

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

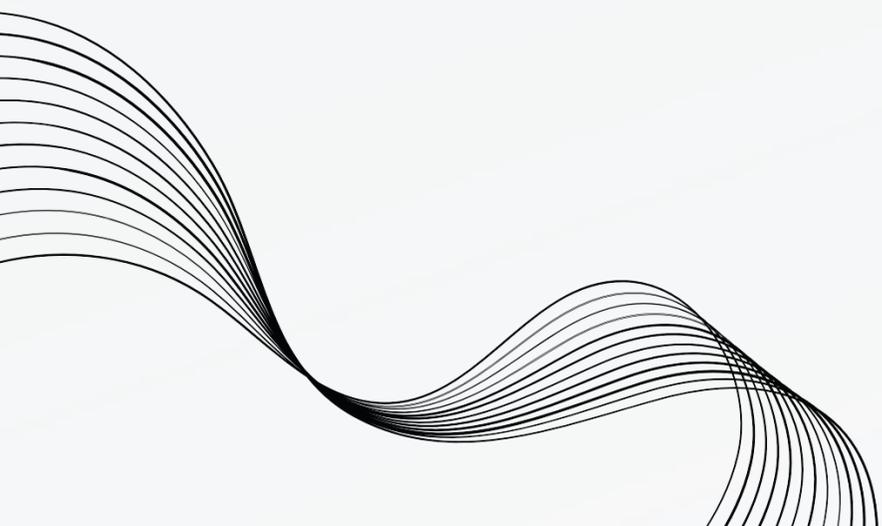
Application of Micro:bit to Make

Thermotank Reminder

溫度提示器裝置

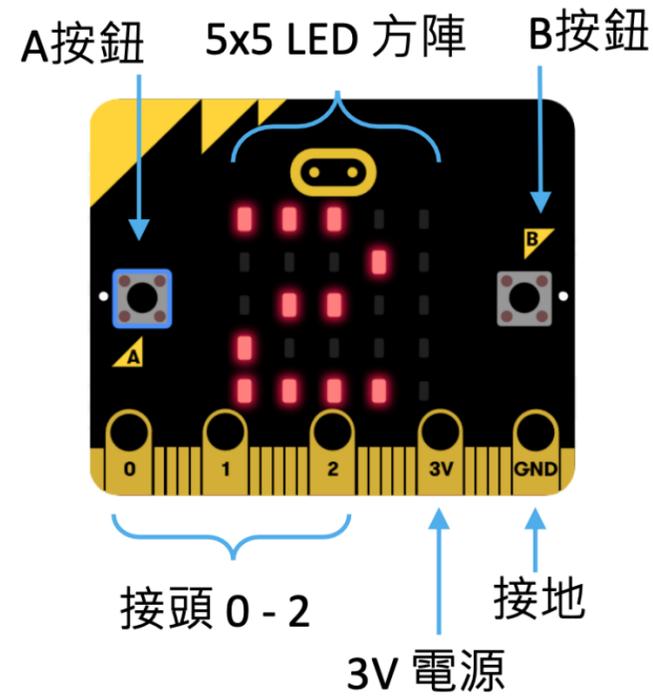
所需配件：

Micro:bit, Temperature Sensor, Motor with Fan, Sensor:bit,
OLED Screen, USB cable



