

Smarthon Documentation

發  1.0

Smarthon Limited

2022 年 07 月 13 日

Contents

1	課程指南	1
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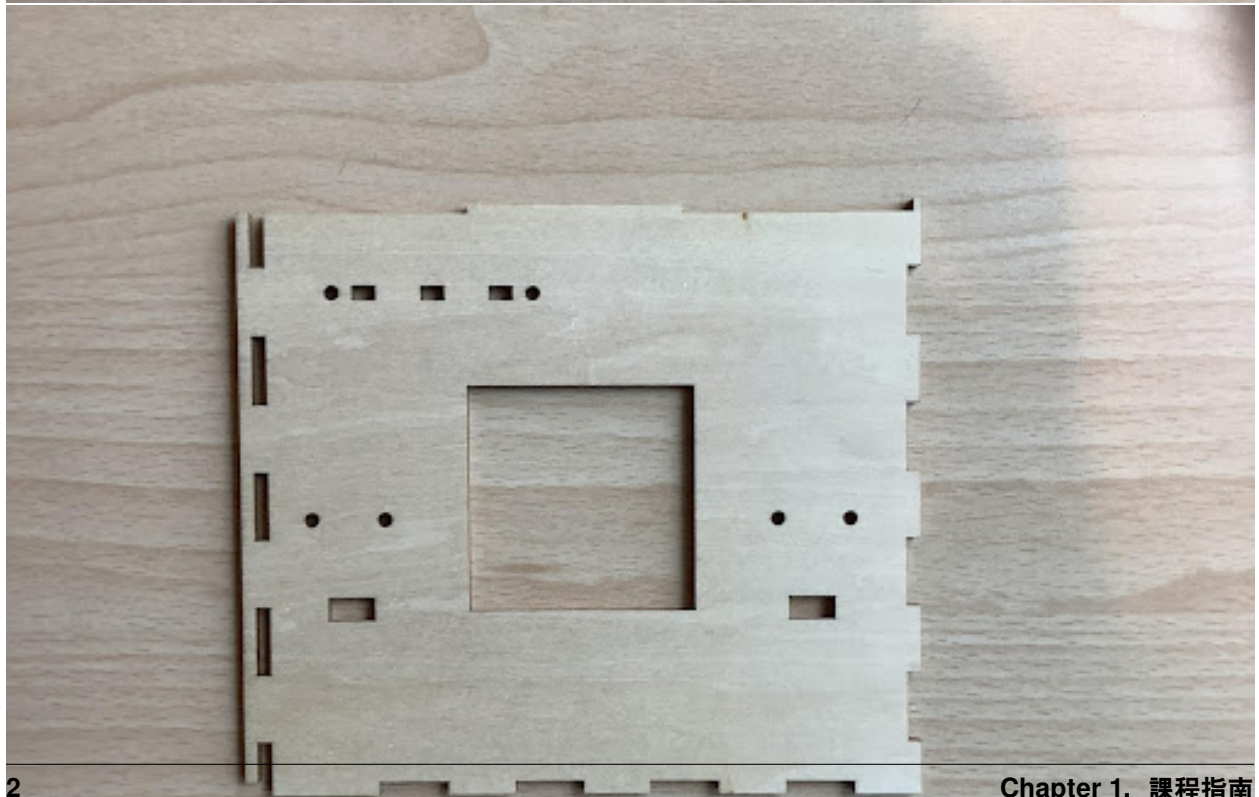
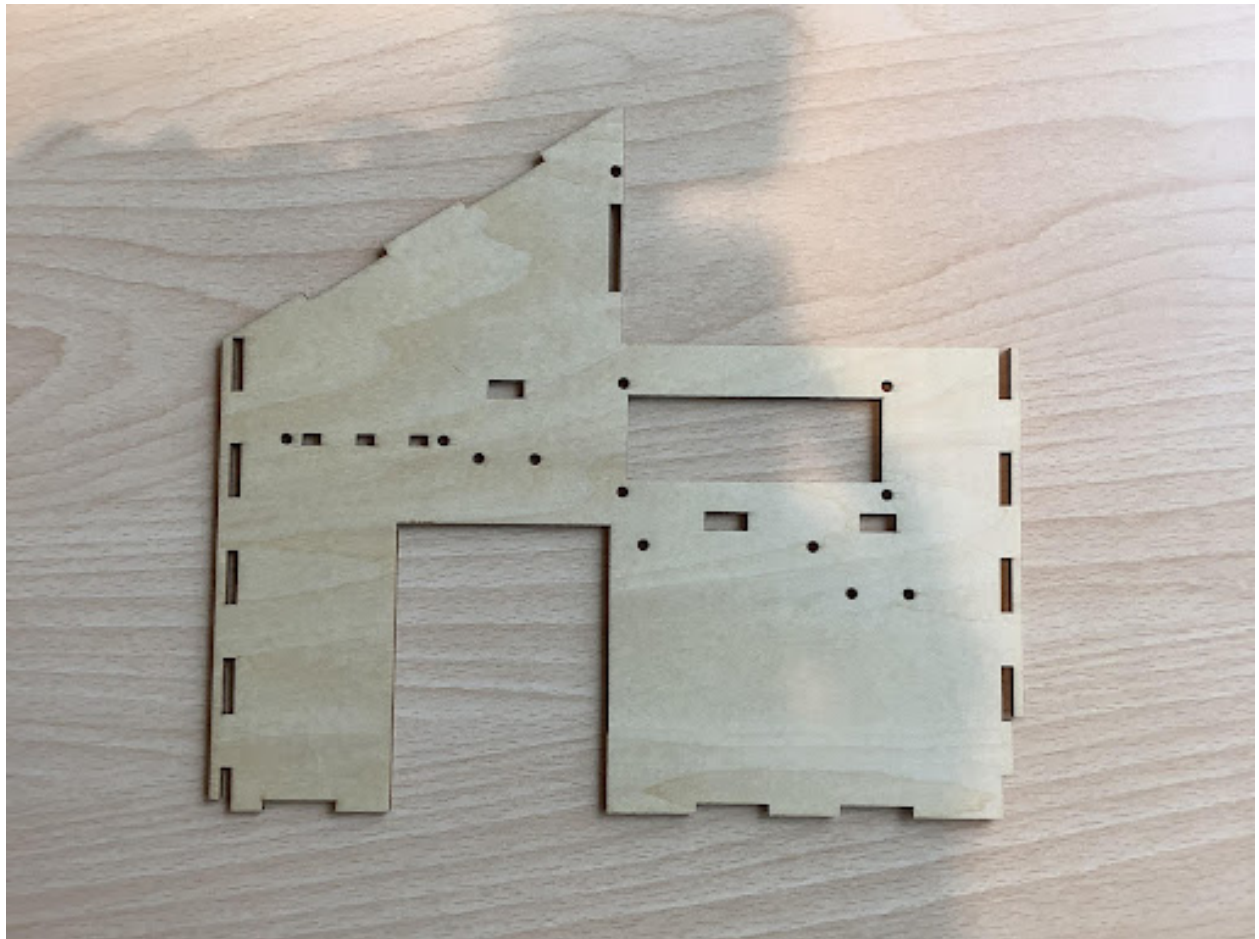
1.1 智能家居套裝課程 micro:bit

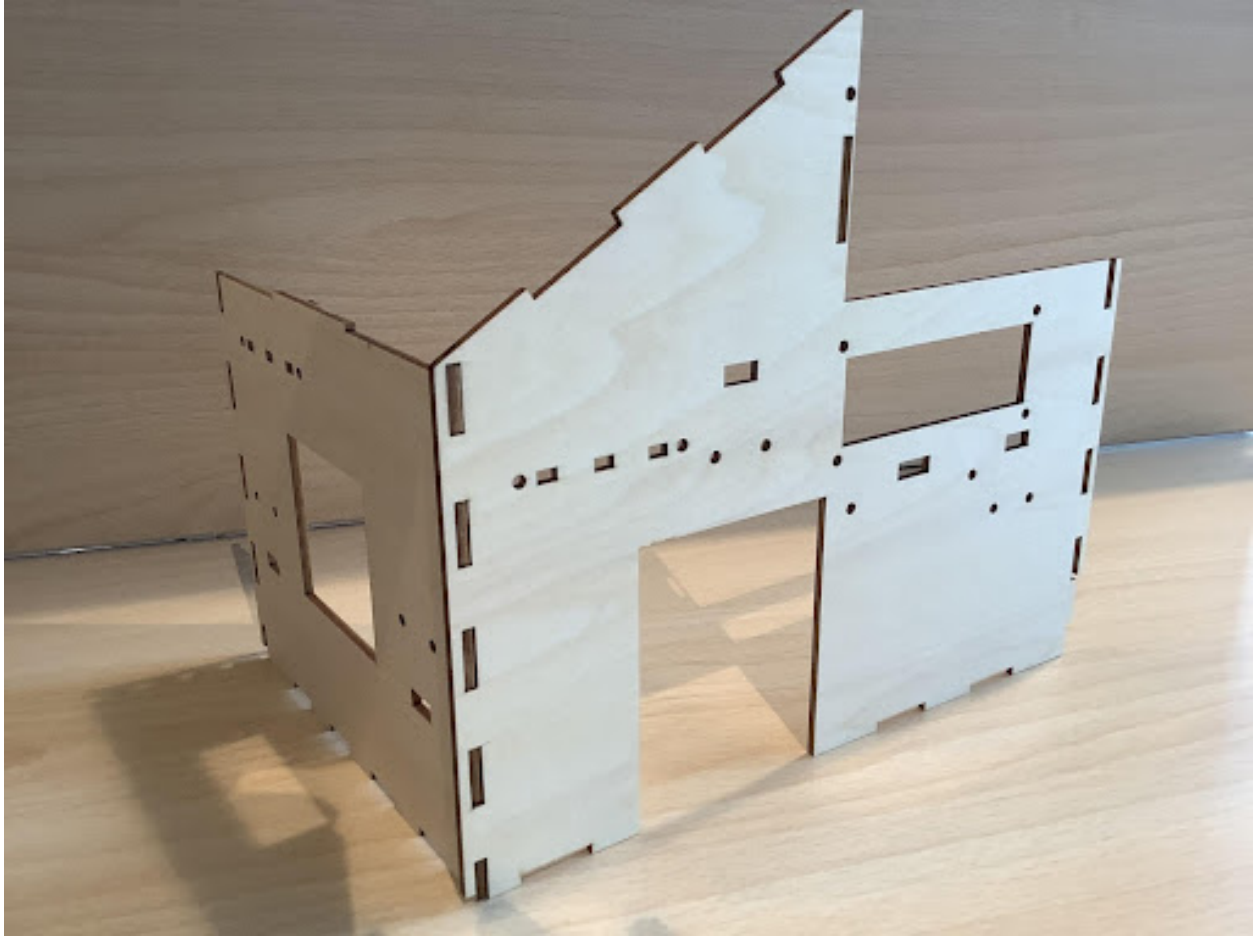
1.1.1 第一課認識智能家居

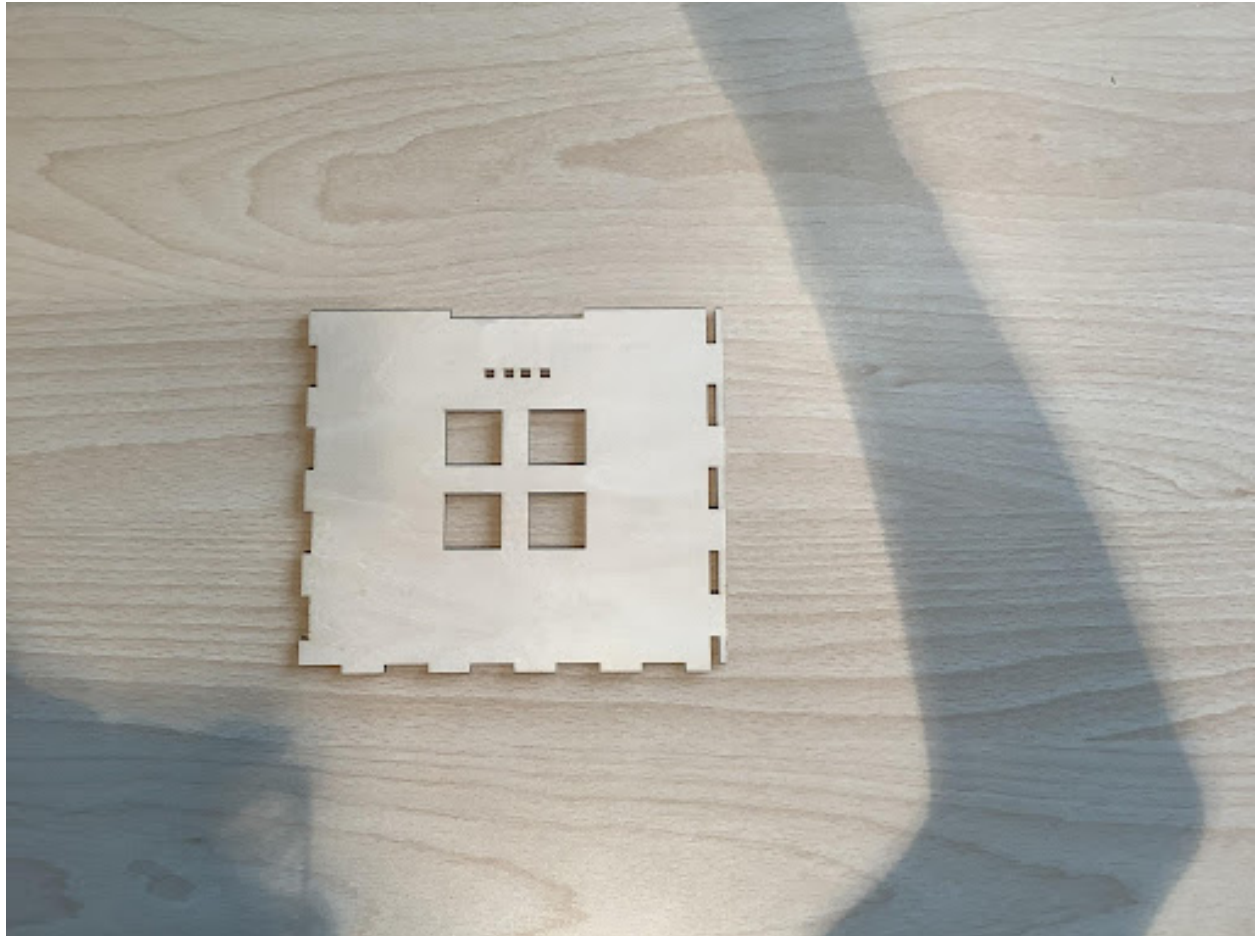
一、什麼是智能家居

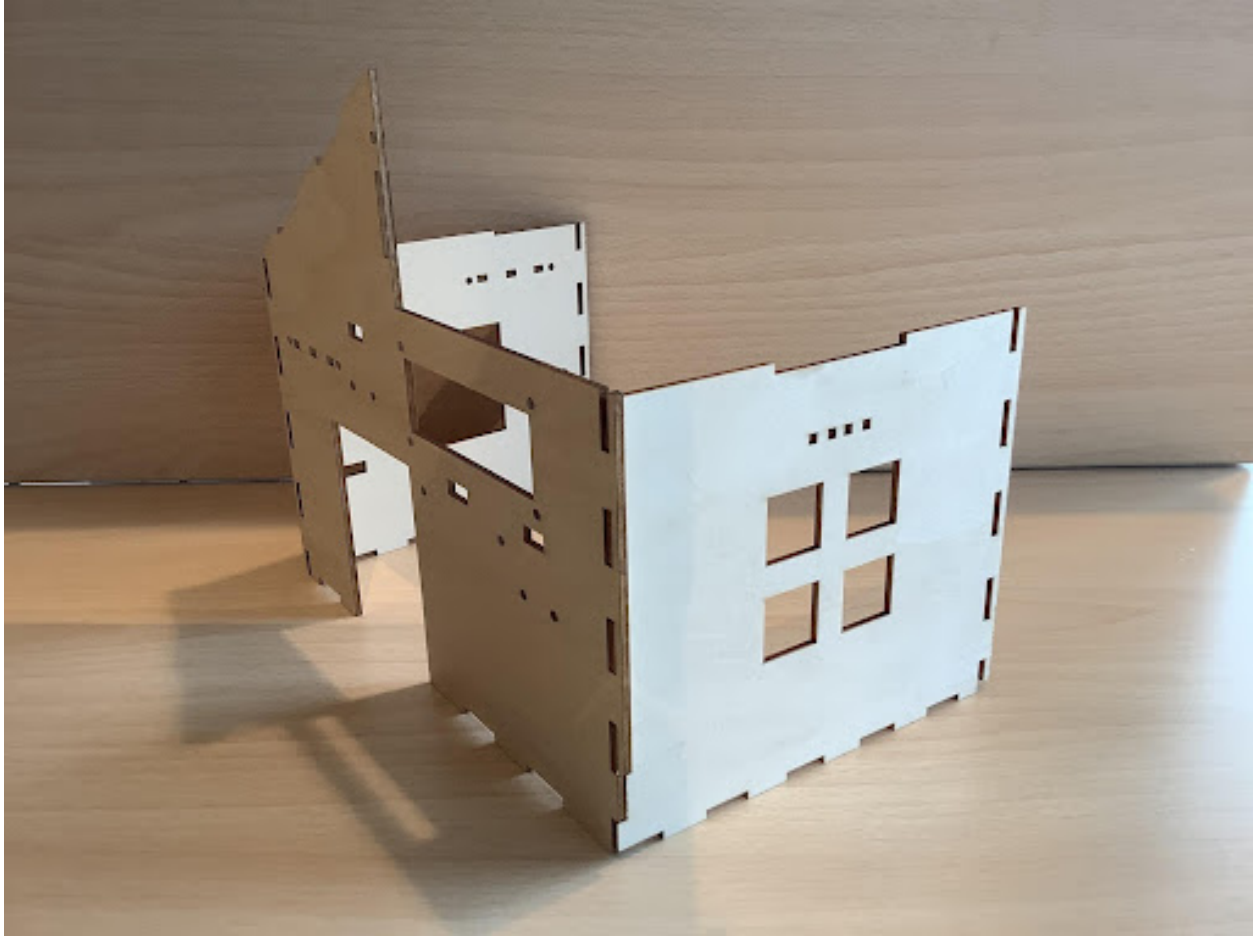
二、智能家居的優勢

三、智能家居模型搭建步驟展示

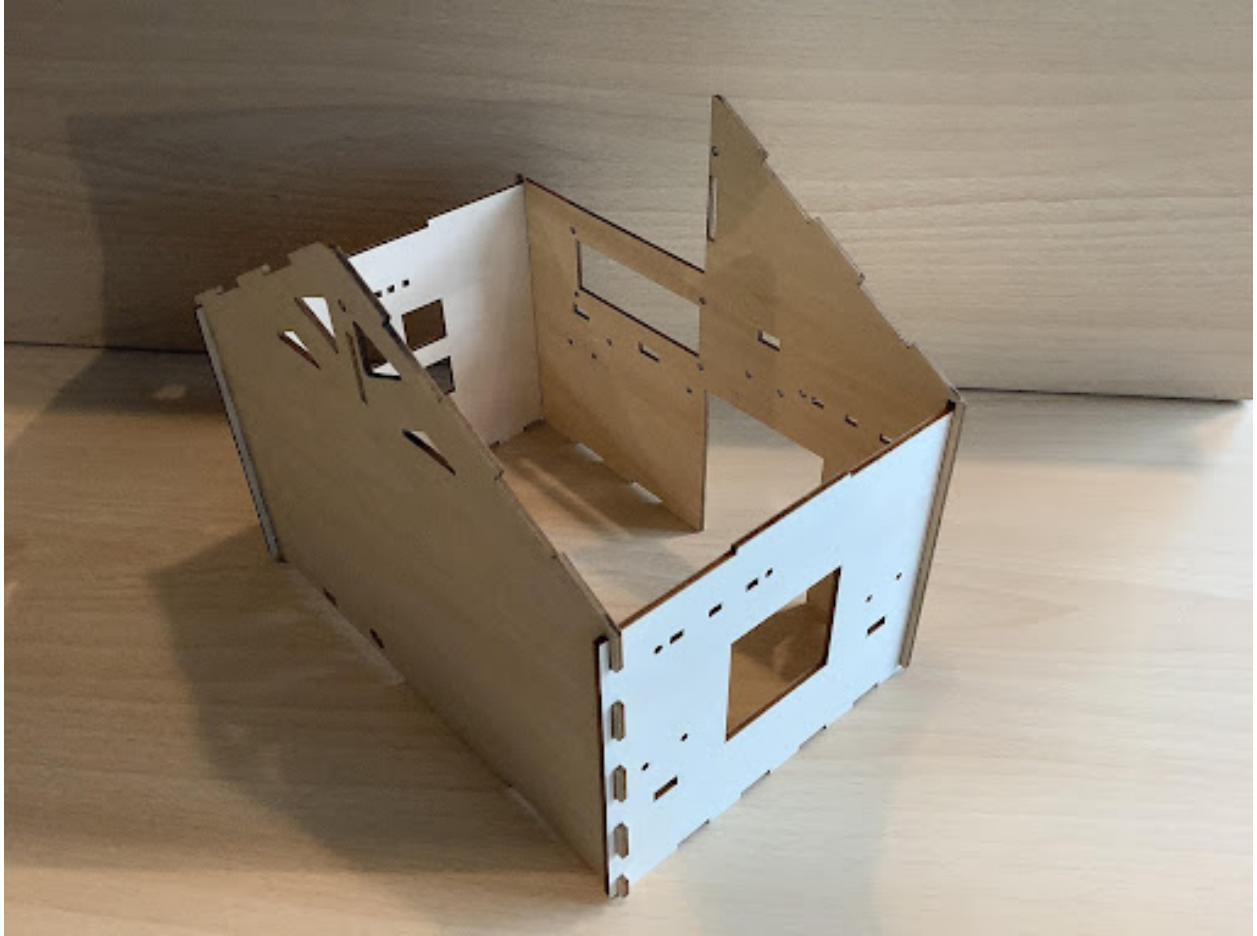


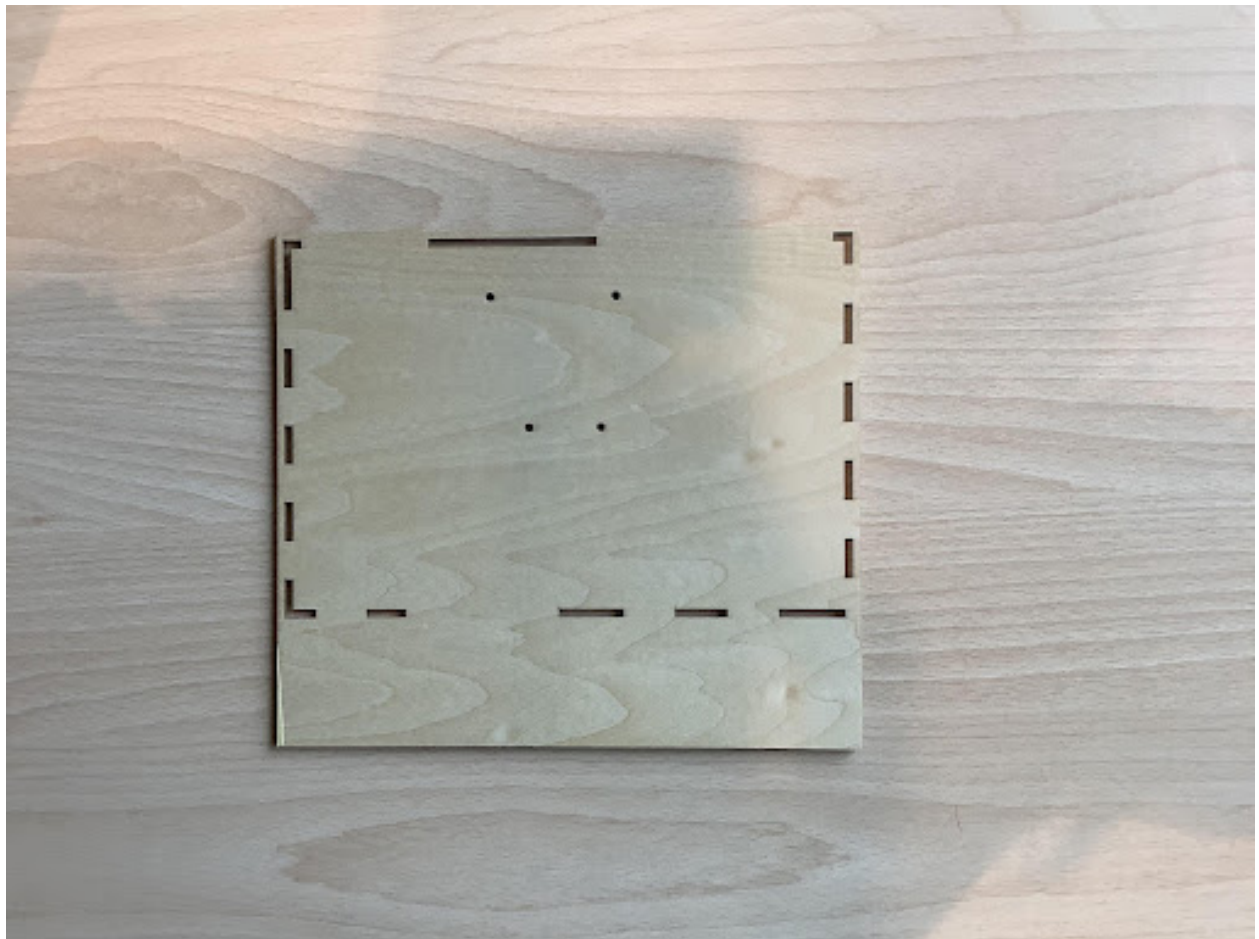








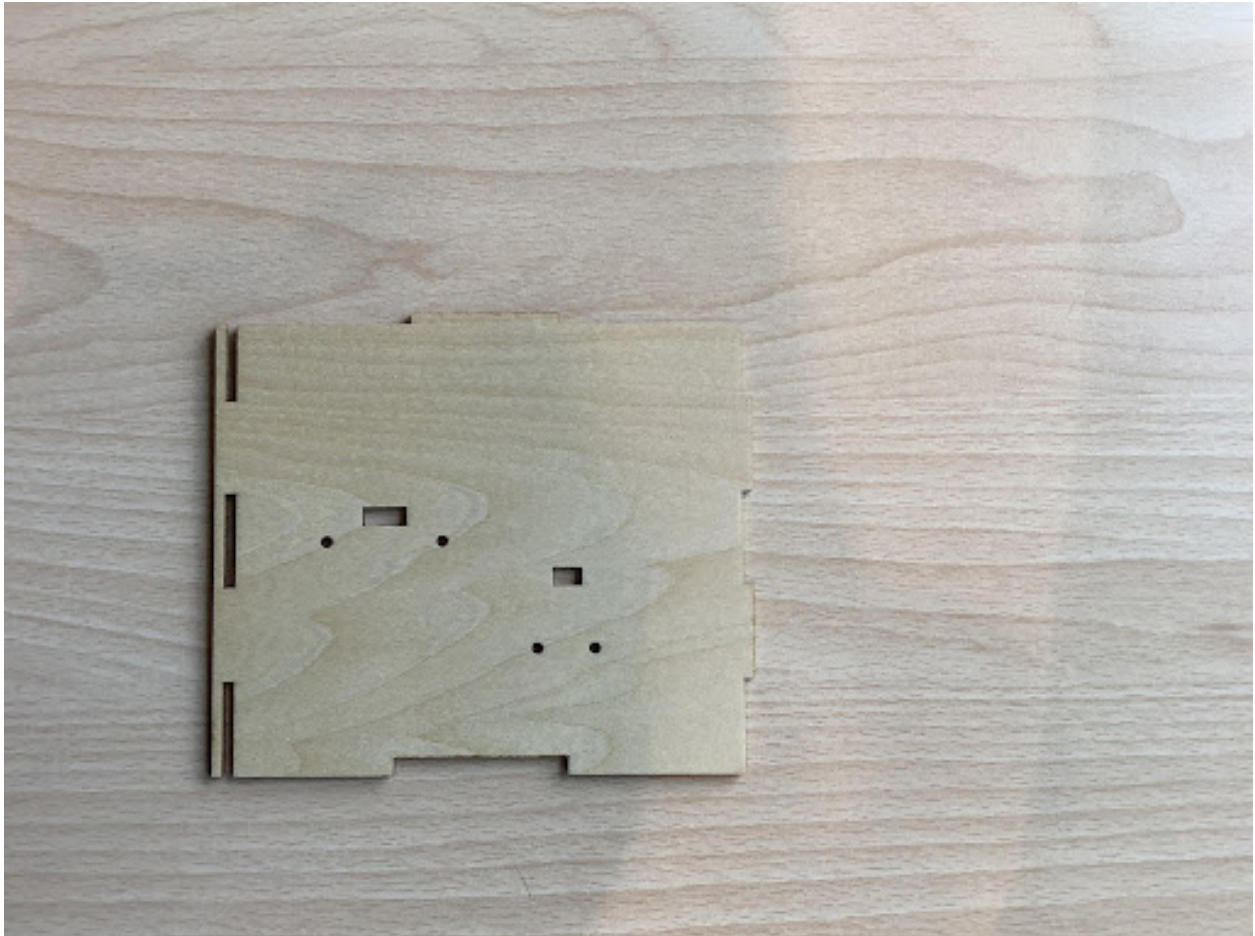






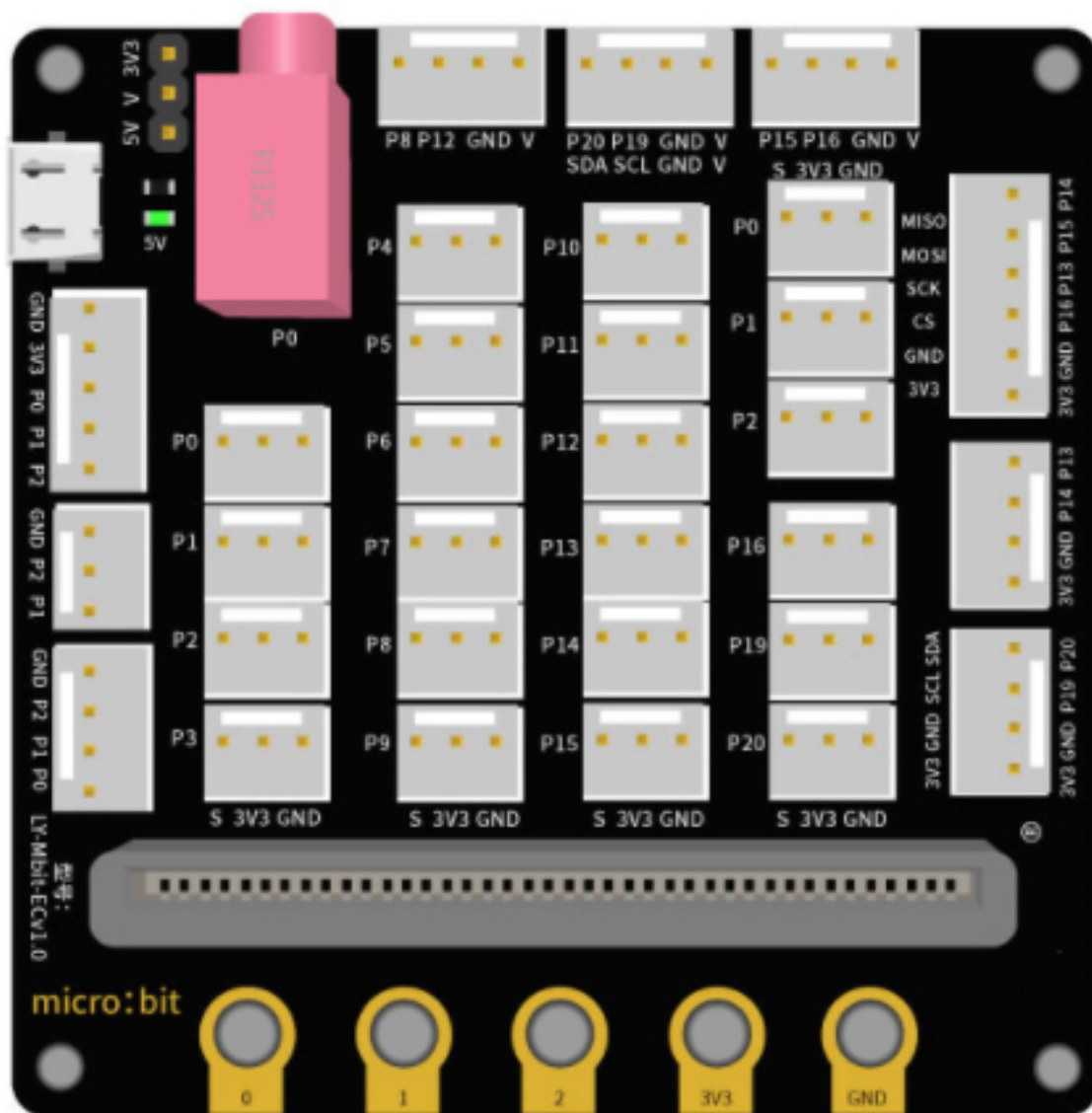








四、了解 micro:bit 拓展板



五、準備 Micro:bit 編程程式 Makecode：添加擴展

我的所有專案

檢視全部

+

新增專案

建立專案 🤪 🤪

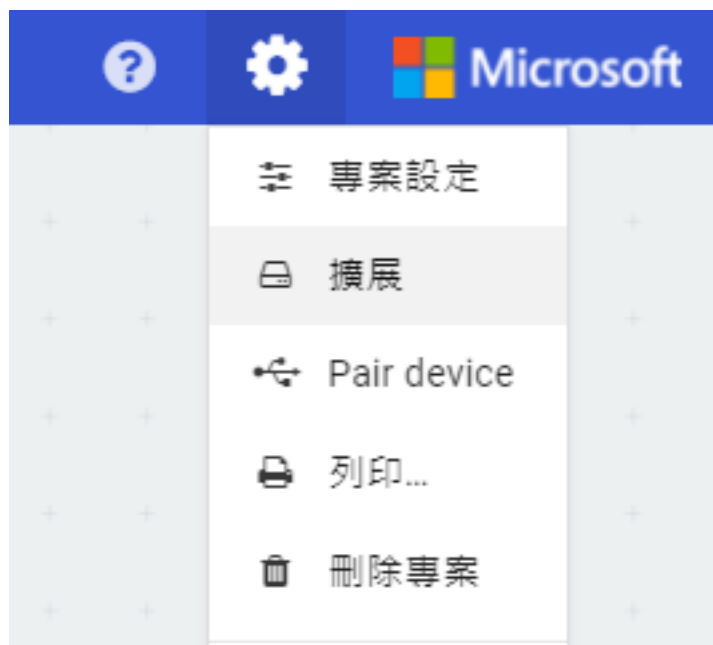
✕

幫你的專案取個名字。

new project

➤ 程式碼選項

創建 (Create) ✓





1.1.2 第二課智能人體感應燈

任務背景

器材準備

一、了解智能人體感應燈

二、了解人體感應傳導器模塊和紅燈模塊

2.1 人體感應傳感器模塊



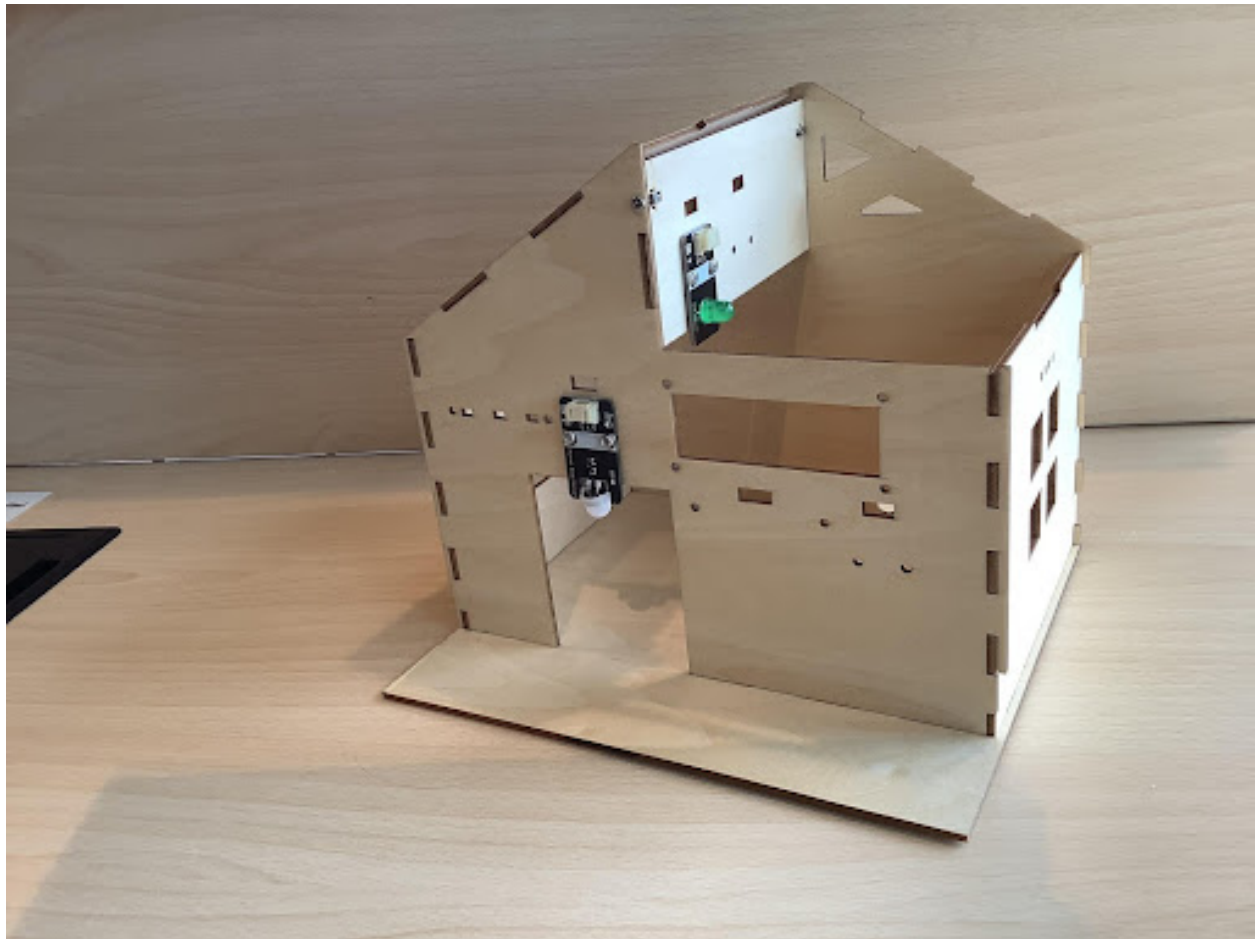
全自動感應: 人進入其感應範圍則輸出高電平，人離開感應範圍則自動延時關閉高電平，輸出低電平。

可重覆觸發方式: 即感應輸出高電平後，在延時時間段^[1]，如果有人體在其感應範圍活動，其輸出將一直保持高電平，直到人離開後才延時將高電平變^[2]低電平（感應模塊檢測到人體的每一次活動後會自動順延一個延時時間段，^[3]且以最後一次活動的時間^[4]延時時間的起始點 HC-SR505 小型人體感應模塊有三個管^[5]，G^[6] GND 接地，V^[7] VCC 接高電平或 5v，S^[8] 信號管^[9]，可以接 D1-D13 數字接口。

