

2023-2024 Quality Education Fund Thematic Network - Tertiary Institutes

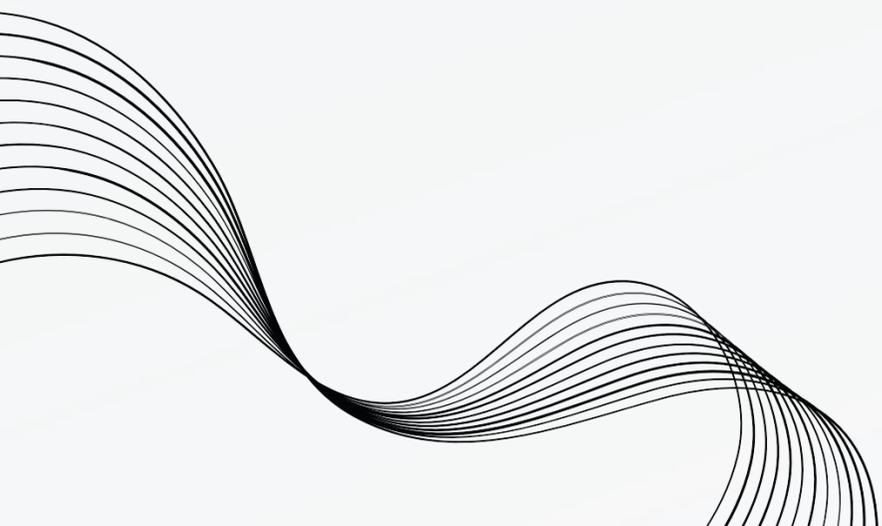
STEAM Education with Self-directed and Progressive Learning of
Engineering Design Process for Problem-solving
透過STEAM教育自主及循序漸進學習以工程設計流程解難

Application of Micro:bit to Make Thermotank Reminder

溫度提示器裝置

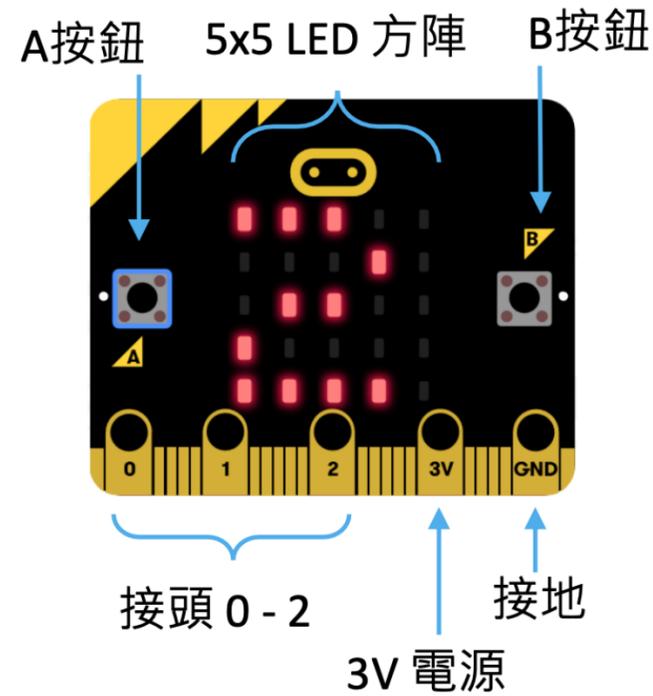
所需配件：

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

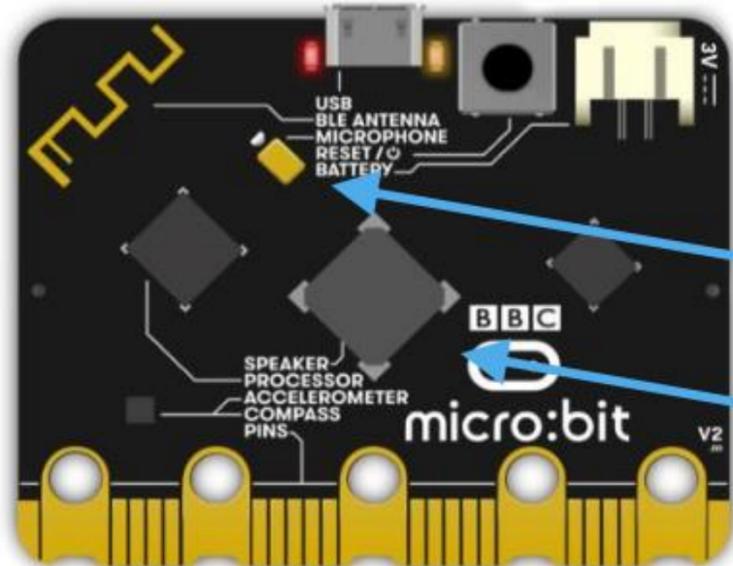
1組2.4GHz無線電模組 (用於藍牙傳訊)