Micro:bit 基本介紹

Micro:bit是由一間英國公司開發設計的微型控制器，用於電腦及編程學。



2個控制按鈕 (A鈕和B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

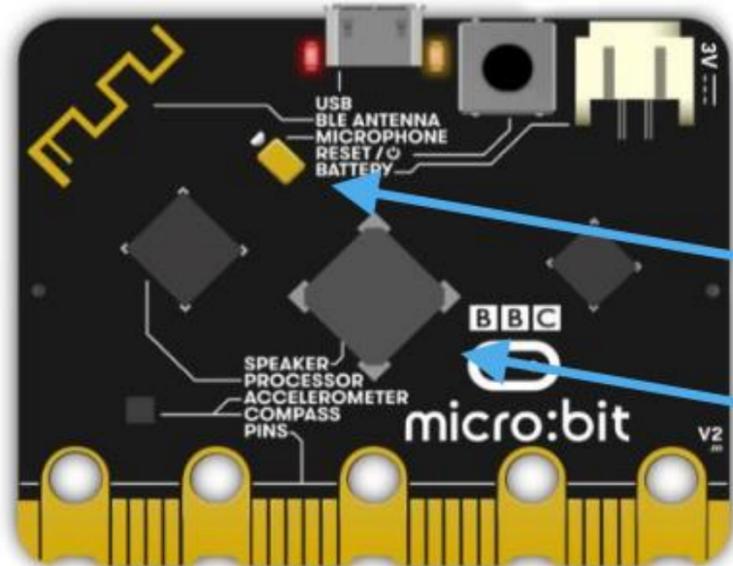
1組2.4GHz無線電模組 (用於藍牙傳訊)

1個揚聲器

1個麥克風

1個觸感傳感器

Version 2



麥克風

揚聲器

Micro:bit 基本程序

我們先進入線上網站：

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

The screenshot shows the Micro:bit online programming interface. On the left is a virtual Micro:bit board simulator. In the center is a sidebar menu for code blocks, categorized into Basic, Input, Music, Led, Radio, Loops, Logic, Variables, and Math. On the right is the main programming workspace with a grid background. A sample program is shown: a purple block 'on button A pressed' containing a blue block 'show number 0'. A red arrow points from the 'Download' button at the bottom left to the text '下載程式並在 micro:bit 上運行'. Another red arrow points from the 'Micro:bit 模擬器, 測試程式' text to the simulator. A third red arrow points from the '程式方塊分類' text to the sidebar menu. A fourth red arrow points from the '編程平台' text to the main workspace.