2.2 白色 LED 燈模塊

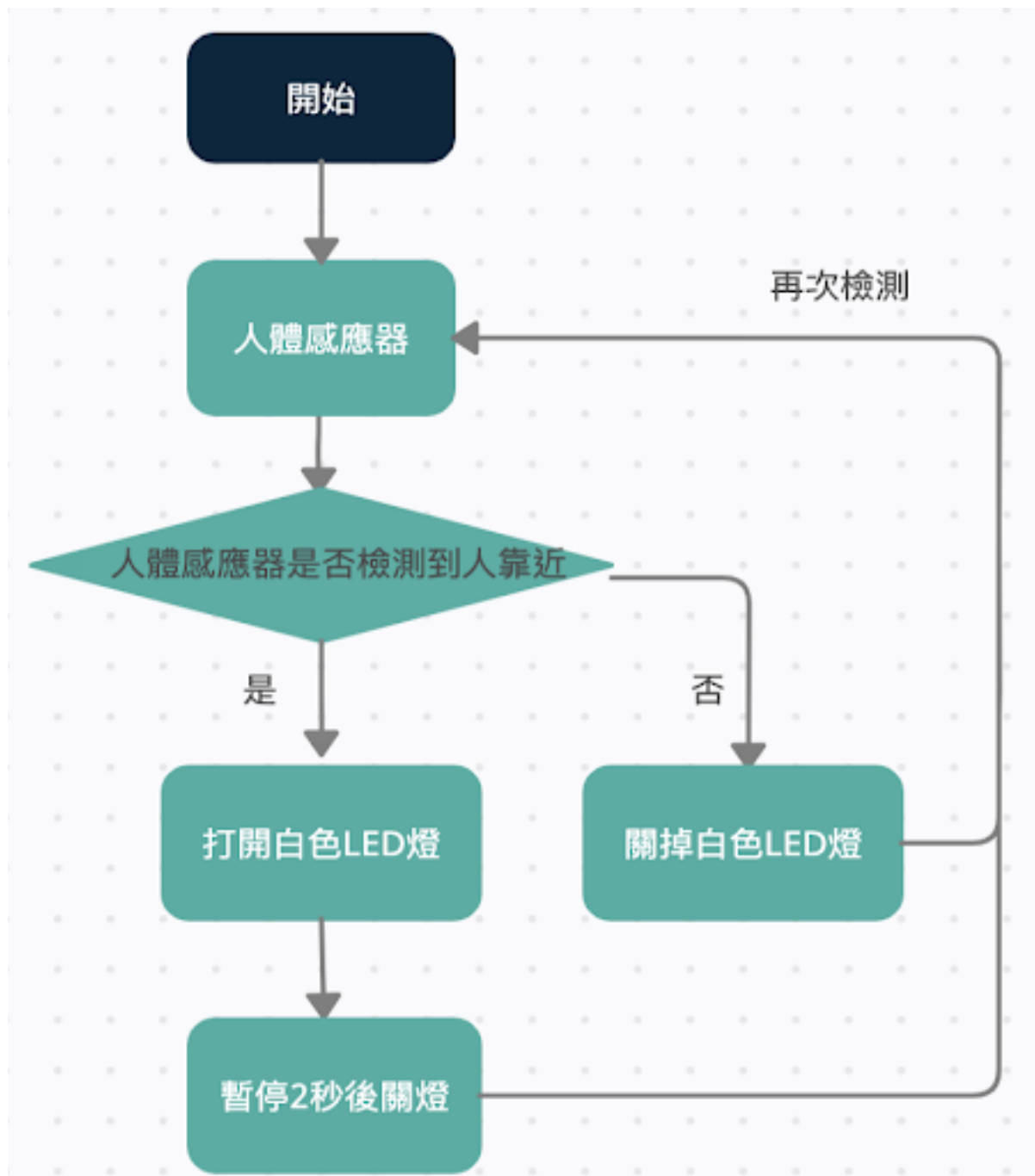


三、人體感應燈安裝

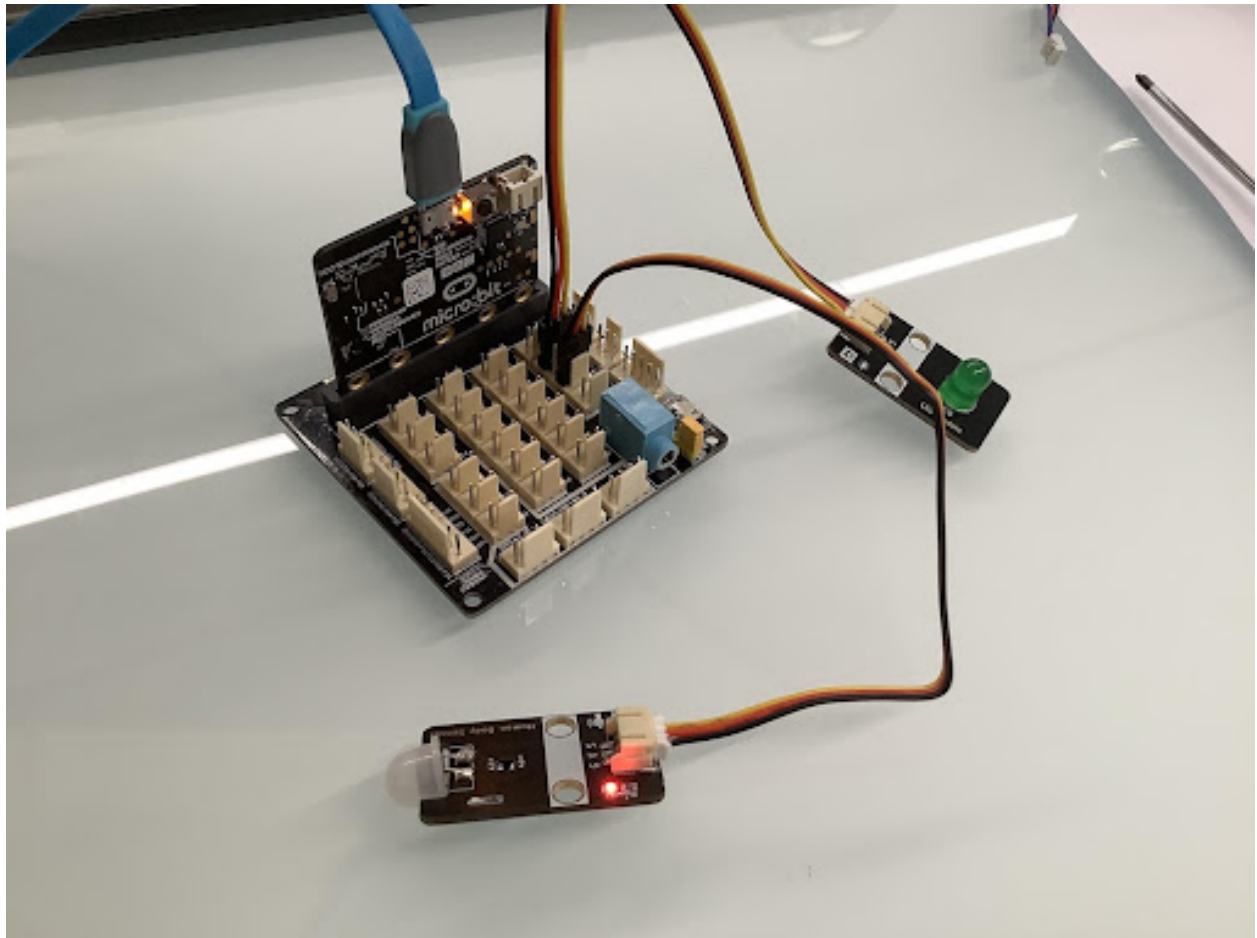


四、程序設計

4.1 算法設計

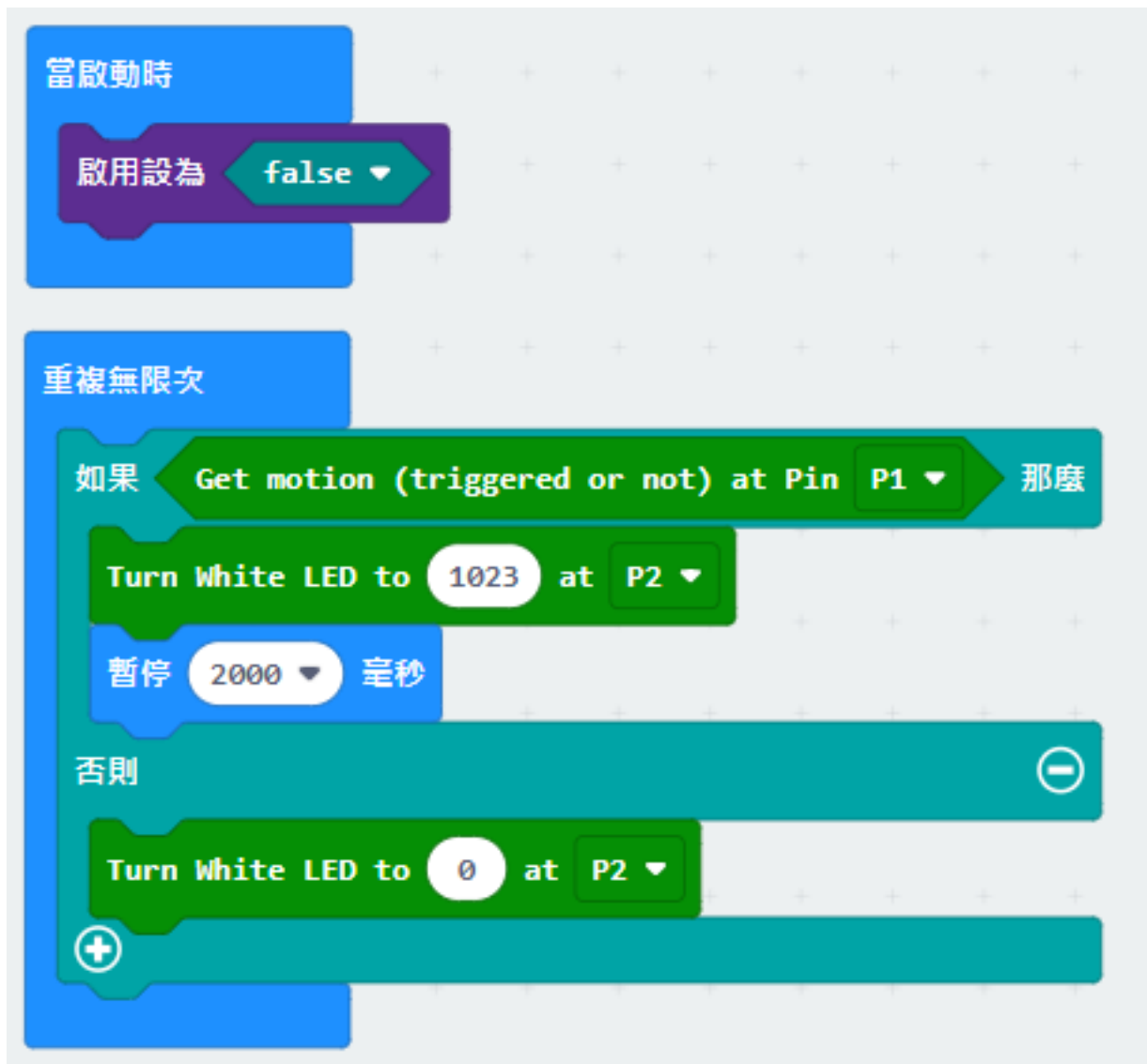


4.2 硬件連接



4.3 程序示例

Makecode 編程



五、總結

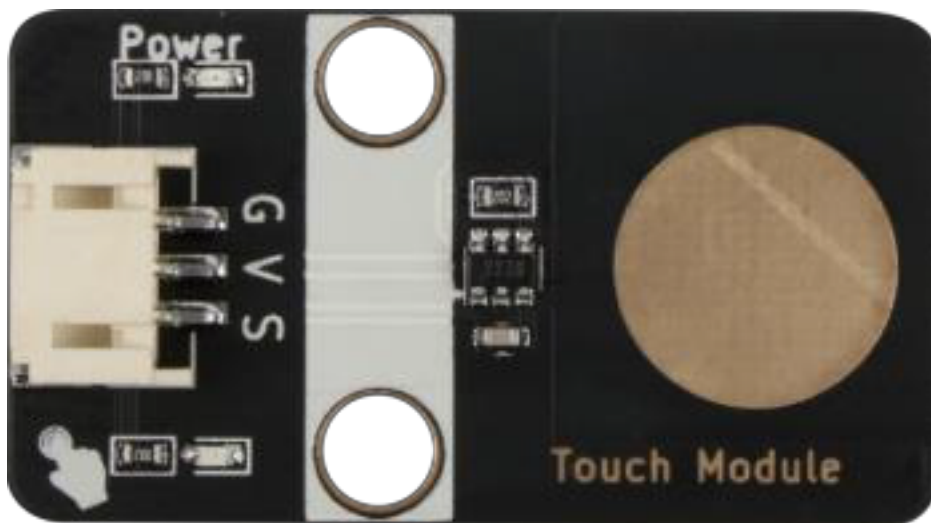
1.1.3 第三課音樂門鈴

任務背景：

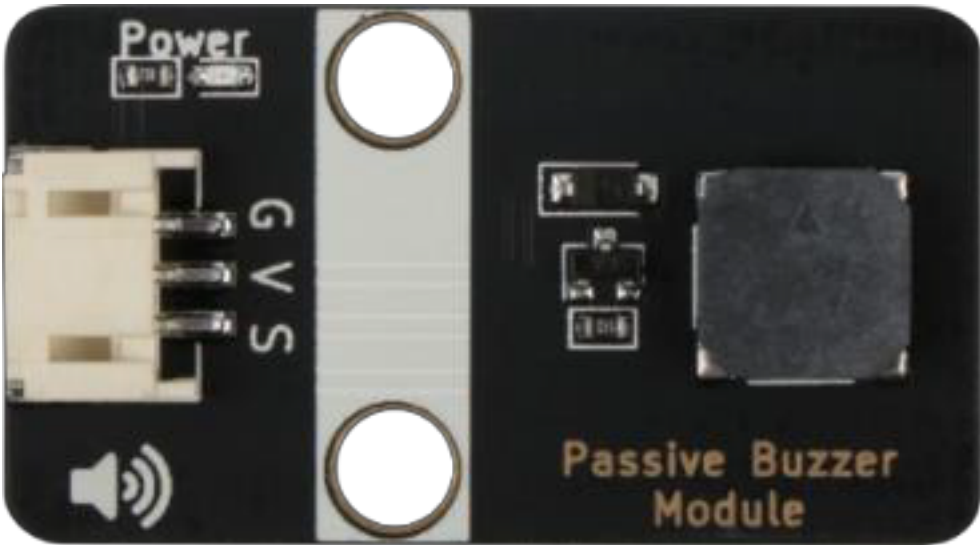
器材準備：

一、了解觸摸傳感器和無源蜂鳴器

1.1 觸摸傳感器

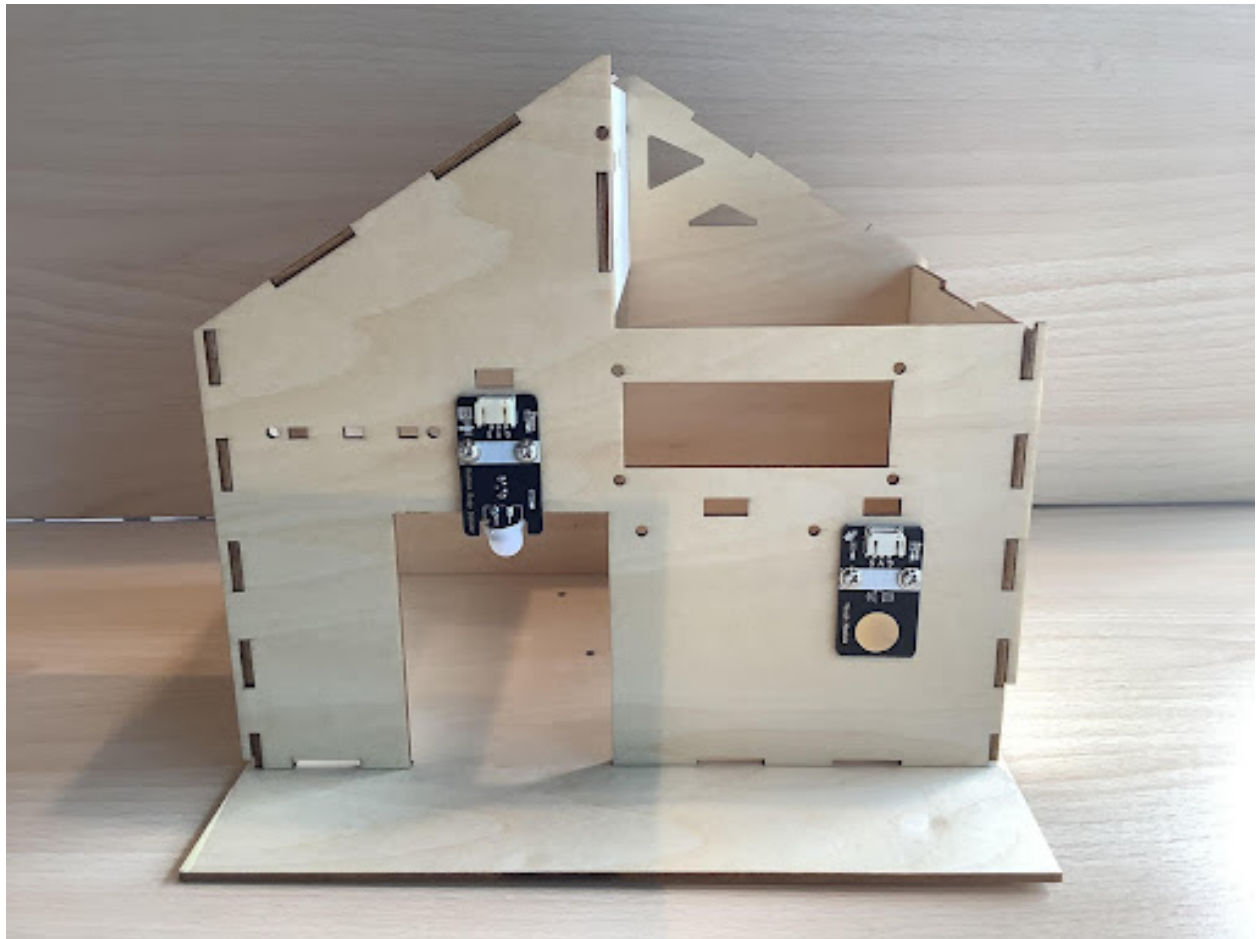


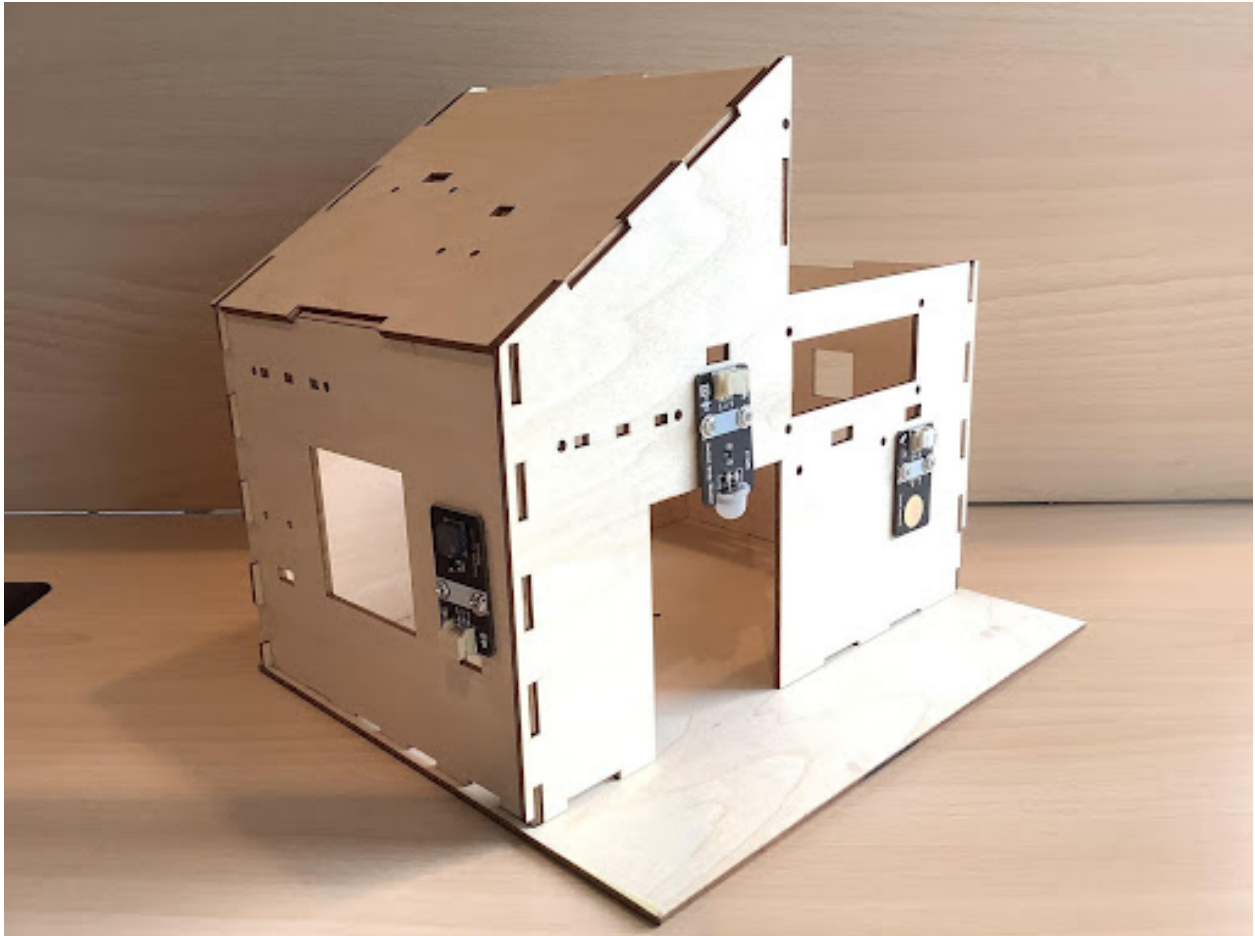
1.2 無源蜂鳴器模塊



蜂鳴器	BLE-UNO 主板
G	GND
V	VCC、5V、3.3V
S	D0-D13

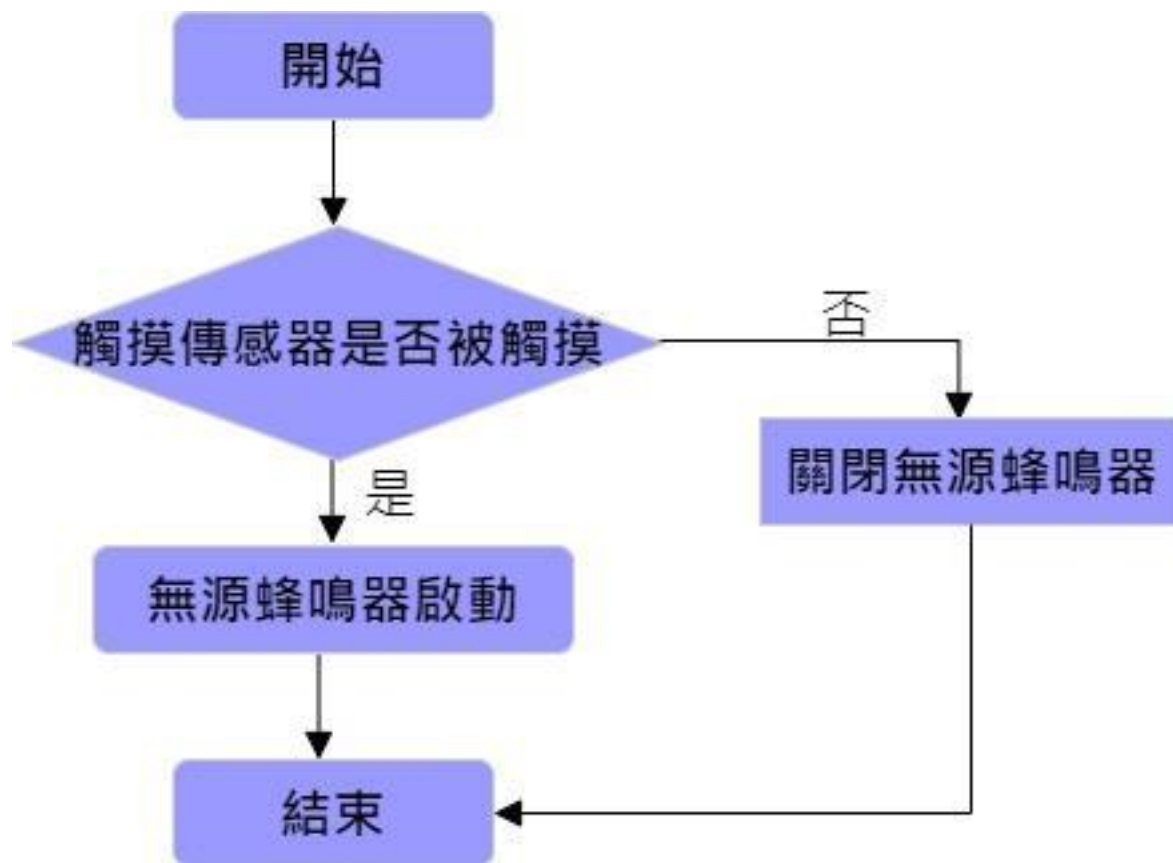
二、門鈴安裝





三、程序設計

3.1 算法設計



3.2 硬件連接：

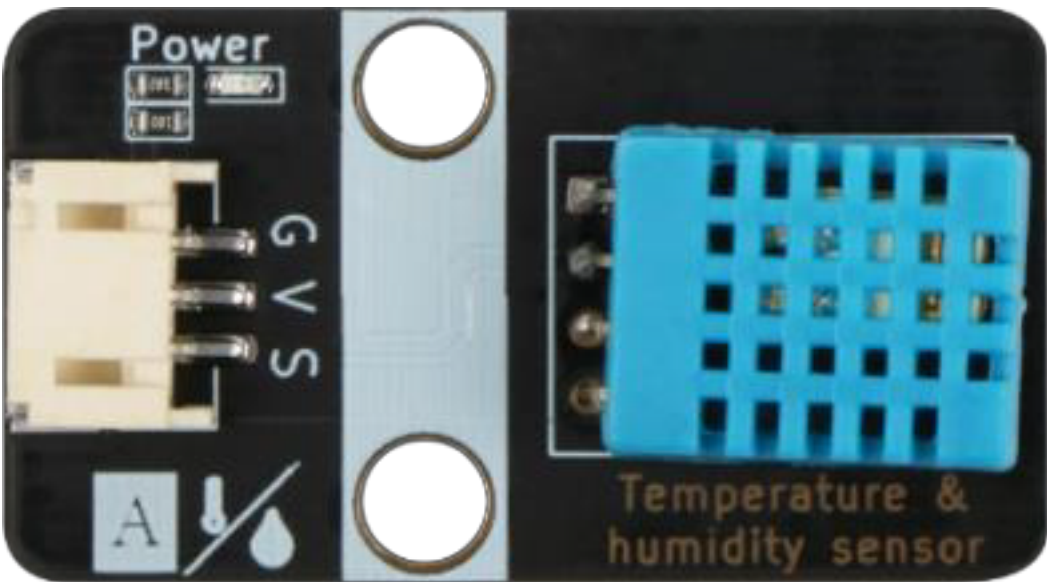
1.1.4 第四課智能F控風扇

任務背景：

器材準備：

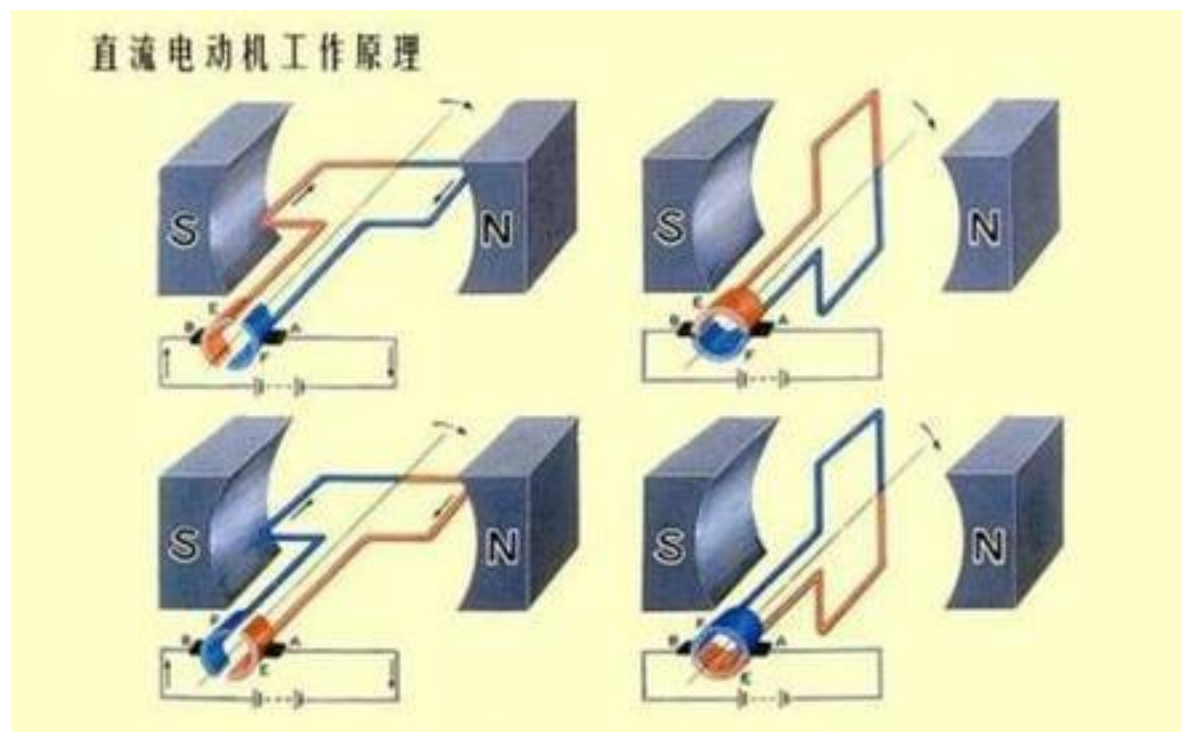
一、了解F濕度傳感器和直流電動機風扇模塊

1.1 E濕度傳感器模塊



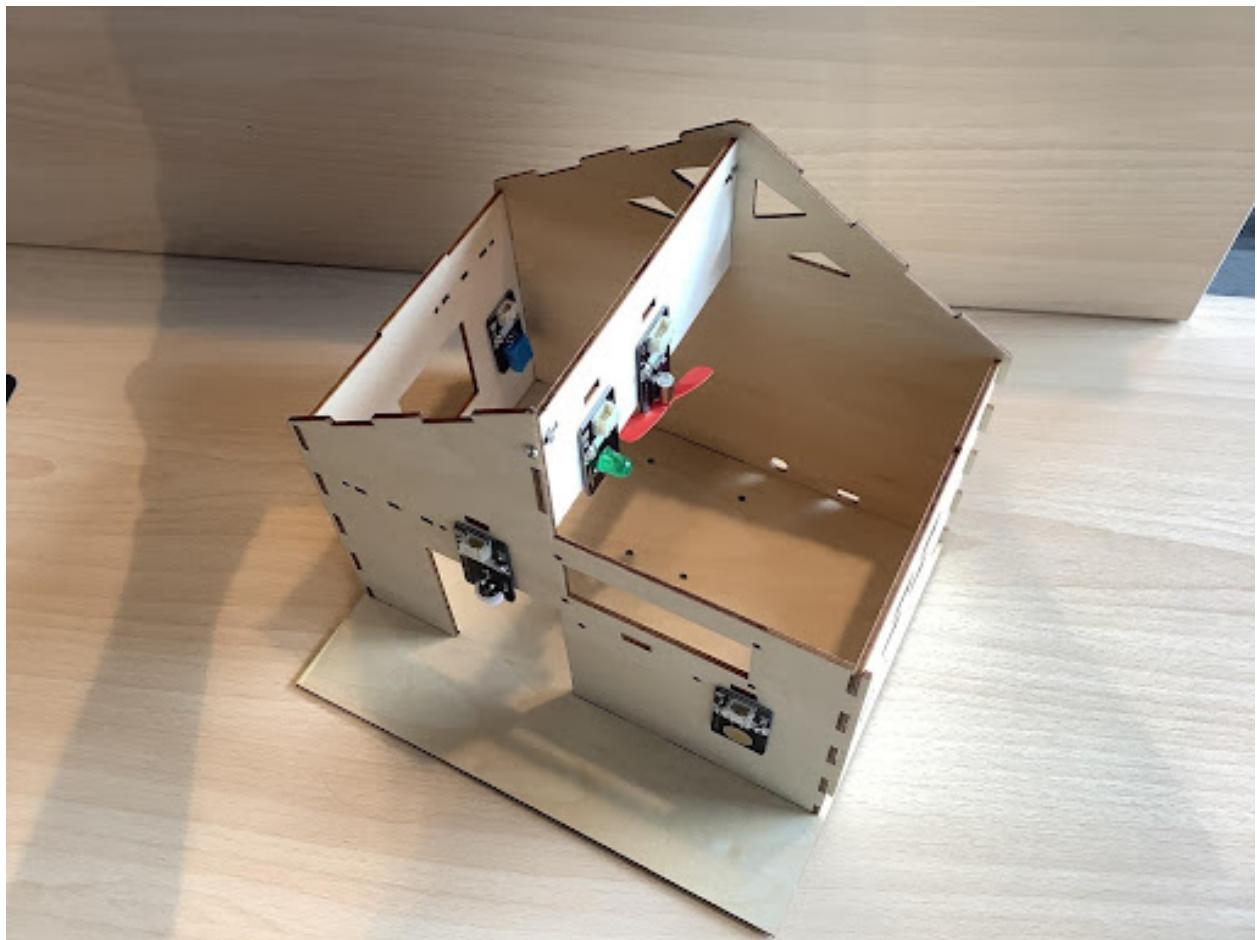
溫濕度傳感器	Arduino BLE-UNO
G	GND
V	VCC、5V
S	A0-A5

1.2 直流電動機風扇模塊



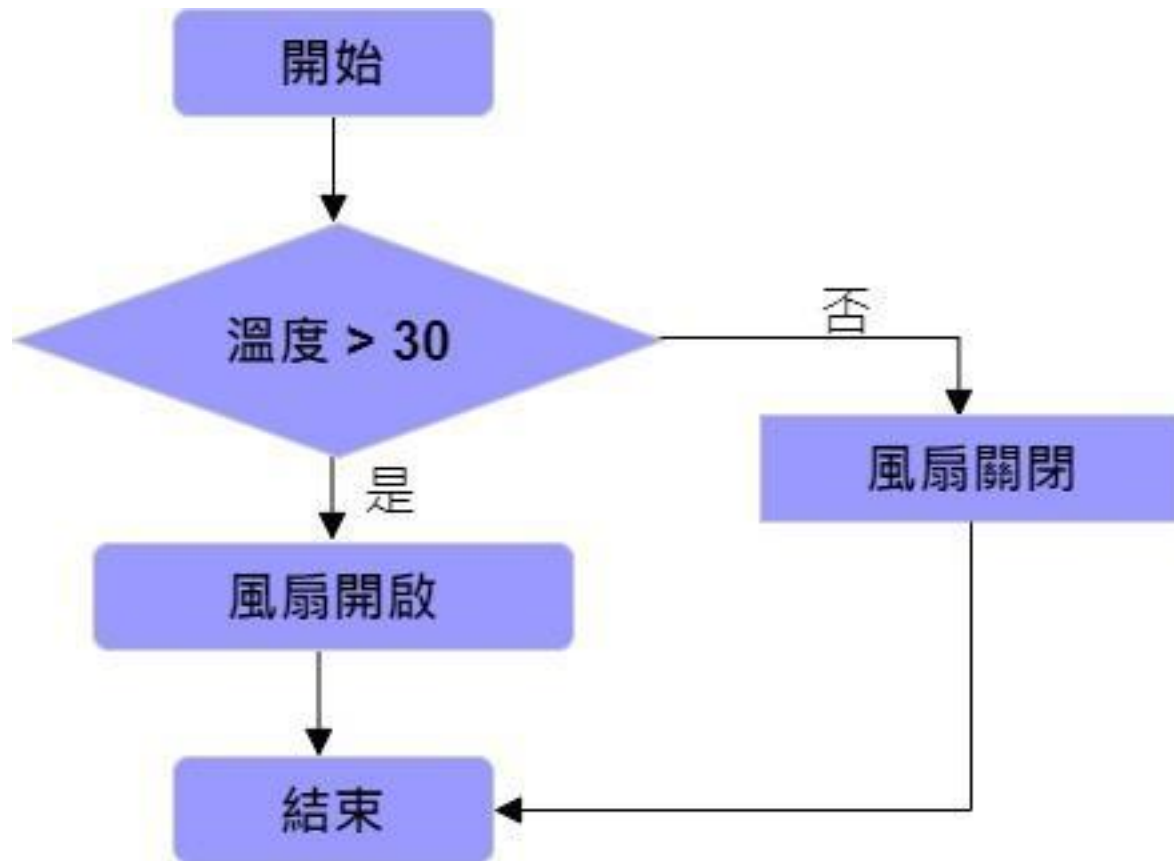
INA	INB	電機狀態
0	0	釋放
1	0	正轉
0	1	反轉
1	1	停止(剎車)

二、 控風扇安裝



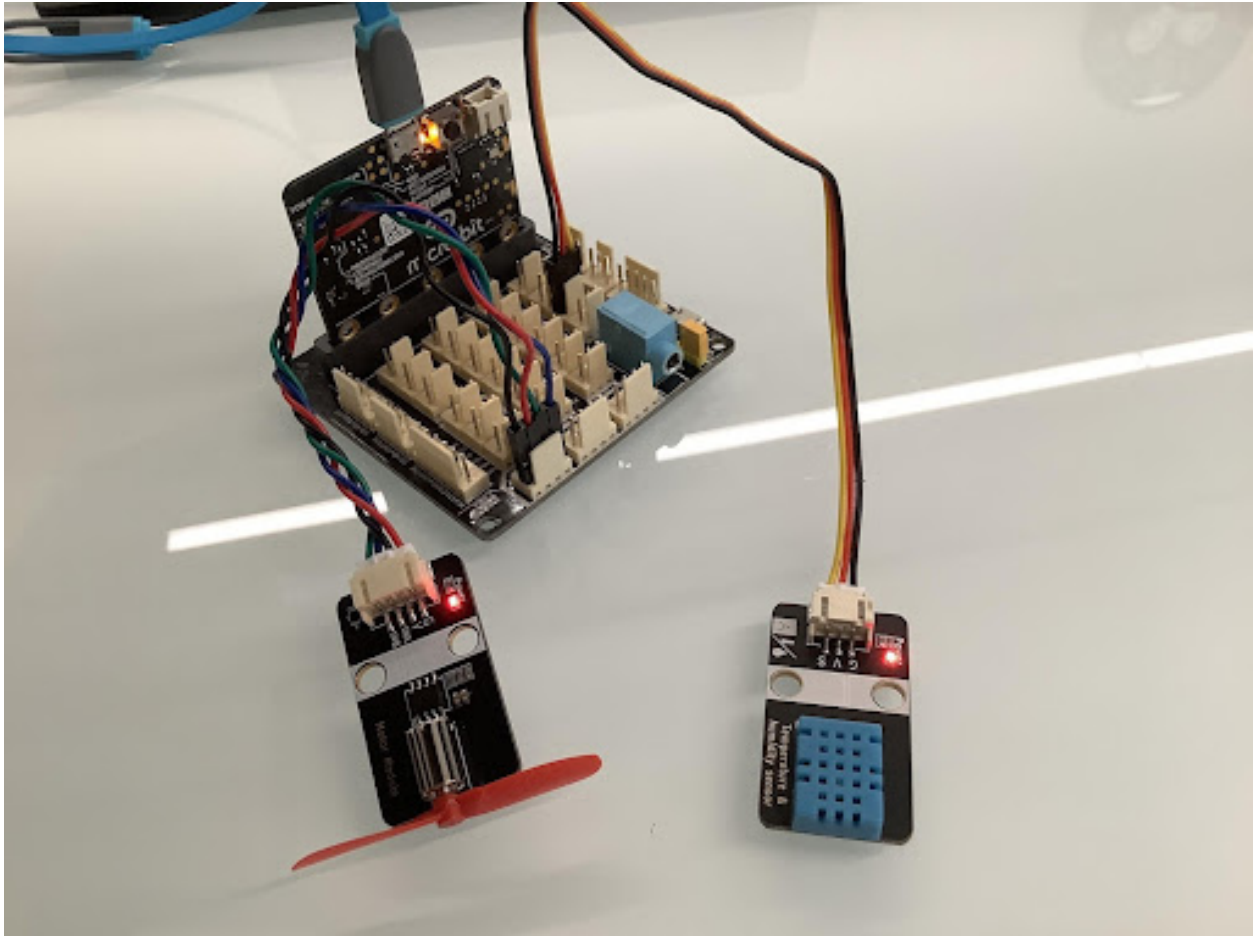
三、程序設計

3.1 算法設計：

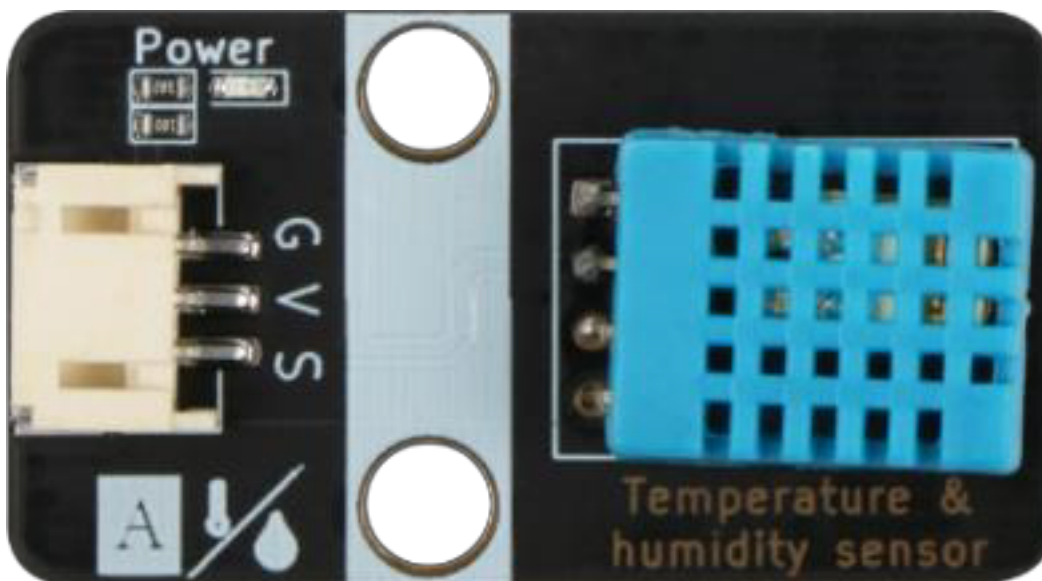


3.2 硬件連接：

傳感器和執行器 | 主控板: I²C - 濕度傳感器 | P1 直流電機風扇模塊 | P15、P16



3.3 程序示例：



四、總結

1.1.5 第五課智能門禁

任務背景

器材準備

一、了解智能門鎖

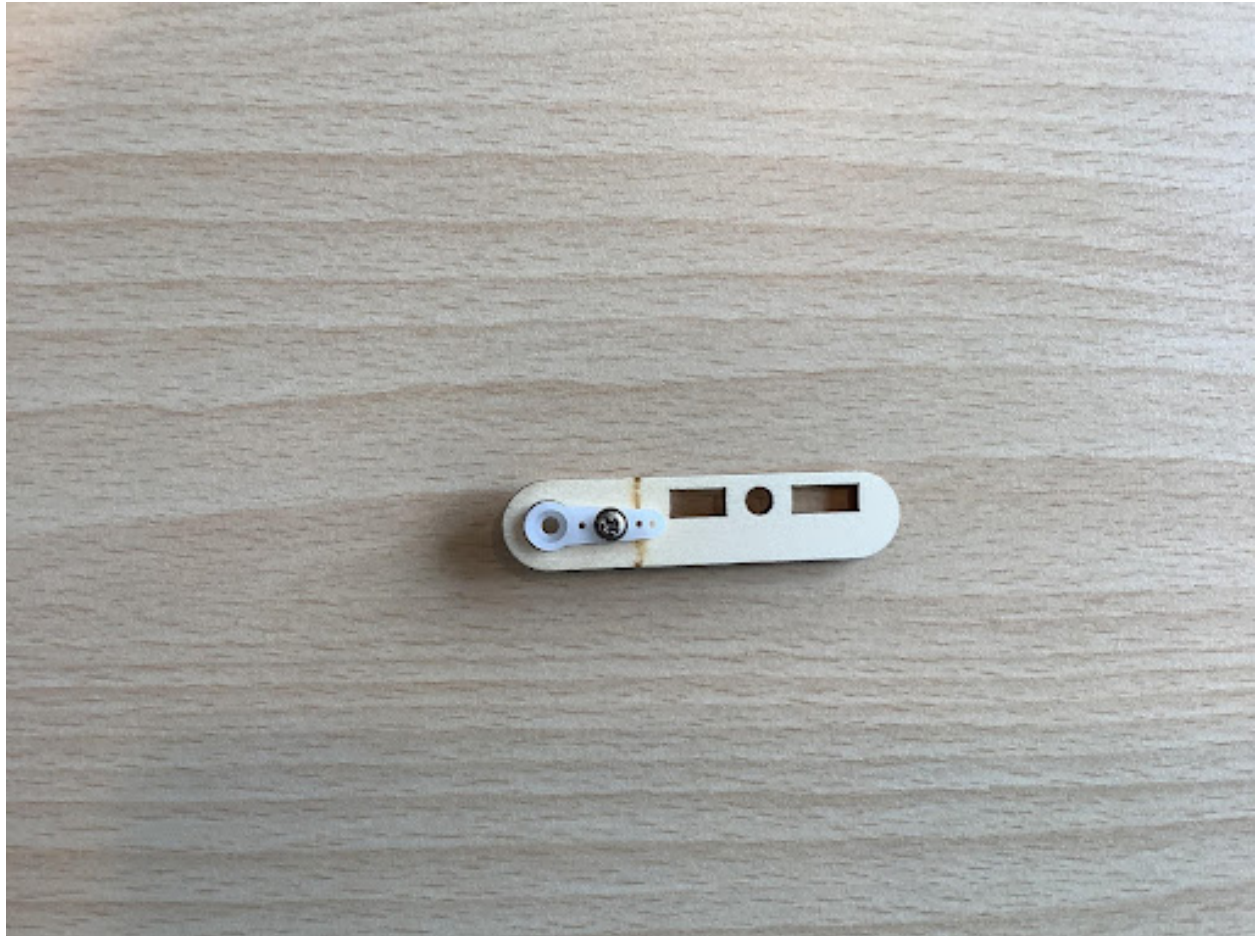
二、了解矩陣鍵盤傳感器模塊

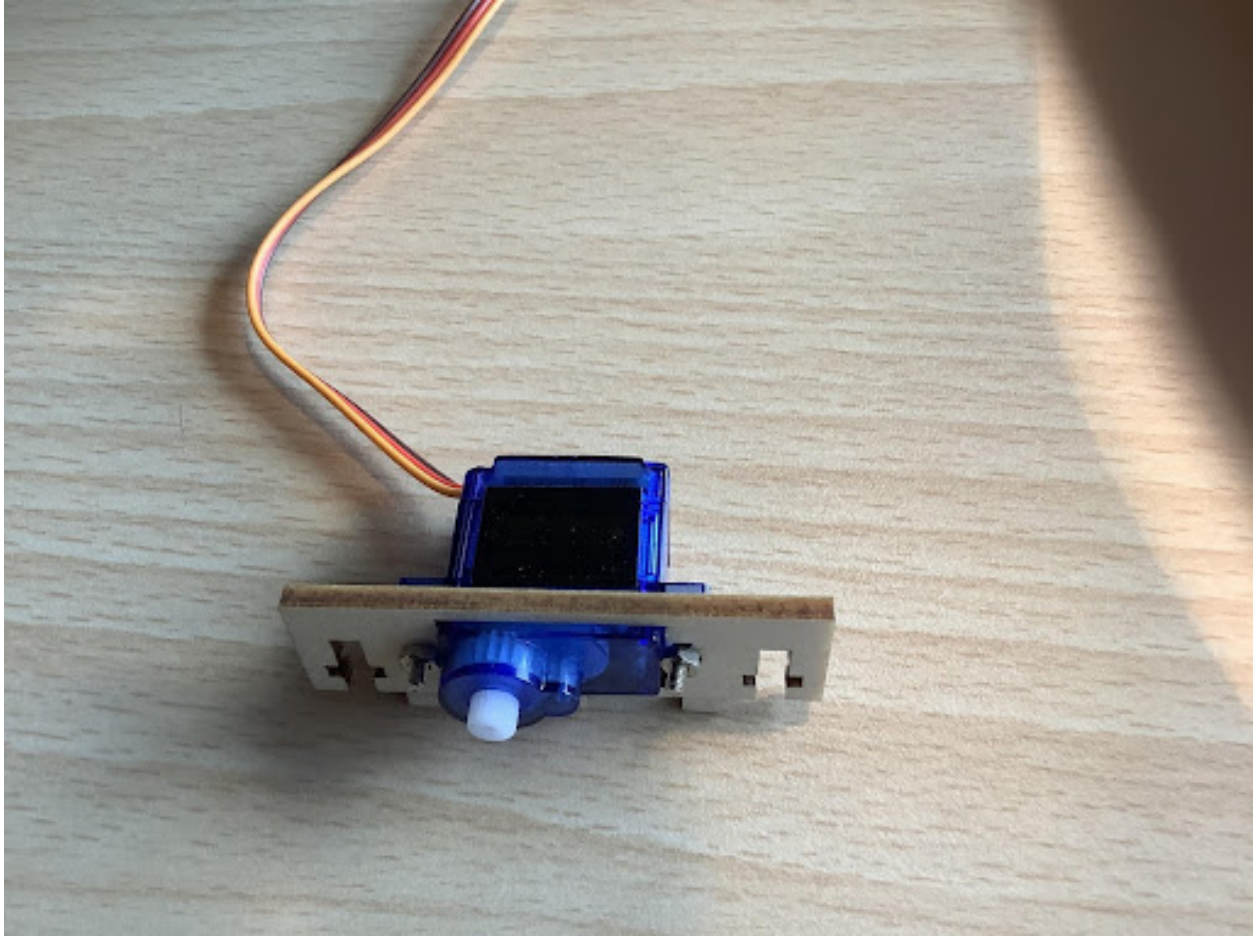


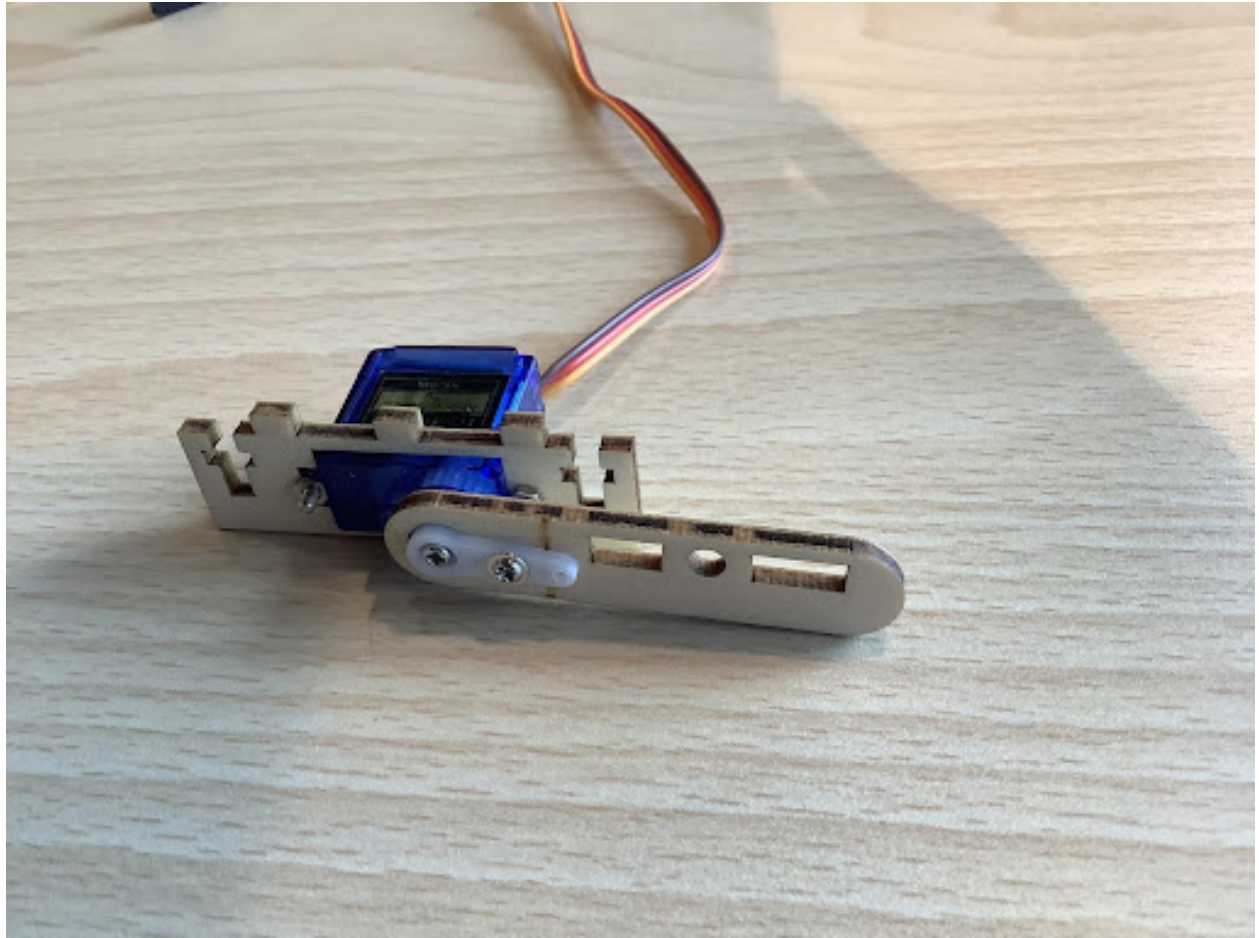
鍵盤值 | 十六進制值 | 鍵盤值 | 十六進制值 | 鍵盤值 | 十六進制值: - | - | - | - | - | - 110xFFFE | 710xFEFF | D10x7FFF
210xFFFF | D810xFDFF | C10xF7FF 310xFFFB | 910xFBFF | B10xFF7F 410xFFEF | *10xEFFF | A10xFF7 510xFFDF | 010xDFFF |
610xFFBF | #10xBFFF |