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 canvas where a script is being built: 'on button A pressed' followed by '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 programming canvas.

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

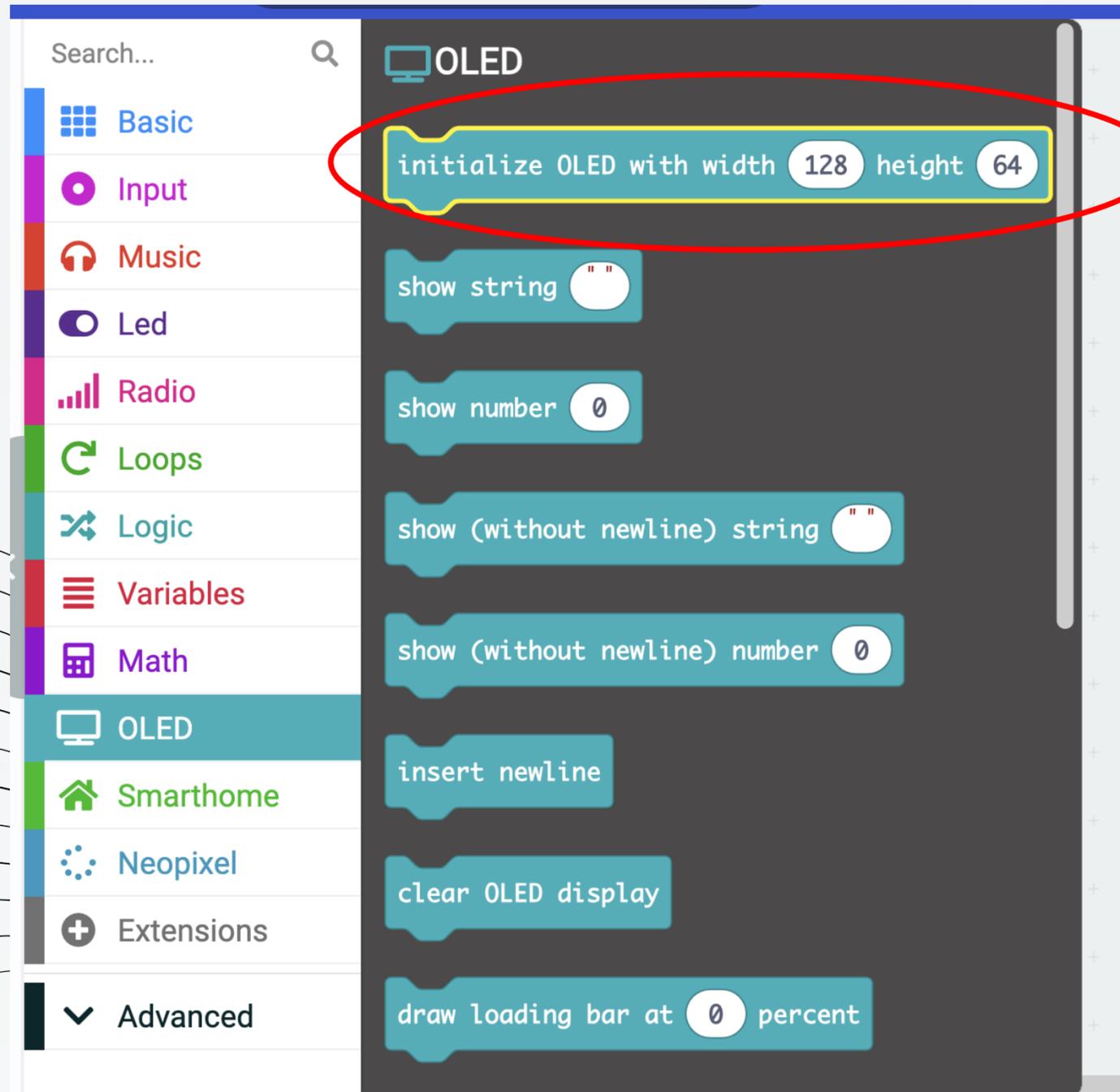
Micro:bit 內置傳感器

```
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 'less than' blocks. Two red circles highlight the 'Logic' category in the sidebar and the 'less than' 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 image shows a block editor interface with a sidebar on the left containing categories: Logic, Variables, Math, OLED, 智能家居, 彩虹灯, Extensions, Advanced, Functions, Arrays, Text, Game, Images, Pins, and Serial. The 'Pins' category is selected, showing several blocks: 'digital read pin P0', 'digital write pin P0 to 0' (circled in yellow), 'analog read pin P0', 'analog write pin P0 to 1023', a 'map' block (0 to 1023 to 0 to 4), 'analog set period pin P0 to (μs) 20000', 'set audio pin P0', 'set audio pin enabled false', 'Servo' blocks: 'servo write pin P0 to 180' and 'servo set pulse pin P0 to (μs) 1500'.