Micro:bit 模擬器, 測試程式

程式方塊分類

編程平台

Download

Untitled

下載程式並在 micro:bit 上運行

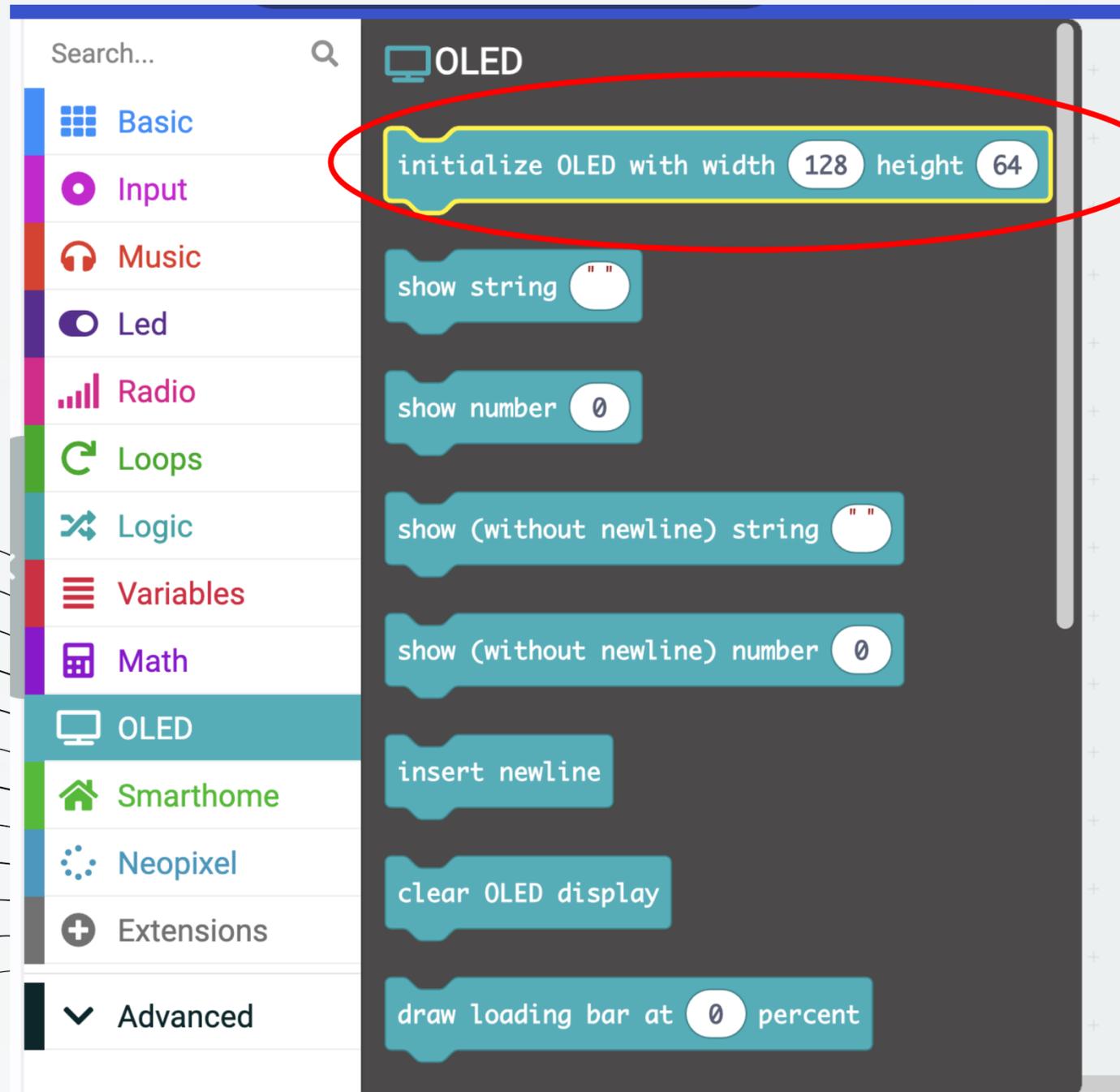
Micro:bit 內置傳感器

```
forever
  if temperature (°C) > 25 then
    show number temperature (°C)
    play melody [C4, D4, E4, F4, G4, A4, B4, C5] at tempo 240 (bpm) in background
    digital write pin P2 to 1
  else
    show icon [grid icon]
    stop all sounds
    digital write pin P2 to 0
```