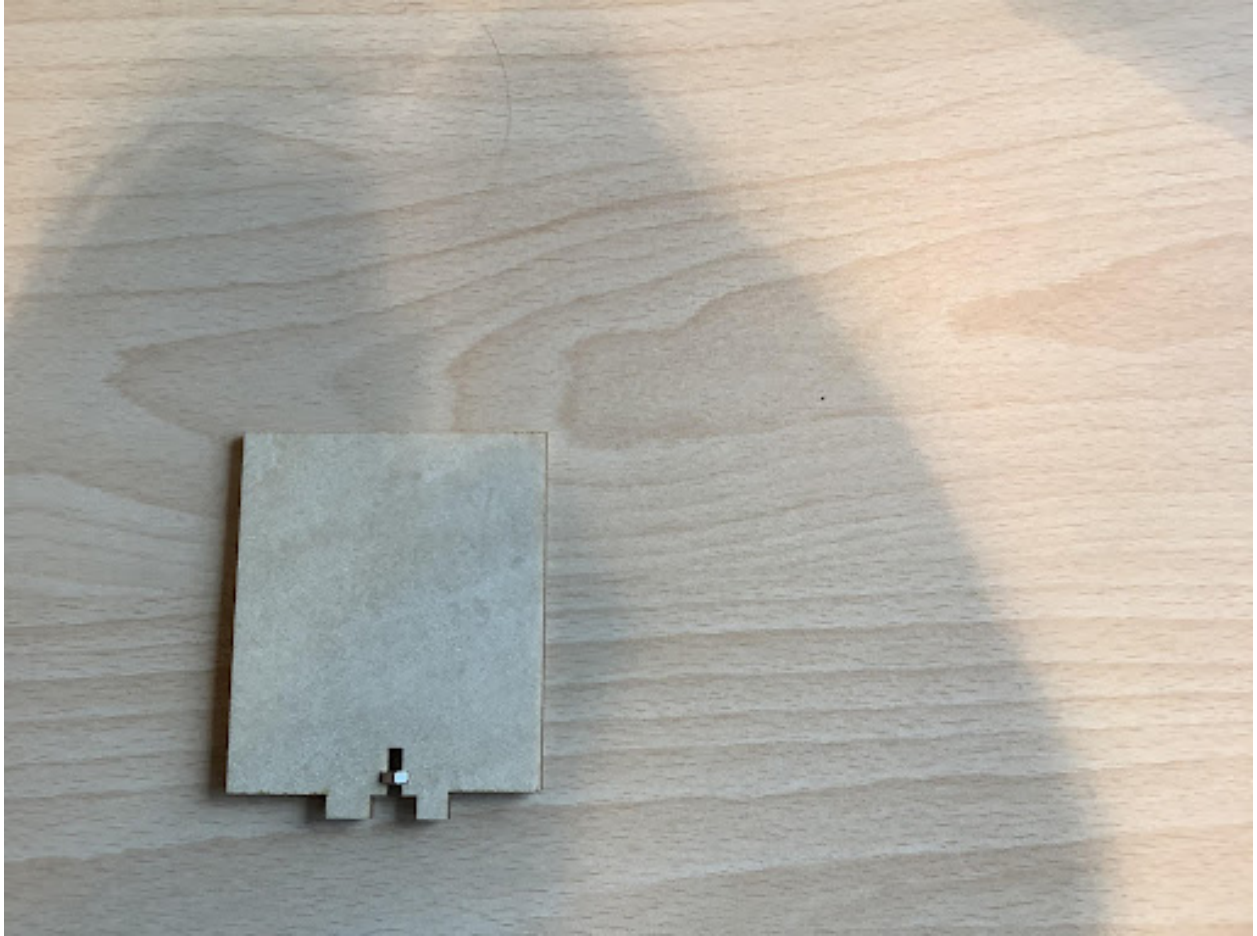
三、智能門禁安裝

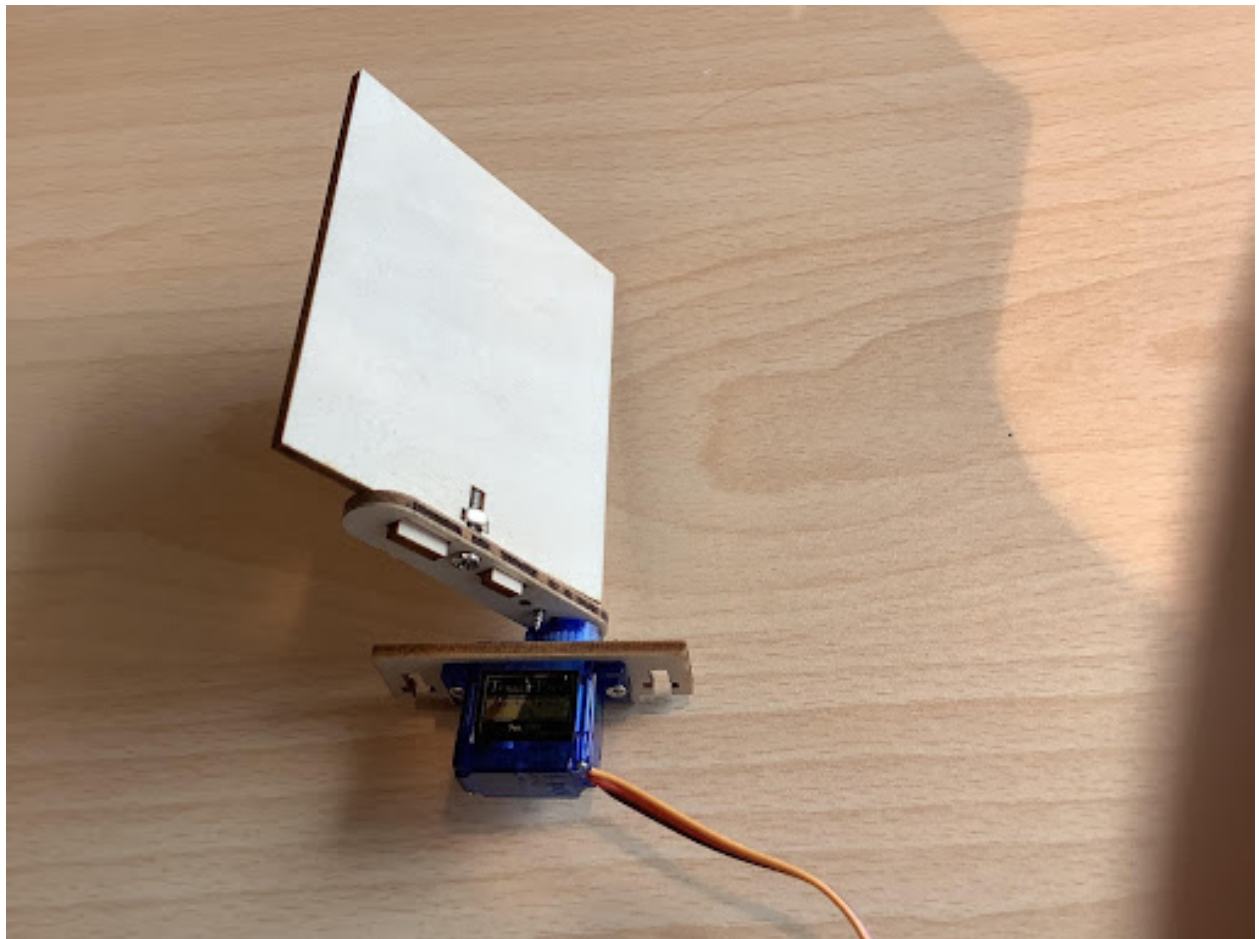




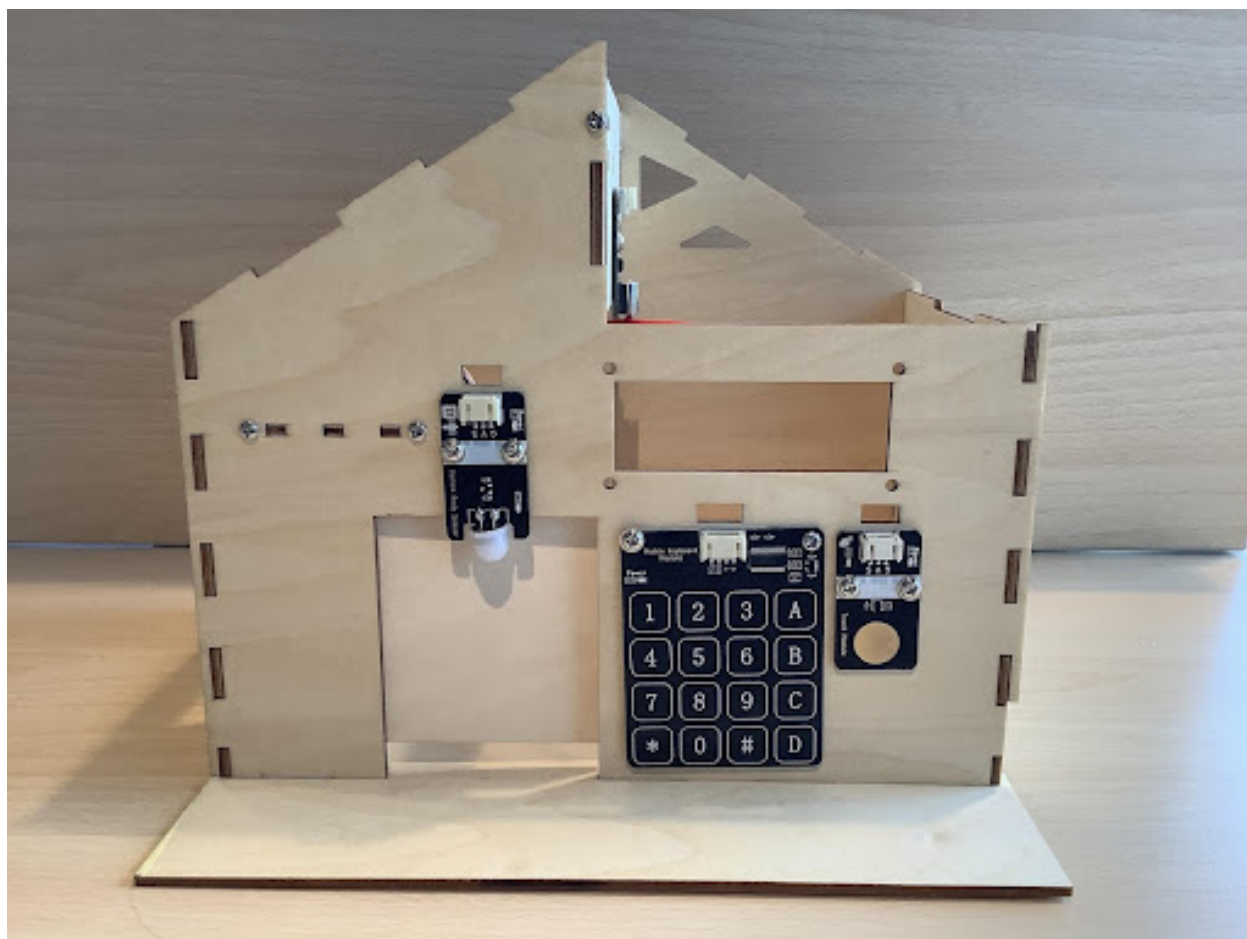










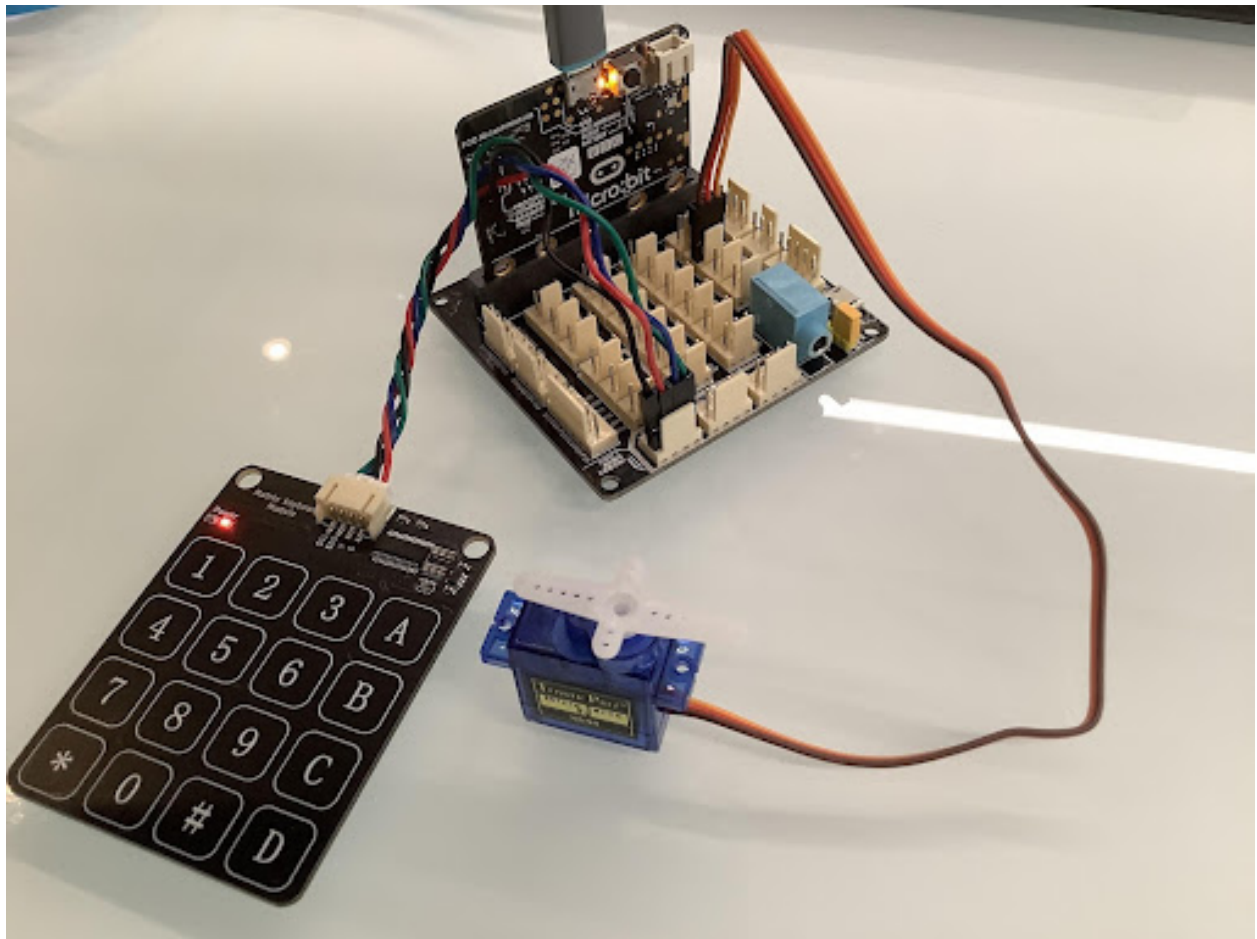


四、程序設計

4.1 算法設計：

4.2 硬件連接：

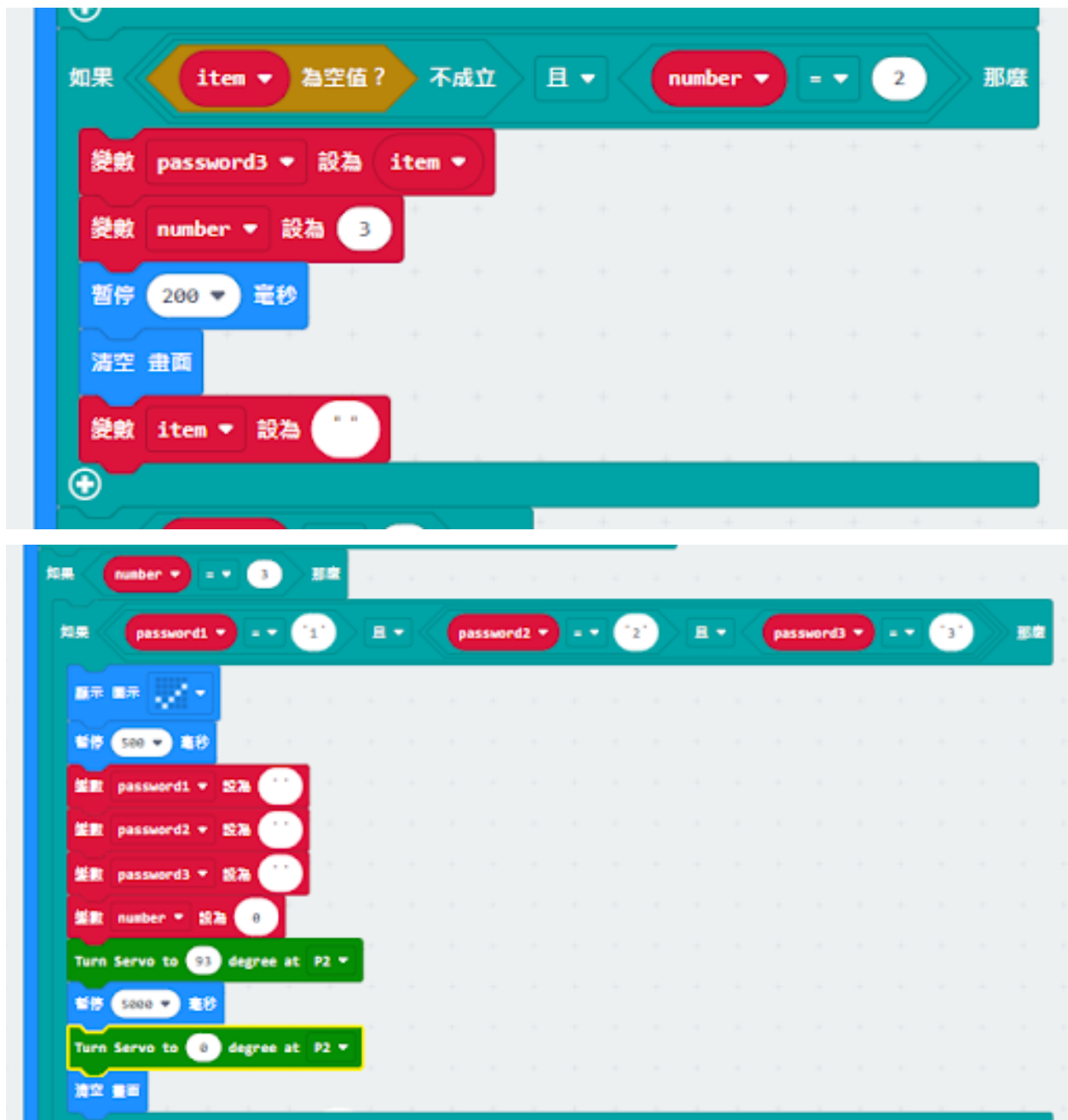
傳感器和執行器 | 主控板：I：矩陣鍵盤傳感器模塊 IP15(SCL)、P16(SDO) 舵機 IP2



4.3 程序示例：









五、總結

1.1.6 第六課光控自動窗

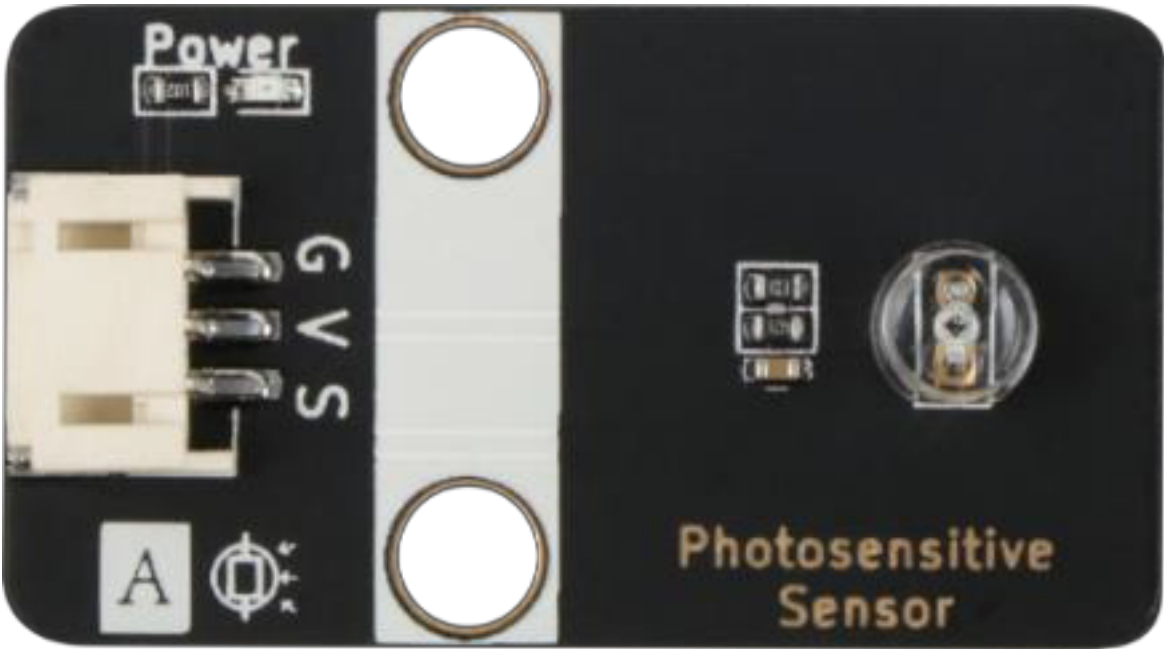
任務背景

器材準備

一、了解光控自動窗的原理

二、了解光敏傳感器和數碼管顯示器

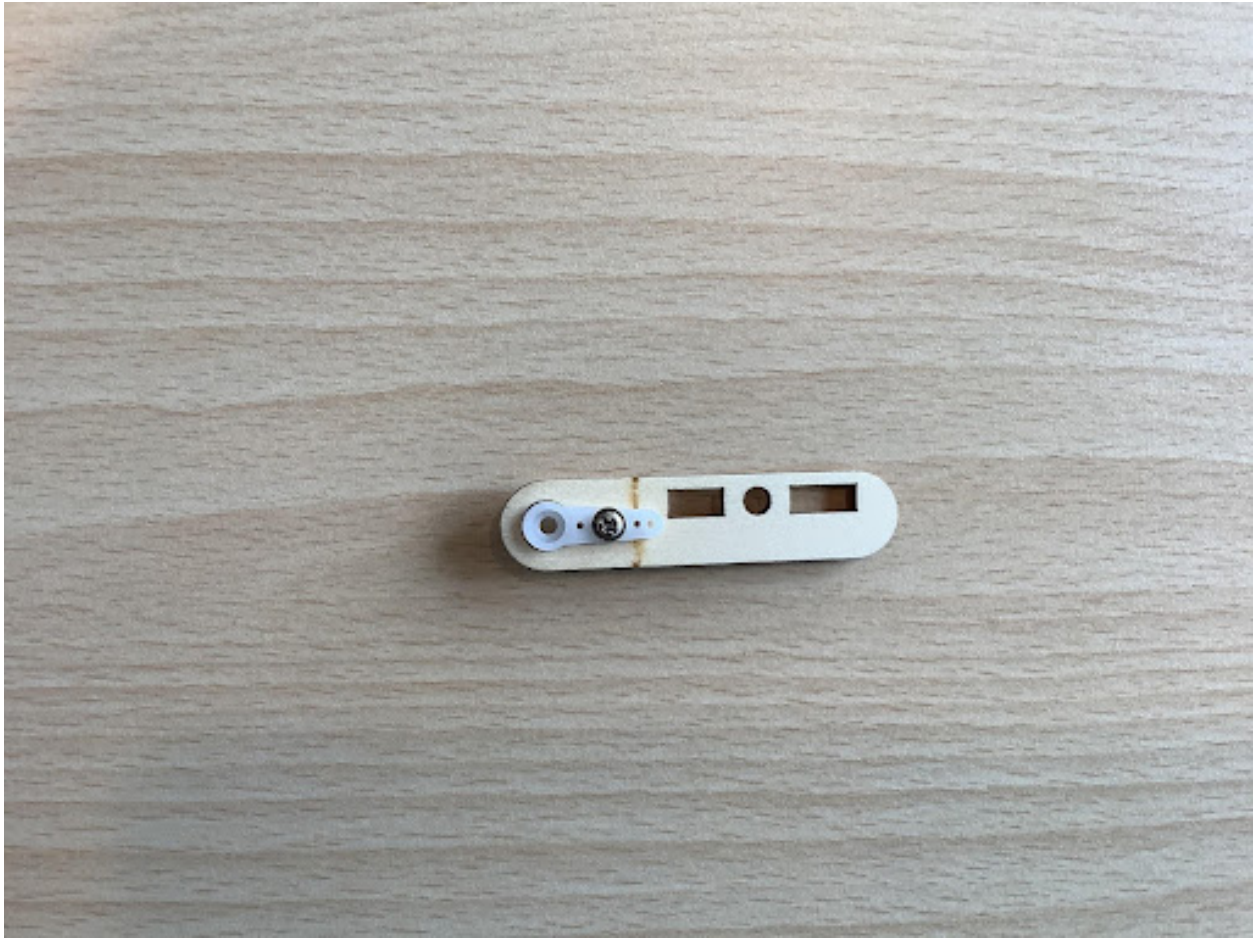
2.1 光敏傳感器

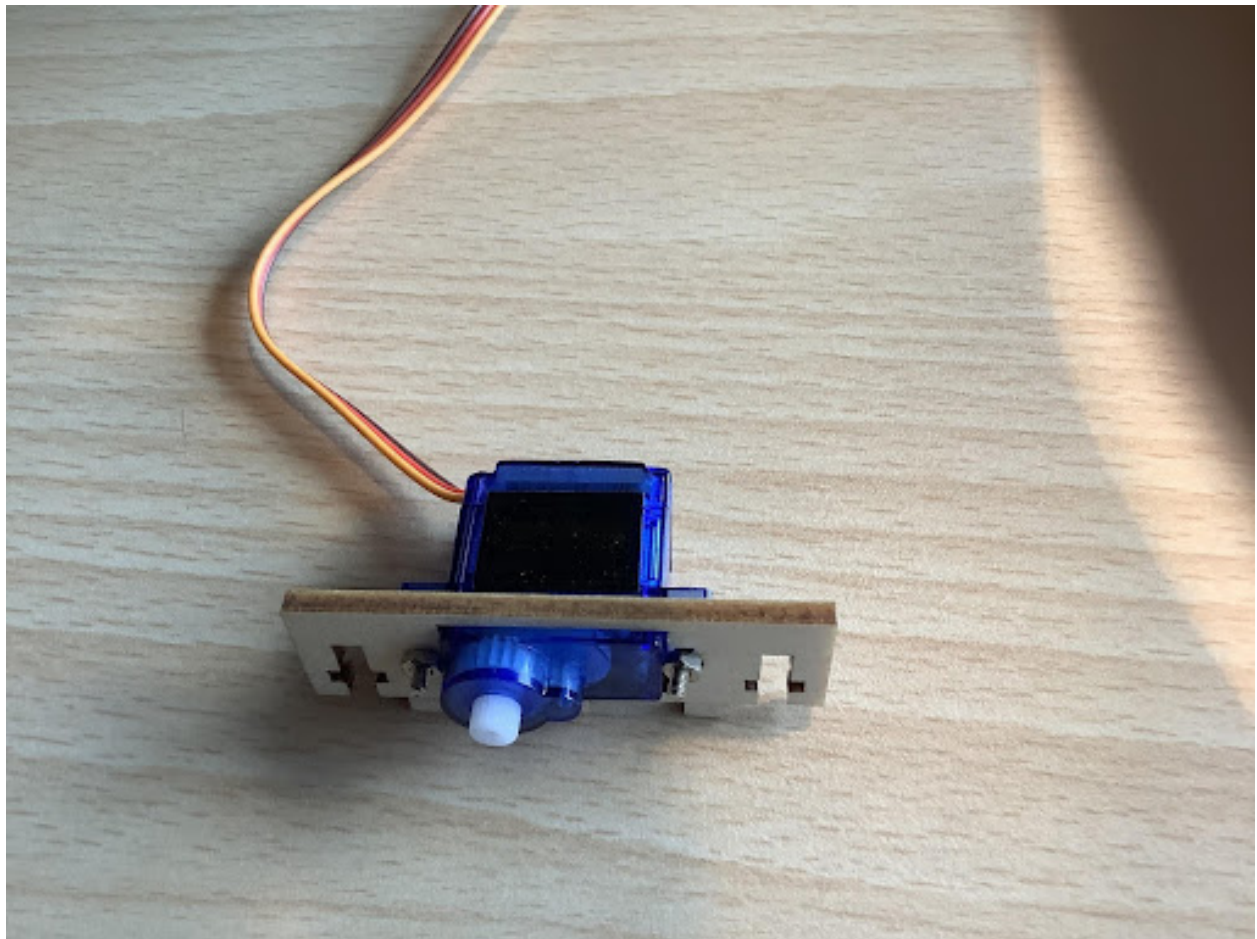


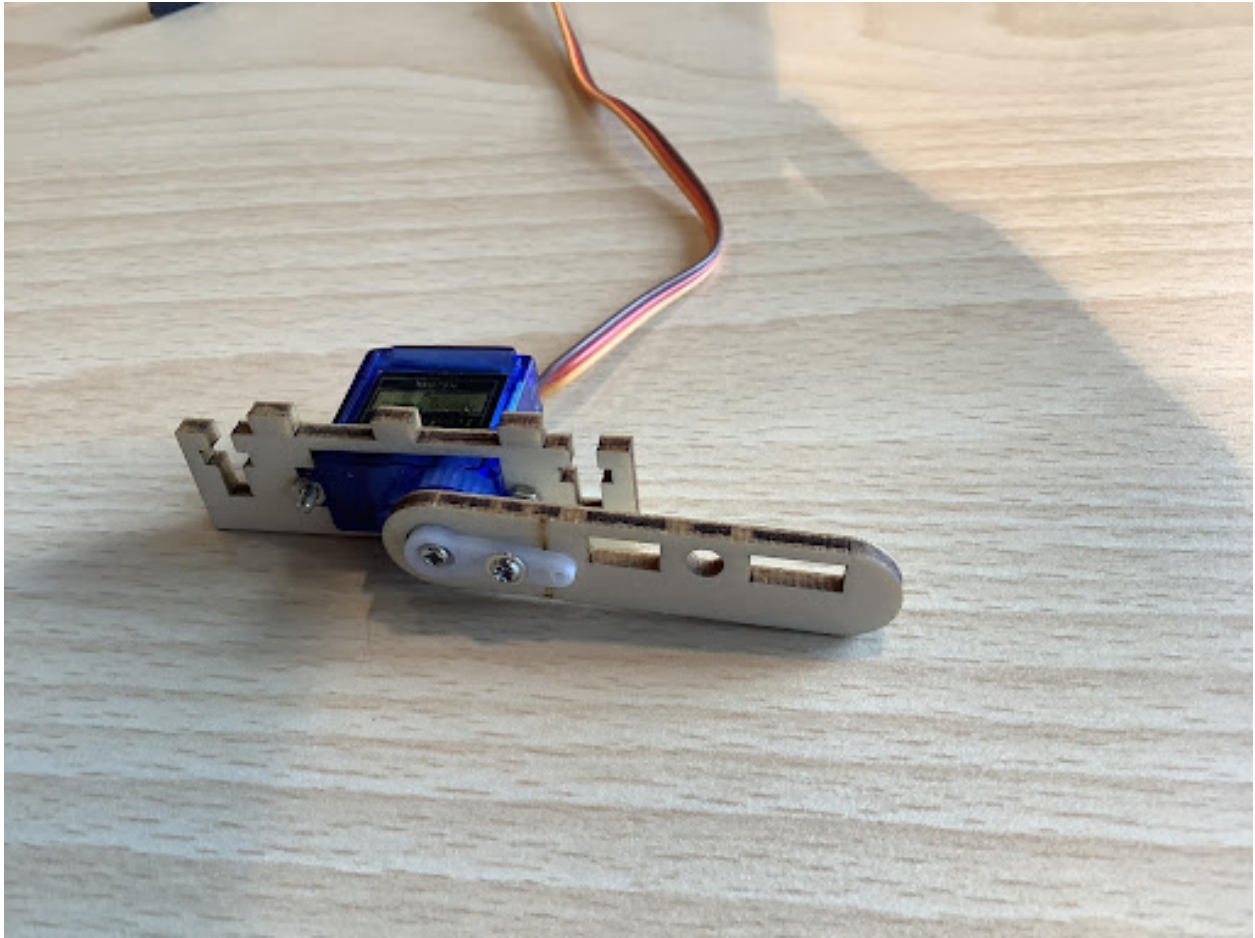
光敏傳感器	Arduino BLE-UNO
G	GND
V	VCC、5V
S	A0-A5

