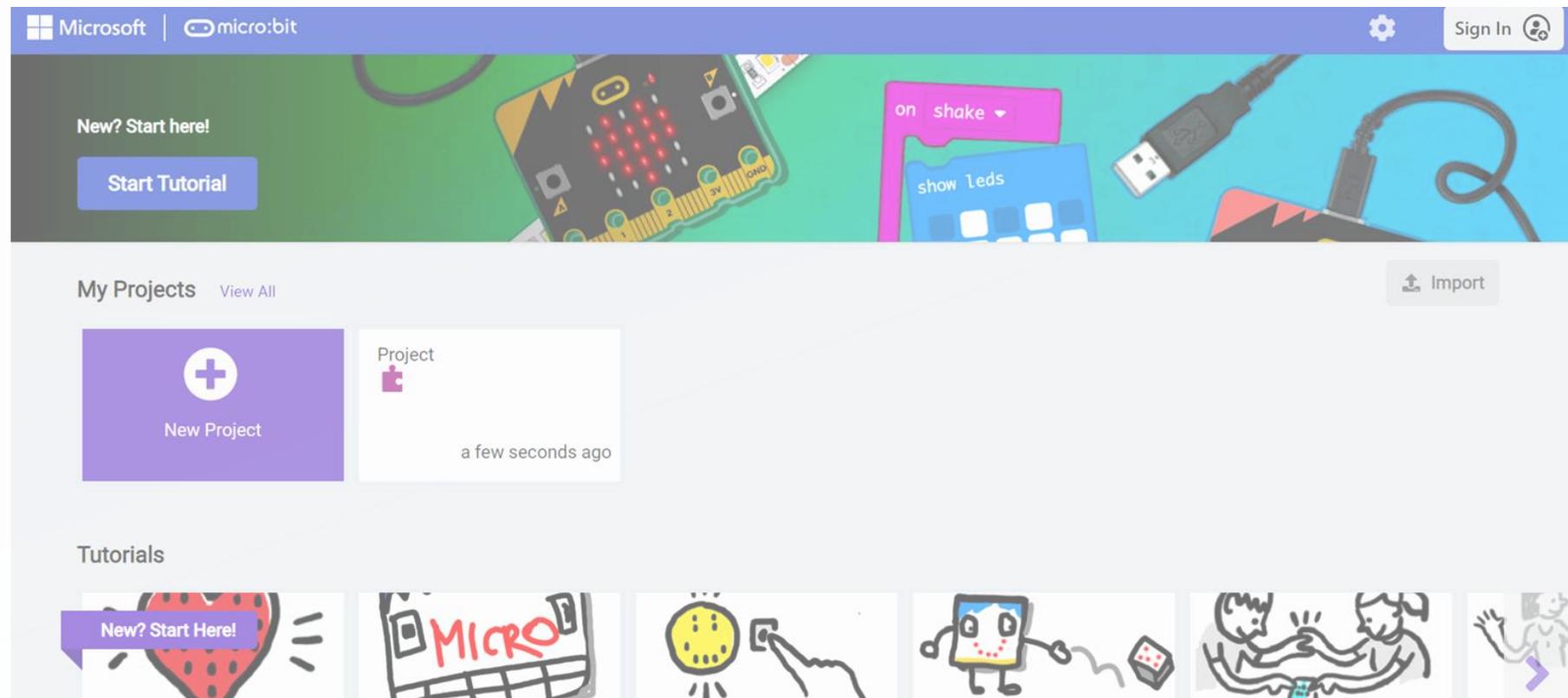


面包板



MakeCode 編程

- 要為micro:bit進行編程，我們需要使用Microsoft出版的makecode軟件
- <https://makecode.microbit.org/>



• <https://makecode.microbit.org/>

The screenshot shows the Microsoft MakeCode Micro:bit website. At the top, there is a blue navigation bar with the Microsoft logo, the text "micro:bit", a settings gear icon, and a "Sign In" button. Below the navigation bar, the main content area features a large background image of a Micro:bit board with a colorful code block. On the left, there is a "New? Start here!" section with a "Start Tutorial" button. In the center, there is a "My Projects" section with a "View All" link and a "New Project" button (a purple square with a white plus sign). To the right of the "New Project" button, there is a "Project" card with a purple icon and the text "a few seconds ago". On the far right, there is an "Import" button (a grey button with an upward arrow icon). At the bottom, there is a "Tutorials" section with several colorful icons representing different projects, including a strawberry, a Micro:bit board, a yellow circle, a character, and two people.

Microsoft | micro:bit Sign In

New? Start here!

Start Tutorial

開始新編程項目

My Projects View All

Project

載入之前儲存的編程檔案 (.hex)

之前的編程項目

Import

New Project

a few seconds ago

Tutorials

New? Start Here!

Search...

Basic

Input

Music

on start

forever

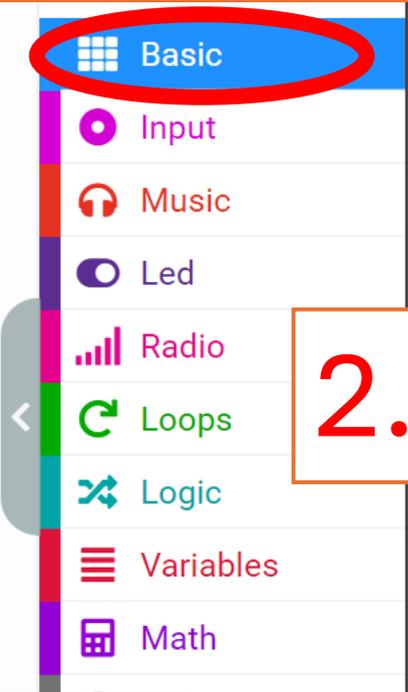
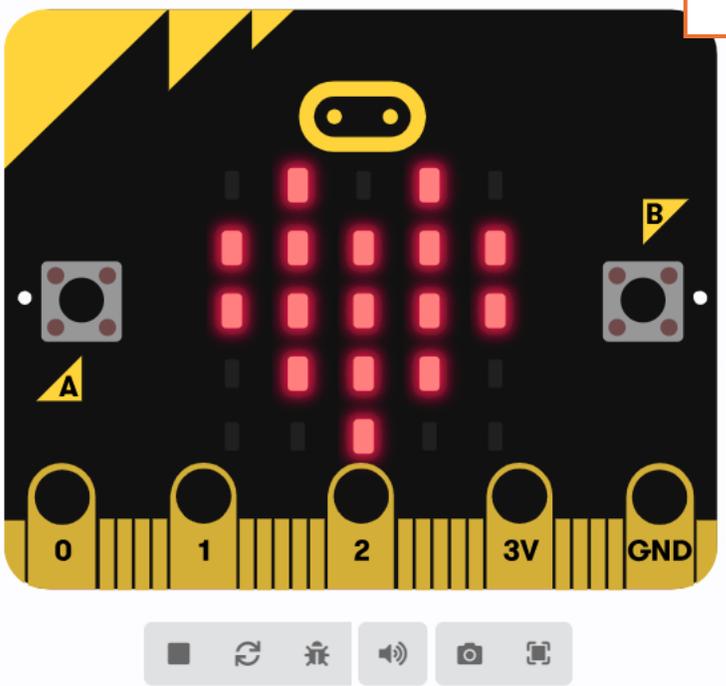
Microbit classroom:

microbit.org/join

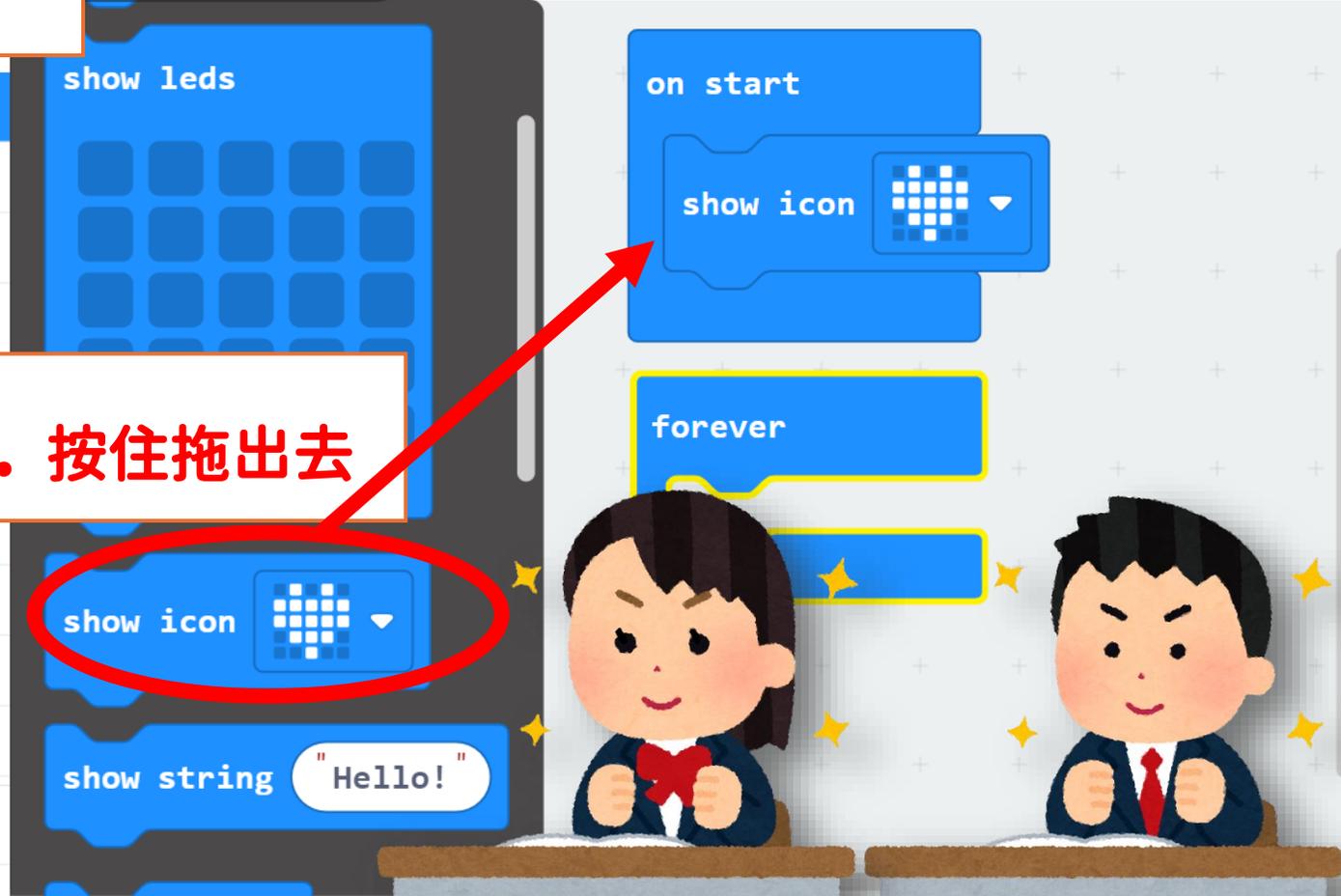
Download

micro:bit 的基本操作

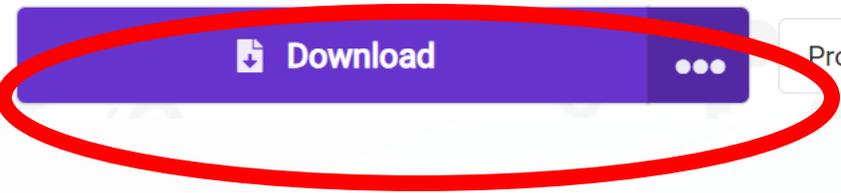
1. 選取Basic



2. 按住拖出去



3. 連接micro:bit並按下載



上傳編程方法

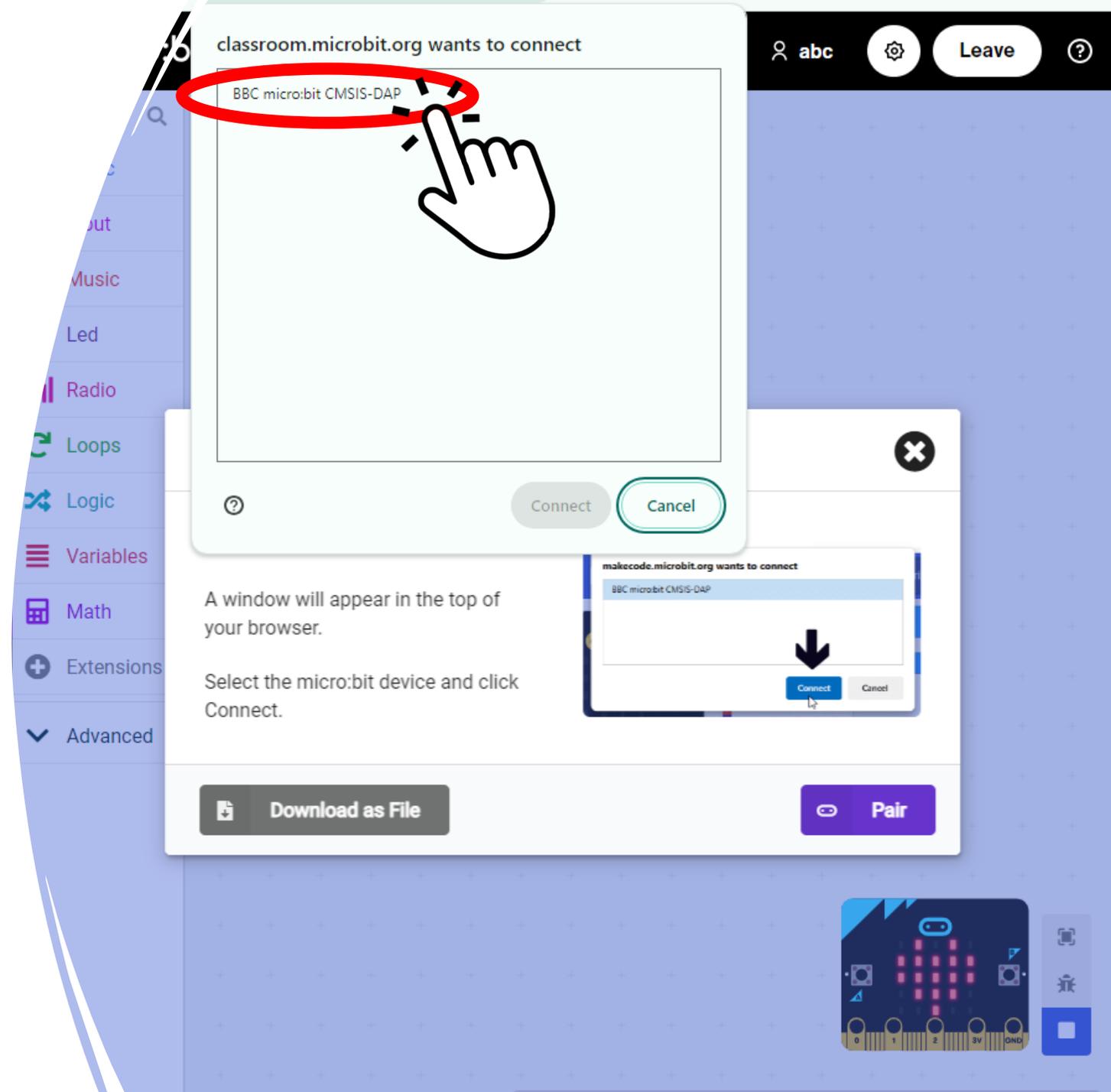
方法一

- 按下載時，瀏覽器會要求進行 Pair 配對