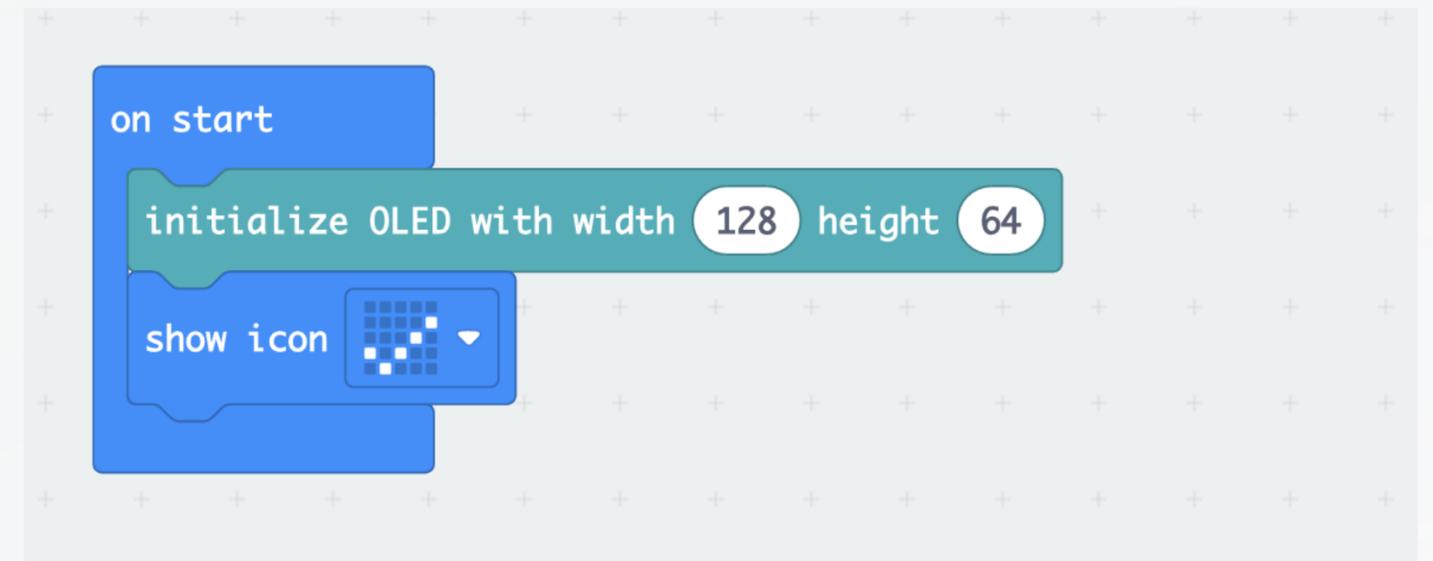
擴展程序

Extensions Search "Smarthome"

The screenshot displays a web interface for searching extensions. At the top, there is a blue navigation bar with a "Go Back" button on the left, the word "Extensions" in the center, and a question mark icon on the right. Below the navigation bar is a search bar containing the text "smarthome" and a magnifying glass icon. Underneath the search bar are five filter buttons: "Lights and Display", "Software", "Science", "Robotics", "Gaming", and "Networking". The main content area has a "Home" link on the left and an "Import File" button on the right. A search result card is displayed in the center, featuring an illustration of a smart home setup. The card contains the following text: "smarthome (智能家居)ElecFreaks Smart Home Kit MakeCode package for micro:bit". At the bottom right of the card is a "Learn More" link.



• 連接 OLED



Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
OLED
Smarthome
Neopixel
Extensions
Advanced
Functions

LED P0 toggle to OFF

PIR sensor P0 detects motion

Ultrasonic sensor pin P0 distance cm

Relay P0 toggle to NCIClose NOIOpen

Motor fan P0 toggle to OFF

value of noise(dB) at pin P1

value of temperature (°C) at pin P1

value of light intensity(0~100) at pin P1

value of soil moisture(0~100) at pin P1

crash sensor pressed

Setup crash sensor at pin P0

- 收集數據
- 顯示數據

```
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
```

- 條件判斷程序

The image shows the Scratch Logic palette. The 'Logic' category is highlighted in the left sidebar. In the main palette, the 'Conditionals' section contains 'if true then' blocks, and the 'Comparison' section contains comparison operators. A red circle highlights the 'Logic' category in the sidebar, and another red circle highlights the '<' comparison block in the 'Comparison' section.

```
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
  if value of temperature (°C) at pin P1 > 25 then
  else
  +
```

- 音樂提示

The screenshot shows the Scratch Music palette with the following categories and blocks:

- Melody:** play melody (with a piano keyboard icon) at tempo 120 (bpm) until done
- Tone:** play tone Middle C for 1 beat until done; ring tone (Hz) Middle C; rest for 1 beat
- Middle C:** Middle C
- Volume:** set volume 127; volume; stop all sounds
- Tempo:** change tempo by (bpm) 20; set tempo to (bpm) 120

```
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
  if value of temperature (°C) at pin P1 > 25 then
    play tone Middle C for 1 beat in background
  else
```