```
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

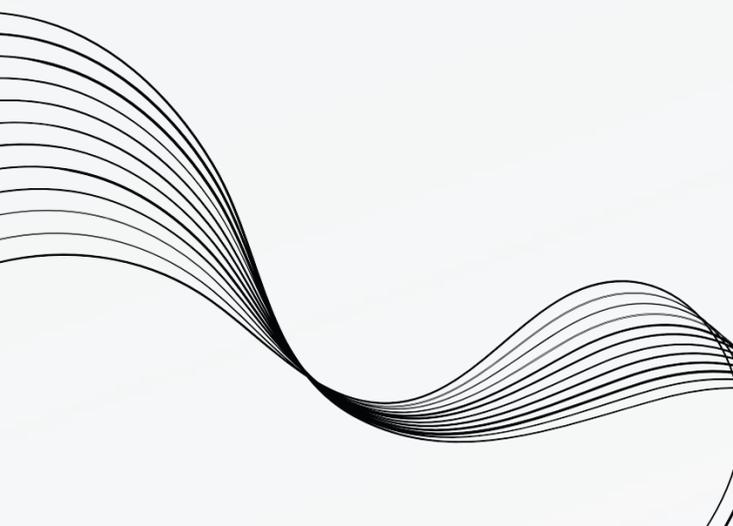
digital write pin P2 to 0

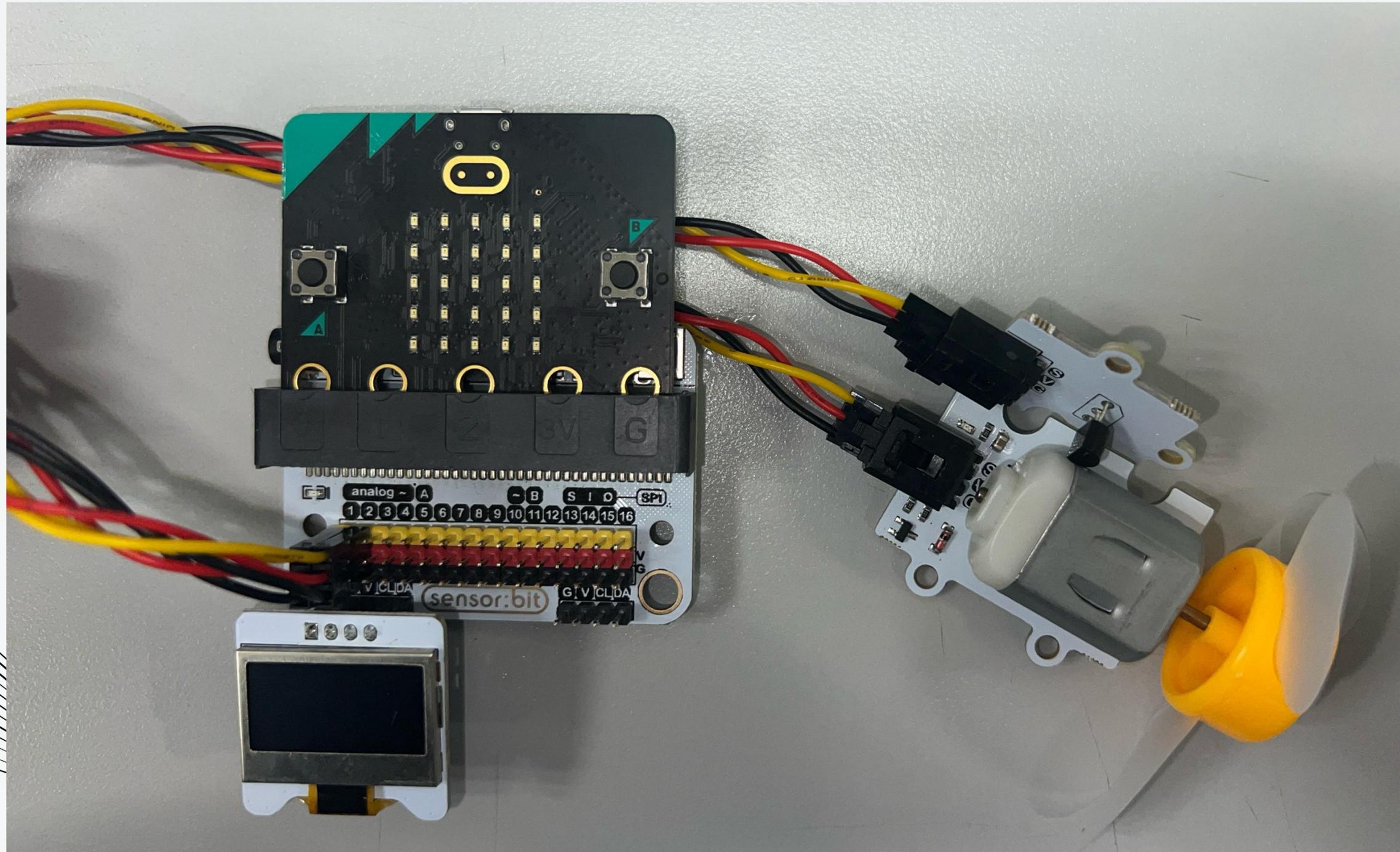
stop all sounds

- 音樂停止判斷條件
- 風扇關閉條件