- 左上角彈出選單
- 選取 BBC microbit 再按 Connect
- 成功配對
- 之後每當按下載會直接上傳程式至 microbit

方法二

- 按 Download as File 下載 .hex 程式檔
- Copy and Paste 至 Microbit 資料夾

Microbit 閃爍完成等於上傳完畢

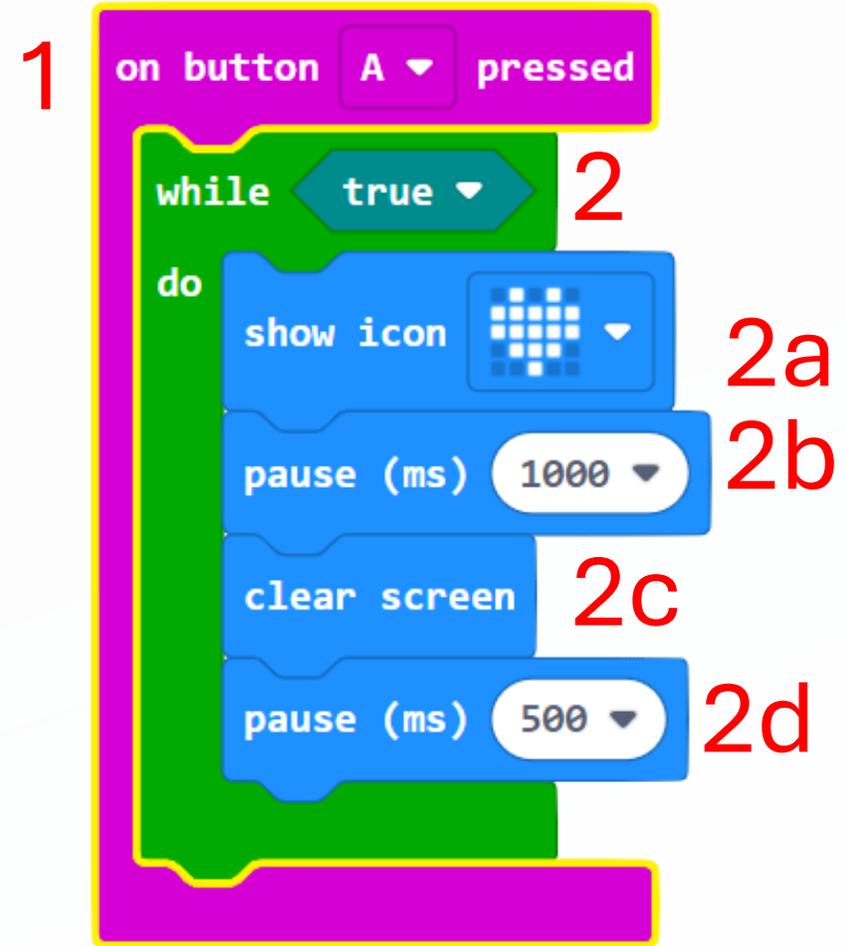
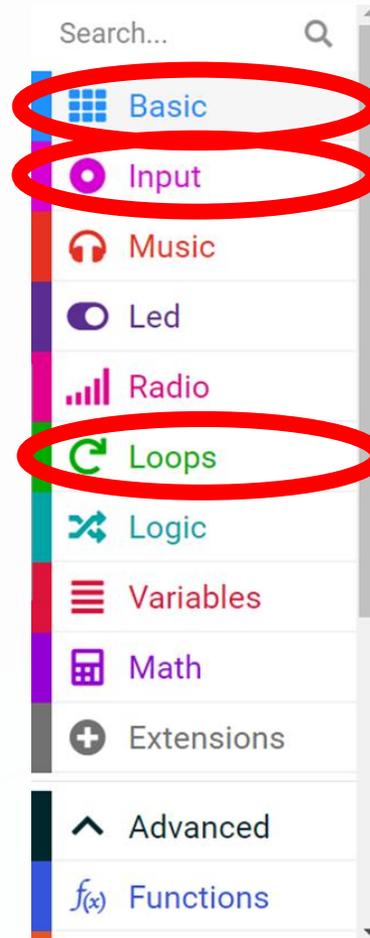