自動開啟風扇

The screenshot shows the Scratch IDE interface. On the left, the 'Pins' category is selected in the sidebar. On the right, the 'Pins' block palette is visible. A yellow circle highlights the 'digital read pin' and 'digital write pin' blocks. The 'digital write pin' block is set to pin P0 and value 0. Below it, the 'analog read pin' and 'analog write pin' blocks are visible, with the latter set to pin P0 and value 1023. A 'map' block is also present, mapping values from 0 to 1023 to 0 to 4. Other blocks include 'analog set period pin', 'set audio pin', and 'set audio pin enabled'.

```
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
  if value of temperature (°C) at pin P1 > 25 then
    play tone Middle C for 1 beat in background
    digital write pin P2 to 1
    pause (ms) 2000
  else
```

forever

clear OLED display

show (without newline) string "Temperature:"

show (without newline) number value of temperature (°C) at pin P1

if value of temperature (°C) at pin P1 > 25 then

play tone Middle C for 1 beat in background

digital write pin P2 to 1

pause (ms) 2000

else

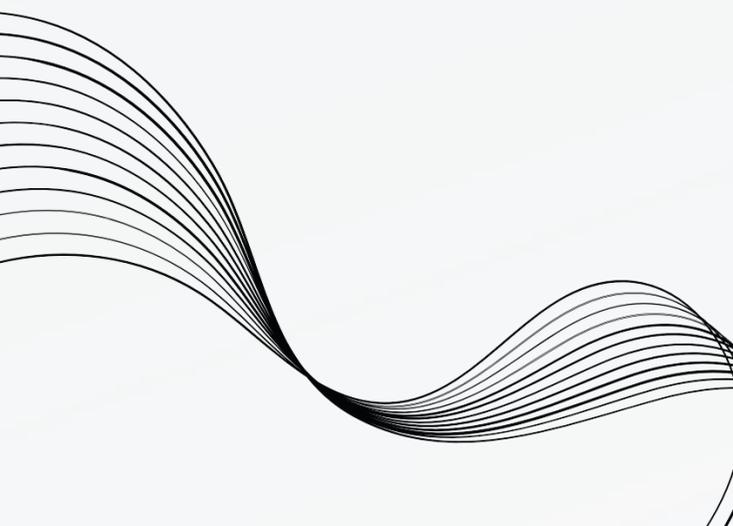
digital write pin P2 to 0