三、光控自動窗安裝

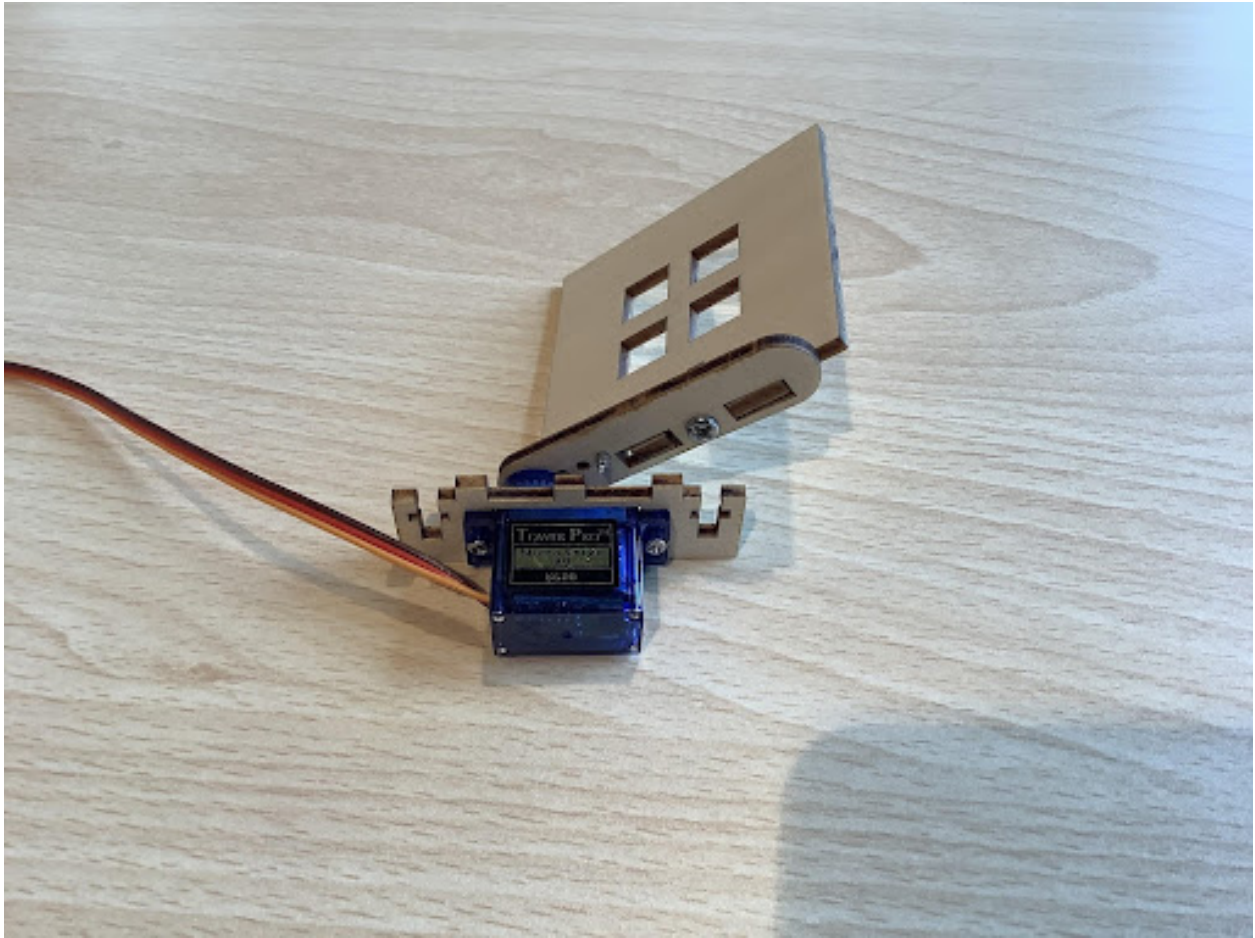


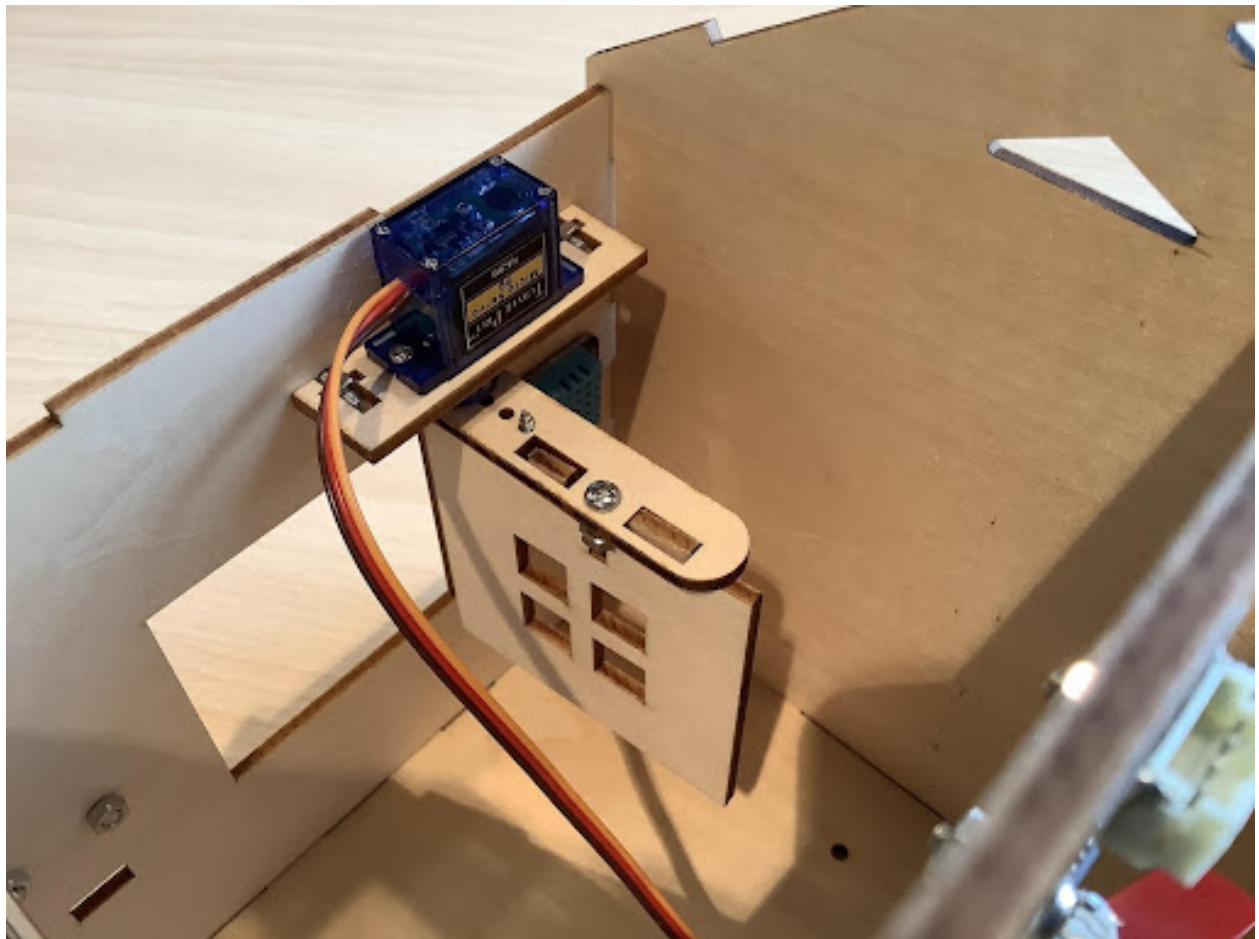


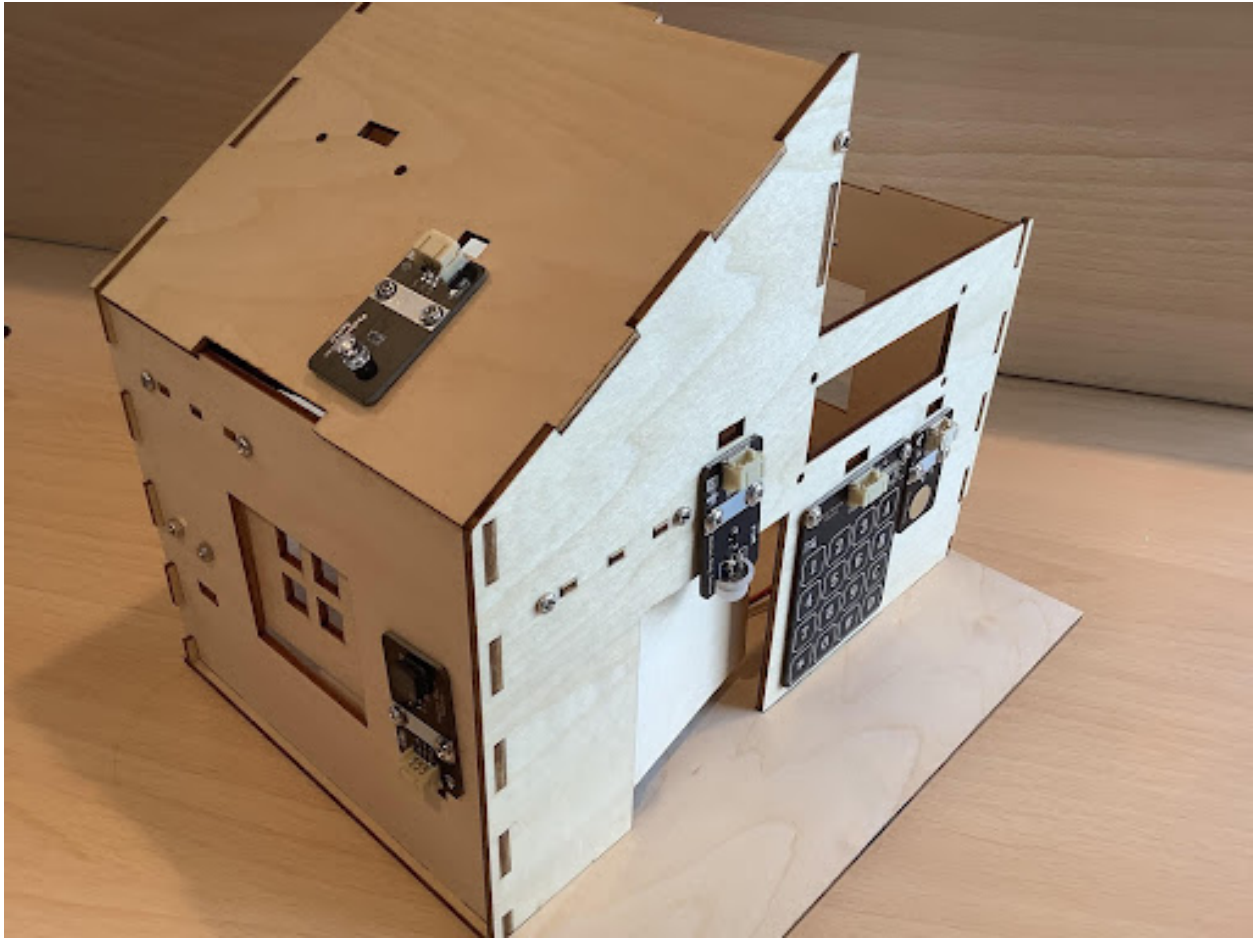






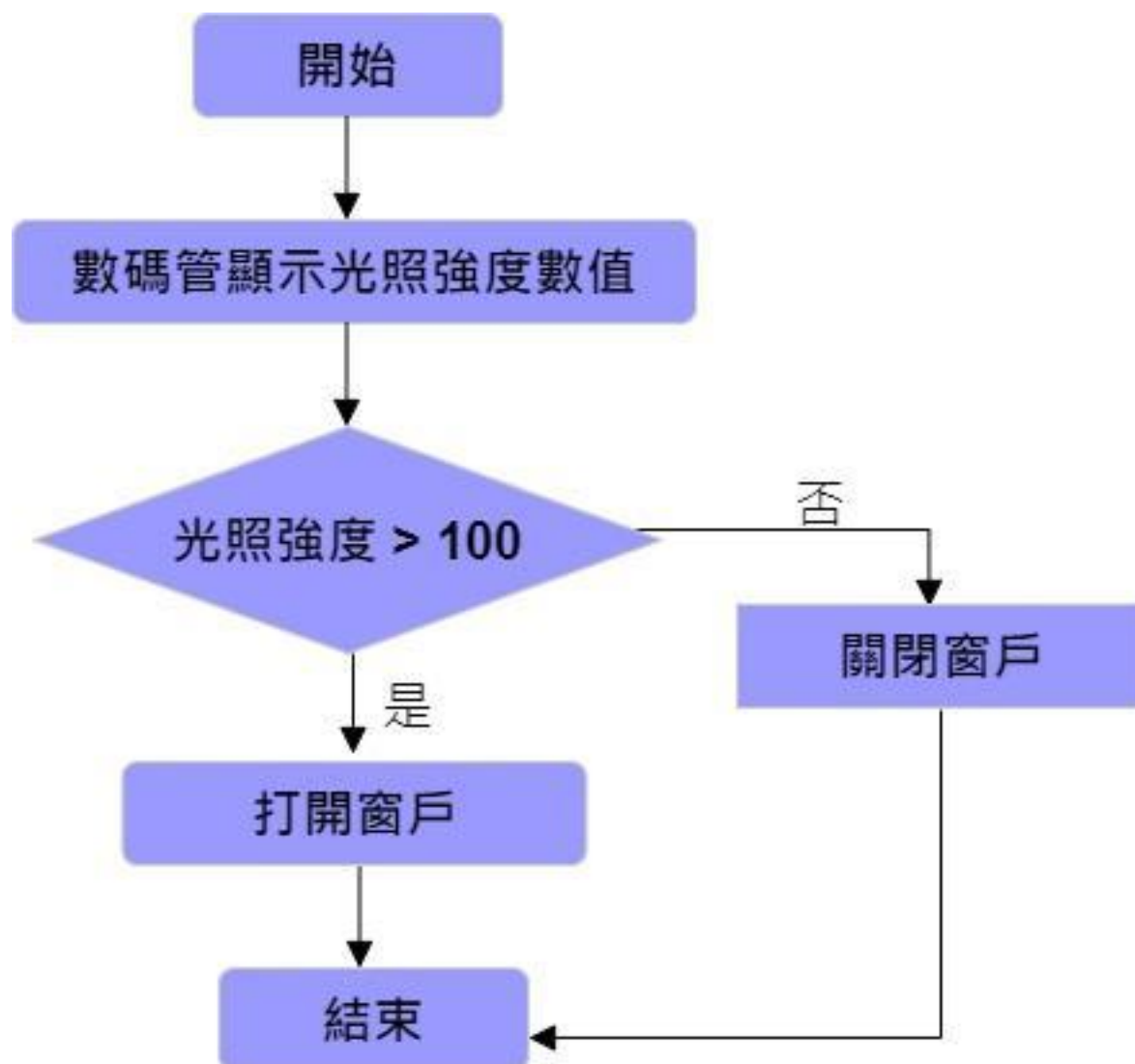






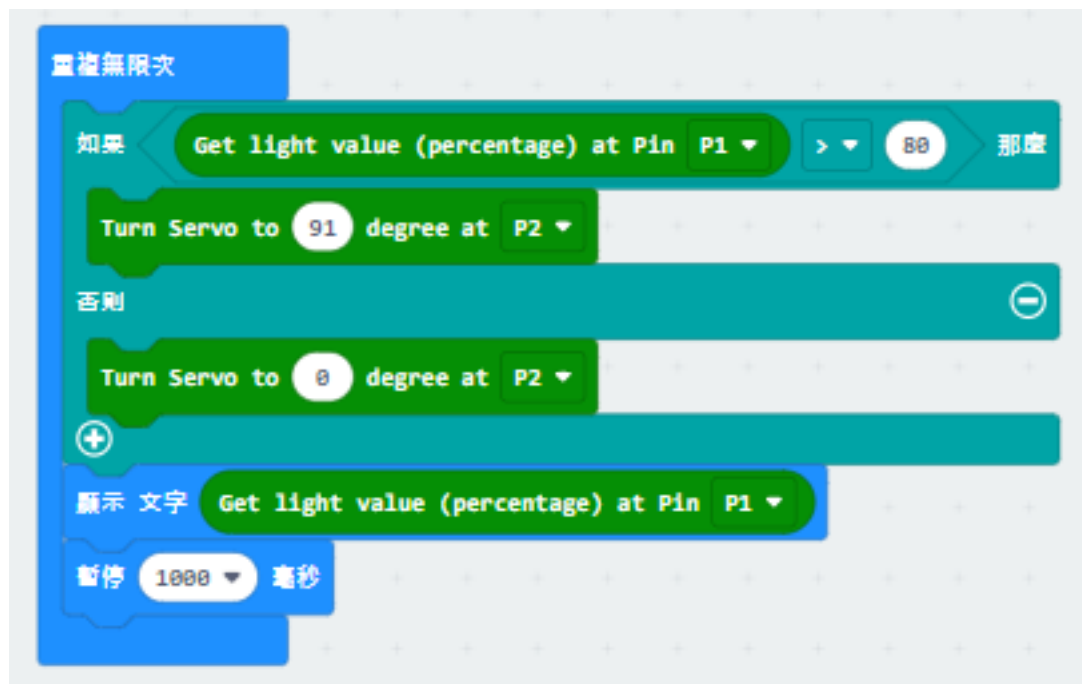
四、程序設計

4.1 算法設計



4.2 硬件連接

4.3 示例程序



五、總結

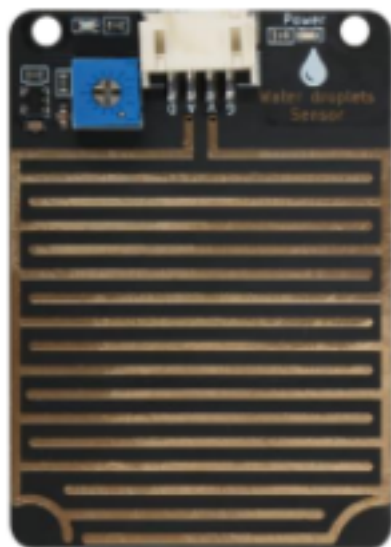
1.1.7 第七課智能雨控窗F

任務背景

器材準備

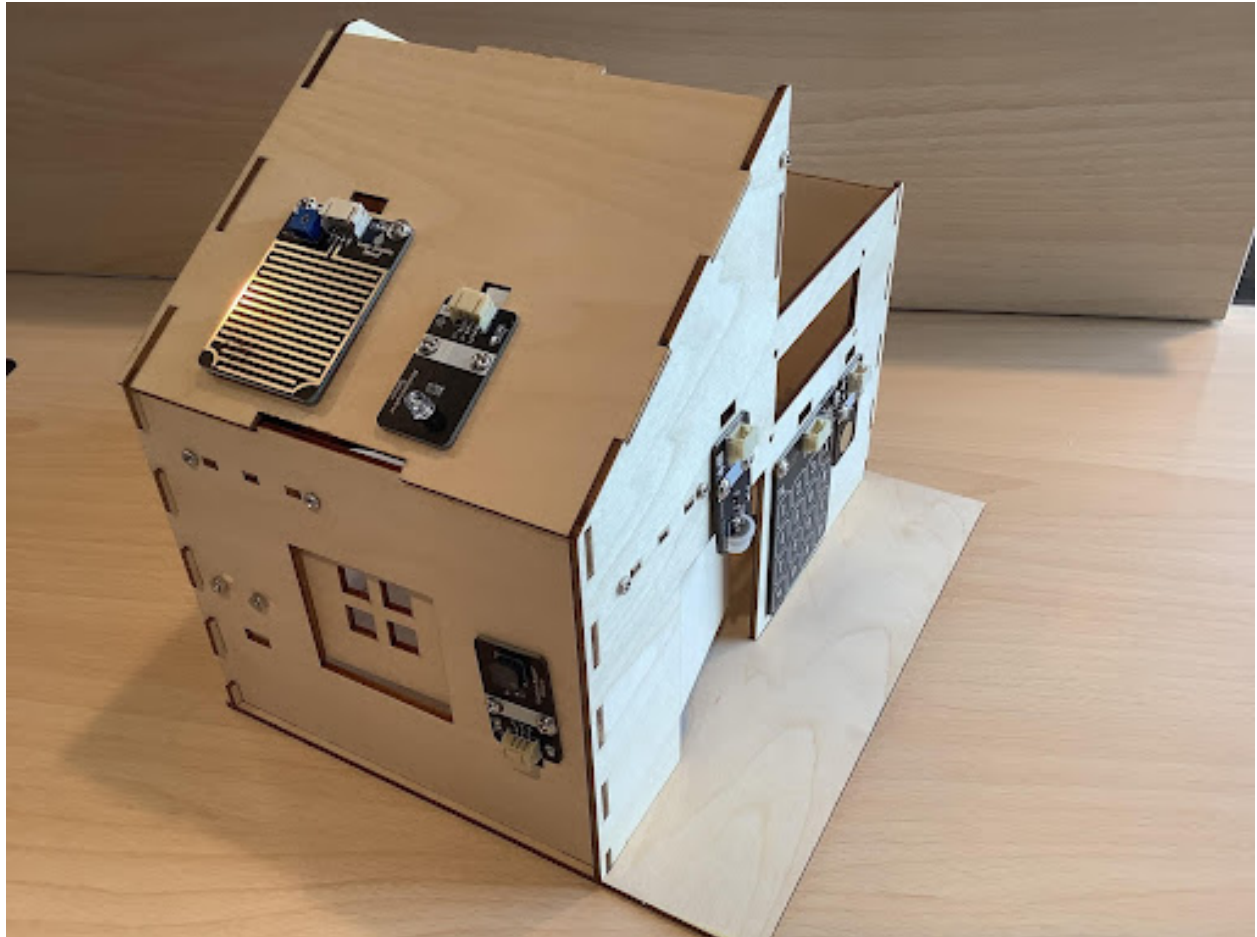
一、智能雨控窗F原理

二、了解雨滴傳感器



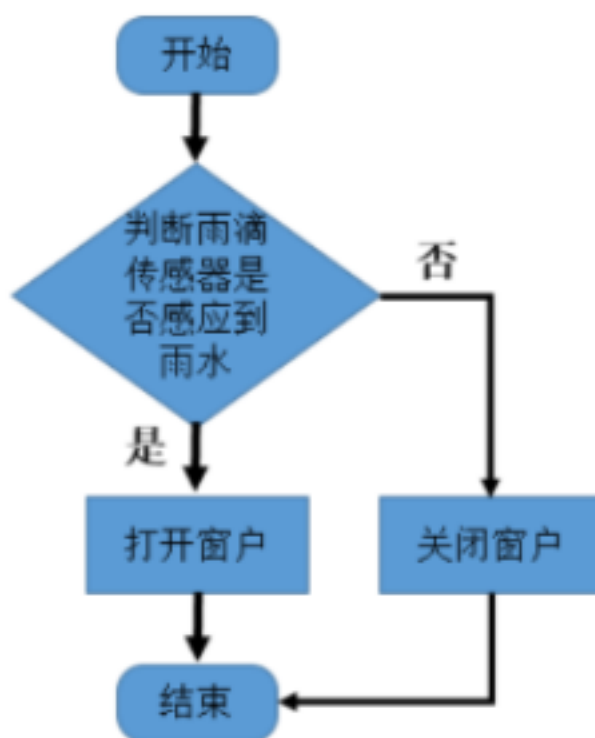
雨滴传感器	Arduino BLE-UNO
G	GND
V	VCC、5V
A	A0-A5
D	D0-D13

三、自動智能窗搭建



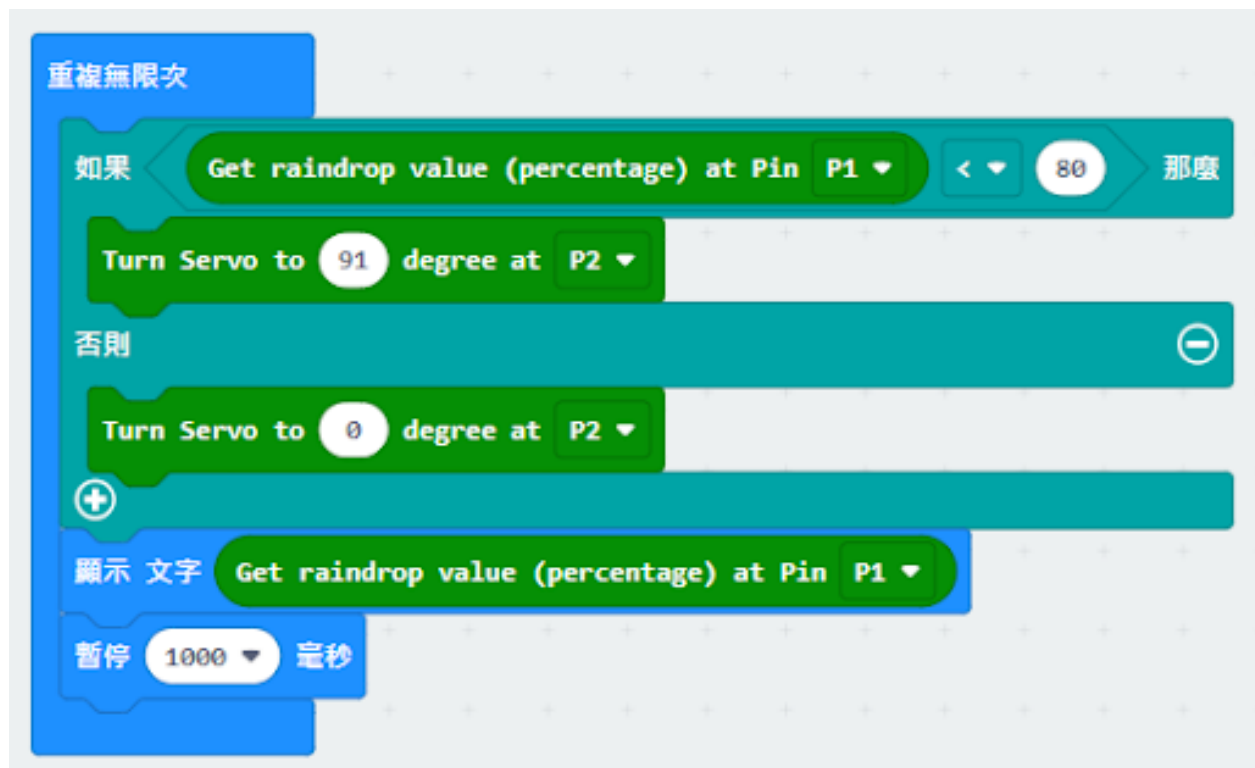
四、程序設計

4.1 算法設計



4.2 硬件連接：

4.3 程序示例：



五、總結

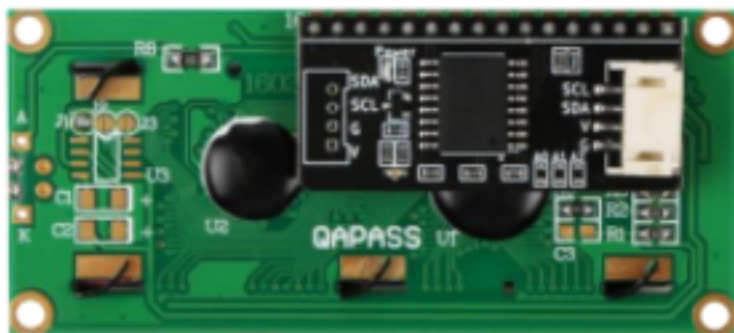
1.1.8 第八課空氣質量檢測系統

任務背景：

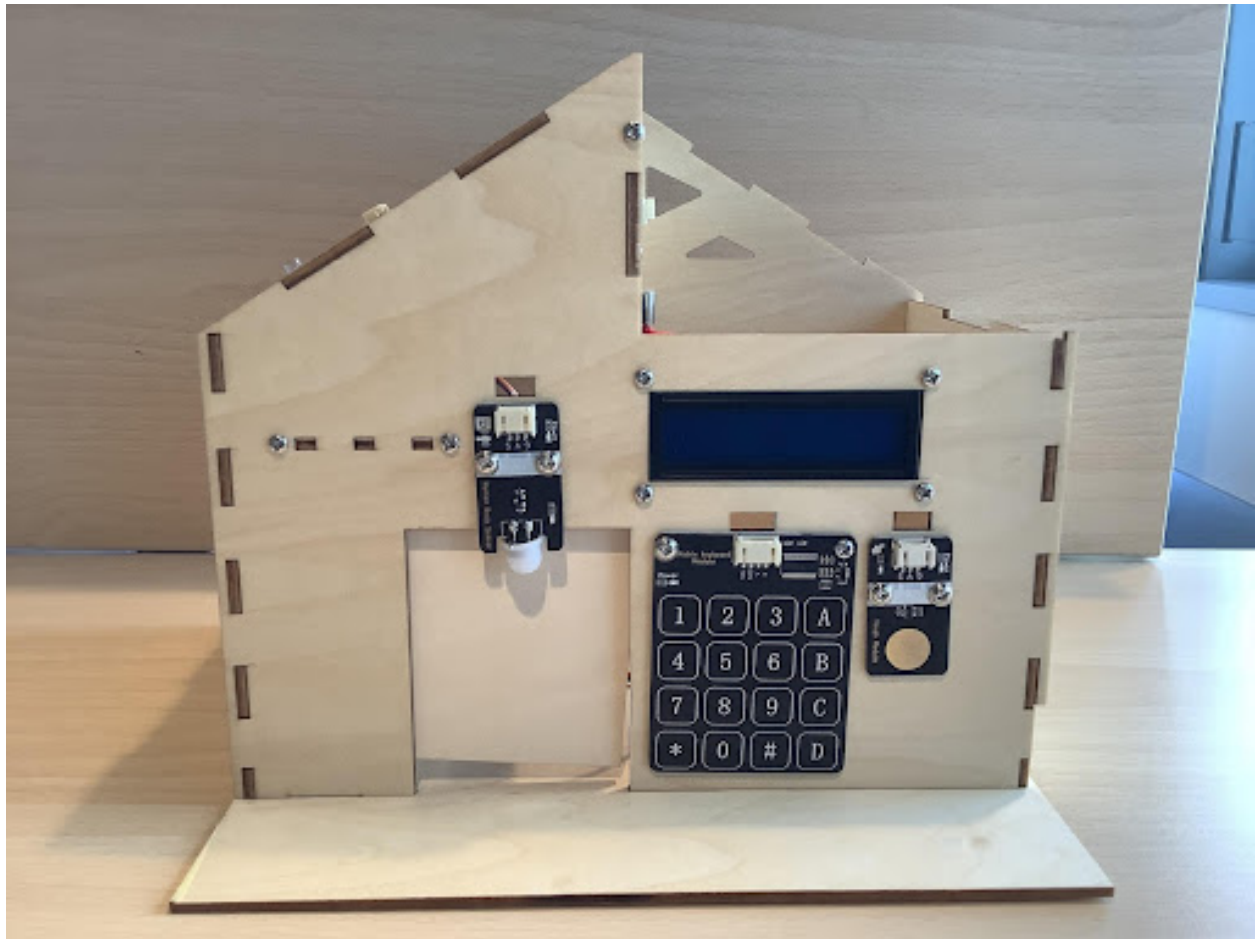
器材準備：

一、了解空氣質量檢測系統

二、了解 LCD 顯示器

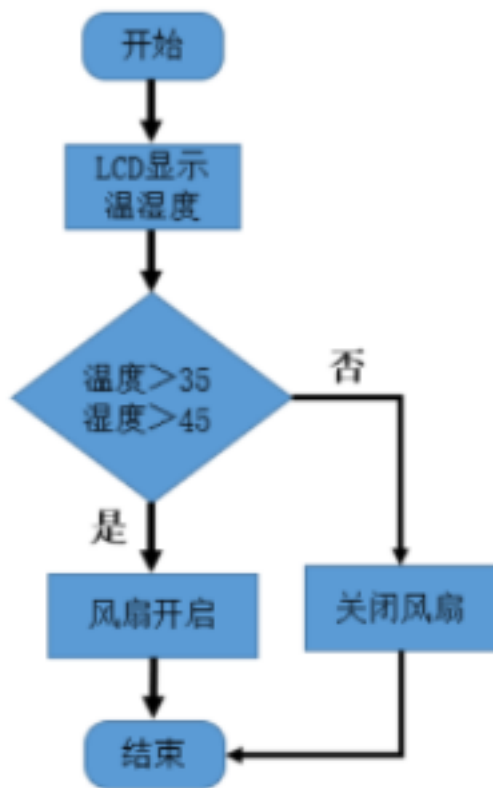


三、空氣檢測系統安裝



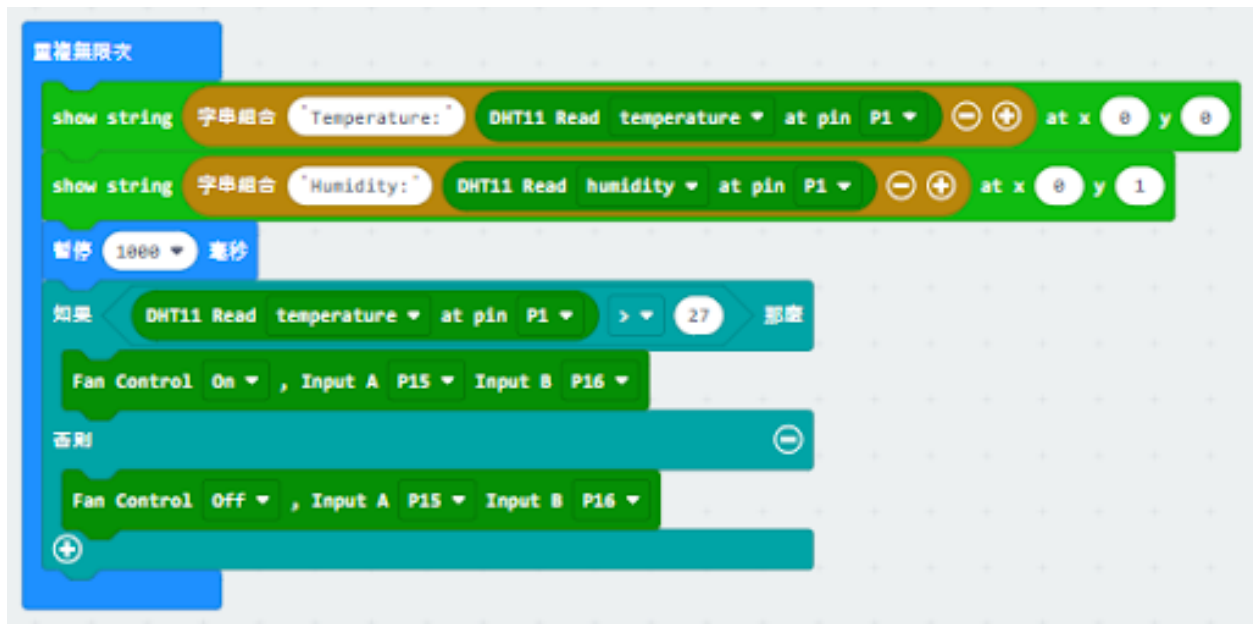
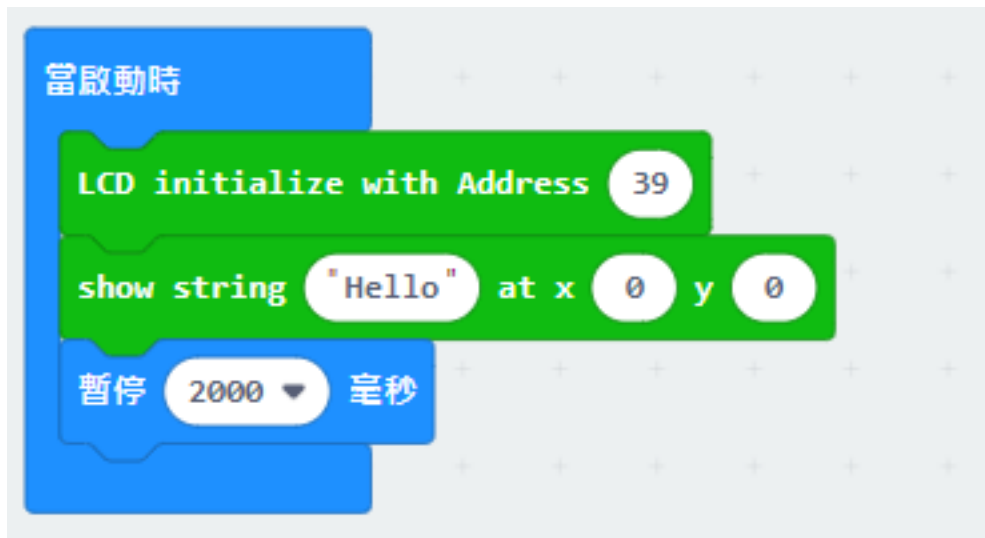
四、程序設計

4.1 算法設計：



4.2 硬件連接：

4.3 程序示例：



五、總結

1.2 智慧城市 IoT 套裝課程

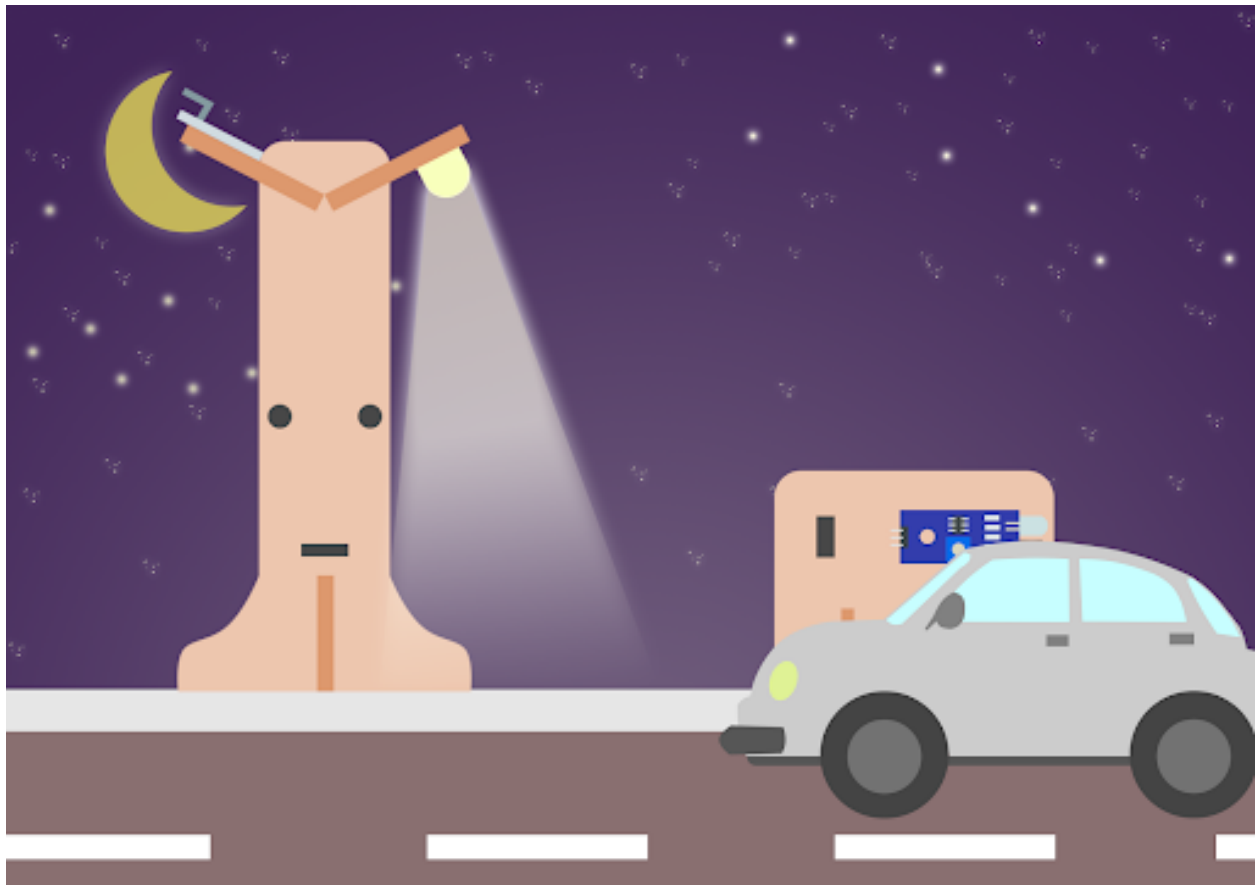
1.2.1 Know More About Smart City 了解智能城市

What is a Smart City? 什麼是智能城市

Advantages of Smart City (智慧城市的好處)

- More effective, data-driven decision-making (作出更加有效、數據驅動的決定)
- Enhanced citizen and government engagement (加強公民和政府的參與)
- Safer communities (更加安全的社區)
- Reduced environmental footprint (減少環境足跡)
- Improved transportation (改善交通)