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

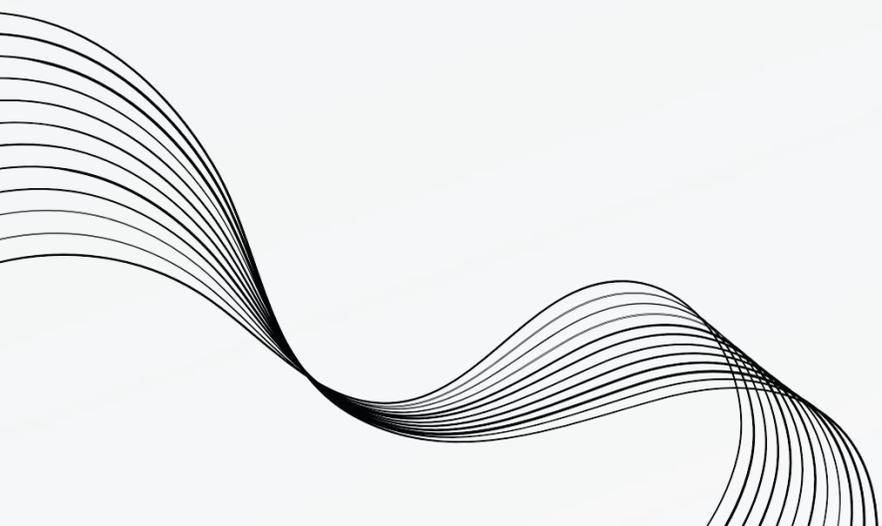
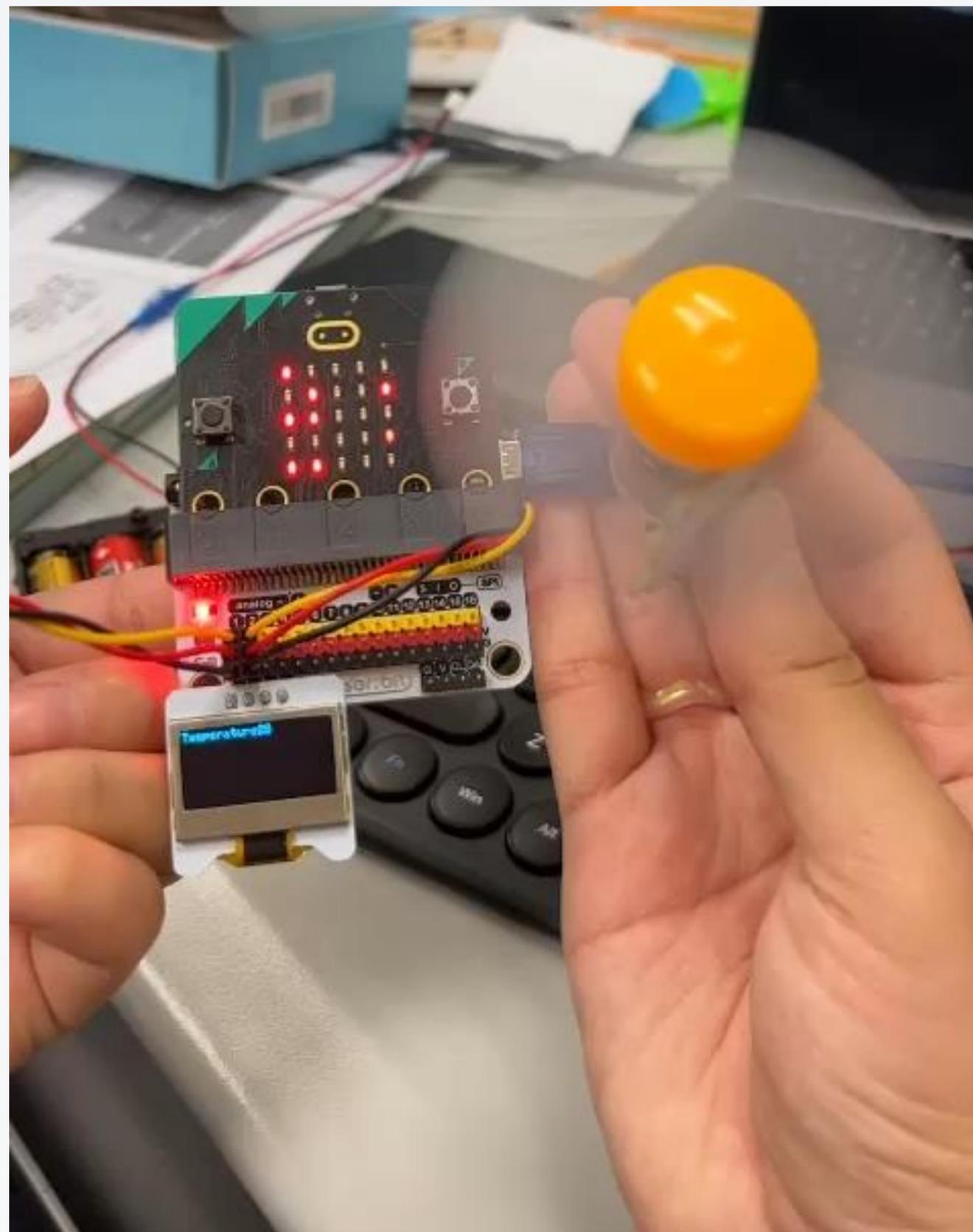
forever
  clear OLED display
  show (without newline) string "Temperature:"
  show (without newline) number value of temperature (°C) at pin P1
  if value of temperature (°C) at pin P1 > 25 then
    play tone Middle C for 1 beat in background
    digital write pin P2 to 1
    pause (ms) 2000
  else
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