實驗一: LED 閃爍

(5-10分鐘)

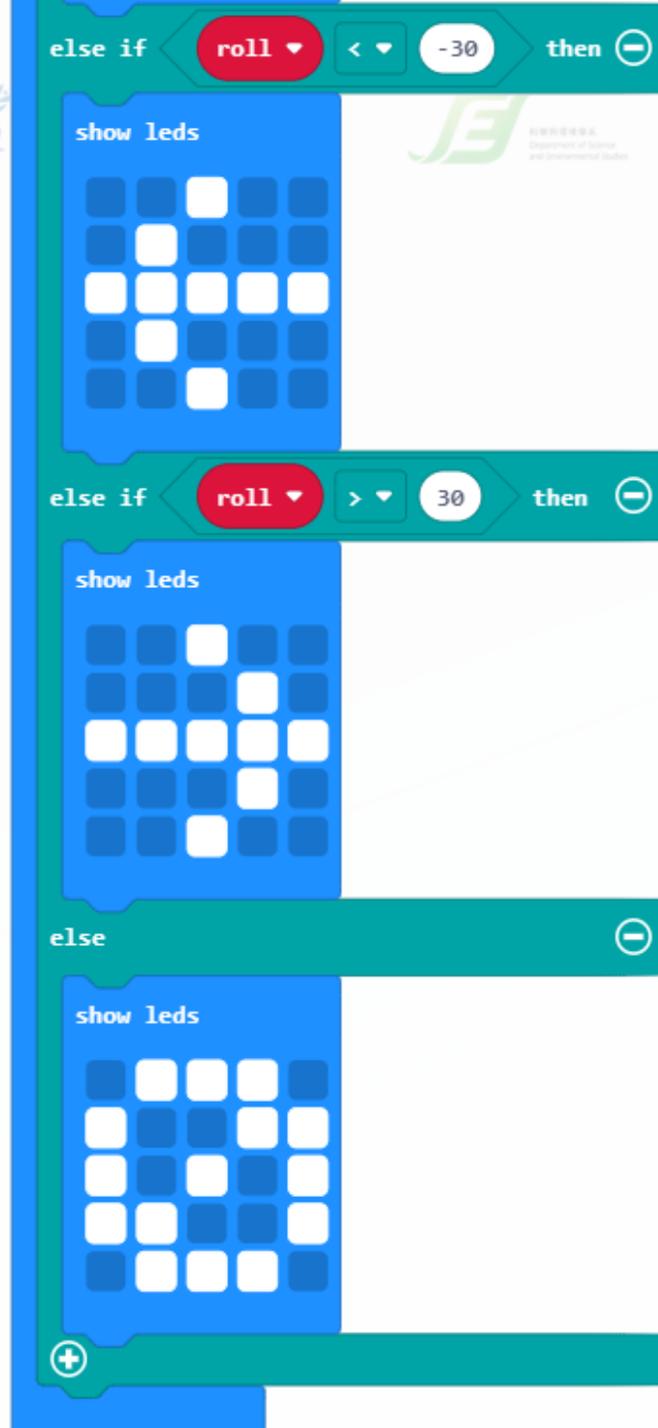
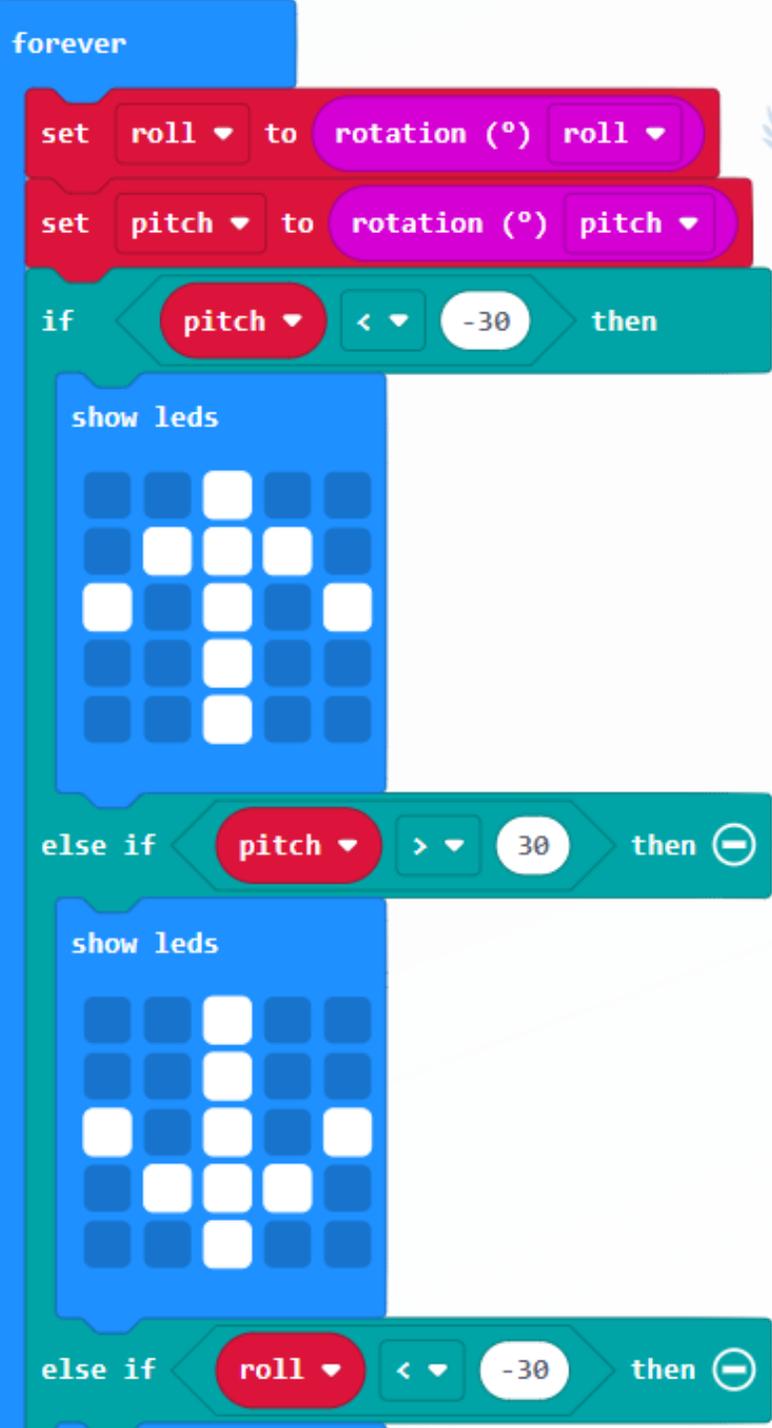
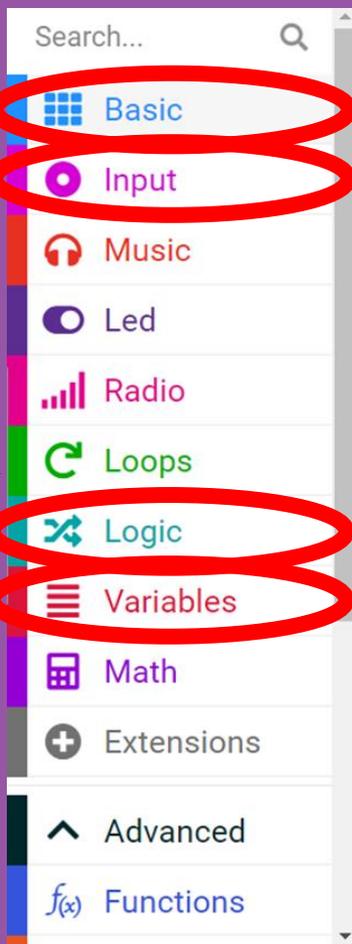
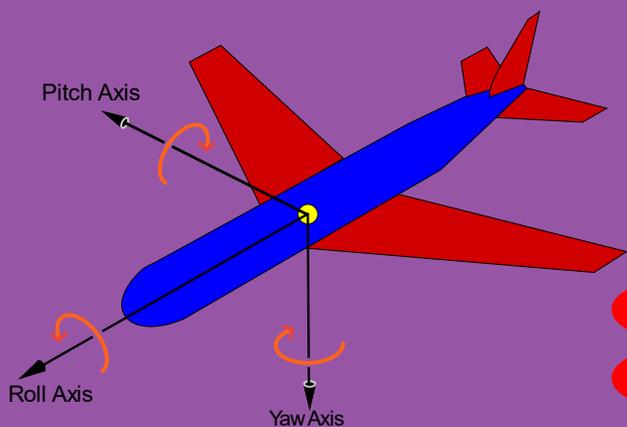
邏輯解釋:

1. 當按下按鈕A
2. 開始無限循環
 - a) 顯示“心心”圖案
 - b) 等待1秒
 - c) 清理畫面
 - d) 等待0.5秒



實驗二：加速度感測器

(15-30分鐘)

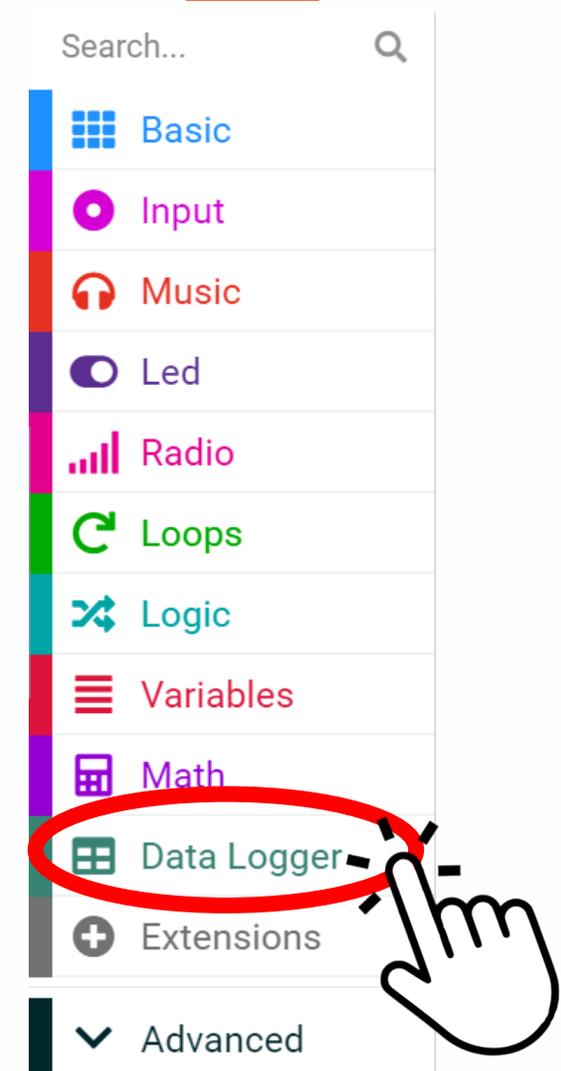