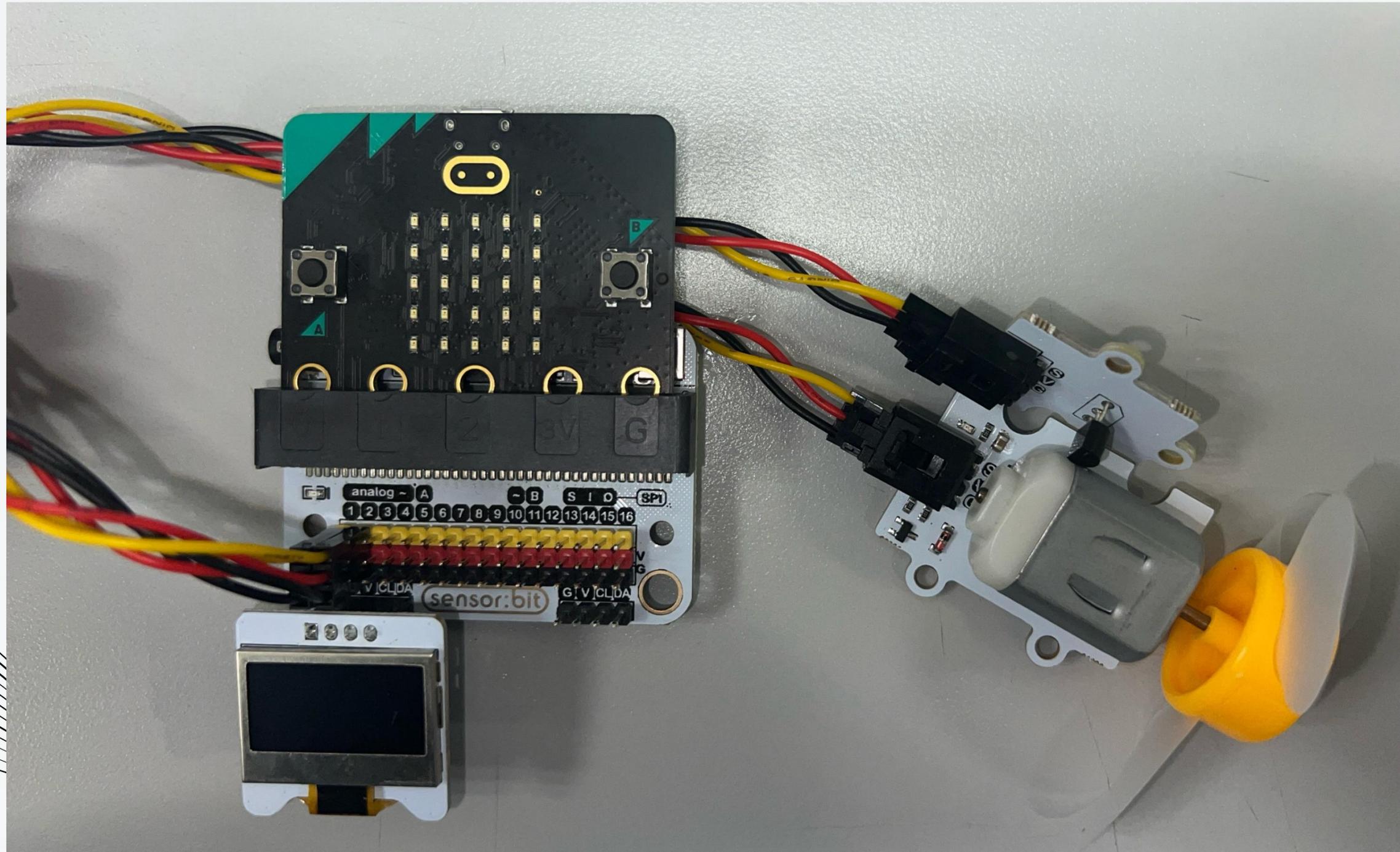
stop all sounds

- 音樂停止判斷條件
- 風扇關閉條件

```
on start
  initialize OLED with width 128 height 64

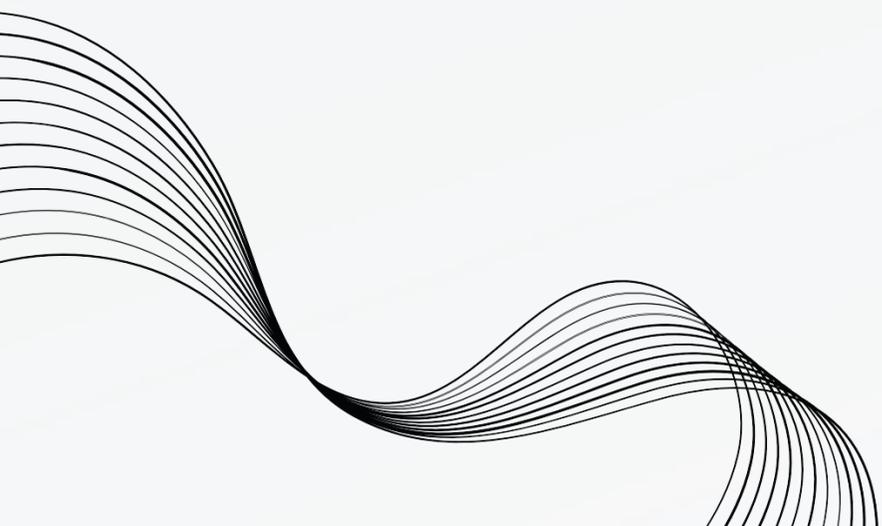
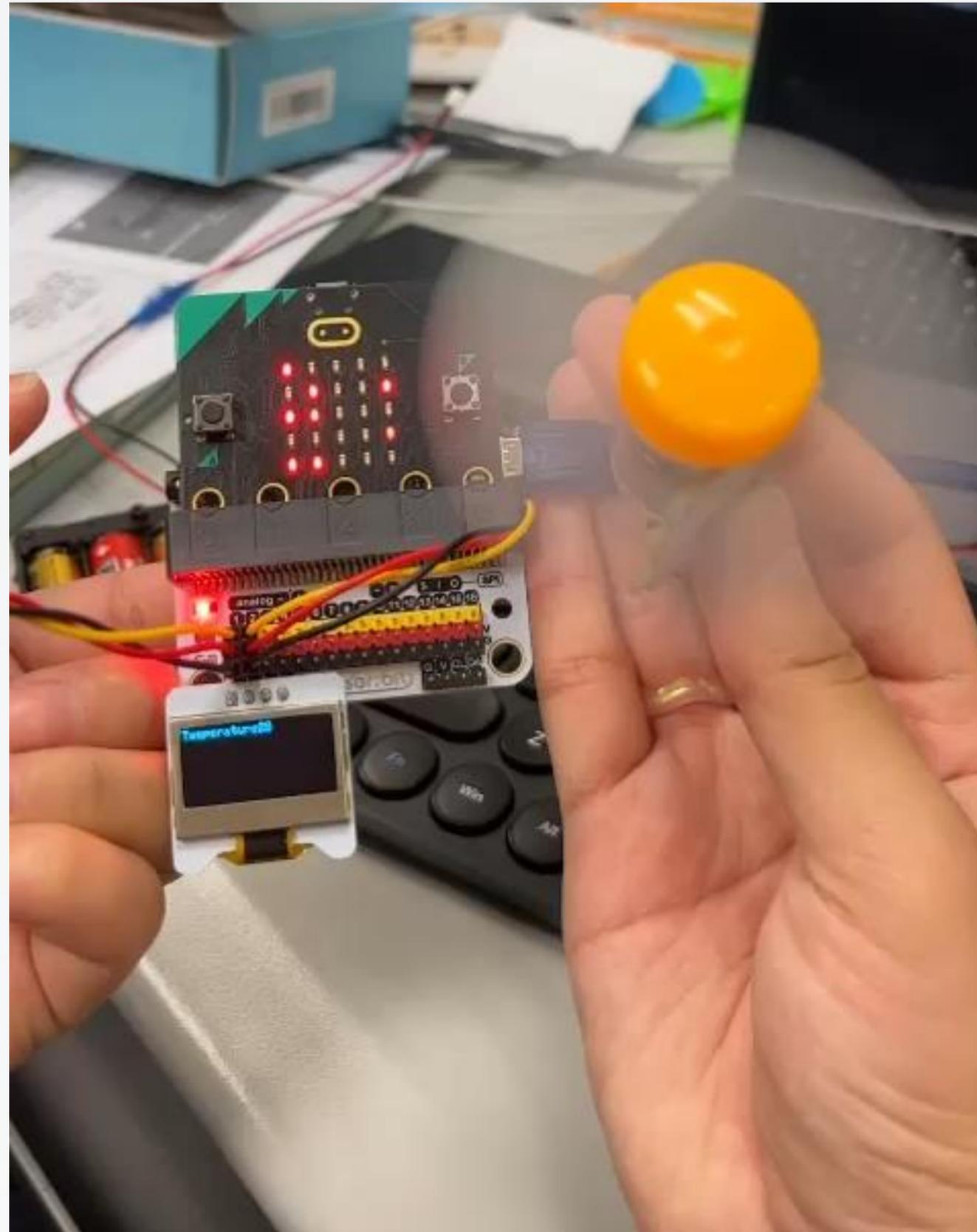
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
  if value of temperature (°C) at pin P1 > 25 then
    play tone Middle C for 1 beat in background
    digital write pin P2 to 1
    pause (ms) 2000
  else
    digital write pin P2 to 0
    stop all sounds
```





- 黑色 - Ground
- 黃色 - Signal
- 紅色 - Voltage

對應顏色接駁





<https://forms.gle/xa1FLyf1s95ksFKh6>