1.2.2 Automated Smart Street Lamp 自動智能街燈



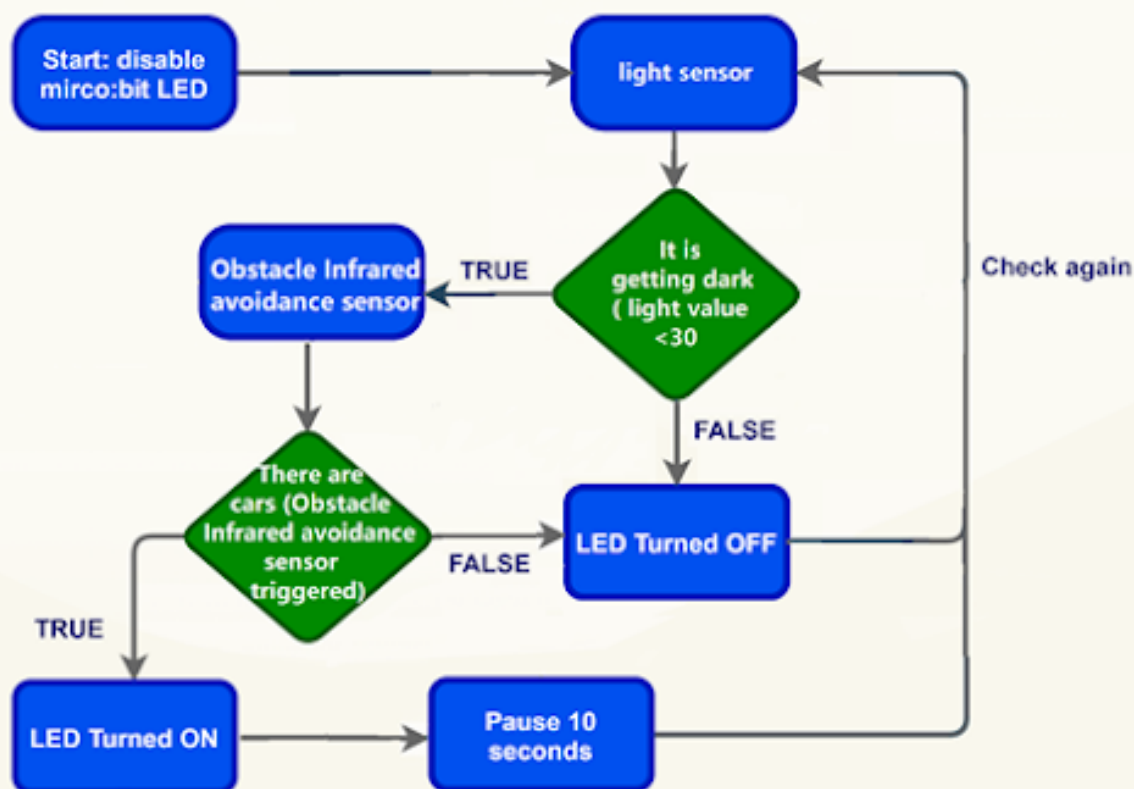
Goal 目標

Background 背景

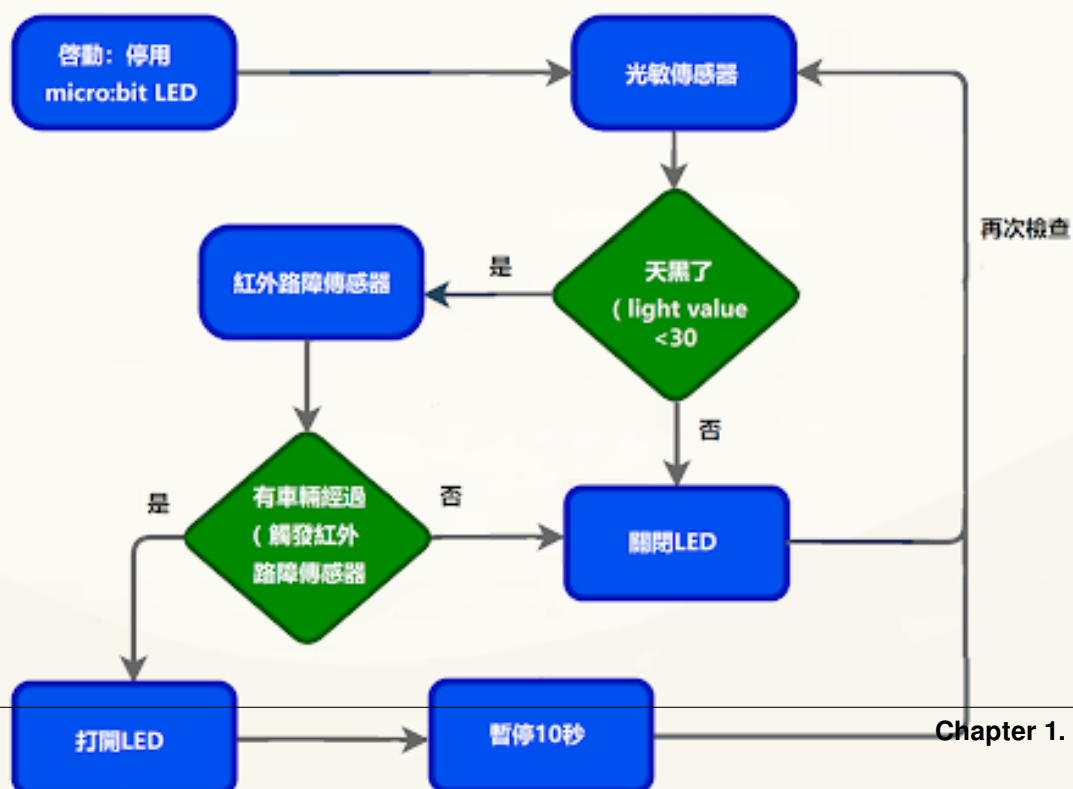
What is a smart street lamp? 什麼是智能街燈

Smart street lamp operation 智能街燈的運作

Case 01 Concept Diagram



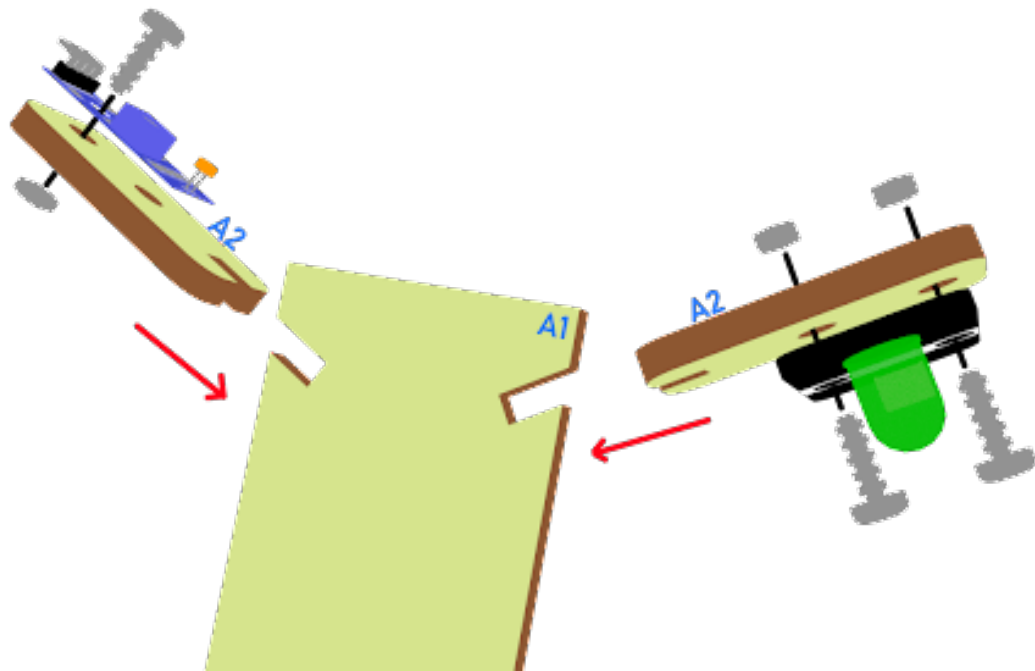
Case 01 概念圖



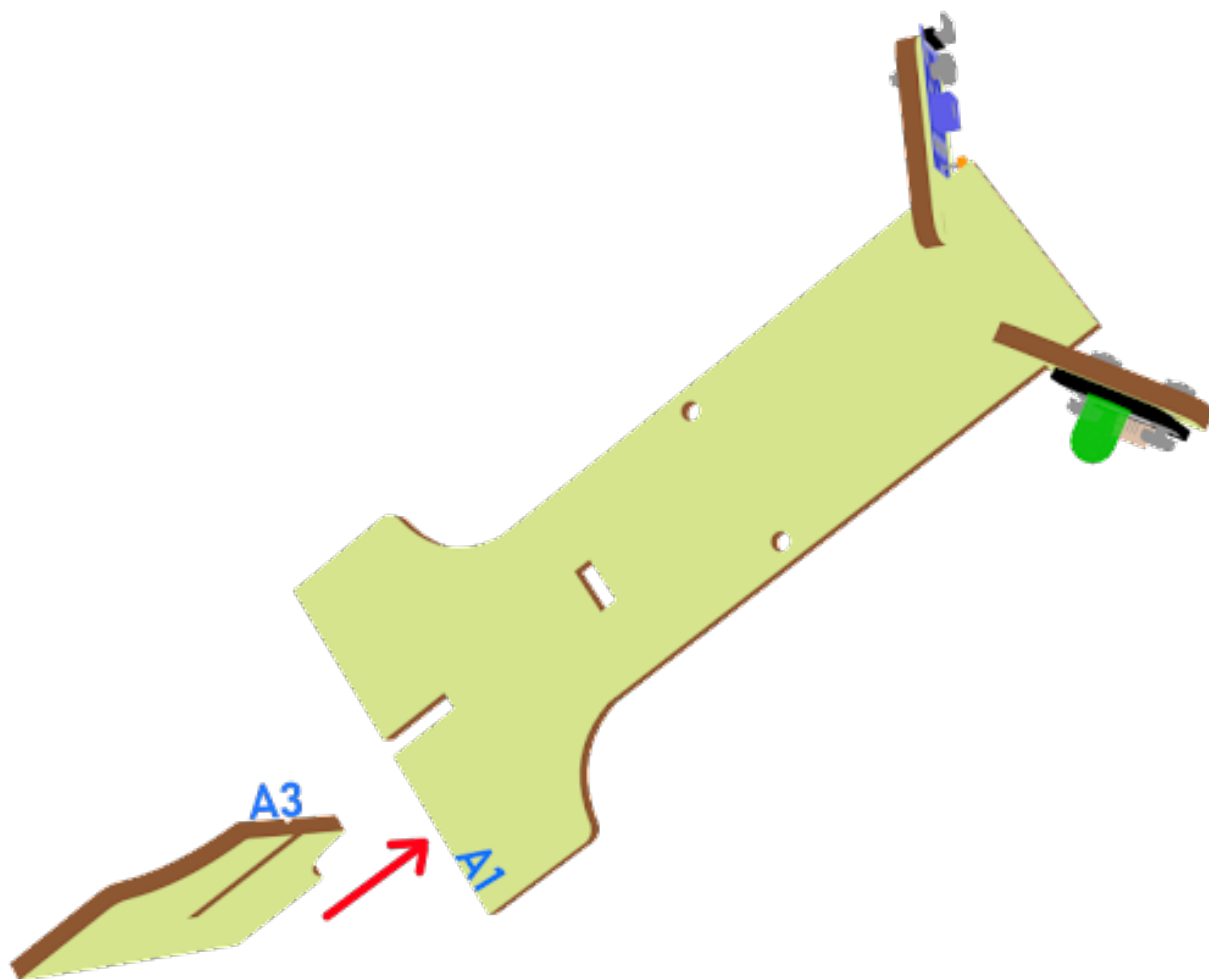
Part List 材料準備

Assembly step 組裝步驟

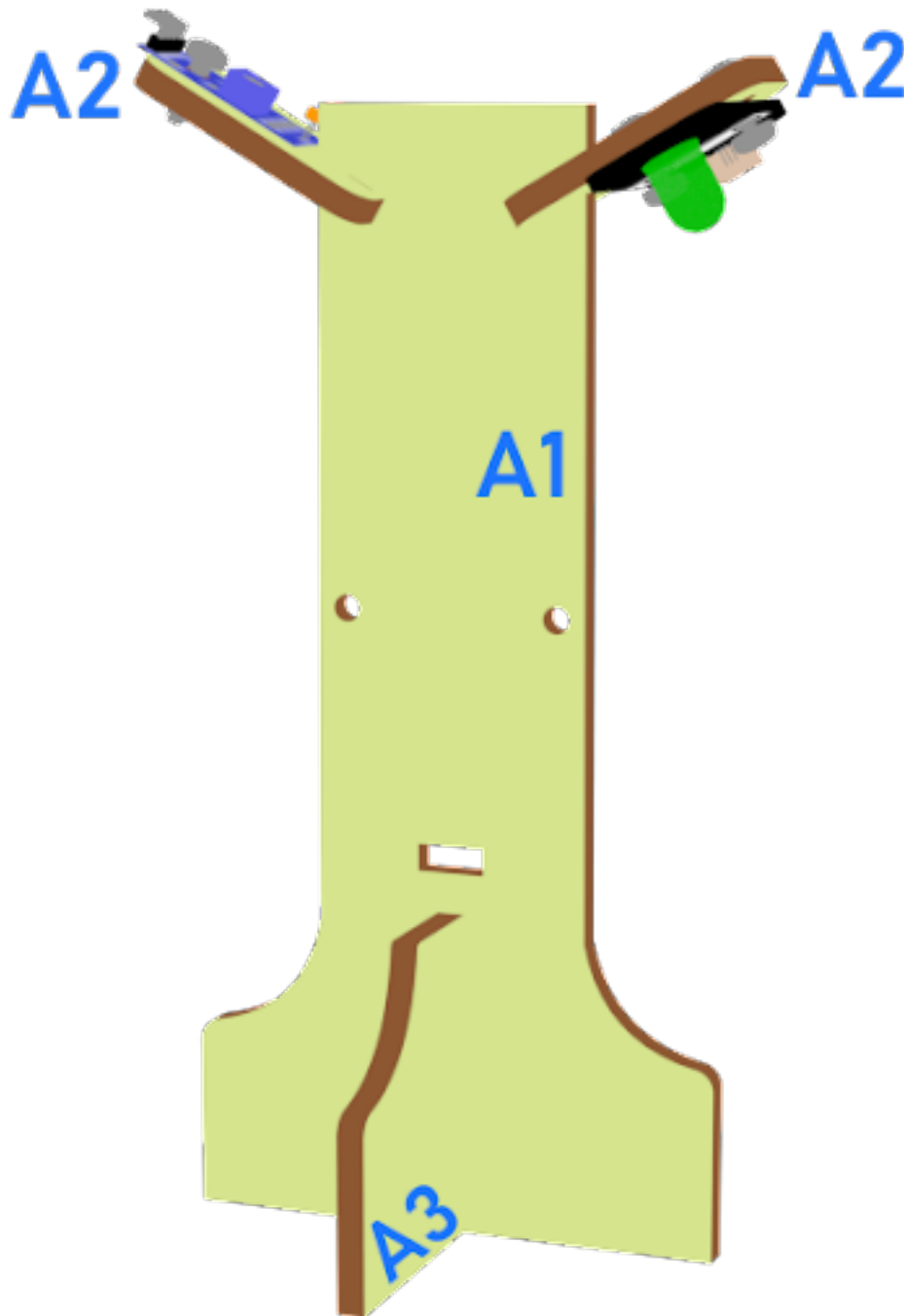
Step 1 第一步



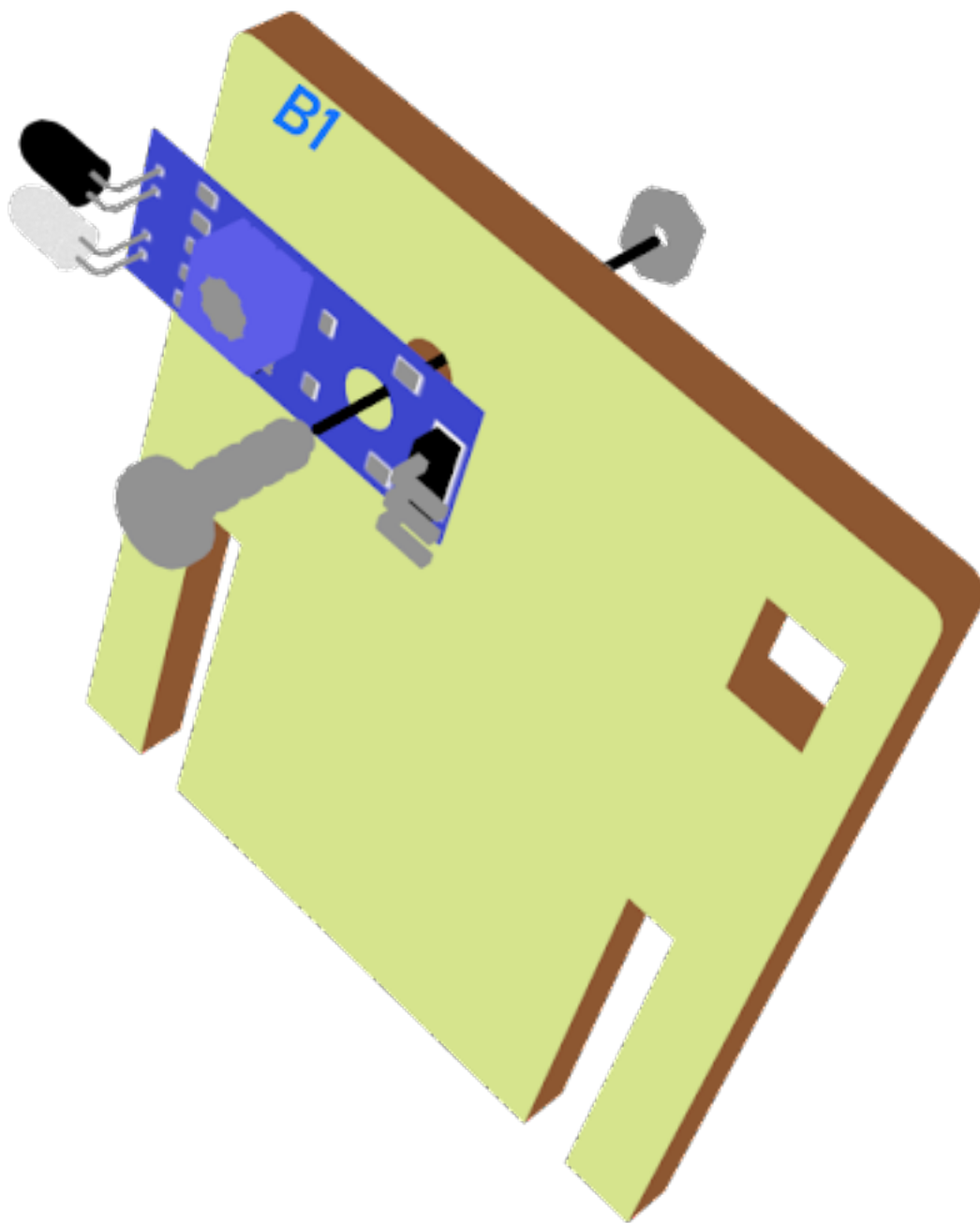
Step 2 第二步



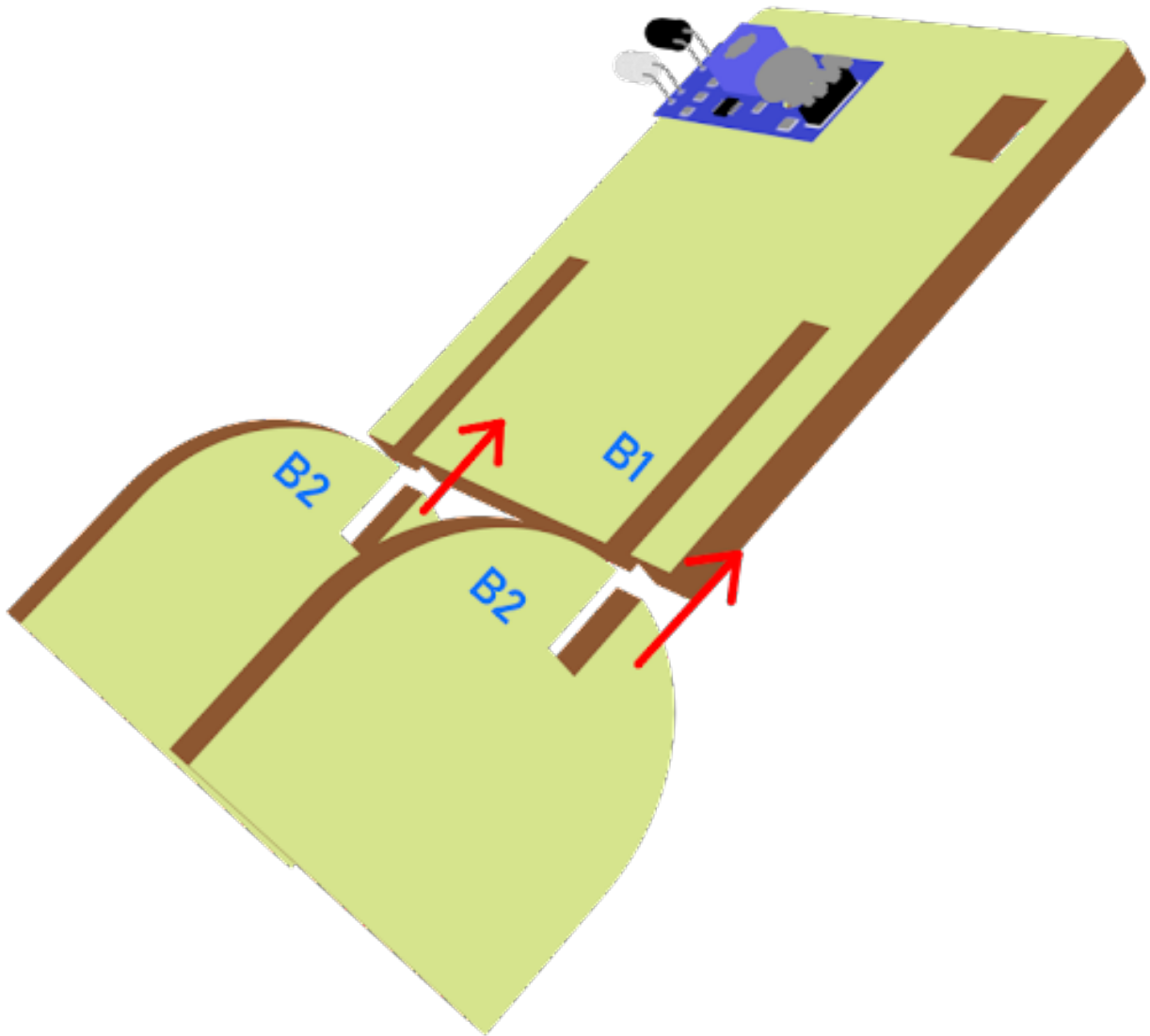
Step 3 第三步



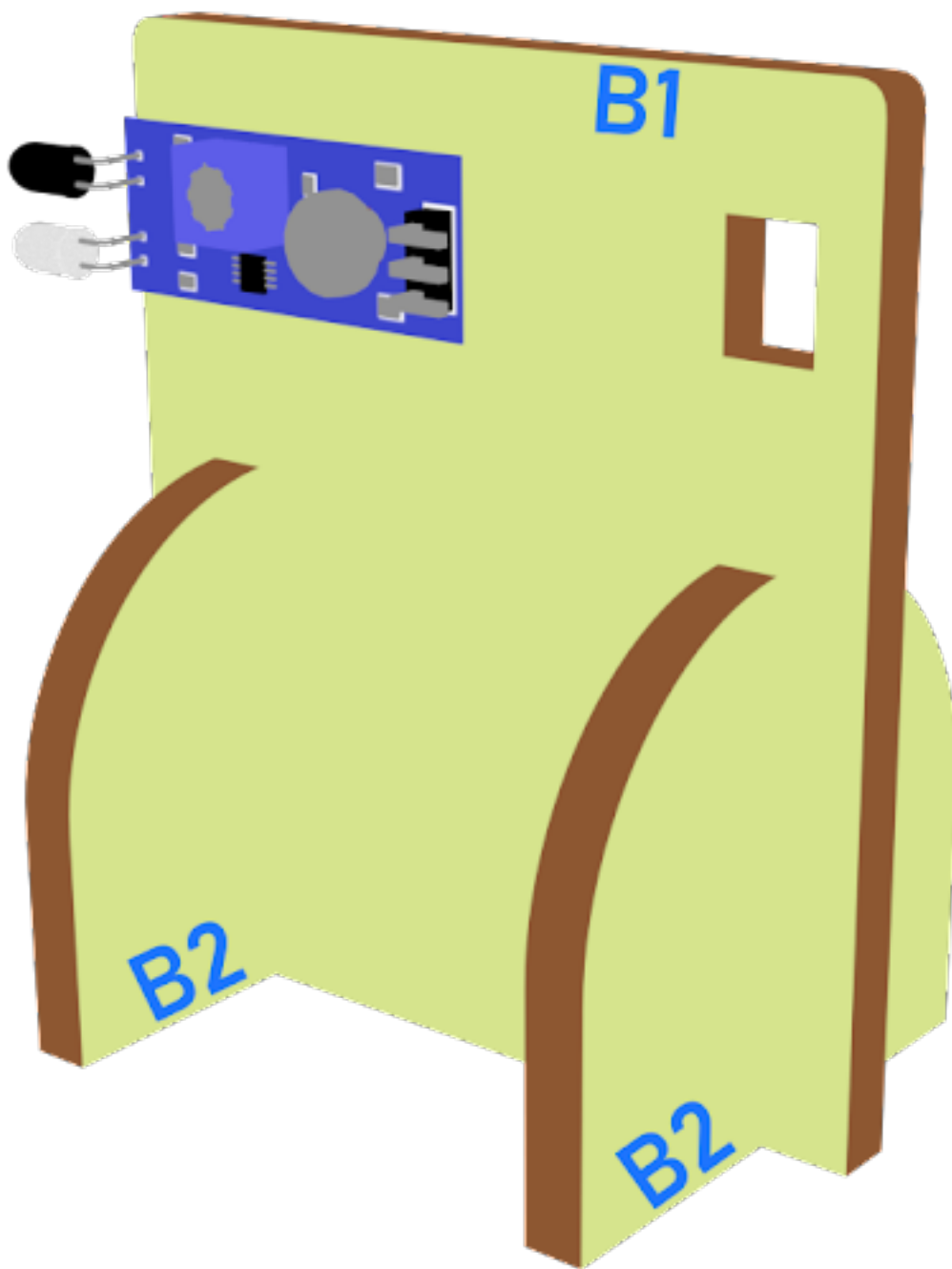
Step 4 第四步



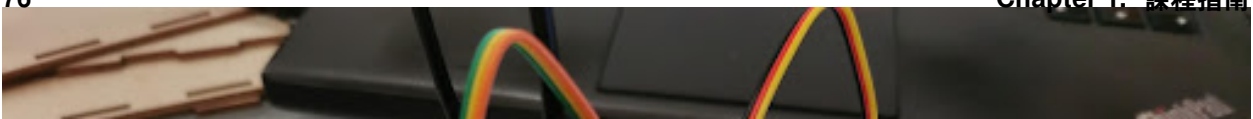
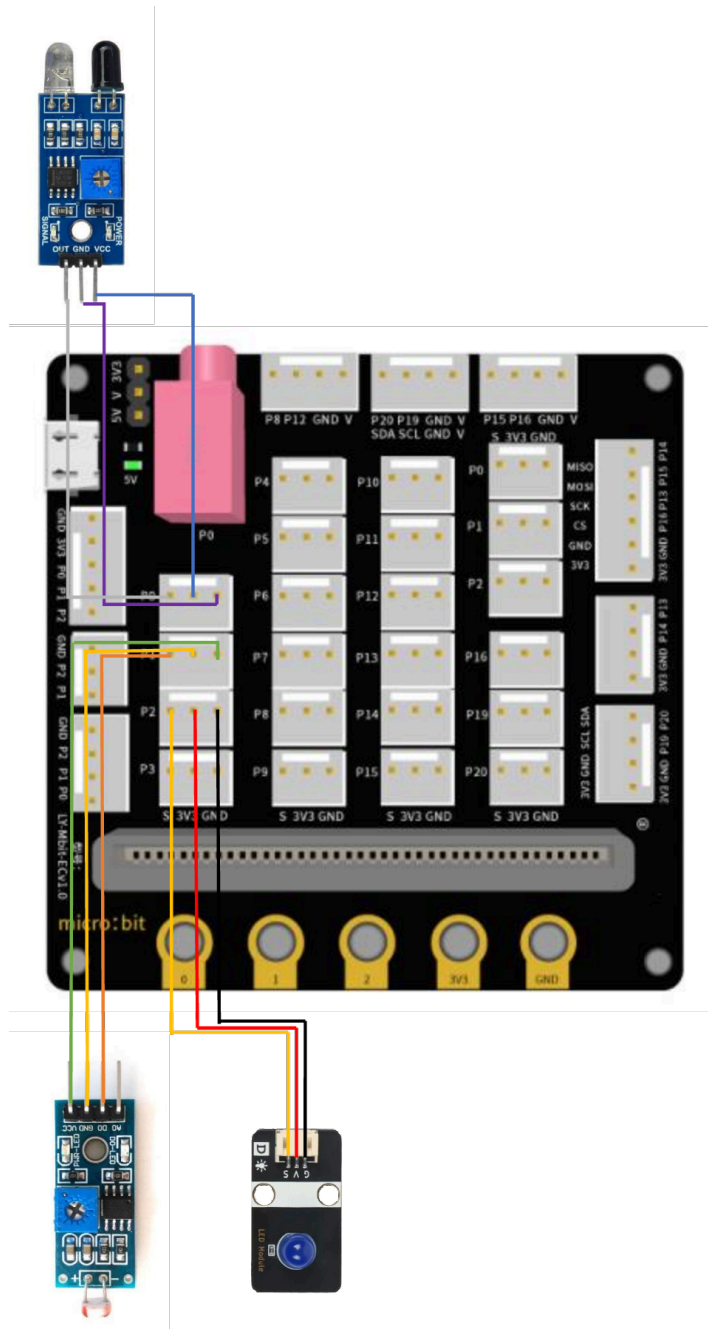
Step 5 第五步



Step 6 第六步



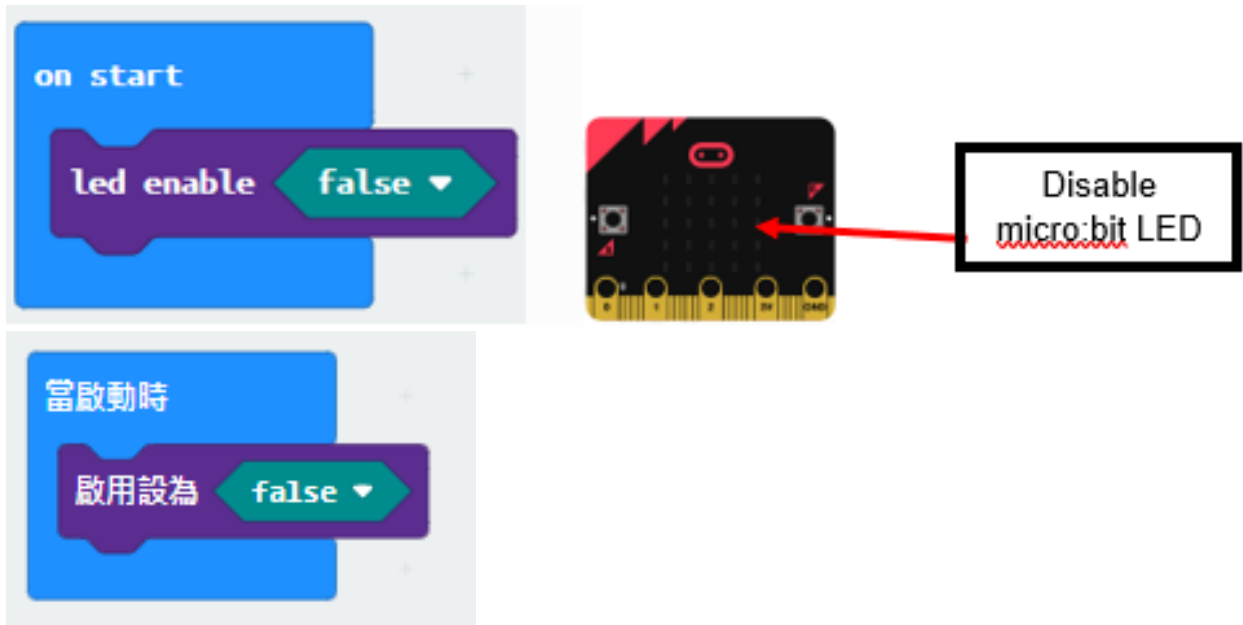
Hardware connect 硬件連接



Programming (MakeCode) 編程

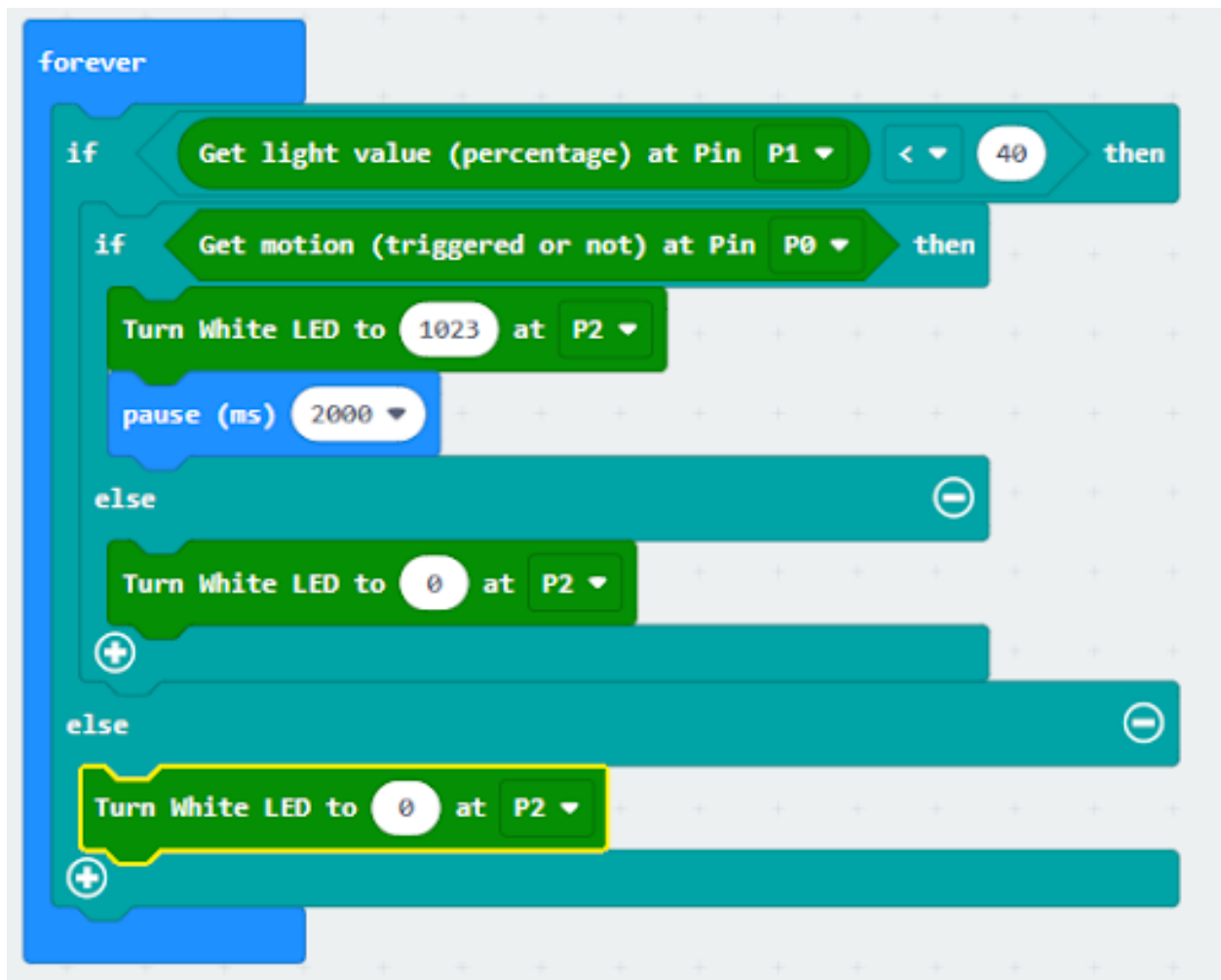
Step 1. Disable micro:bit LED. 第一步停用 micro:bit LED。

- Snap led enable false to on start 將積木啟用設為 false 拖放到當啟動時
- Note that P3 is used as LED in default setting, LED need to be disable 注意，P3 在默认设置中被用作 LED，因此 LED 需要被禁用。



Step 2. Turn on LED by light sensor and obstacle Infrared avoidance sensor 第二步使用光敏傳感器和紅外路障傳感器打開 LED

- Drag forever from Basic 從基本中拖出重 無數次
- Snap if statement into forever 將如果語句放入重 無數次中
- Set get light value (percentage) at P1 <40 and get motion (triggered or not) at P0 = true, into if statement that says motion is triggered, someone passes by. 在如果語句中設定 get light value (percentage) at P1 <40 和 get motion (triggered or not) at P0 = true。
- Then, turn white LED to 1023 at P2 as turning on white LED and pause 10 seconds. 然后，turn white LED to 1023 at P2，打開白色 LED 暫停 10 秒。
- Else, turn white LED at P2 to 0 as turning off. 否则，turn white LED at P2 to 0，關閉白色 LED。

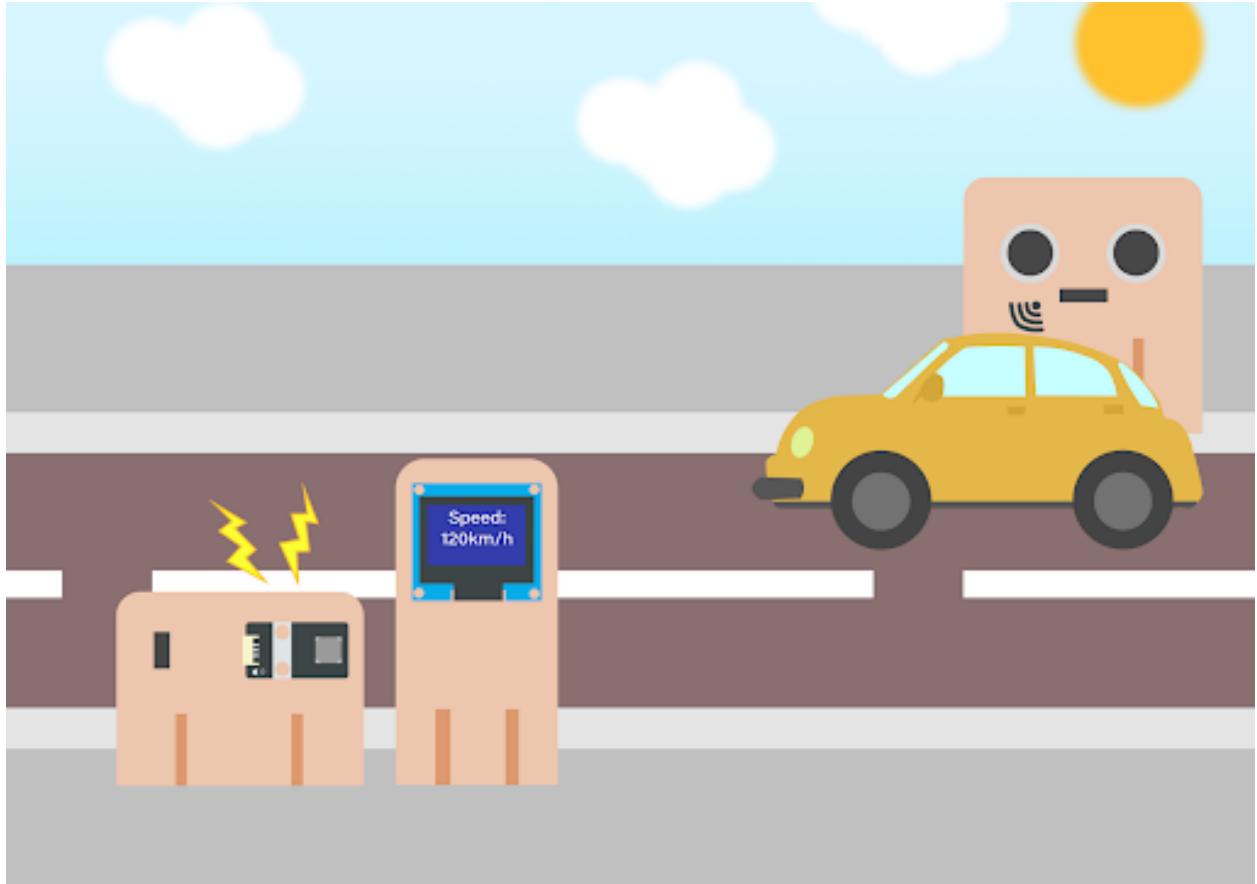




Result 總結

Think 思考

1.2.3 Car Speed Monitoring 車速監測



Goal 目標

background 背景

What is car speed monitoring? 什麼是車速檢測

Car speed monitor operation 車速檢測運作

Distance1: initial distance



Distance2: distance after 0.5s



By equation, $\text{Speed} = \frac{\text{distance}}{\text{time}}$, we found that $\text{Speed} = \frac{\text{distance1} - \text{distance2}}{\text{time}}$