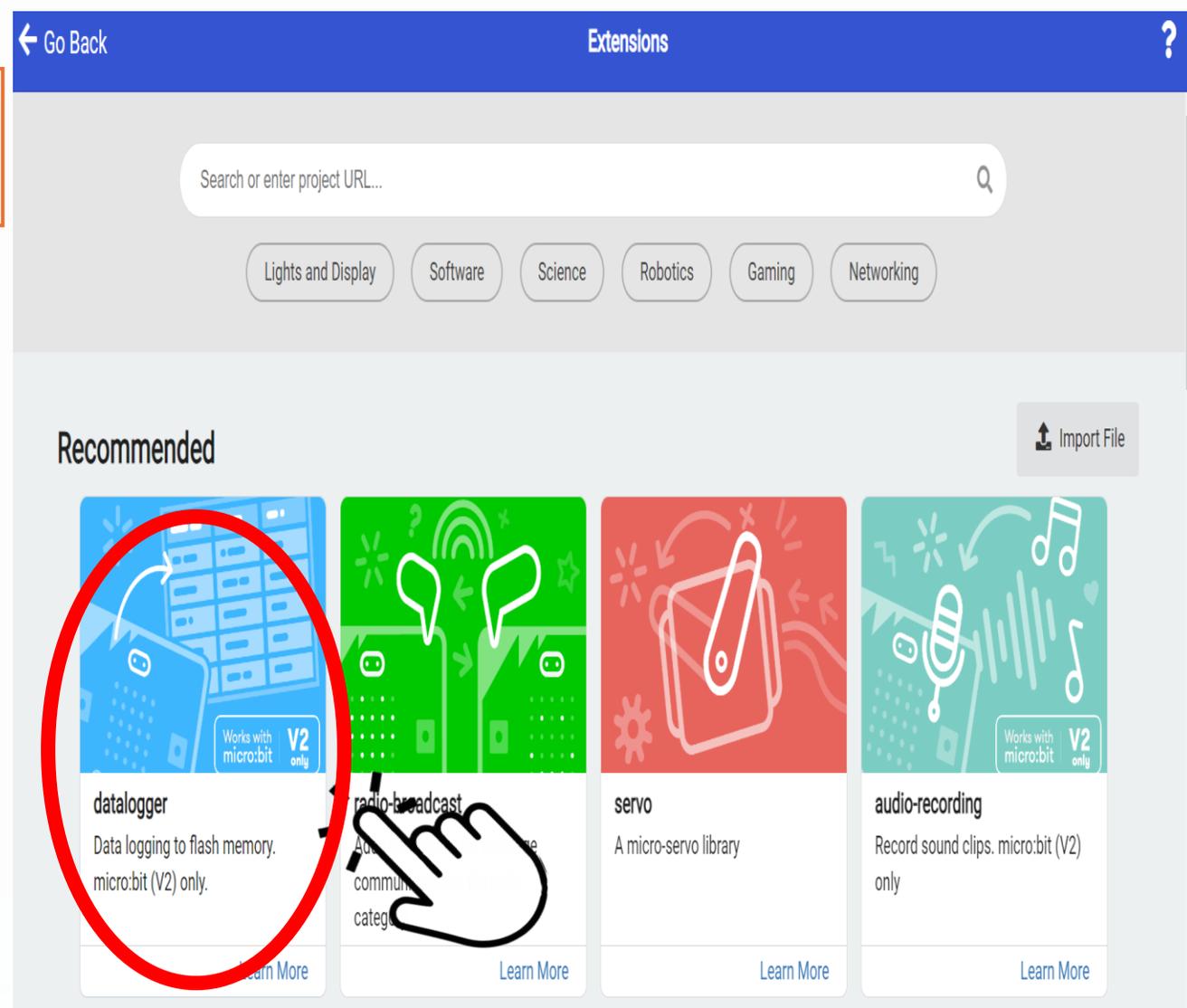
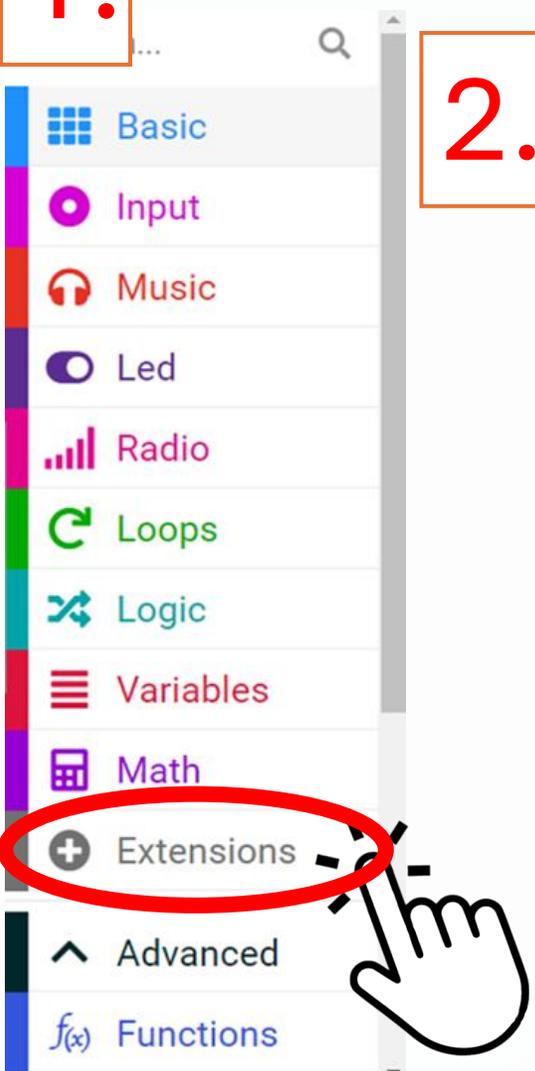


實驗二：進階版 結合數據記錄

1.

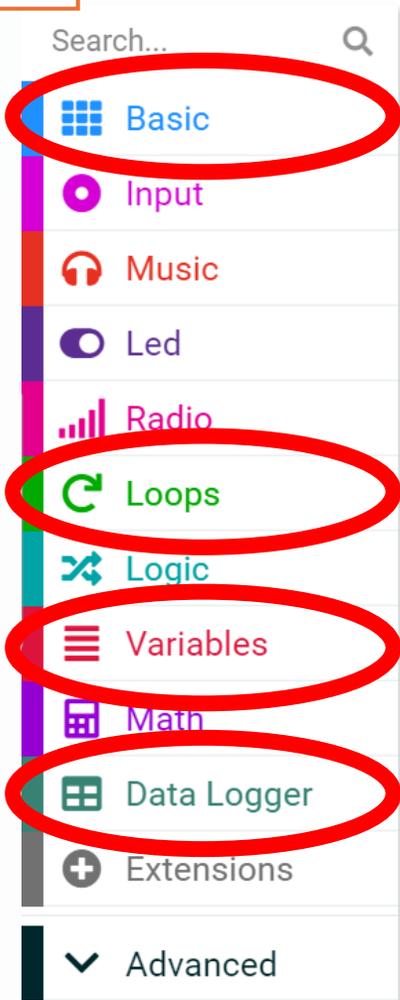
2.

3.

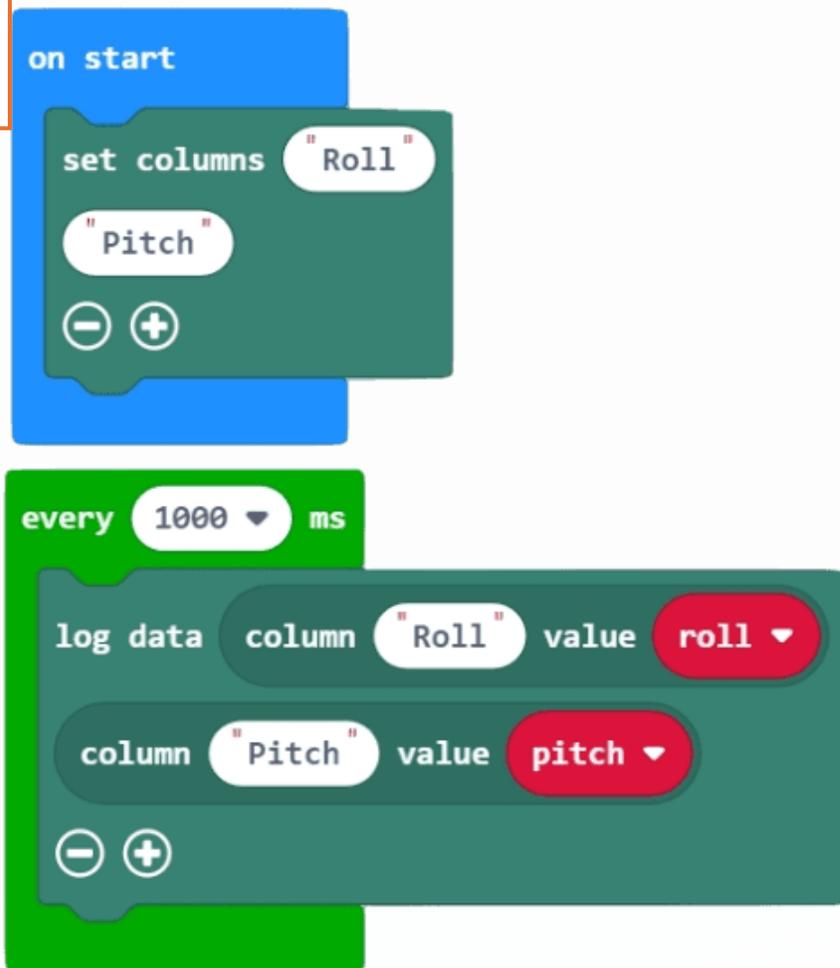


實驗二：進階版 結合數據記錄

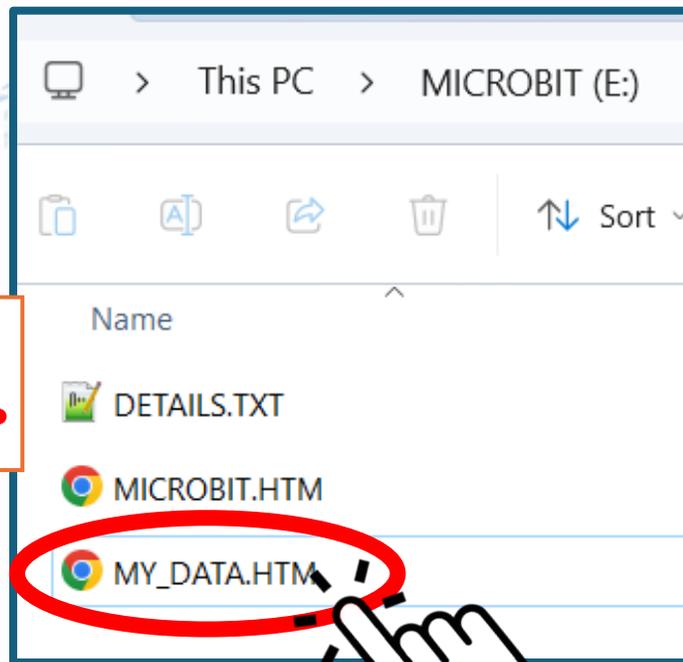
4.



5.



6.



micro:bit

micro:bit data log

Download

Copy

Update data...

Clear log...

Visual preview

This is the data from your micro:bit. To view your data, or download it to your computer as a CSV file, click on the Download button. You can also copy and paste the data into a spreadsheet program. [Learn more about micro:bit data logging.](#)

7.