距離1: 初始距離

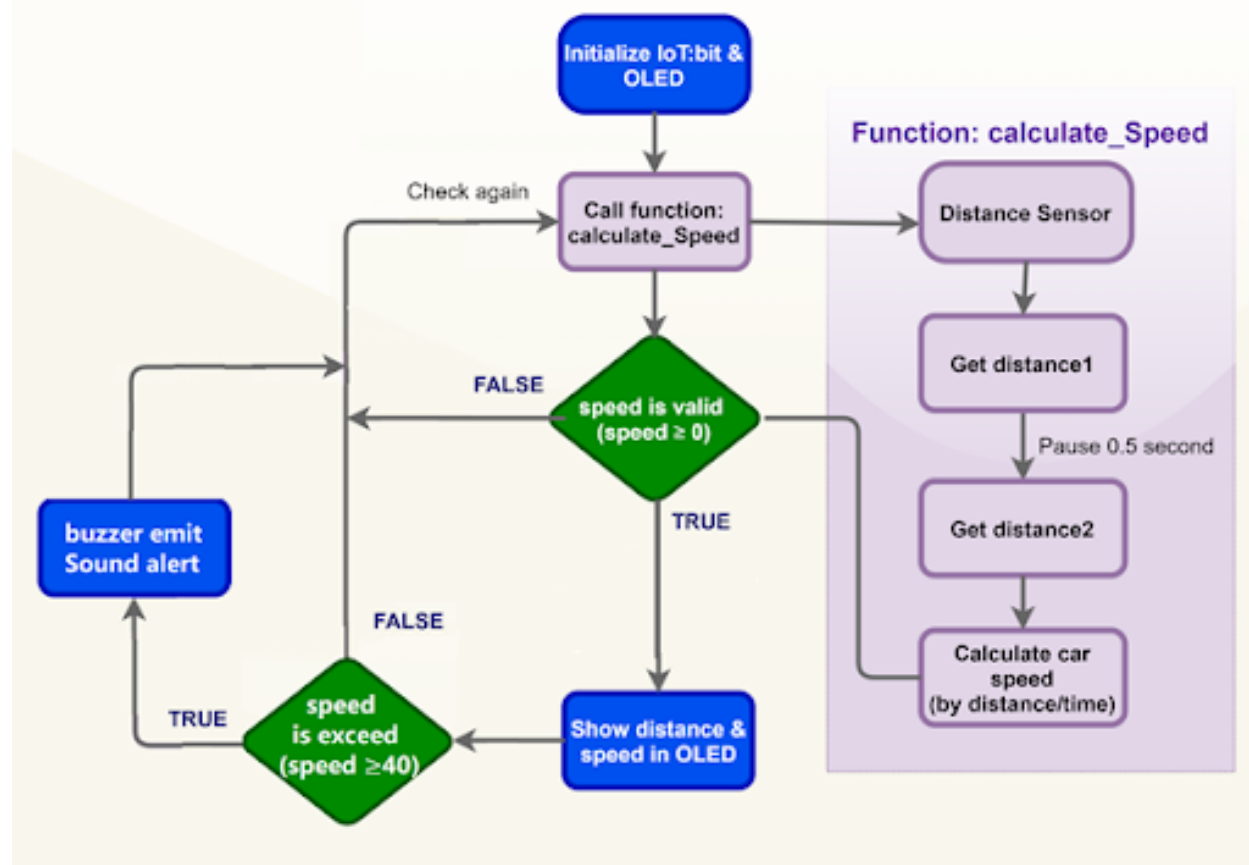


距離2: 0.5秒的距離

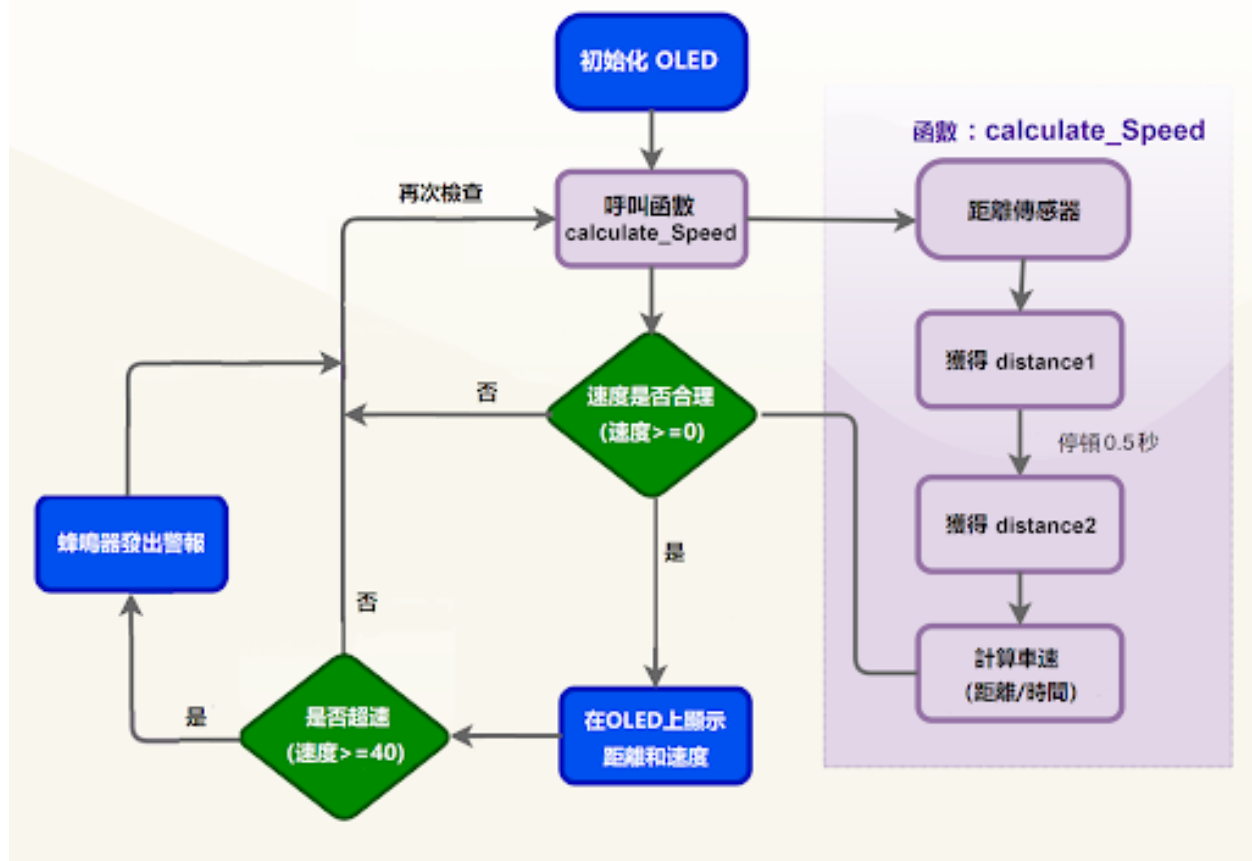


根據公式，速度 = 距離 / 時間，所以以上速度為 = (距離1 - 距離2) / 時間

Case 02 Concept Diagram



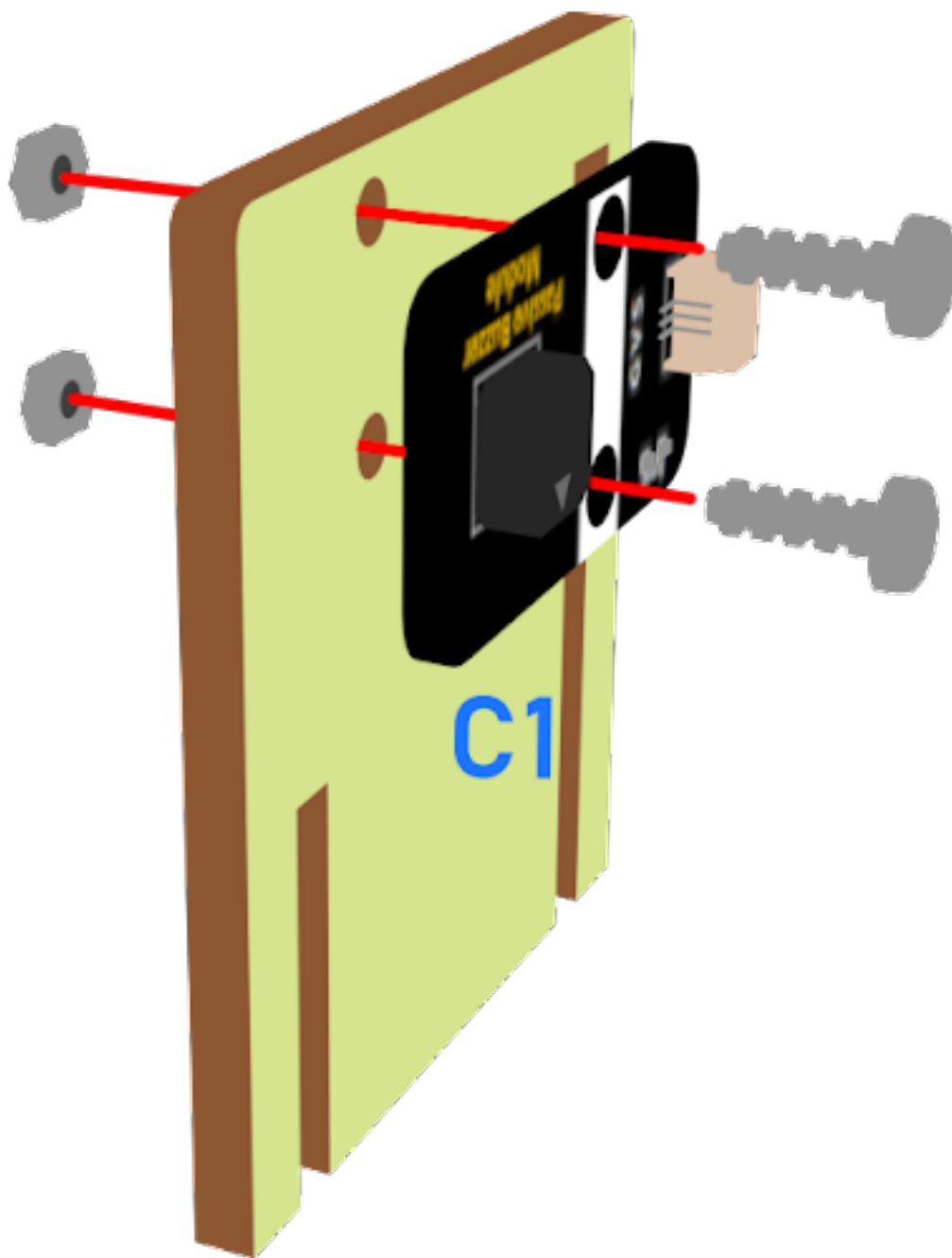
Case 02 概念圖



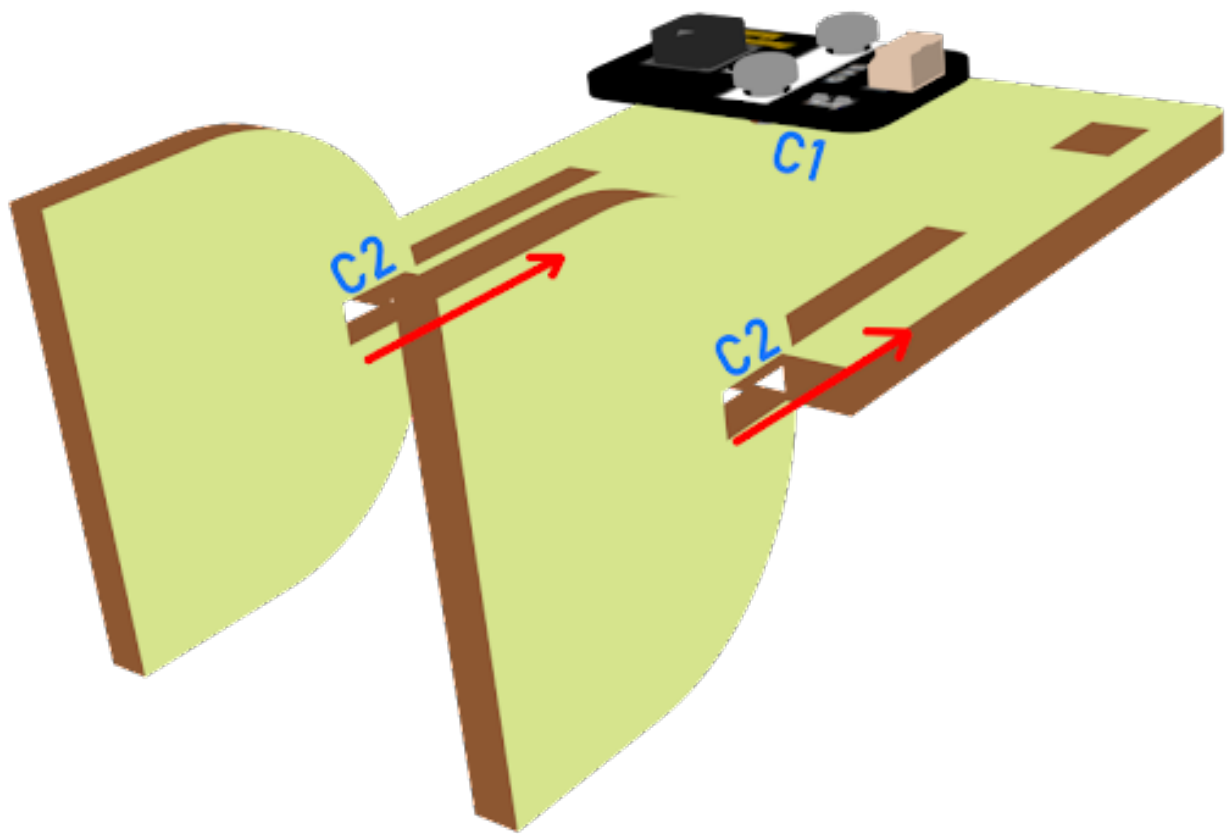
Part List 材料準備

Assembly step 組裝步驟

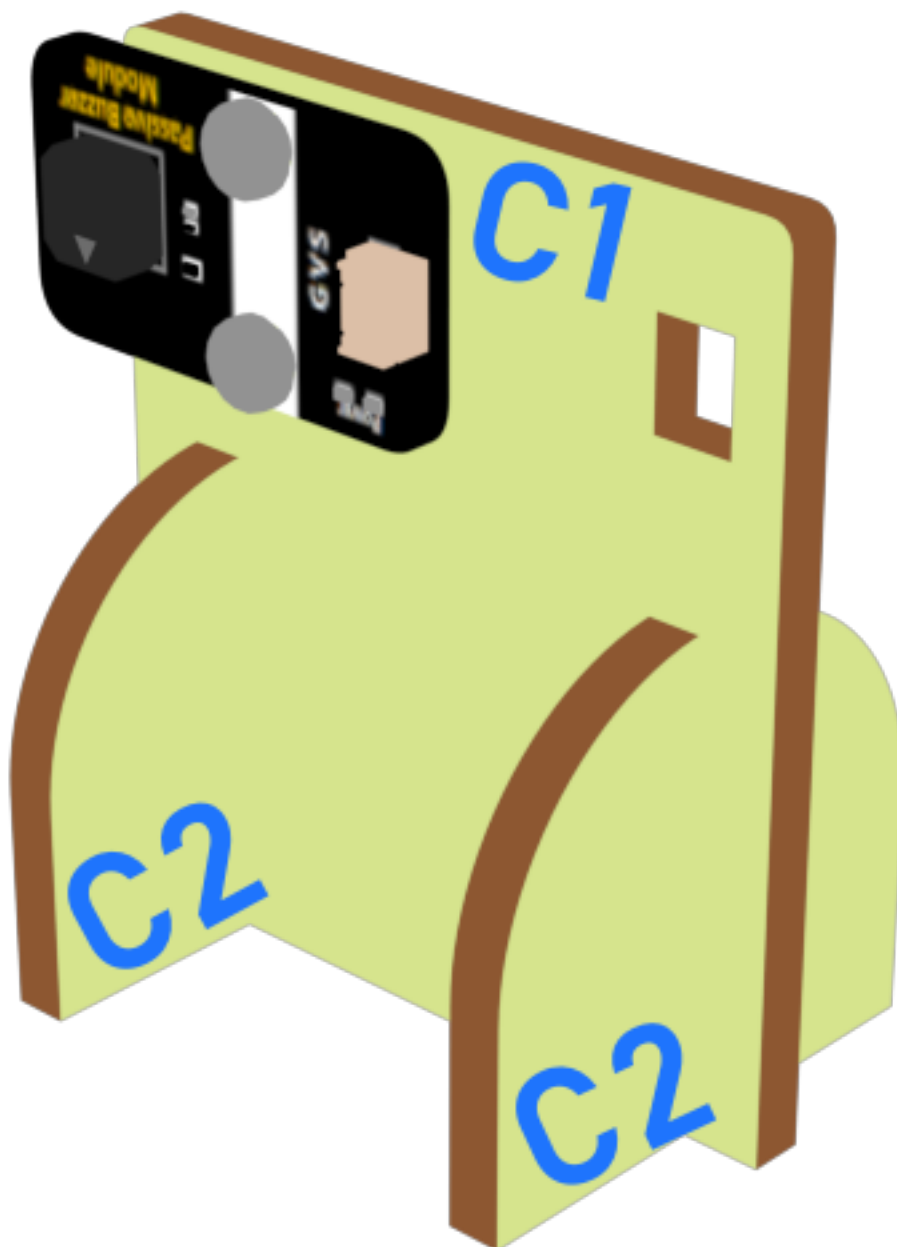
Step 1 第一步



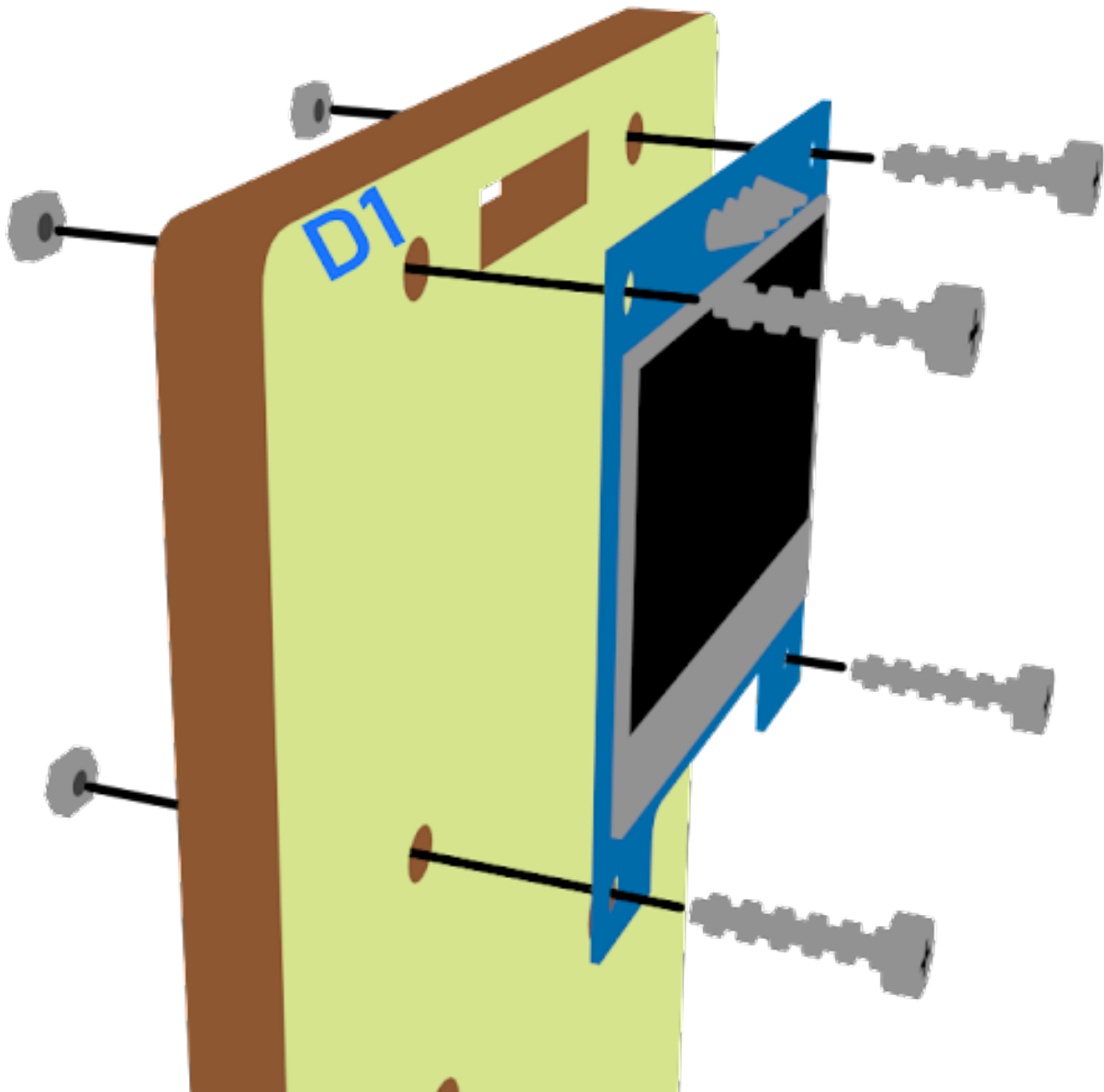
Step 2 第二步



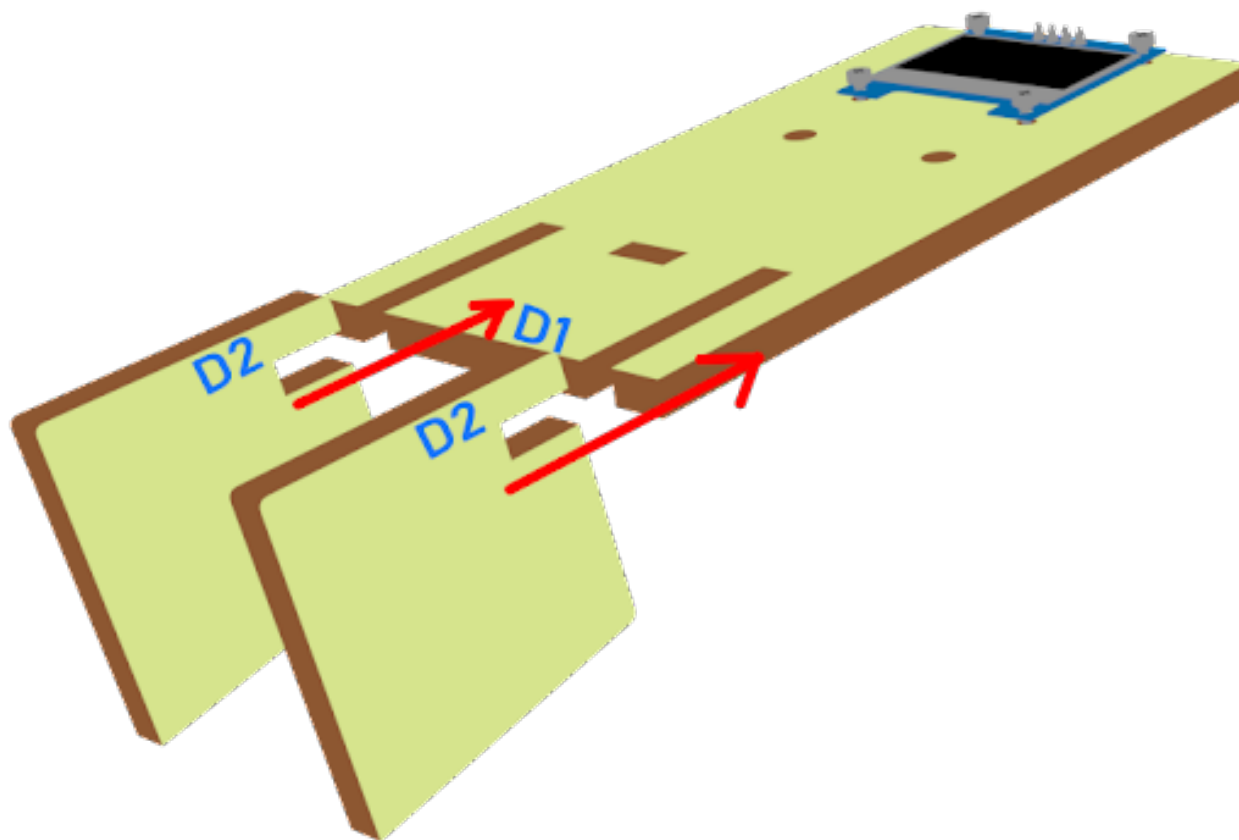
Step 3 第三步



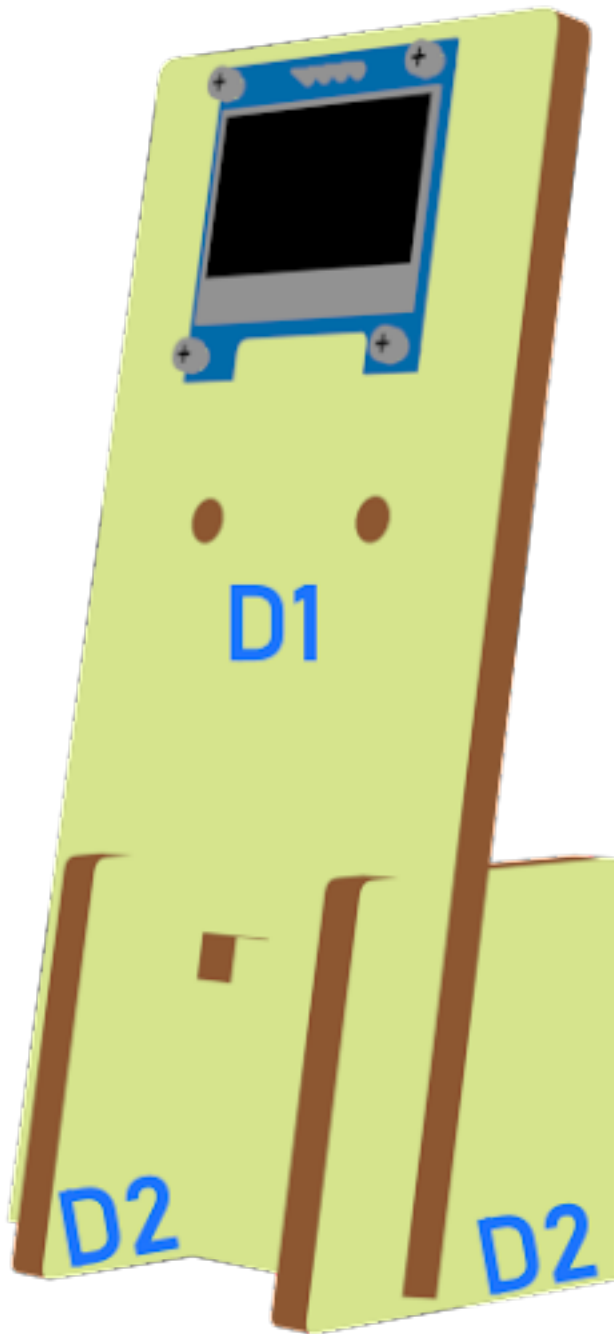
Step 4 第四步



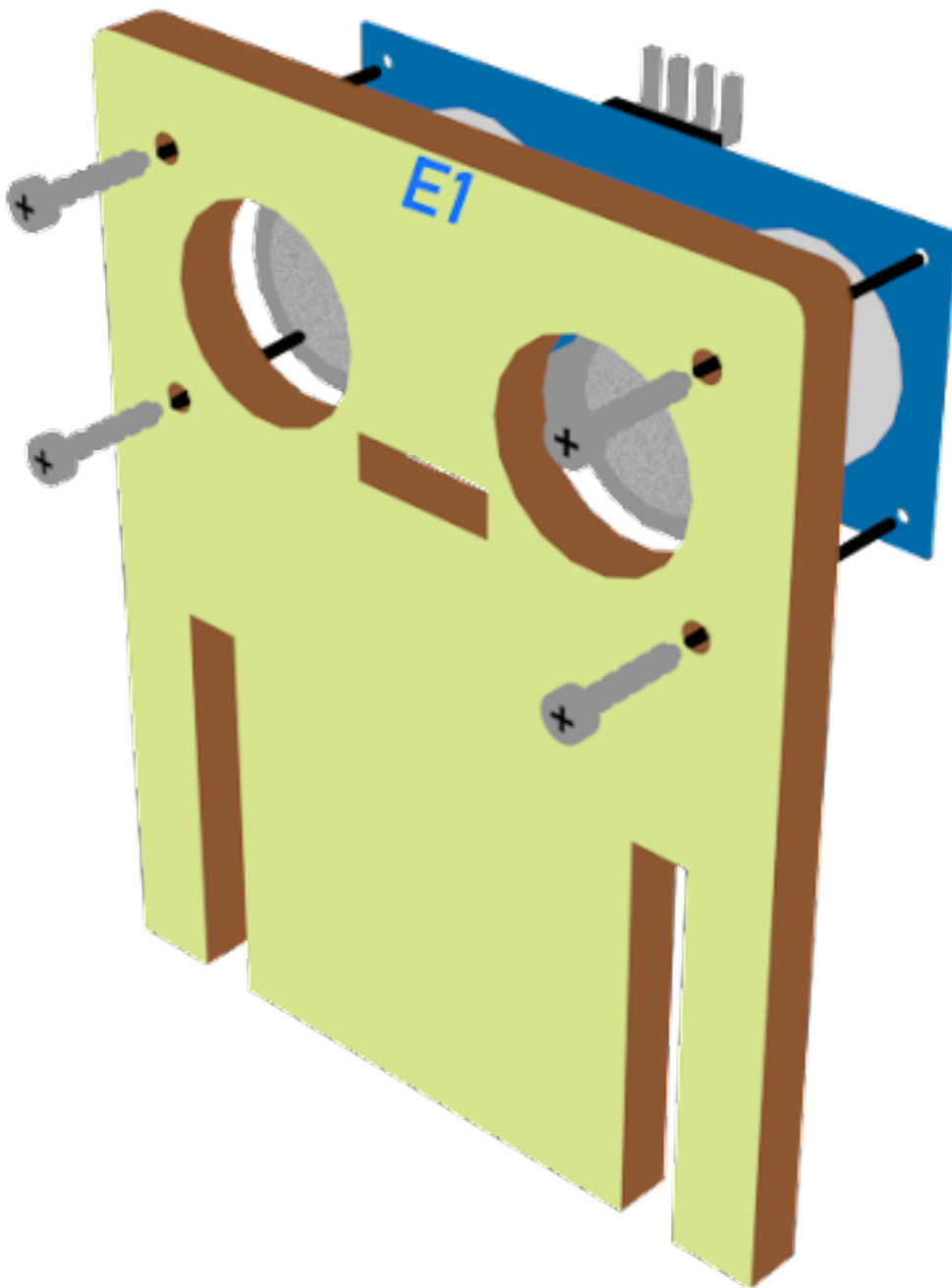
Step 5 第五步



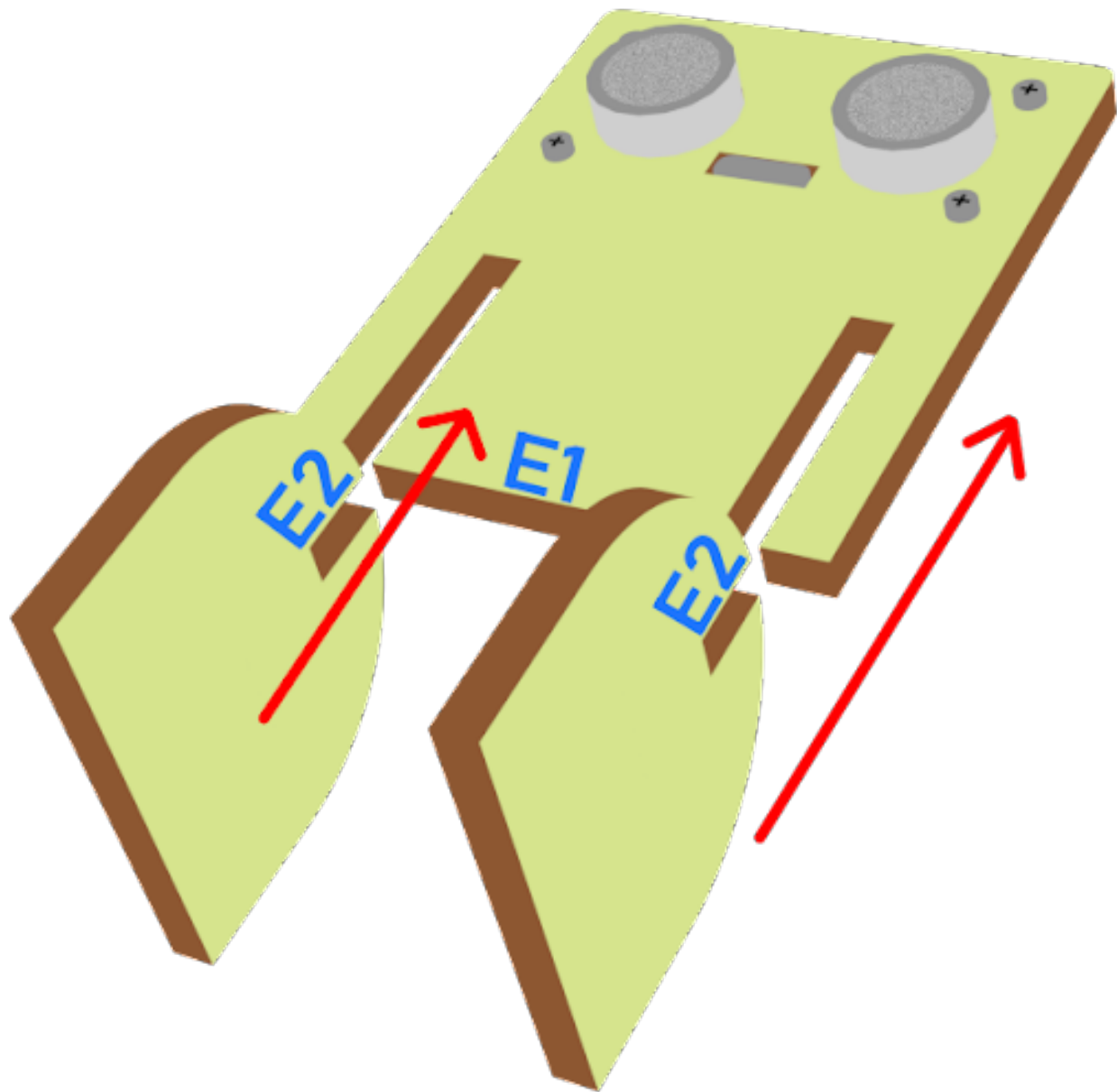
Step 6 第六步



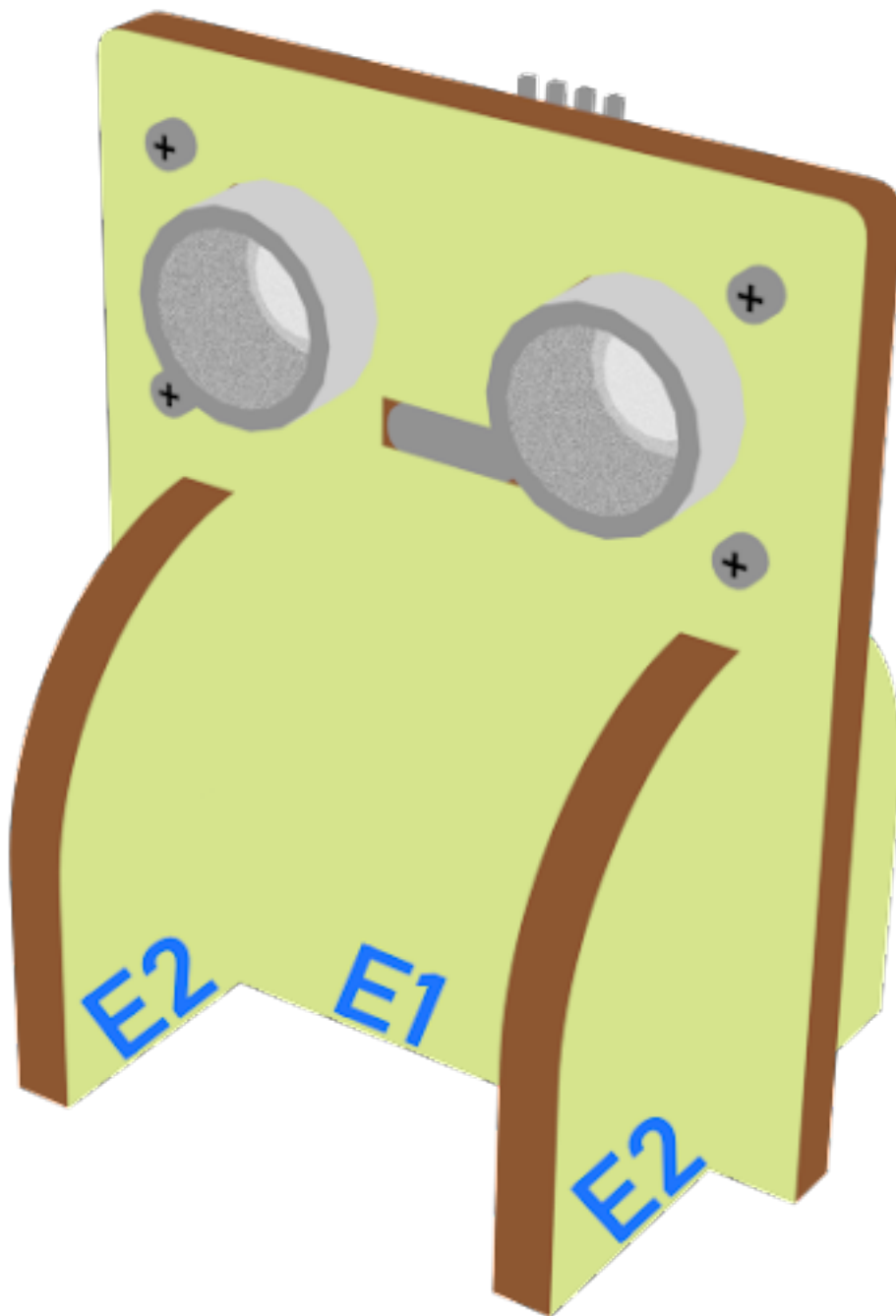
Step 7 第七步



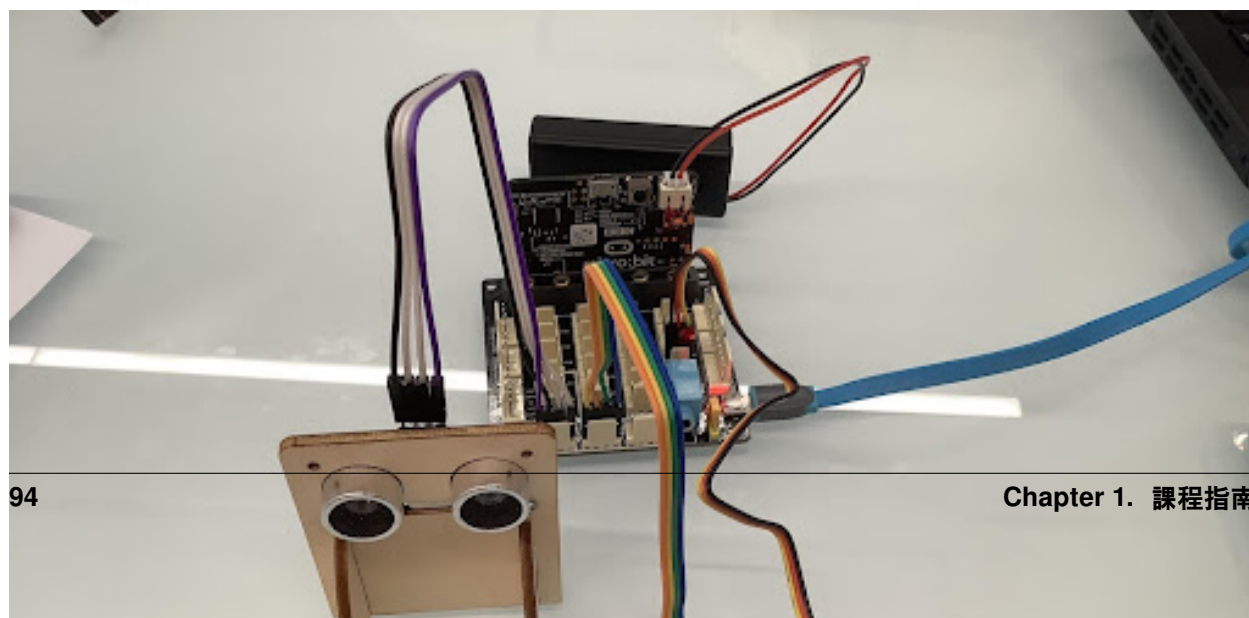
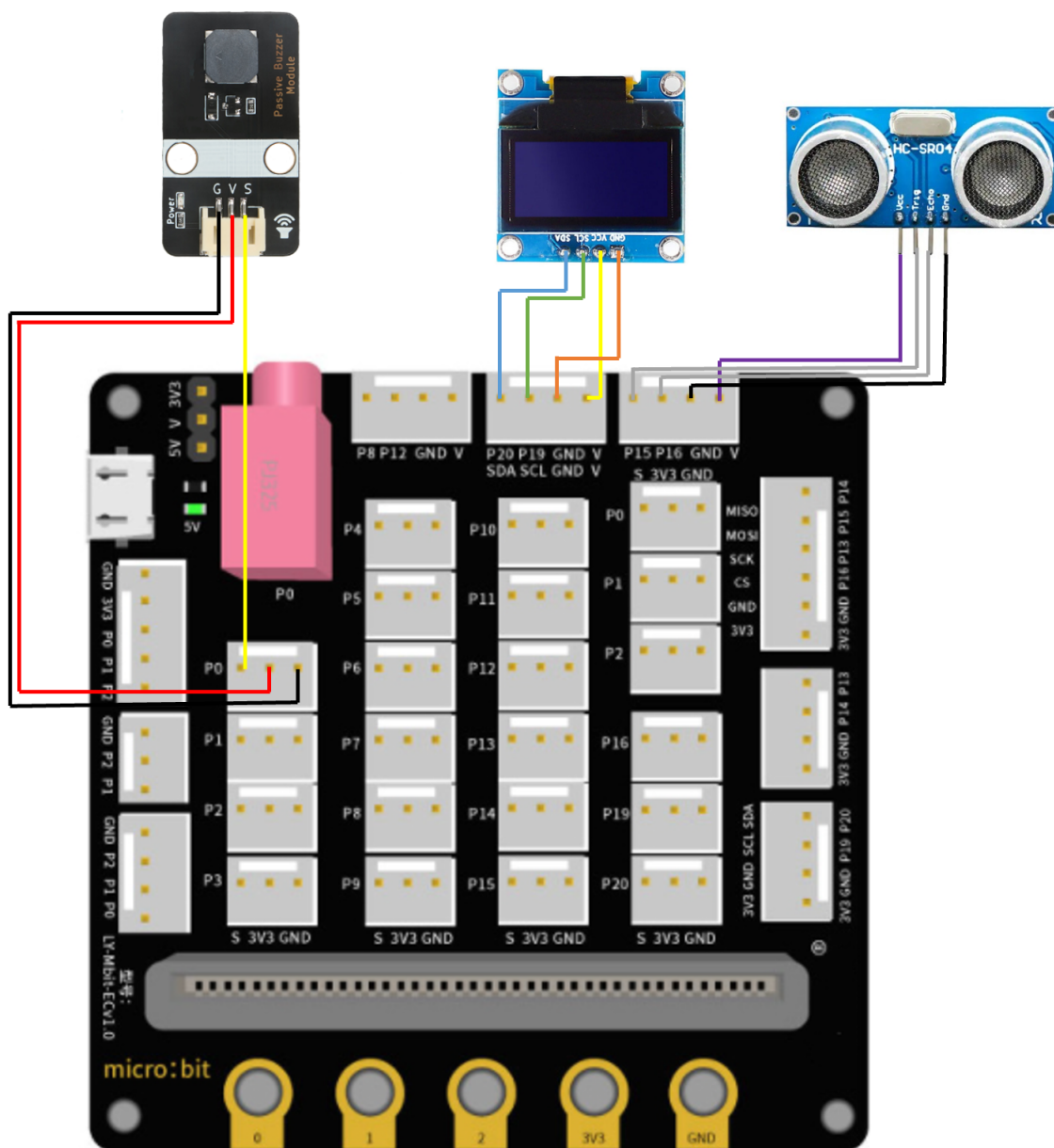
Step 8 第八步



Step 9 第九步



Hardware connect 硬件連接



Programming (MakeCode) 編程

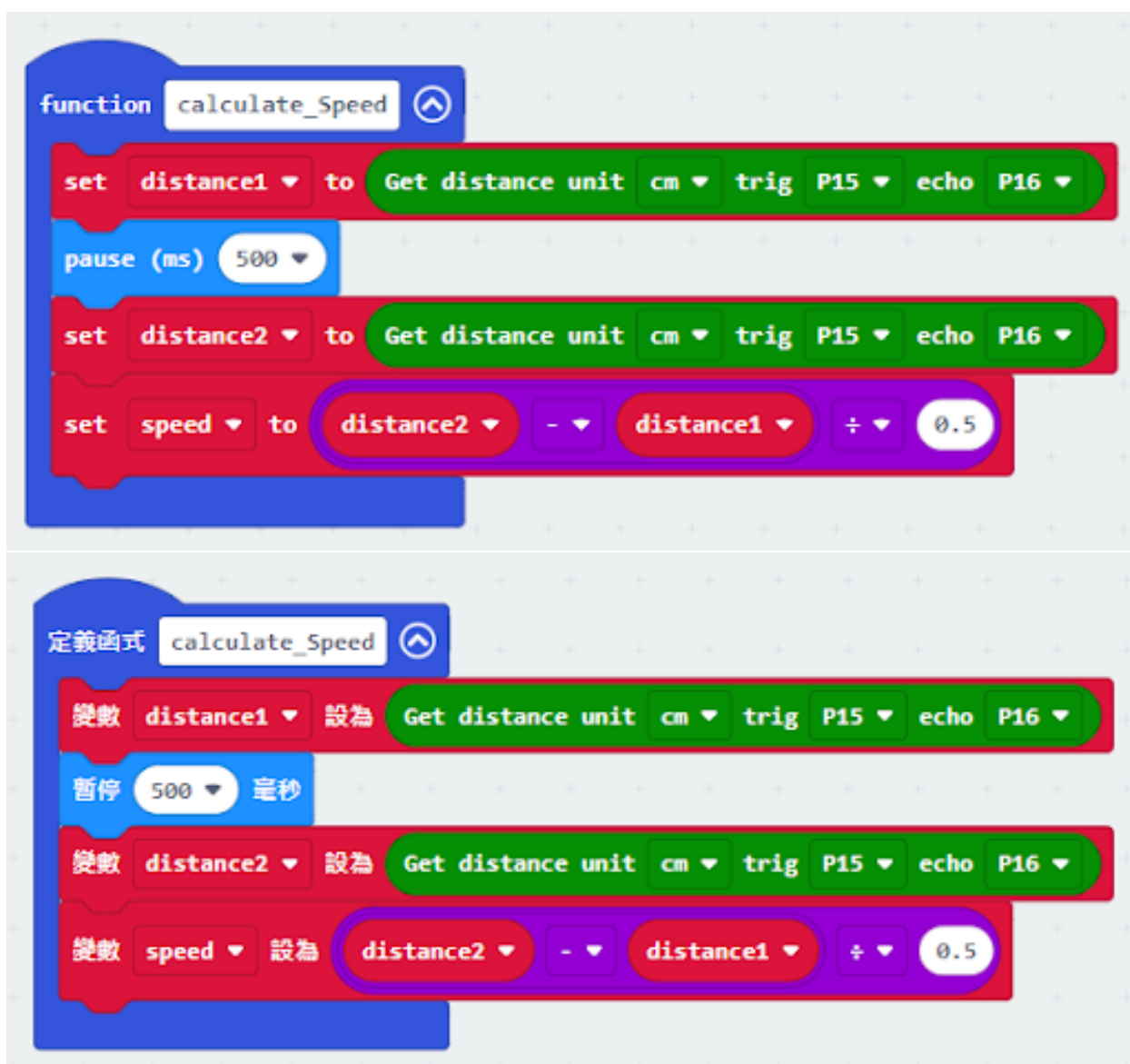
Step 1. Initialize OLED screen 初始化 OLED 屏幕

- Drag Initialize OLED with width:128, height: 64 to on start 拖動 OLED 初始化寬: 128 高:64, 至當機動時。
- Set distance1, distance2 and speed to 0 from variables 從變數中將 distance1、distance2 和 speed 設為 0。



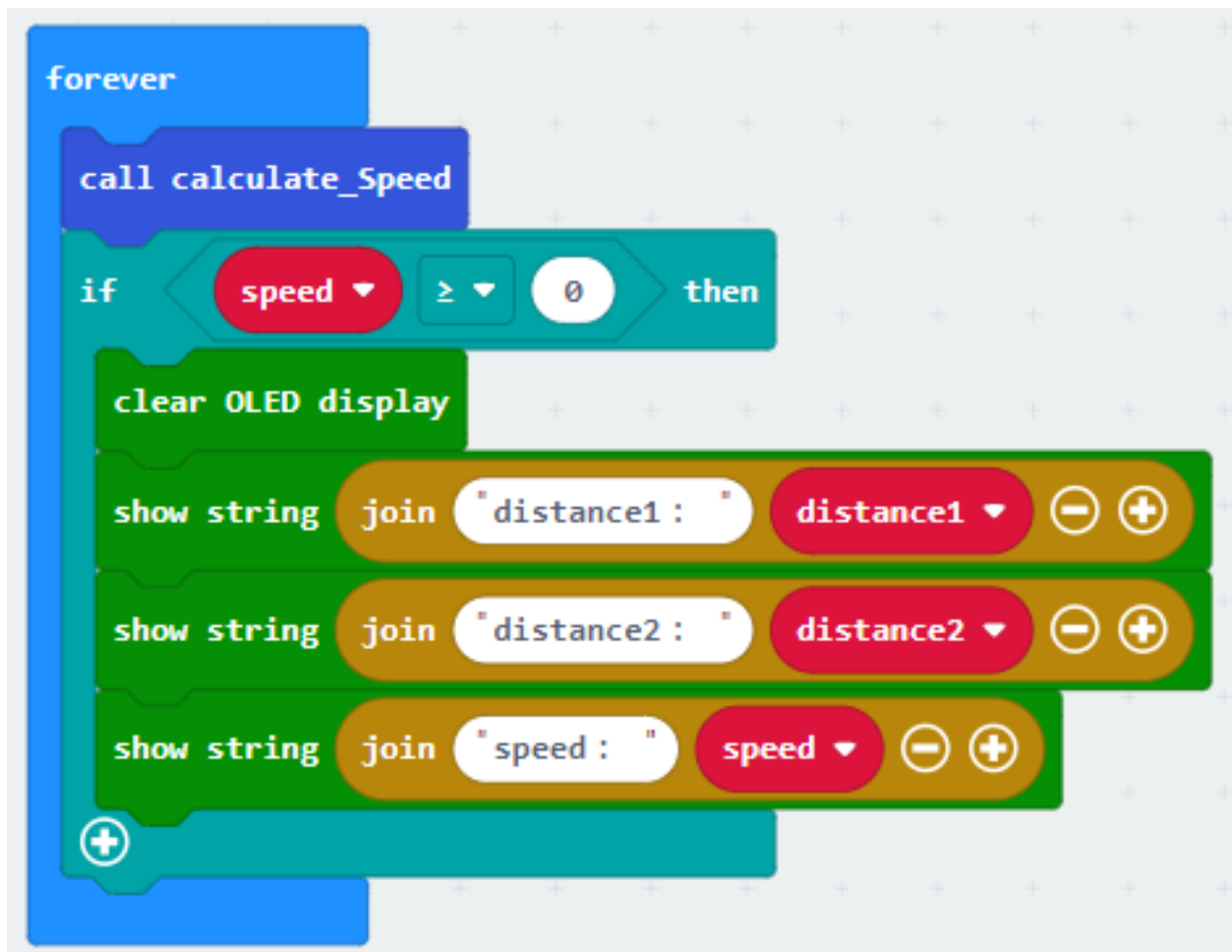
Step 2. Set up function (calculate_Speed) 設定函數 (計算速度)

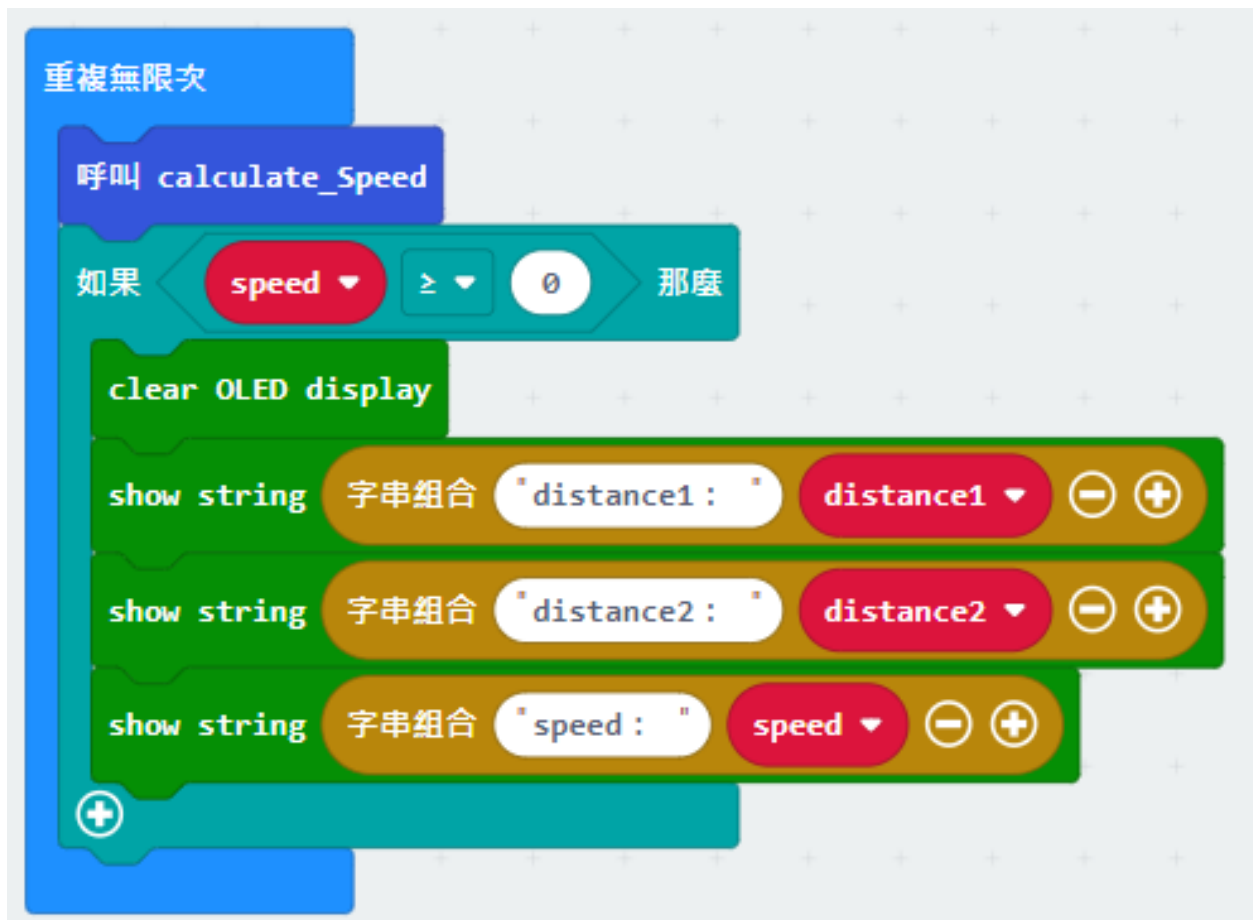
- Set up a new function calculate_Speed from Advanced > Functions. 從高級 > 功能中定義函式 calculate_Speed。
- Set distance1 to get distance unit cm trig P14 echo P15 (distance from the car to the distance sensor before 0.5 second) Drag Pause to wait 500ms and set distance2 to get distance unit cm trig P14 echo P15 (distance from the car to the distance sensor after 0.5 second) 將 distance1 設為 get distance unit cm trig P14 echo P15 (0.5 秒前從汽車到距離傳感器的距離) 拖動 Pause 等待 500ms, 將 distance2 設為 get distance unit cm trig P14 echo P15 (0.5 秒後從汽車到距離傳感器的距離)。
- By the equation of speed = distance / time. We get the speed of the moving car to (distance1-distance2)/0.5 (unit: cm/s) 根據速度 = 距離/時間的方程式, 我們得到移動的汽車的速度 (distance1-distance2) / 0.5 (單位: cm/s)。



Step 3. Calculate car speed 計算車速

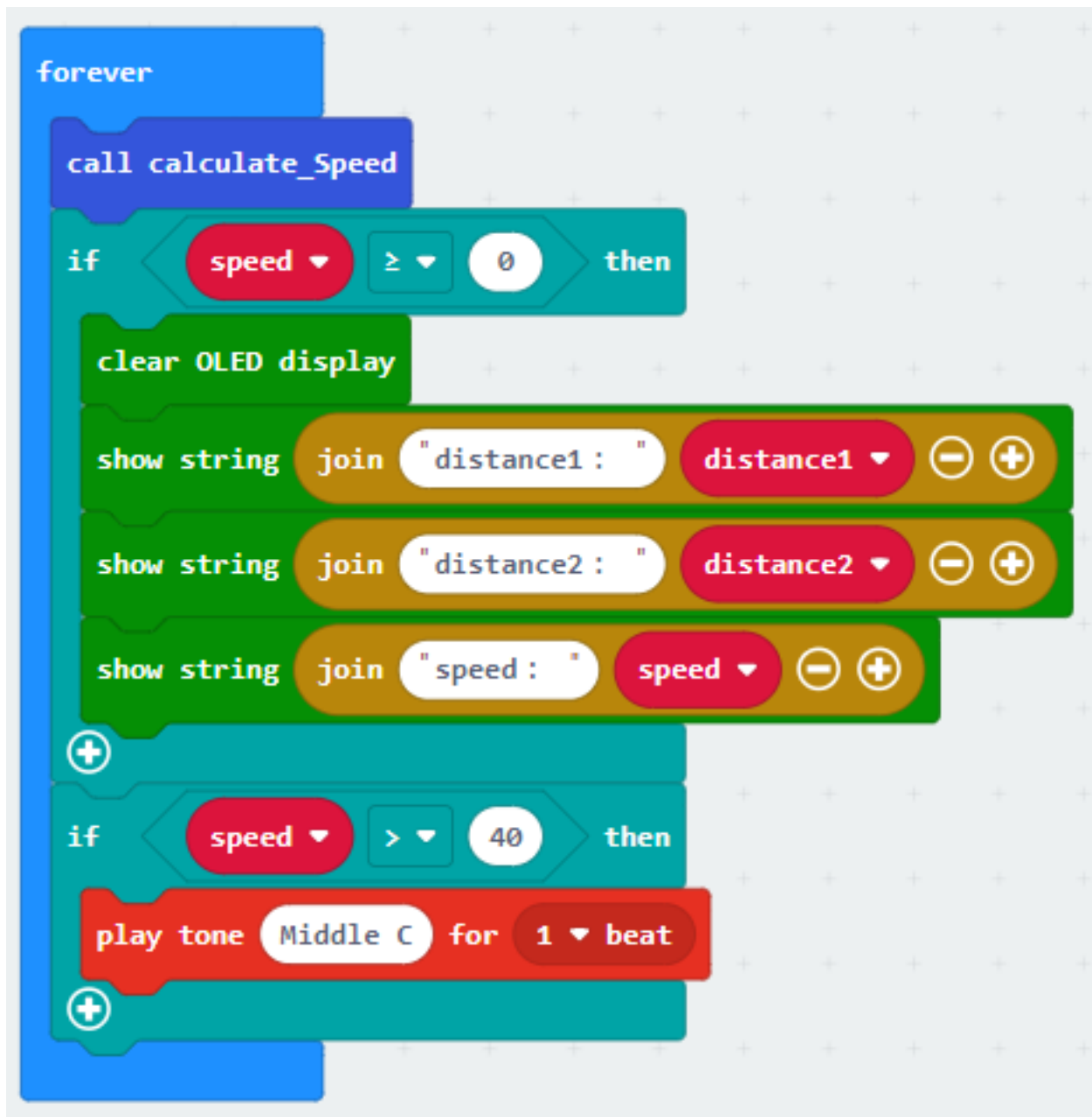
- In block forever, call function calculate_Speed from Advanced > Functions to get the speed of the moving car 在重疊無限次塊中，從高級 > 函數中呼叫函式 calculate_Speed，以獲得移動的汽車的速度。
- Snap If statement into the loop 將如果語句放入循環中
- Snap clear OLED display from OLED to avoid overlap 從 OLED 中拖出清除 OLED 顯示，以避免重疊。
- Snap show string and show value of variables distance1, distance2 and speed 拖出新建顯示字符串顯示變數 distance1、distance2 和 speed 的值。

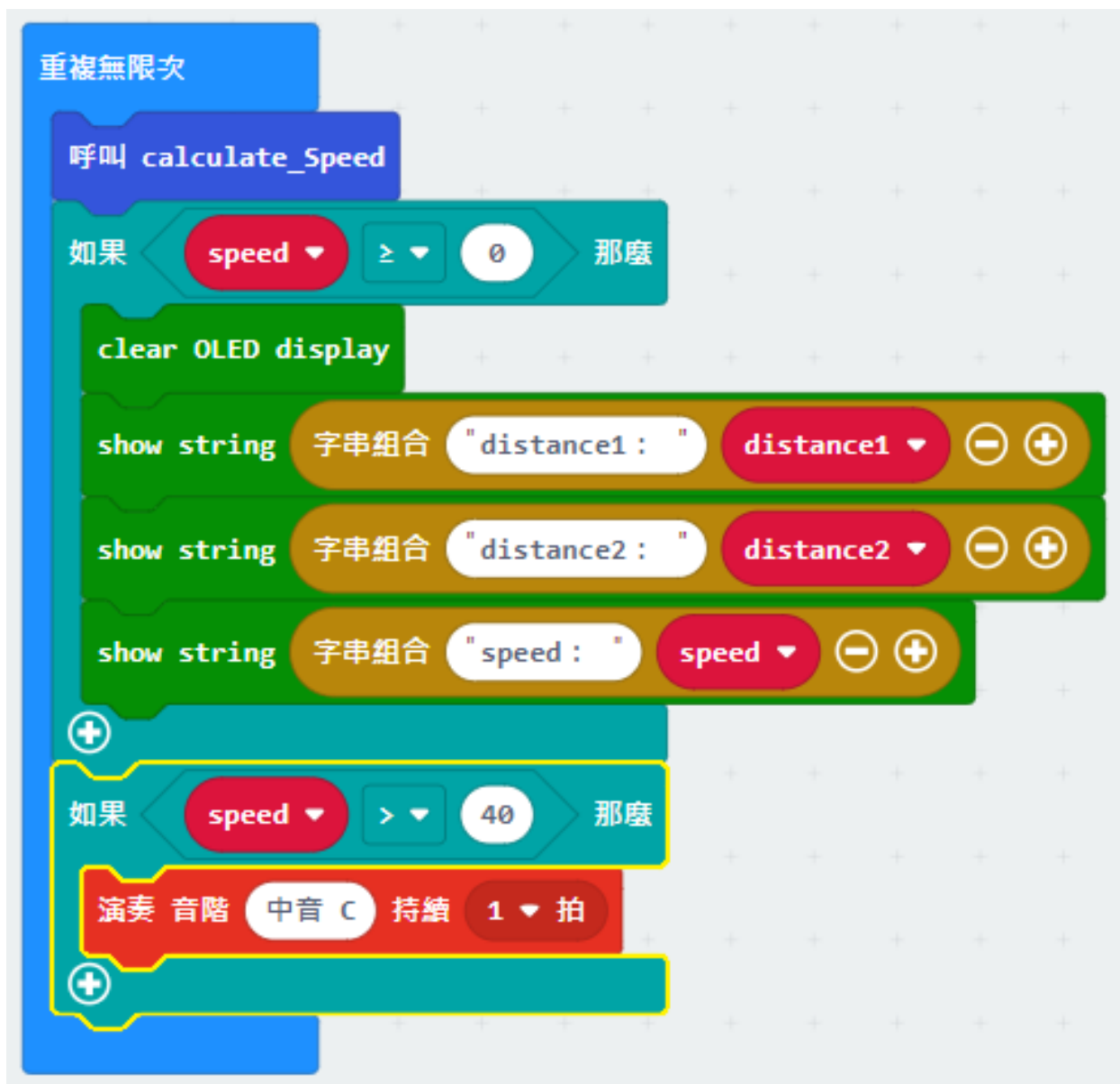




Step 4. buzzer

- Snap If statement into the loop 將如果語句放入循環中
- If speed ≥ 40 , then snap play tone Middle C for 1 beat from music 如果 speed ≥ 40 , 那麼演奏音階中音 C 持續一拍