Time (seconds)	Roll	Pitch
1.01	0	0
2.02	3	2
3.02	4	2

實驗三：動手接線試試看

Education University
of Hong Kong

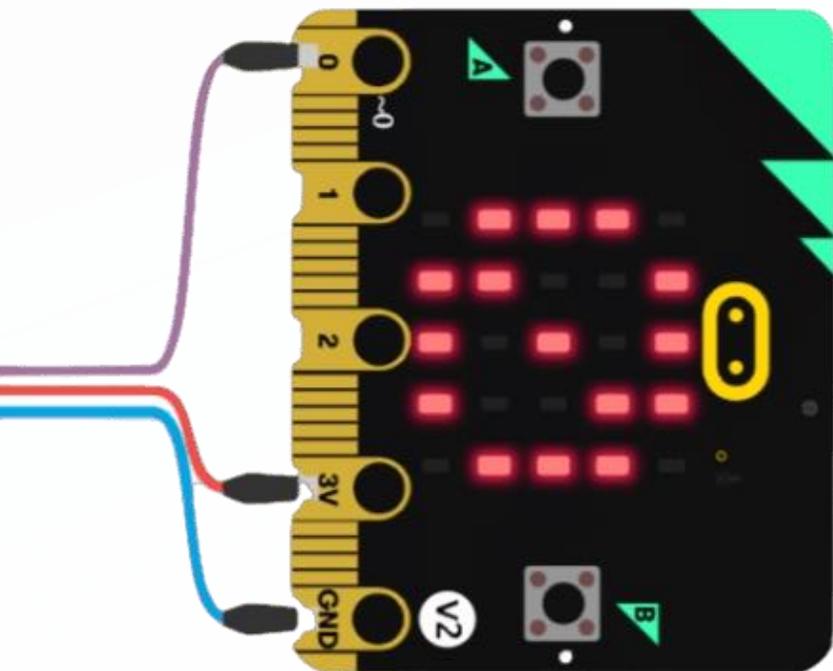
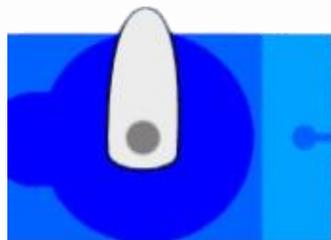
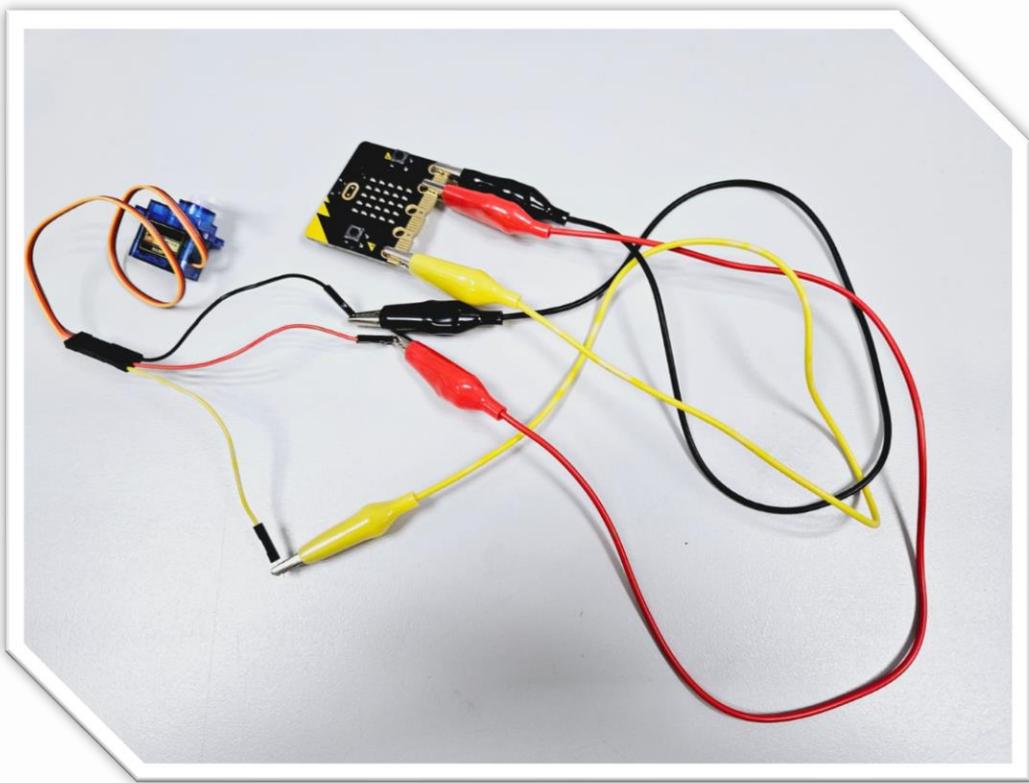
(20-30分鐘)



鱷魚夾



杜邦線



實驗三：動手接線 試試看

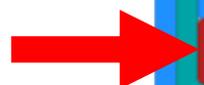
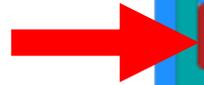
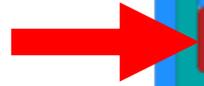
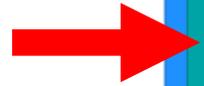
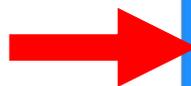
- Advanced
- Functions
- Arrays
- Text
- Game
- Images
- Pins**
- more

```
on start
  servo write pin P0 to 0
  set columns "Roll"
  "Pitch"
```

```
every 1000 ms
  log data column "Roll" value roll
  column "Pitch" value pitch
```

```
forever
  set roll to rotation(°) roll
  set pitch to rotation(°) pitch
  if pitch < -30 then
    show leds
    servo write pin P0 to 180
  else if pitch > 30 then
    show leds
    servo write pin P0 to 0
  else if roll < -30 then
```

```
    else if roll > 30 then
      show leds
      servo write pin P0 to 0
    else
      show leds
      servo write pin P0 to 0
```



如何收集功課/分享同學成果？

- 先去micro:bit classroom: <https://classroom.microbit.org/>

Welcome to micro:bit classroom

Run whole class sessions, easily share code with students and save progress ↗

Pick up where you left off

Open last session



Continue a saved session

Use the file you saved to your computer to continue a session



1. 開始新項目

Start something new

New blank session

Start your students with a blank code editor or set up starting code yourself



Choose a project or lesson

Find a project or lesson from our teacher resources and open it in micro:bit classroom

Browse projects

Browse lessons



New session setup

Name

First Lesson

2. 輸入項目名

Code editor

MakeCode Python

Starter code

Starter code is given to students when they join

on start

forever

3. 給學生的起始編程

Edit

Back

Start session



Setup

Invite

Save

End session



Class



You

Edit code

Send code



You

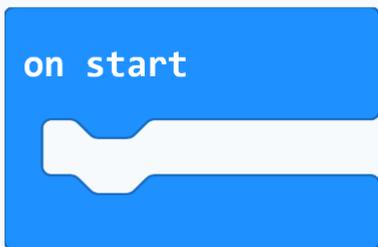
View and edit your own code

No students have joined yet

Copy invite link

Show joining details

Joined: 0



1. 建立邀請碼

Setup

Invite

Save

End session



Class



You

Edit code

Copy student invite link

Show student joining details



Student joining details



Go to URL

microbit.org/join



Classroom name

Cloudy * Pink Museum 69



Password

88 - 9M - 11 - DG

No students have

Copy invite

Show joining

Joined: 0

Class



You

Edit code



You

View and edit your own code

No students have joined yet

Copy invite link

Show joining details

Joined: 0

on start

forever

Save session as a file
Continue this session by opening this file

Save session report
Save a Word document showing images of the students' code

Class

You

Edit code

Send code

on start

forever

2. 修改並回傳學生的編程

1. 在線學生

- You
View and edit your own code
- Amari
- Ann
- Ashanti
- Azia
- Charlotte
- Chloé
- Daniel
- Emma

micro:bit 的科學教育上的應用

QTN 其他學校 project 例子

對象	電路版	題材
小學生	Microbit	遙控車/遙控無人機
小學生	Microbit	水耕種植自動淋水
小學生	Microbit	降落傘撞擊力測試
中學生	Microbit	PH值測試
中學生	Microbit	不同顏色光的吸收與反射
中學生	Arduino	麥克納姆輪全方向遙控車

總結

- 本工作坊介紹了
 - ✓ Microbit 基本功能
 - ✓ Microbit 軟件上編程操作
 - ✓ Microbit 硬件上連接電線操作
 - ✓ 網上互動教室 micro:bit classroom 的基本操作

Q & A