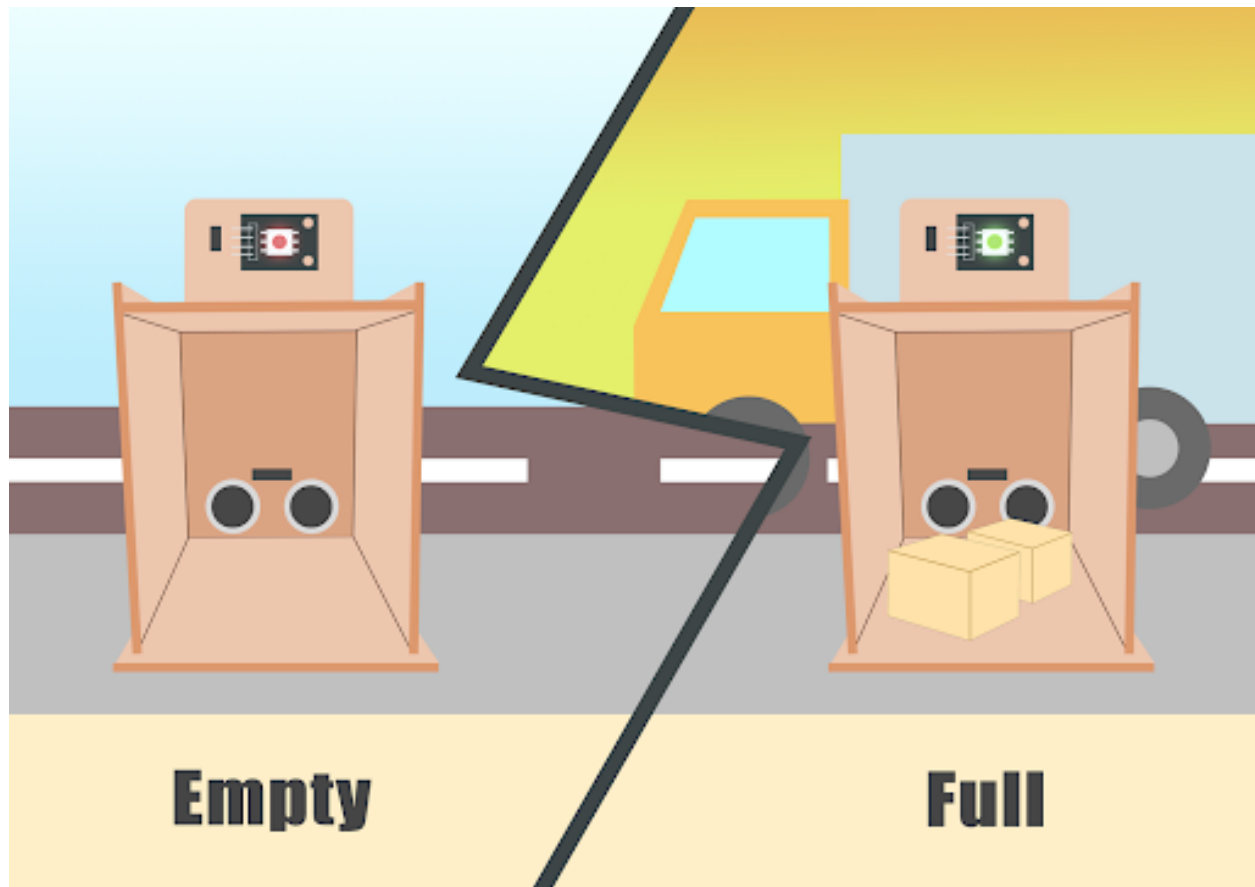




Result 總結

Think 思考

1.2.4 Unloading Alert System 卸貨提醒系統



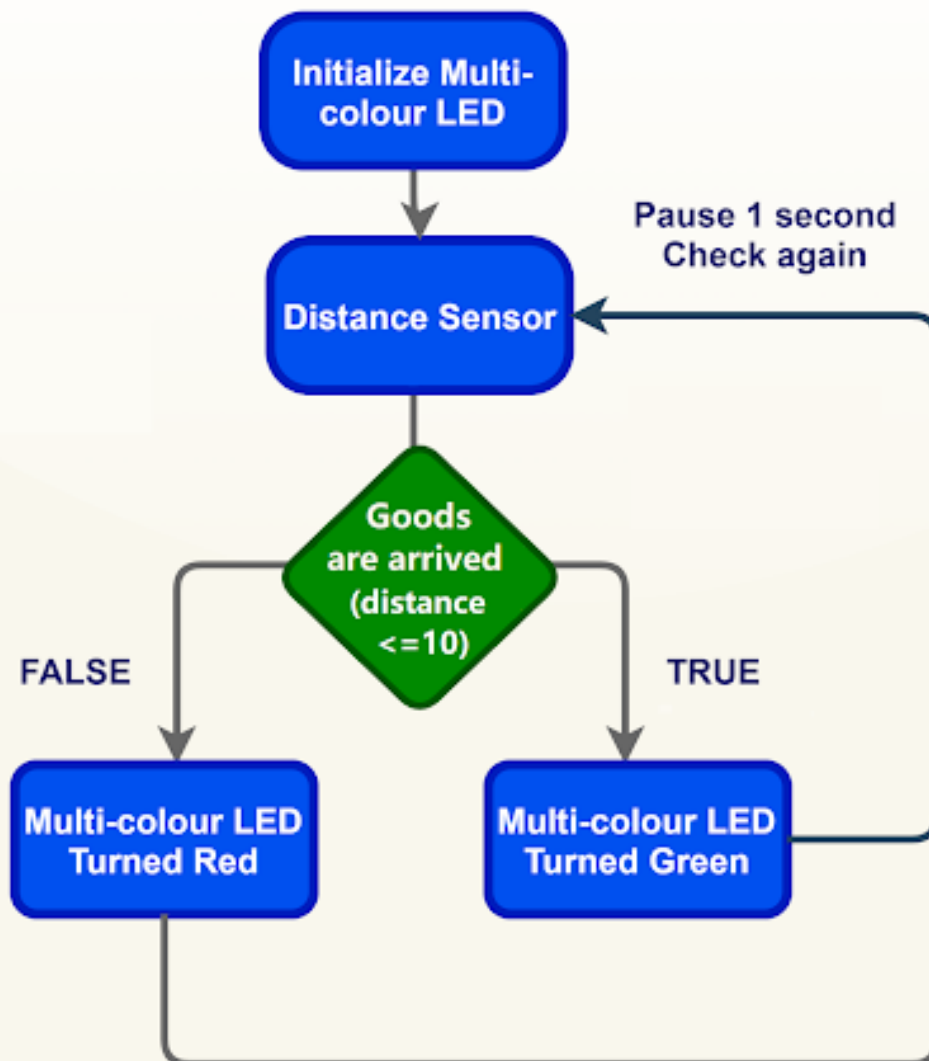
Goal 目標

Background 背景

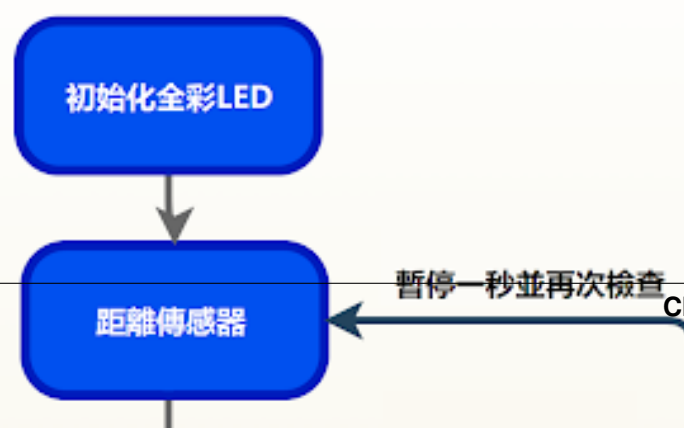
What is an Unloading alert system? 什麼是卸貨提醒系統？

Unloading alert system operation 卸貨提醒系統運作

Case 03 Concept Diagram



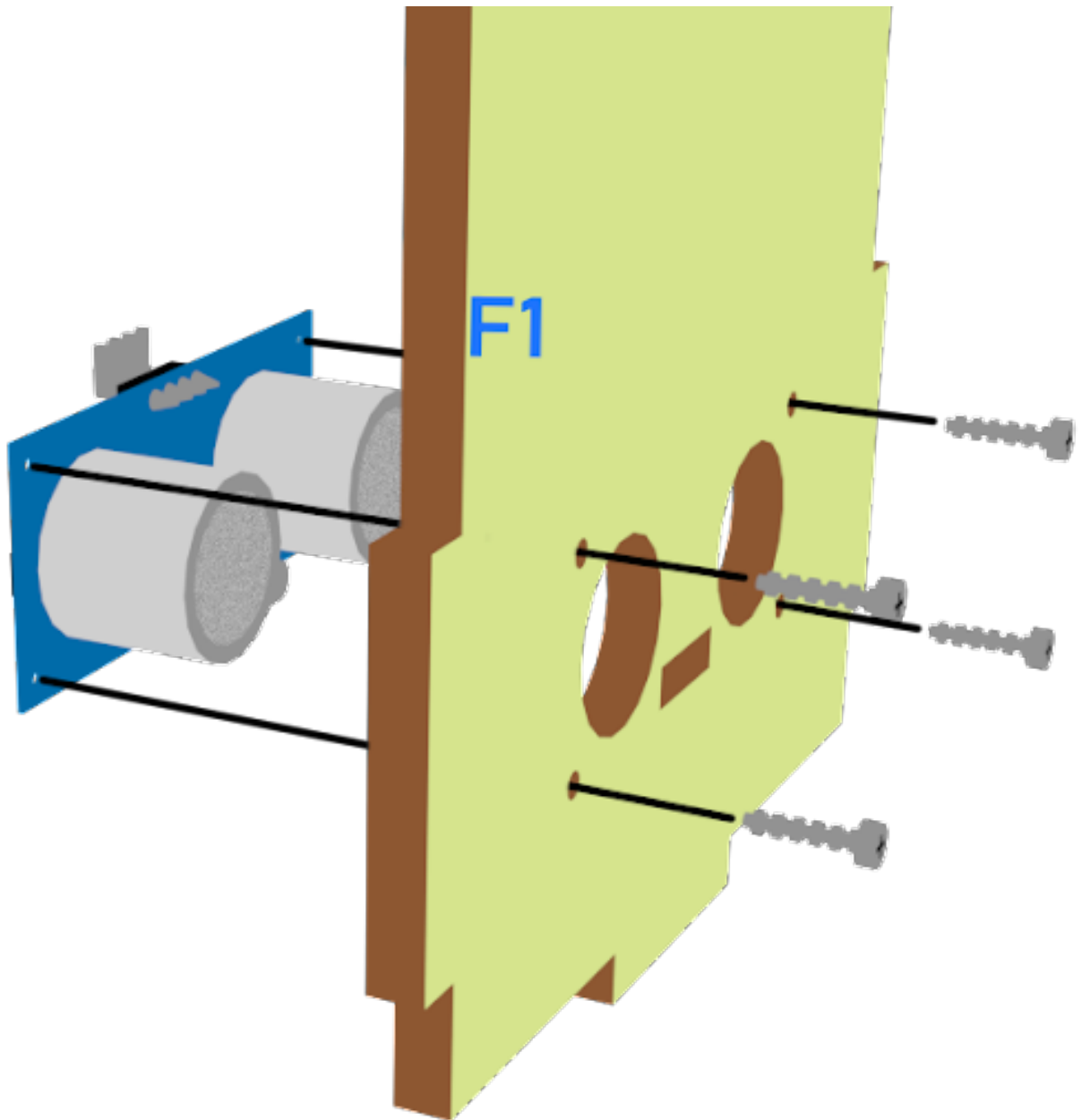
Case 03 概念圖



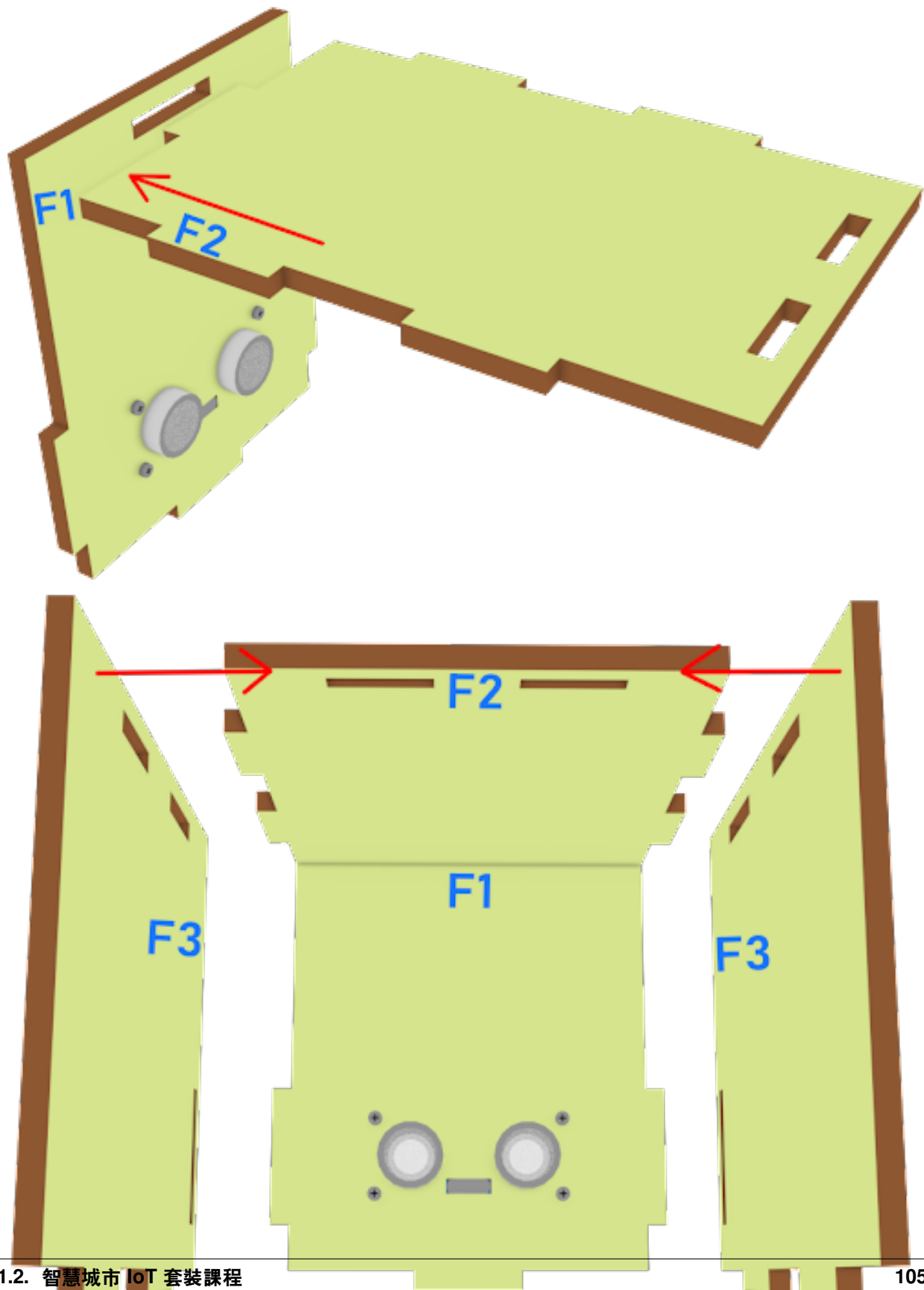
Part List 材料準備

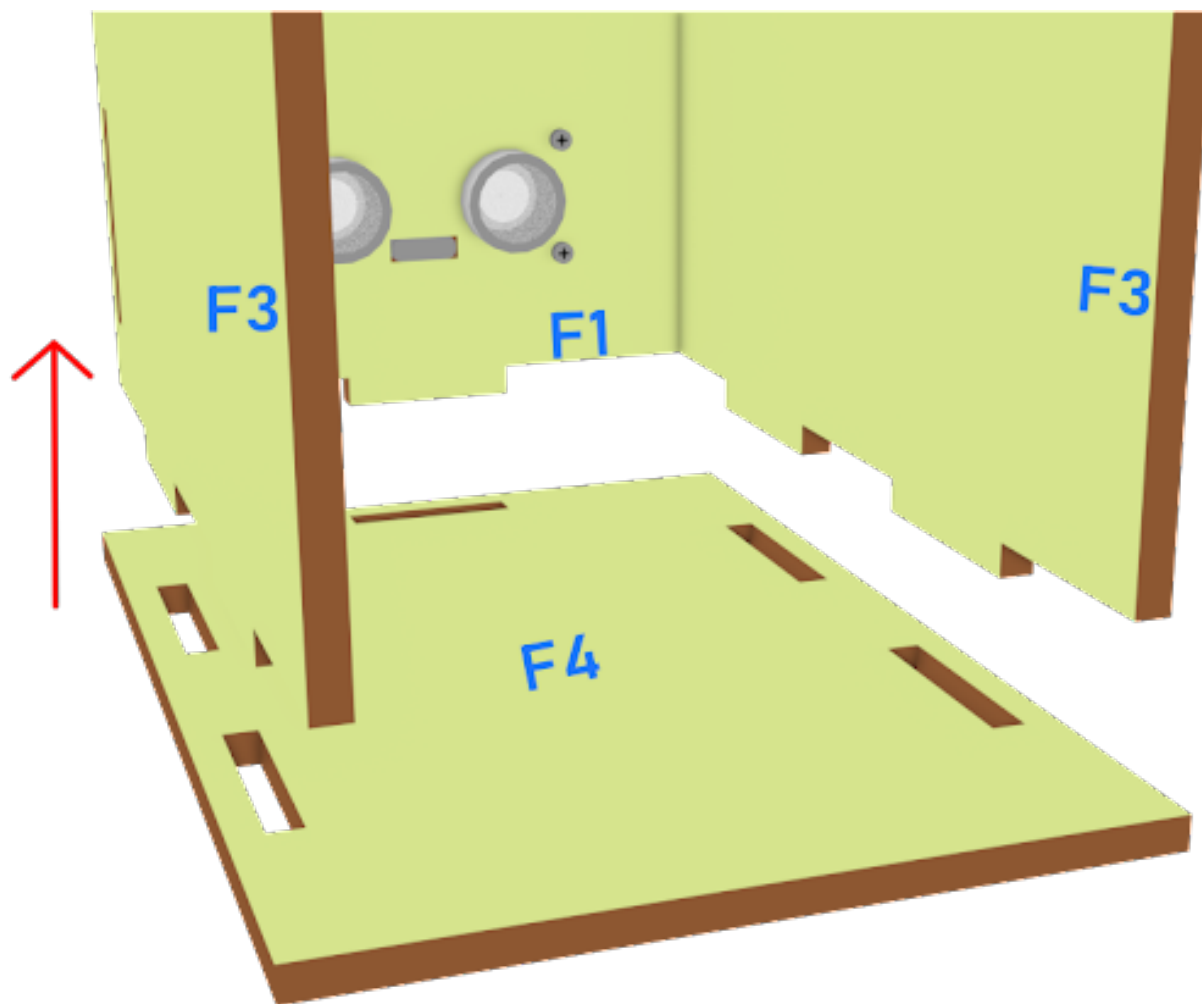
Assembly step 組裝步驟

Step 1 第一步

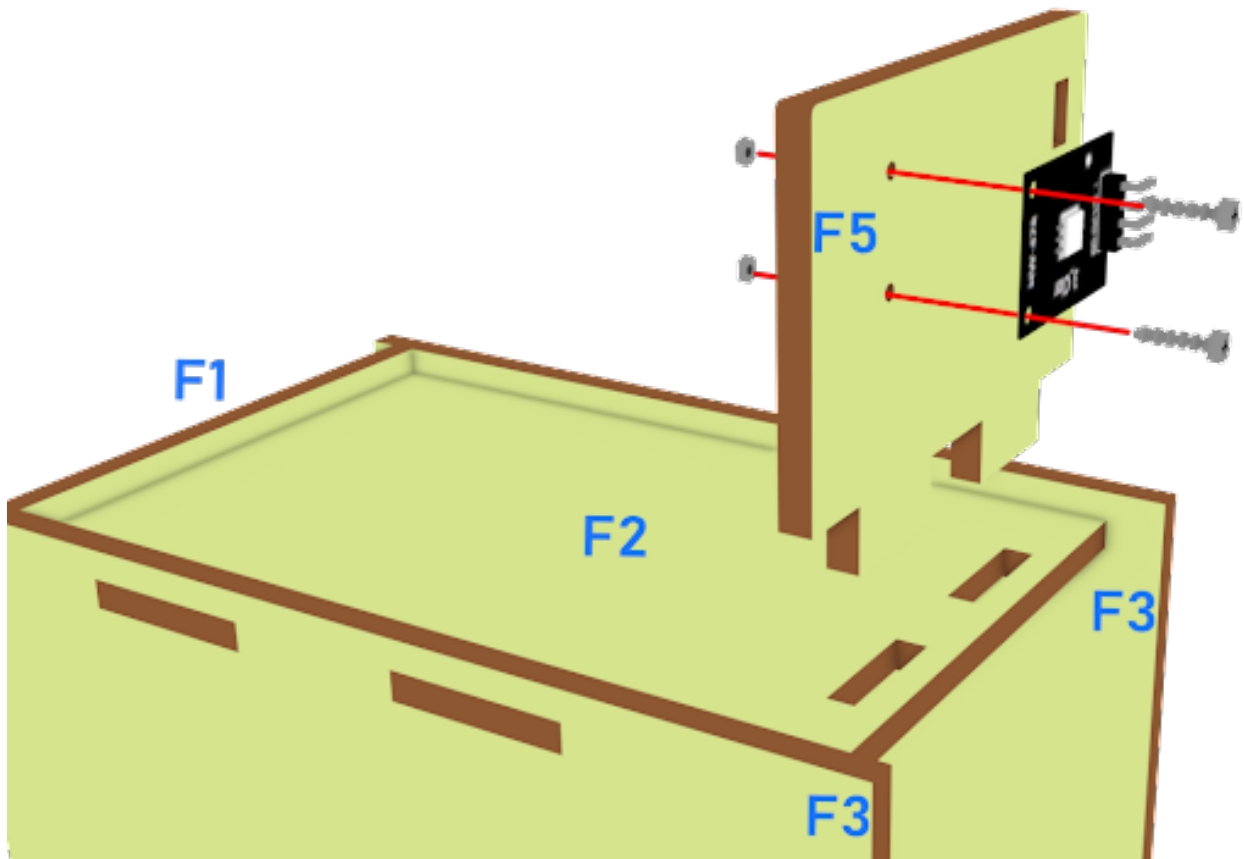


Step 2 第二步

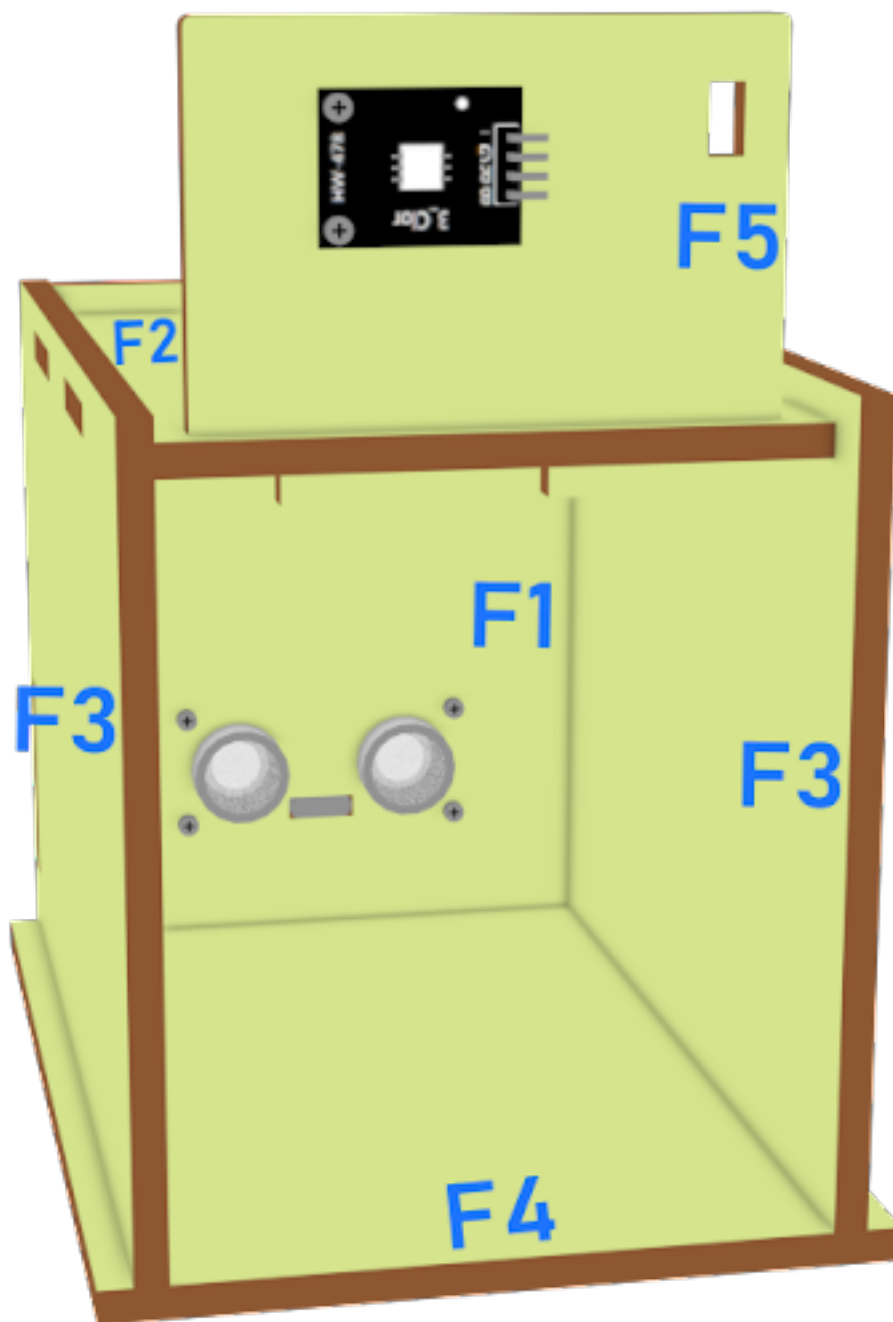




Step3 第三步



Step 4 第四步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Step 1. Set variable and initialize multi-colour LED 設置變量初始化多色 LED

- Inside on start, snap set variable distance to 0 from variables 在但啟動時裏，從變數拖入變數 distance 設 0
- Snap set colorLED to color pin setting... 拖入變數 colorLED 設 color pin 設定...
- Snap pause to wait 5 seconds 拖出暫停 5 秒



Step 2. Get distance value 獲取距離值

- Inside block forever. Set distance to get distance unit cm trig P15 echo P16, that's say get the distance value by connecting the distance sensor to P15 and P16 在重無限次的版塊裏。將變數 distance 設 get distance unit cm trig P15 echo P16，也就是通過連接距離傳感器到 P15 和 P16 獲得 distance 值。
- Snap if statement into forever, set distance ≤ 10 into if statement 將如果語句插入重無限次中，將如果語句設 distance ≤ 10 。
- Snap Pause to the loop to wait 1 second for next checking 把暫停拖入循環，下一次檢查等待 1 秒。



Step 3. Show indicating colours with distance value 以距離值顯示指示色

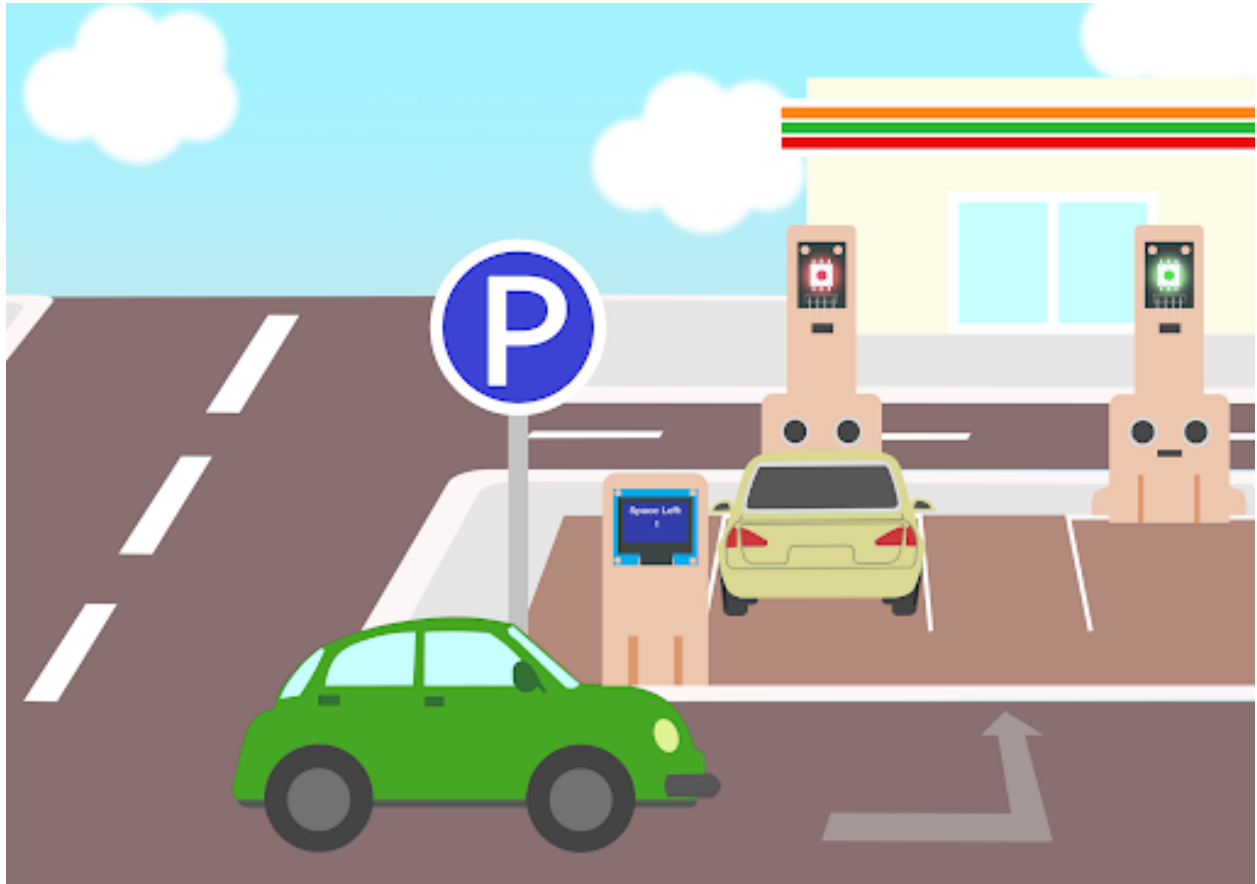
- If distance ≤ 10 , then strip show color green, else strip show color red 如果 distance ≤ 10 , 則顯示綠色, 否則顯示紅色。



Result 總結

Think 思考

1.2.5 Smart Car Park Access Barrier 1: Car Park Monitoring System 智能停車場障礙一：車位監測

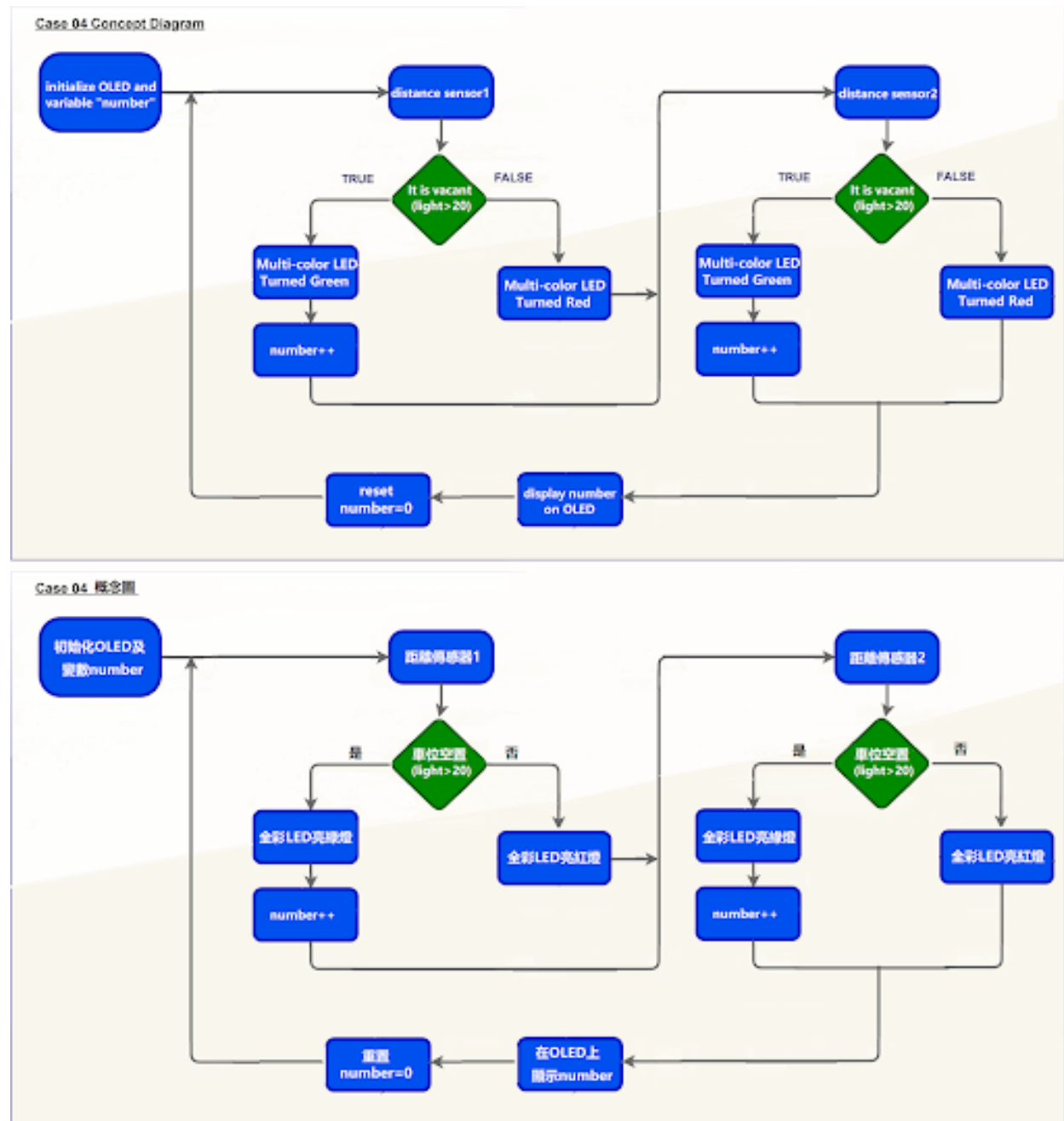


Goal 目標

Background 背景

What is an Smart car park monitoring systems? 什麼是智能停車場監控系統？

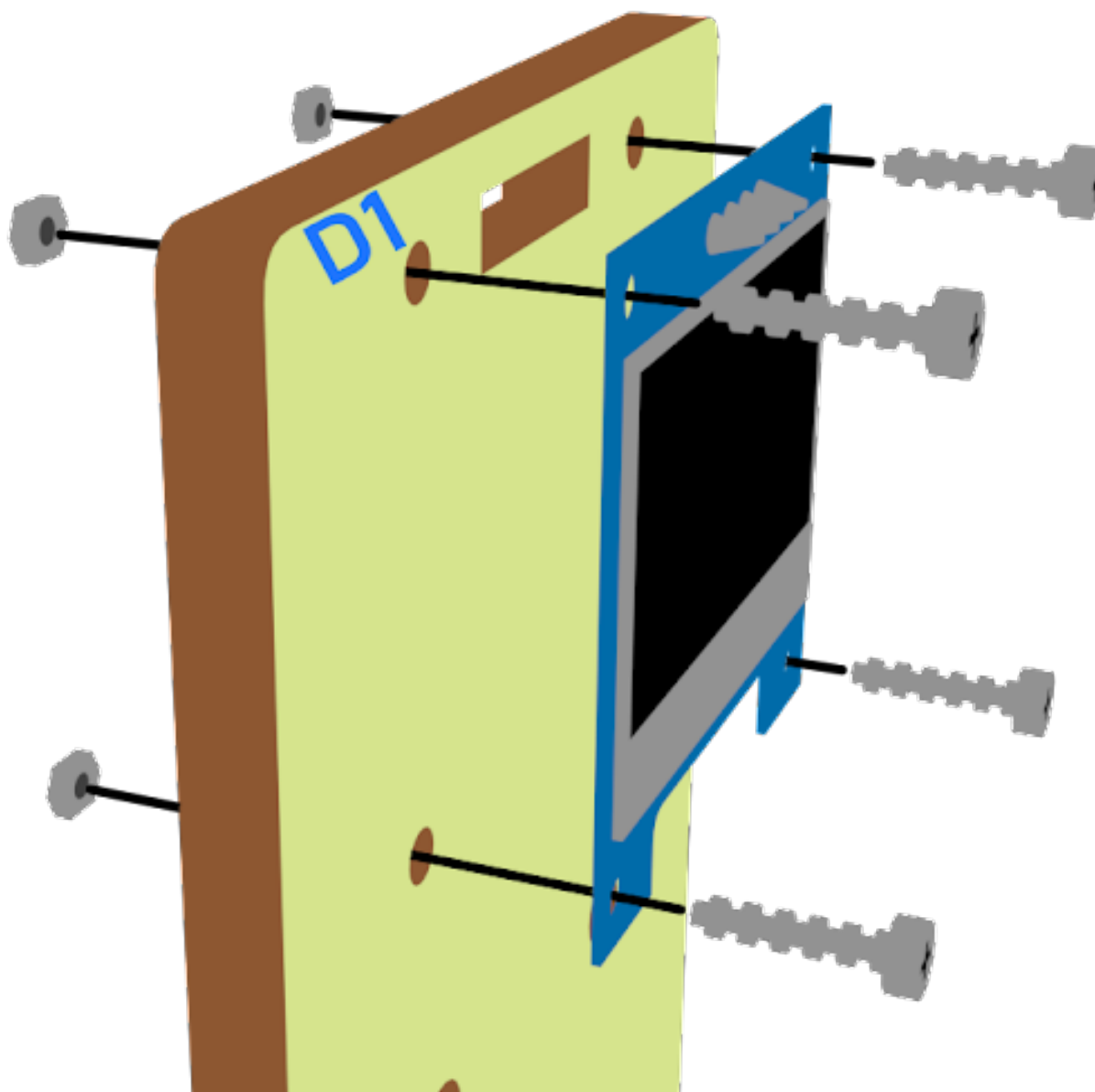
Smart car park monitoring systems operation 智能停車場監控系統運作



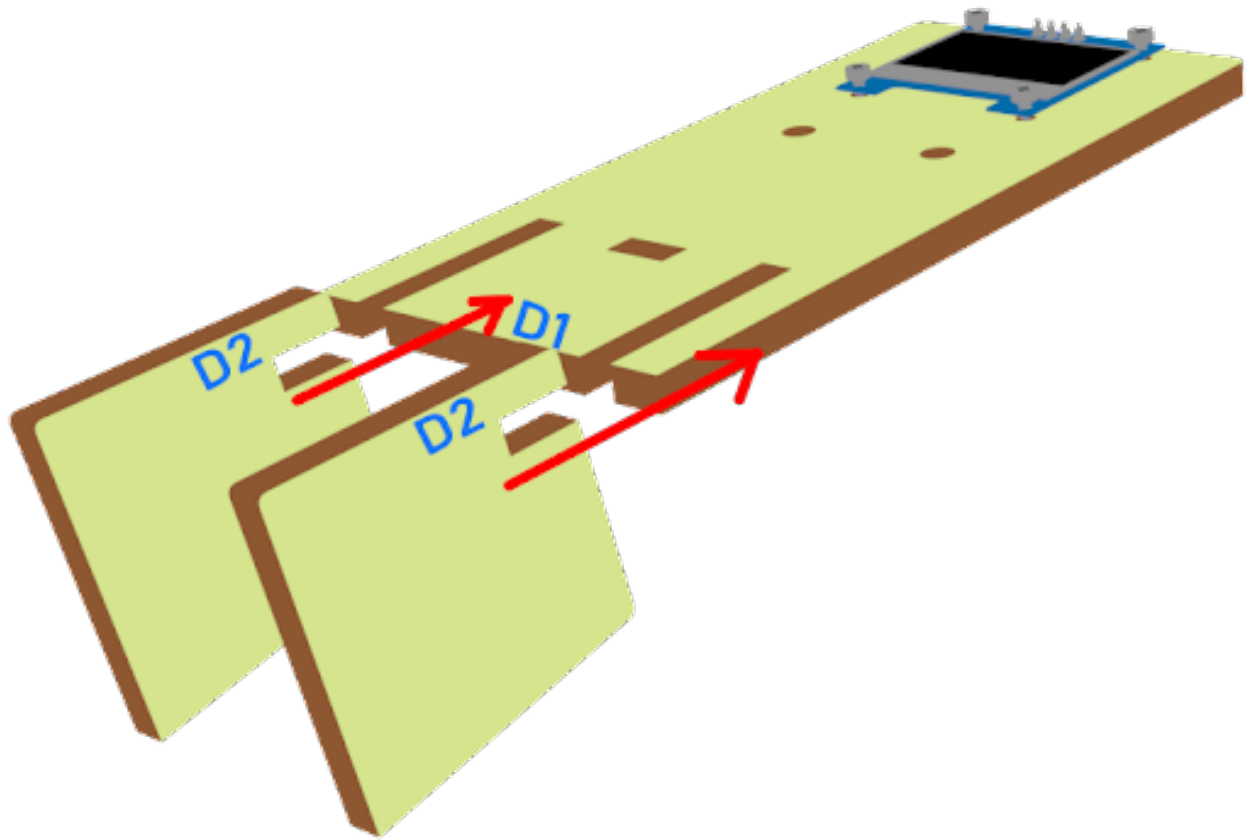
Part List 材料準備

Assembly step 組裝步驟

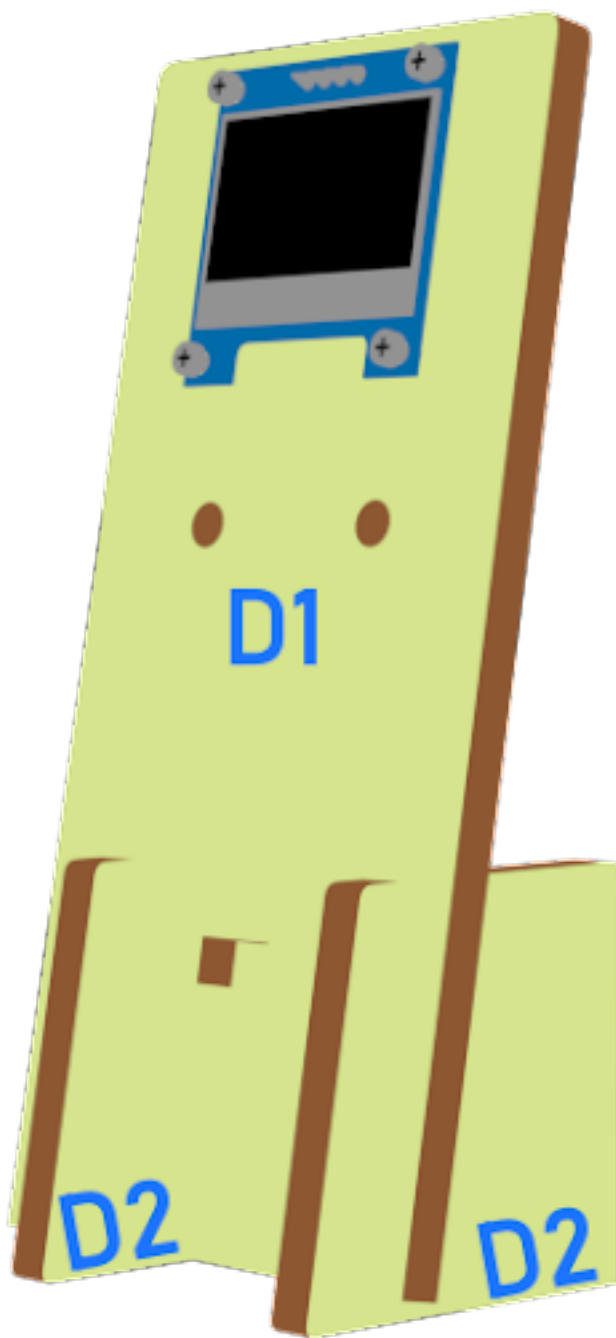
Step 1 第一步



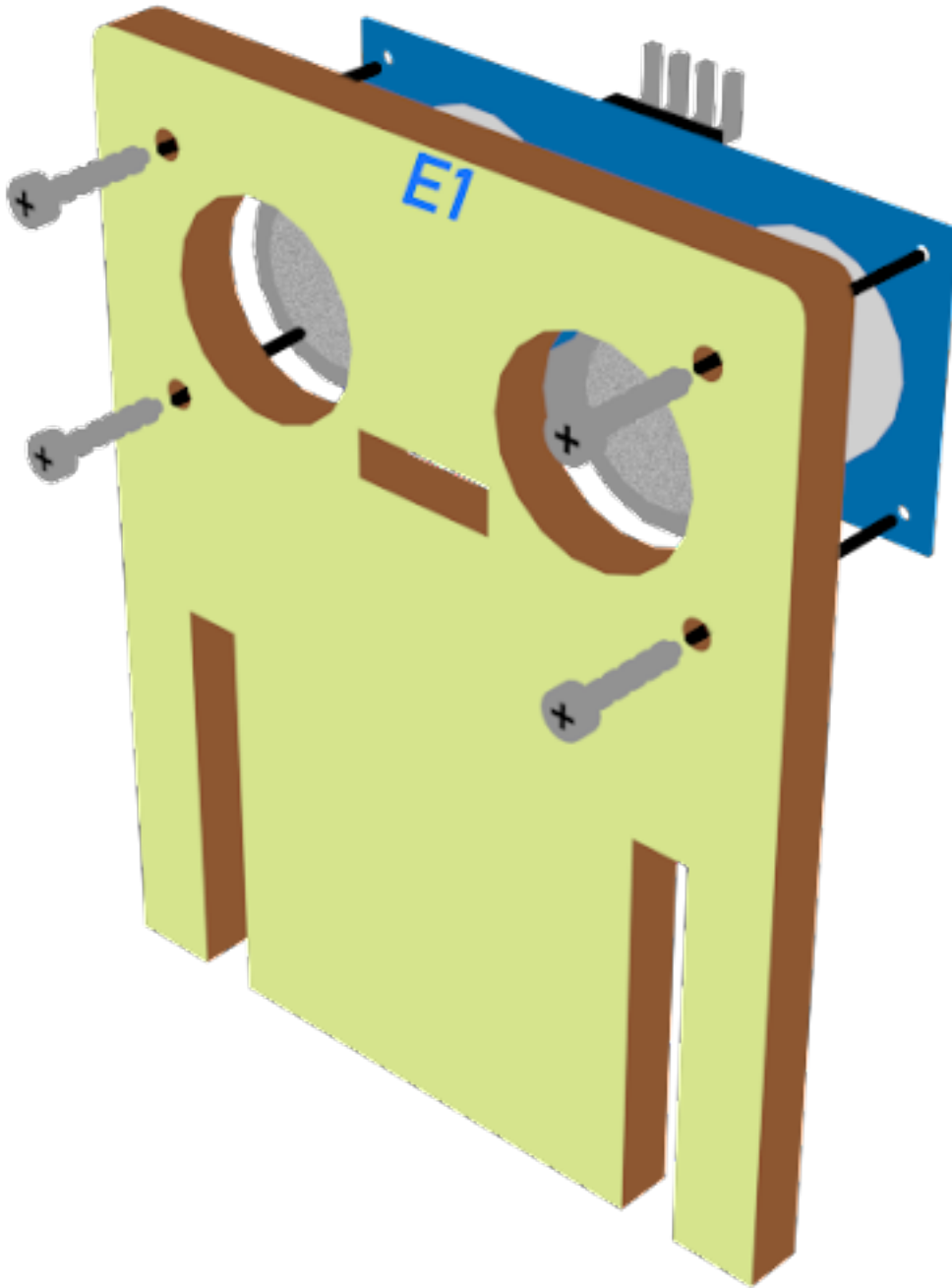
Step 2 第二步



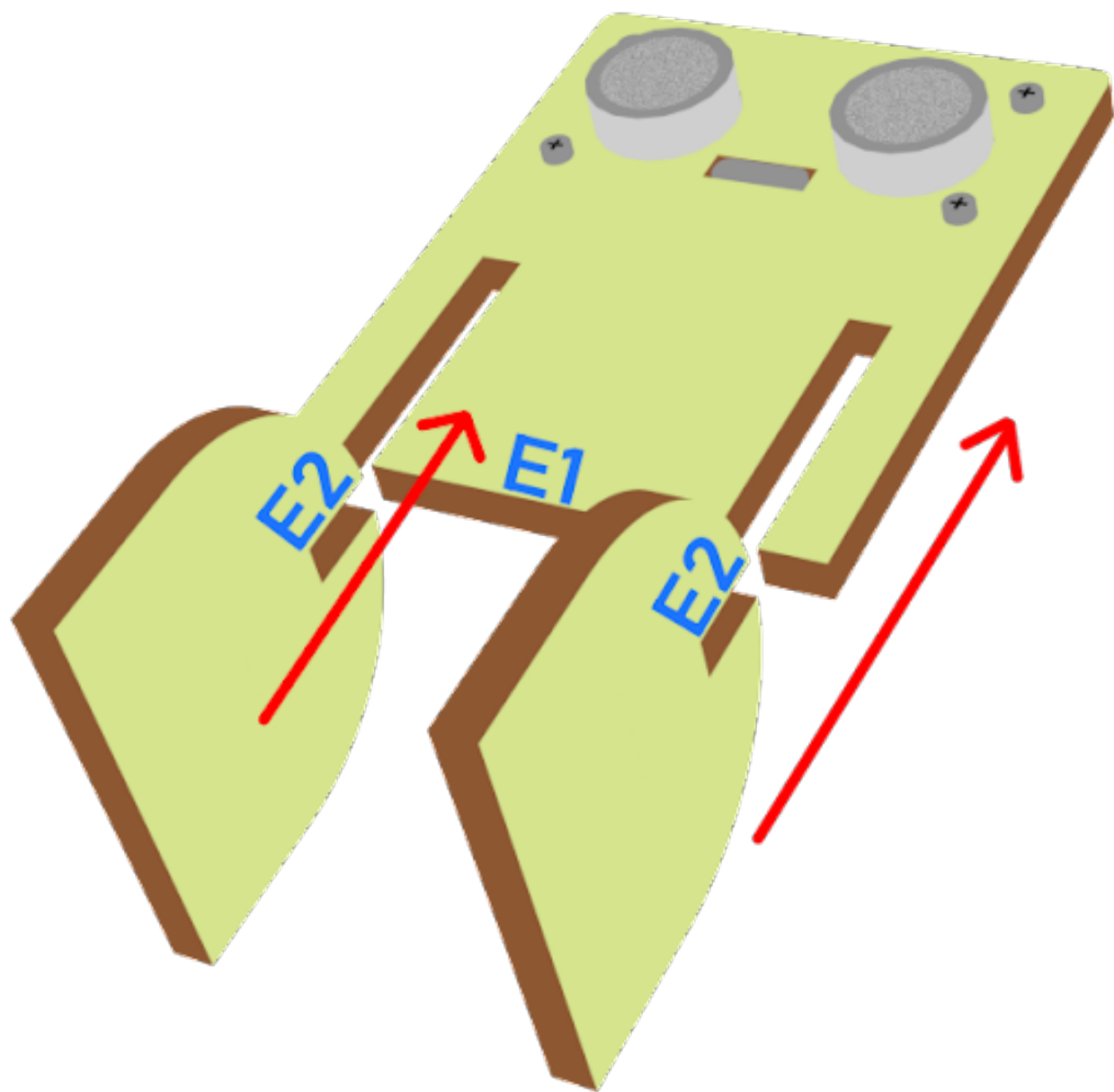
Step 3 第三步



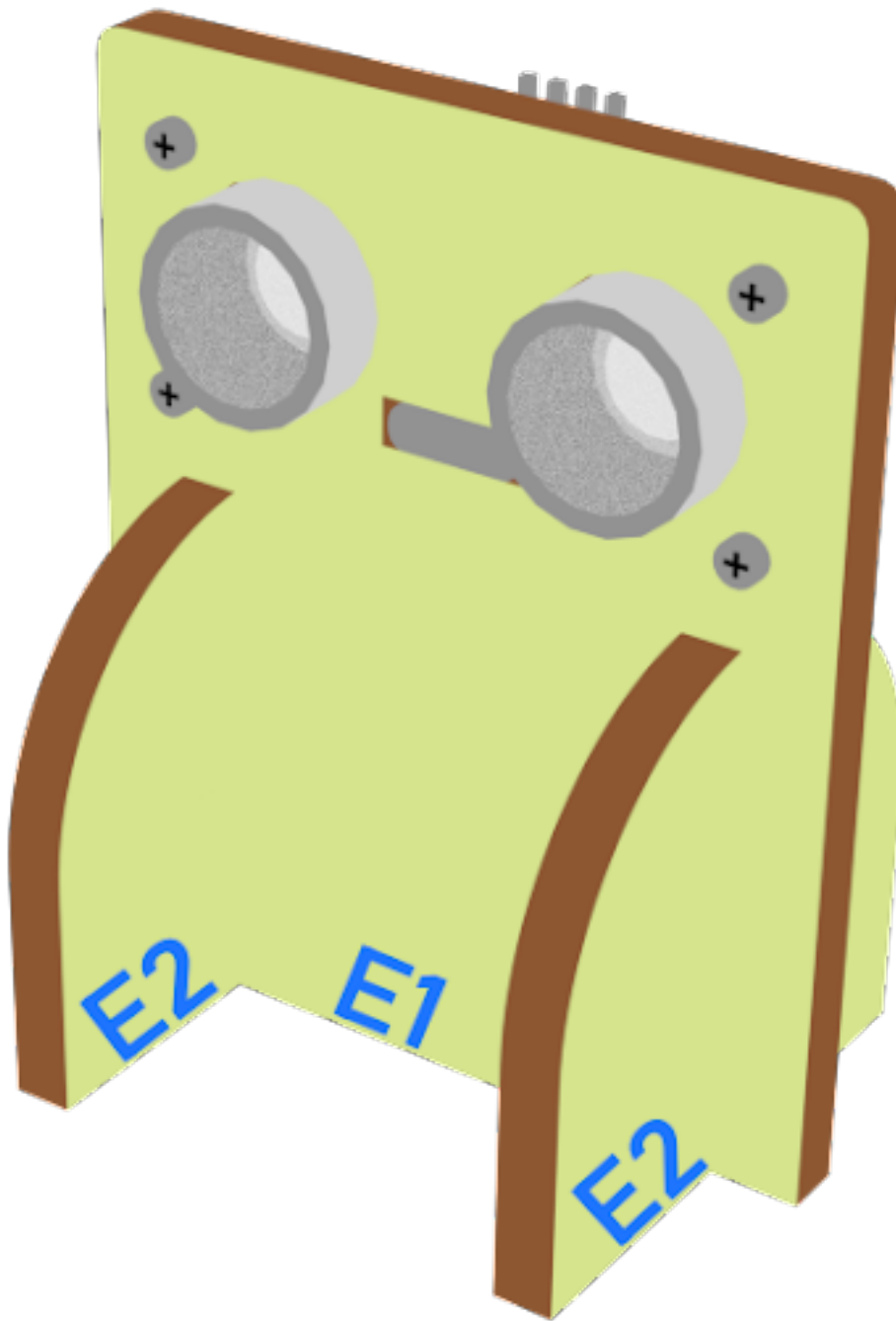
Step 4 第四步



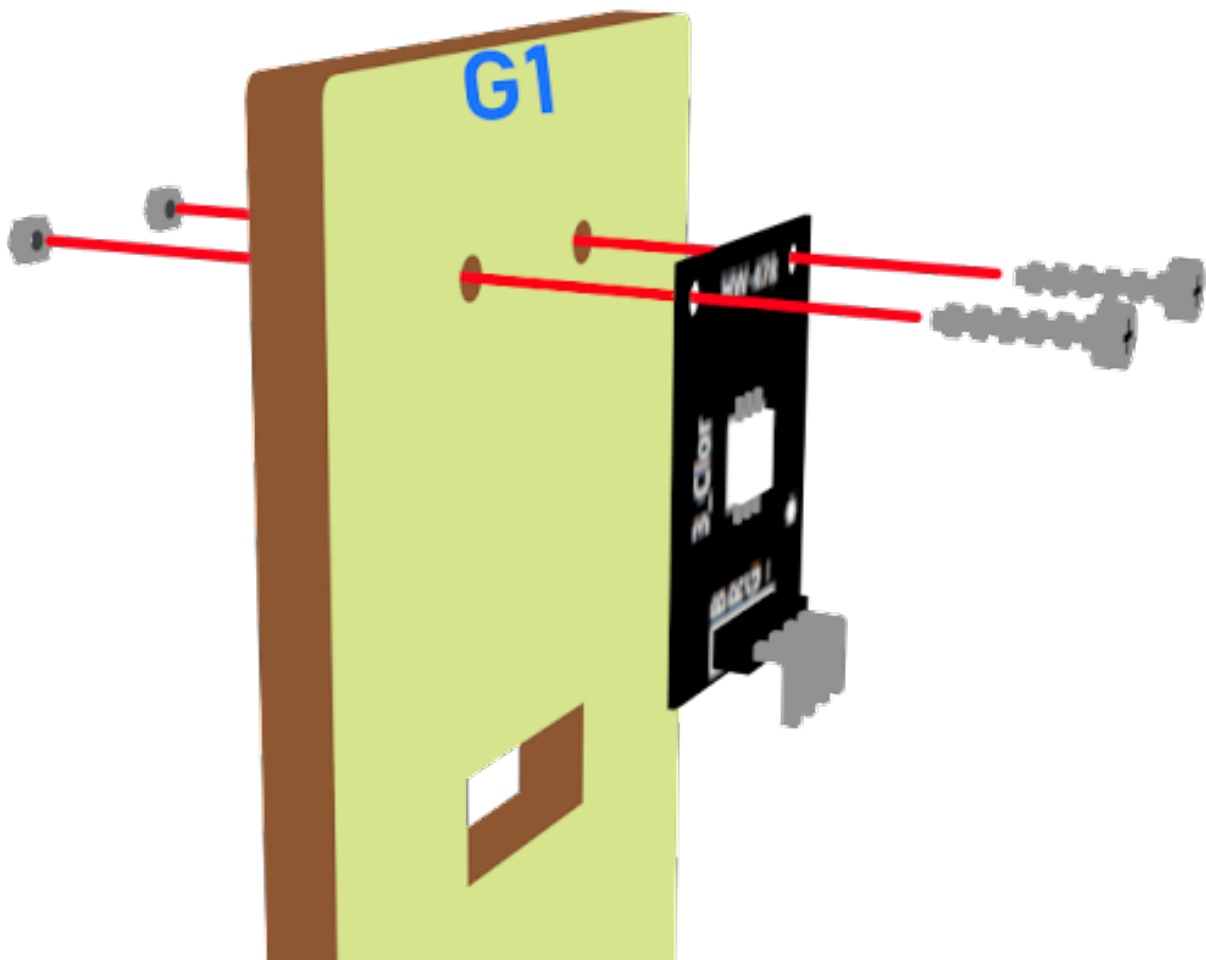
Step 5 第五步



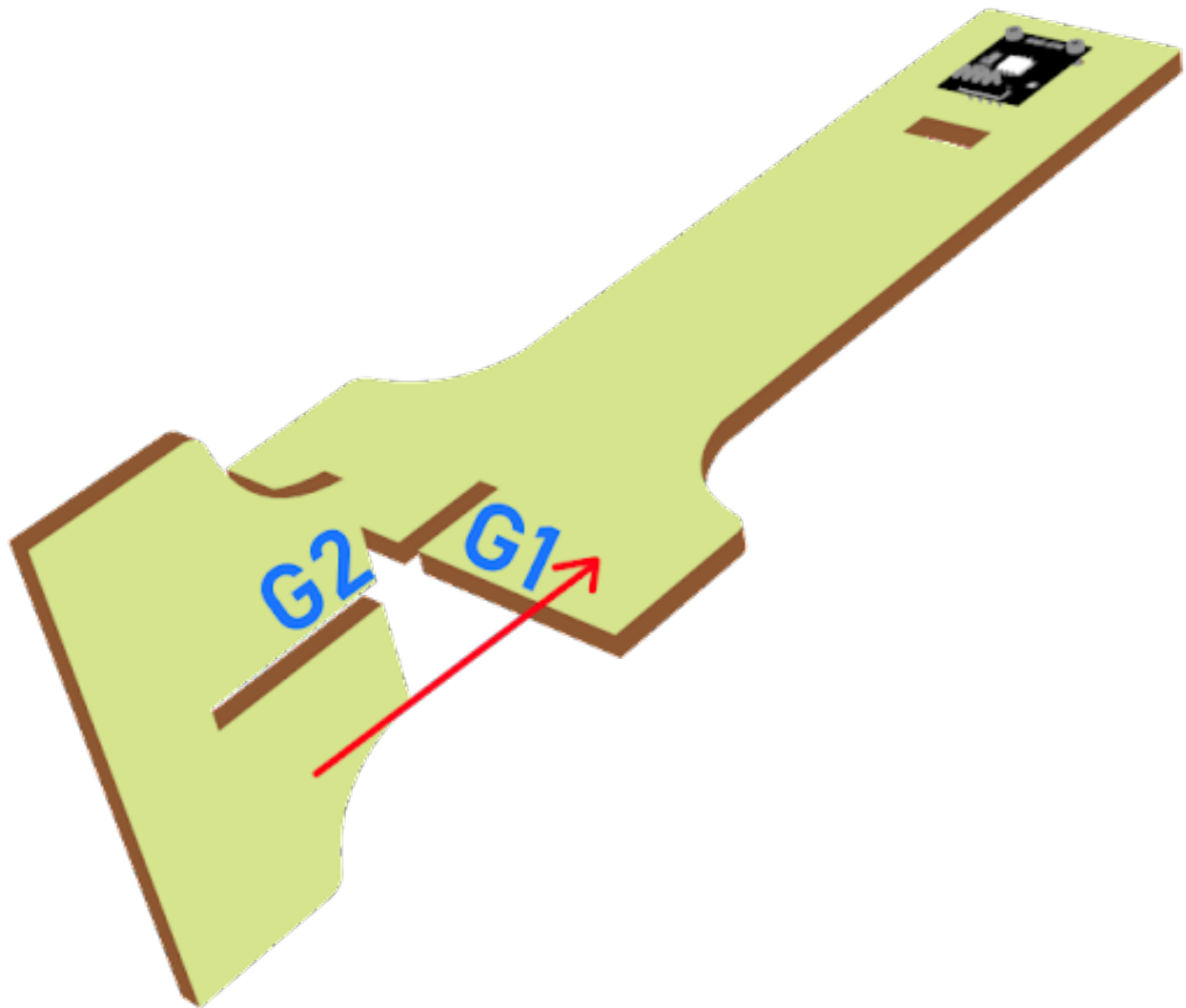
Step 6 第六步



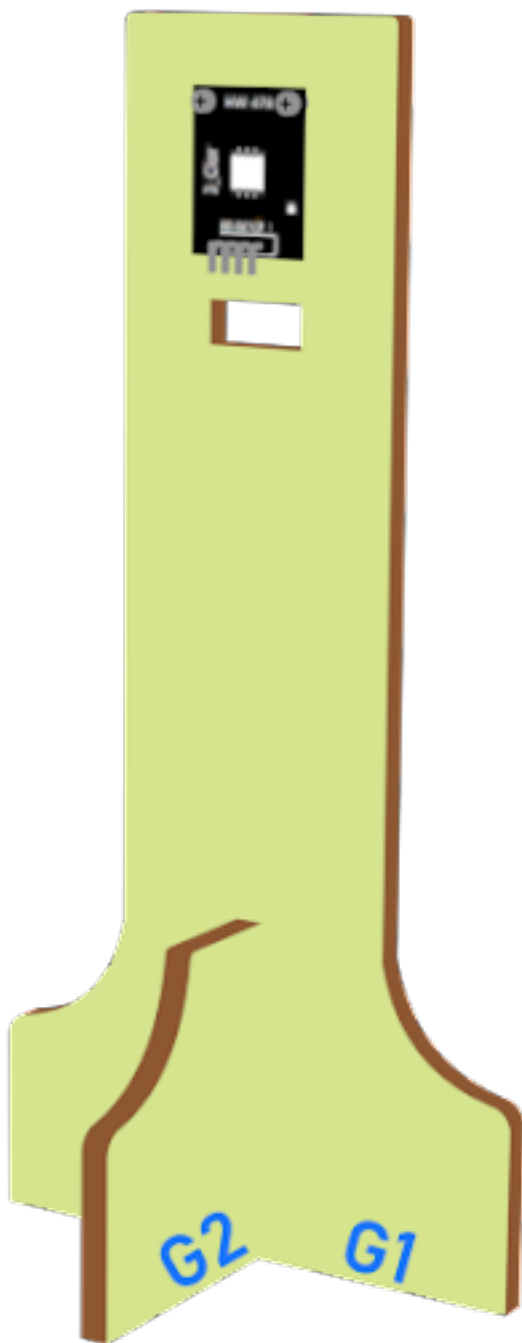
Step 7 第七步



Step 8 第八步



Step 9 第九步



Hardware connect 硬件連接

Programming (MakeCode) 編程

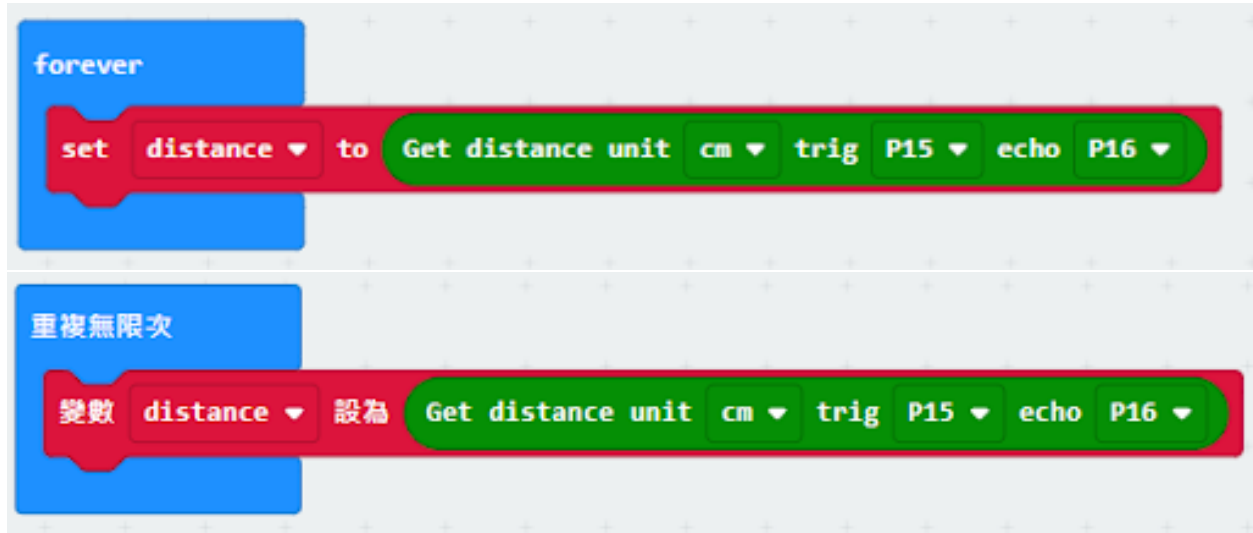
Step 1. Set variables and initialize multi-colour LED and OLED screen 在起始位置設置變量初始化多色 LED 及 OLED 屏幕

- Drag Initialize OLED with width:128, height: 64 to on start 拖動 OLED 初始化寬：128 高:64，至當啟動時。
- Inside on start, snap set variable distance to 0 and set number to 0 from variables. 在當啟動時中，從變數中拖入變數 distance 設 0，變數 number 設 0。
- Snap set colorLED to color led pin setting ...拖入 set colorLED to color led pin setting ...。



Step 2. Get distance 獲得距離的數值

- Drag get distance to distance unit cm trig P15 echo P16, store the value to variable distance. 拖動變數 distance 設 get distance unit cm trig P15 echo P16, 將該值存儲到變量 distance。



Step 3. Show indicating colours and count the number of vacancies 顯示指示色及計算空置車位數量

- Snap if statement into forever, set variable distance > 10 將如果語句放入重無限次，設變數 distance>10
- If distance >10, then colorLED shows color green, else colorLED shows color red 如果 distance>10, 則顯示色, 否則顯示紅色。
- Snap change number by 1 if distance>10



Step 4 display on OLED 在 OLED 上顯示空置車位數量

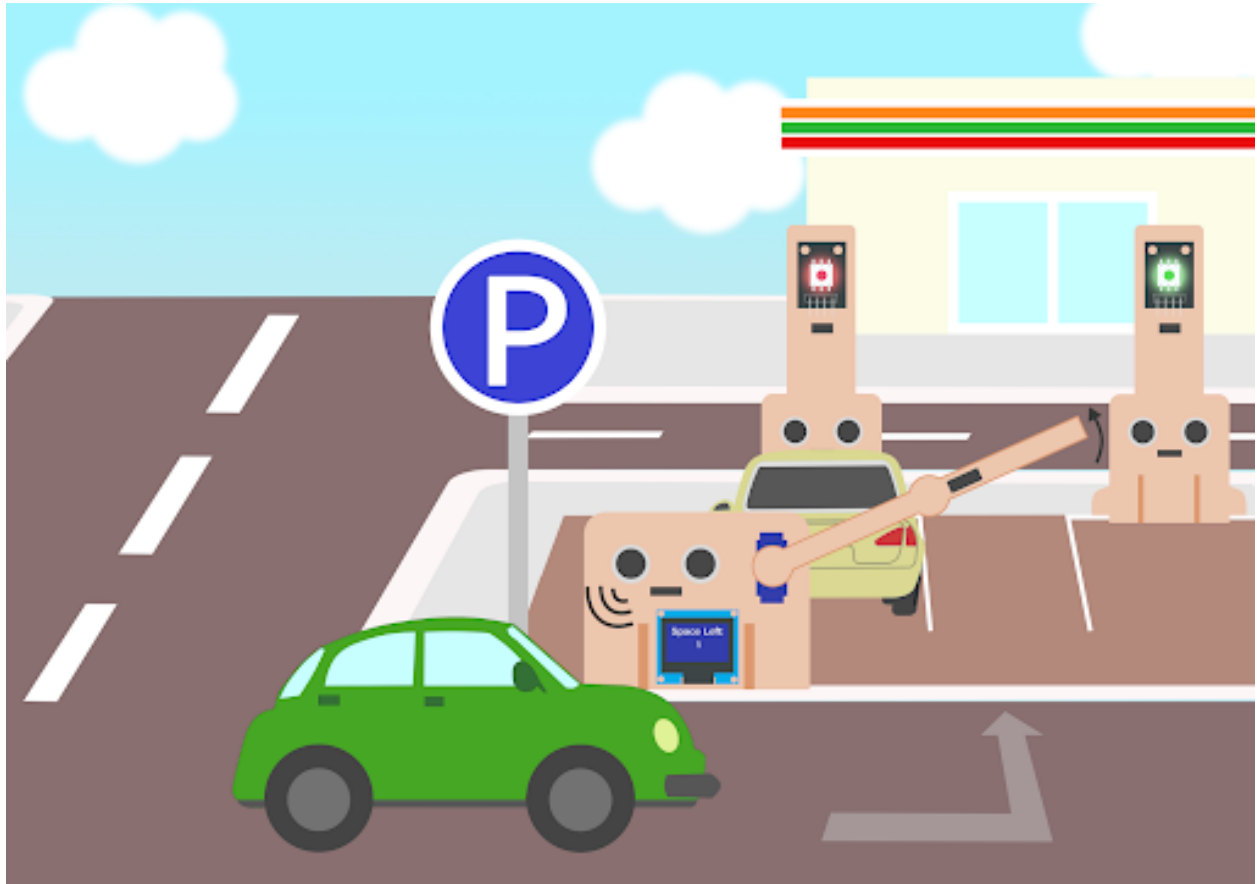
- Snap clear OLED display from OLED to avoid overlap 從 OLED 中拖出清除 OLED 顯示，以避免重疊。
- Snap show number and show value of variables number 拖出新行數字顯示變數 number 的值。
- Snap Pause to the loop to wait 1 second for next checking 把暫停拖入循環，下一次檢查等待 1 秒。
- Reset number to 0 before next checking 重置 number 至 0 以開始新的檢查。



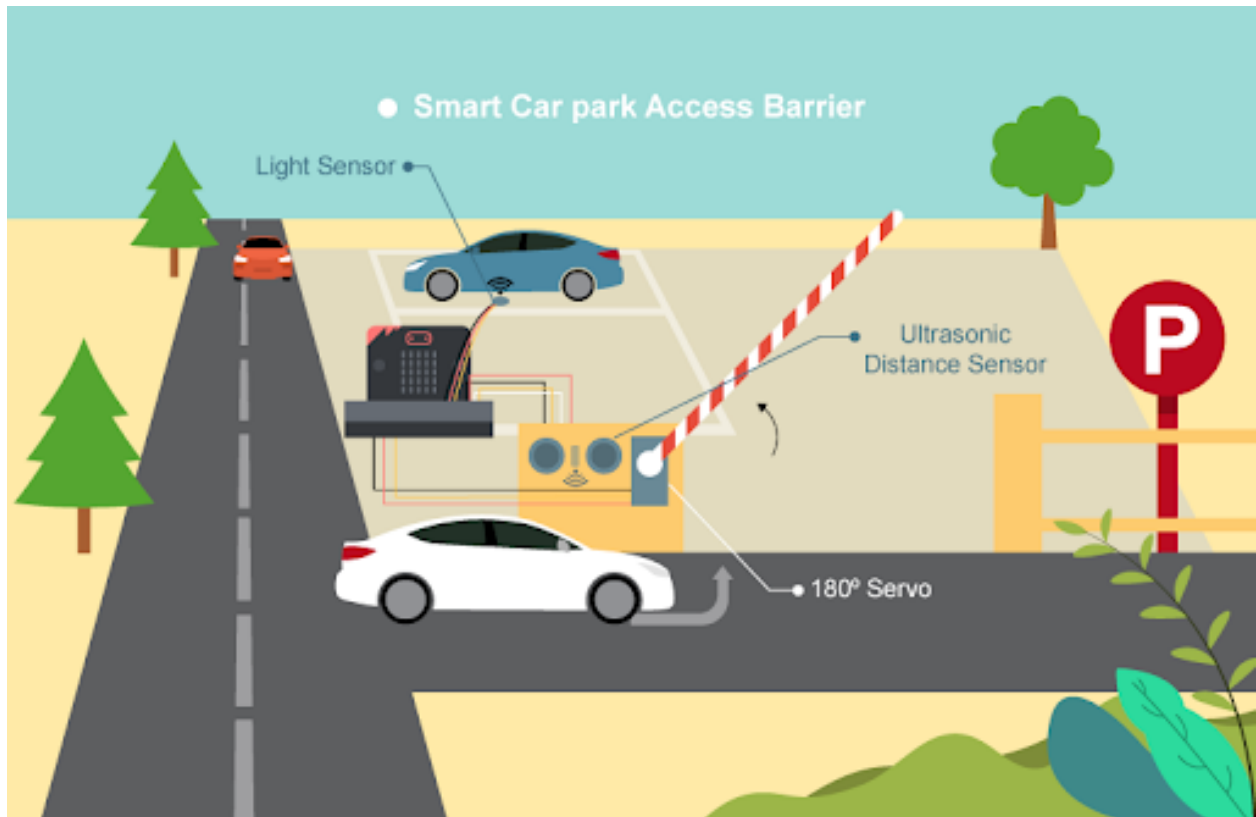
Result 總結

Think 思考

1.2.6 Smart Car Park Access Barrier 2: Car Park Access Barrier 智能停車場障礙二：車閘



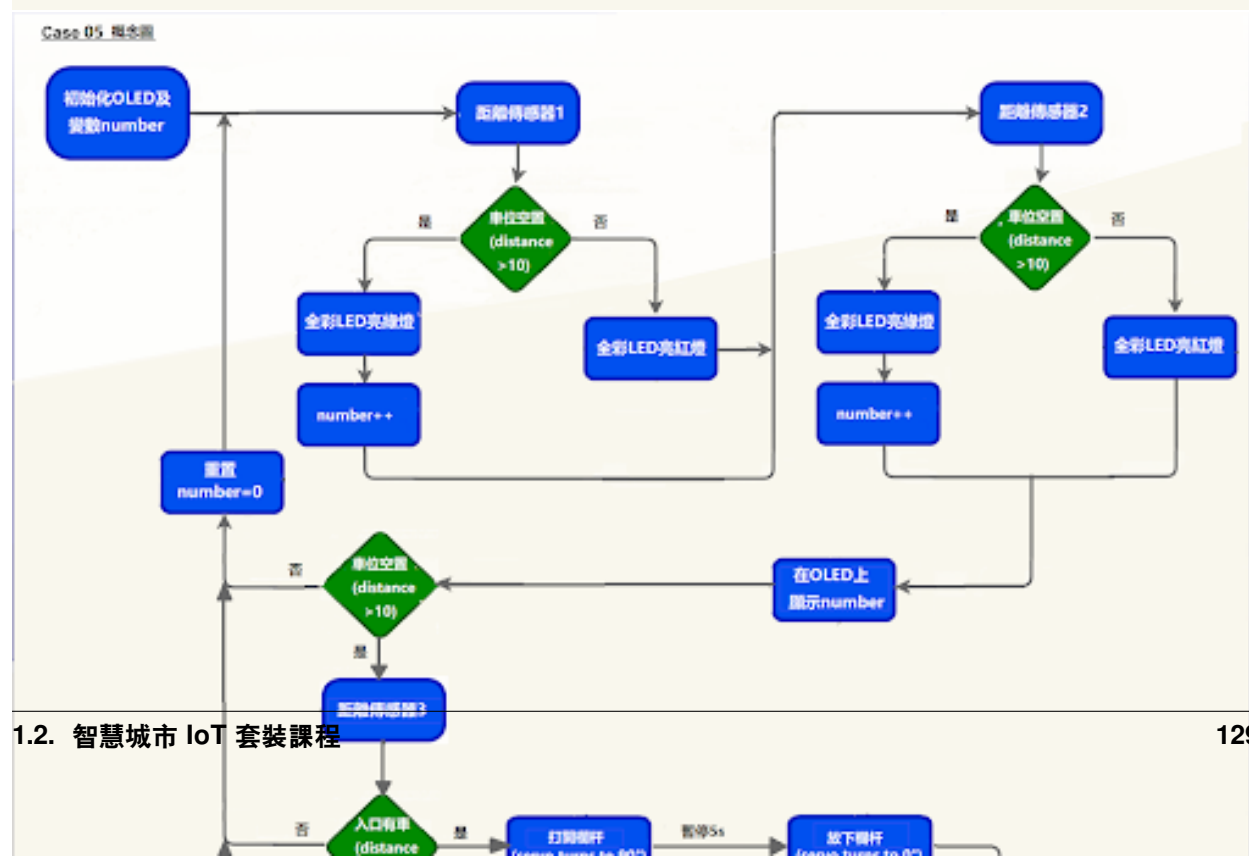
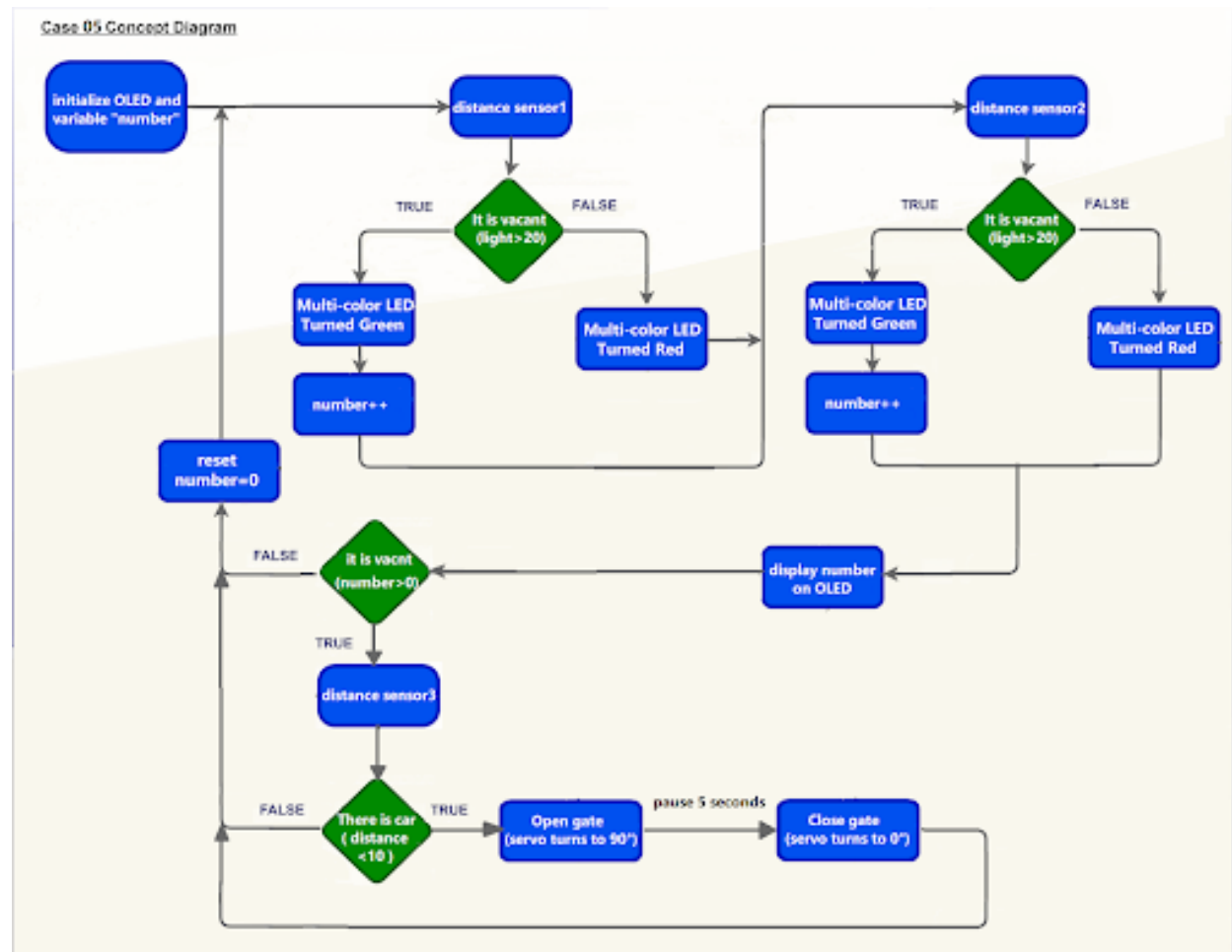
Goal 目標



Background 背景

What is a smart car park access barrier? 什麼是智能停車場入口欄杆？

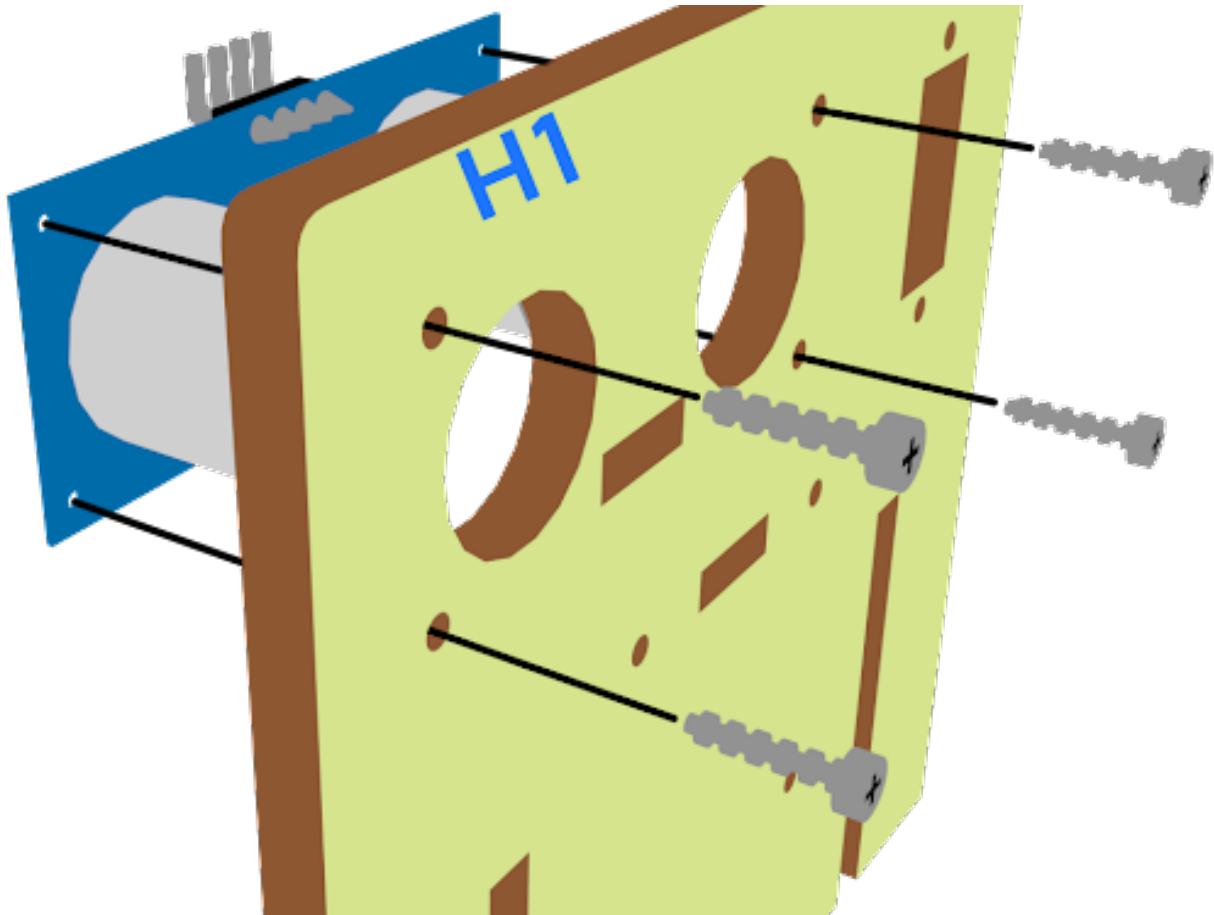
Car park access barrier operation 停車場欄杆運作



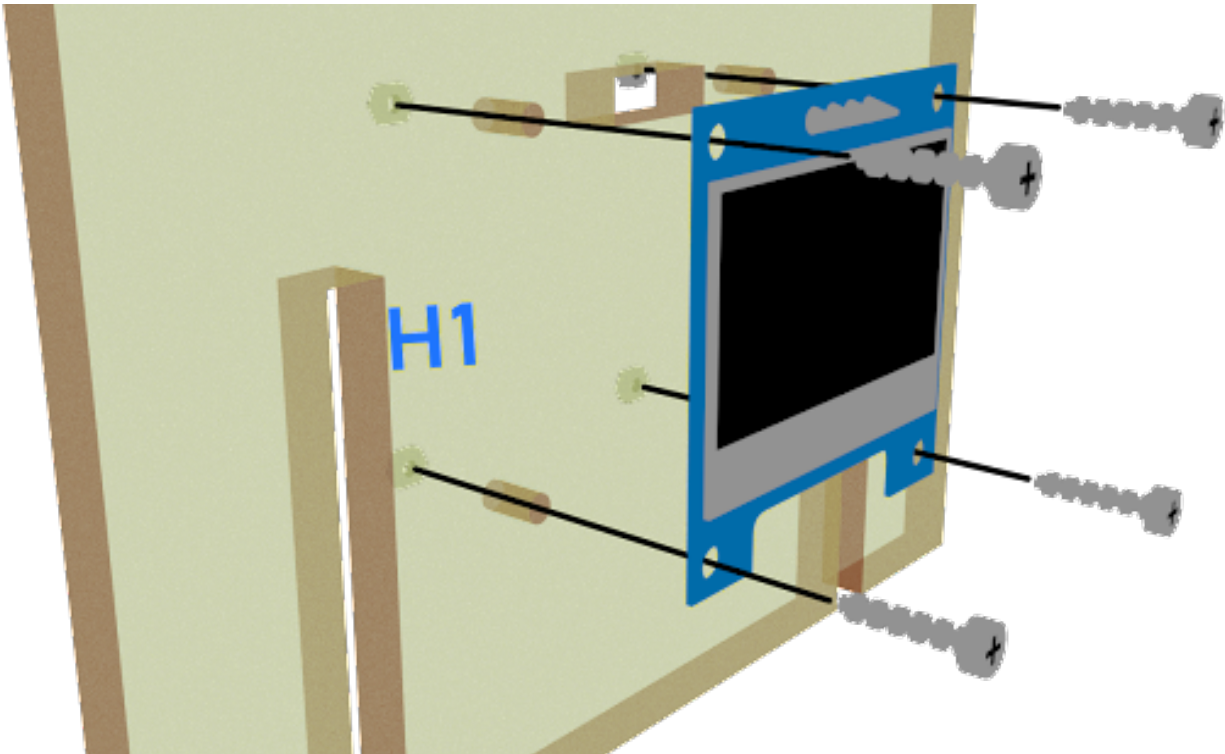
Part List 材料準備

Assembly step 組裝步驟

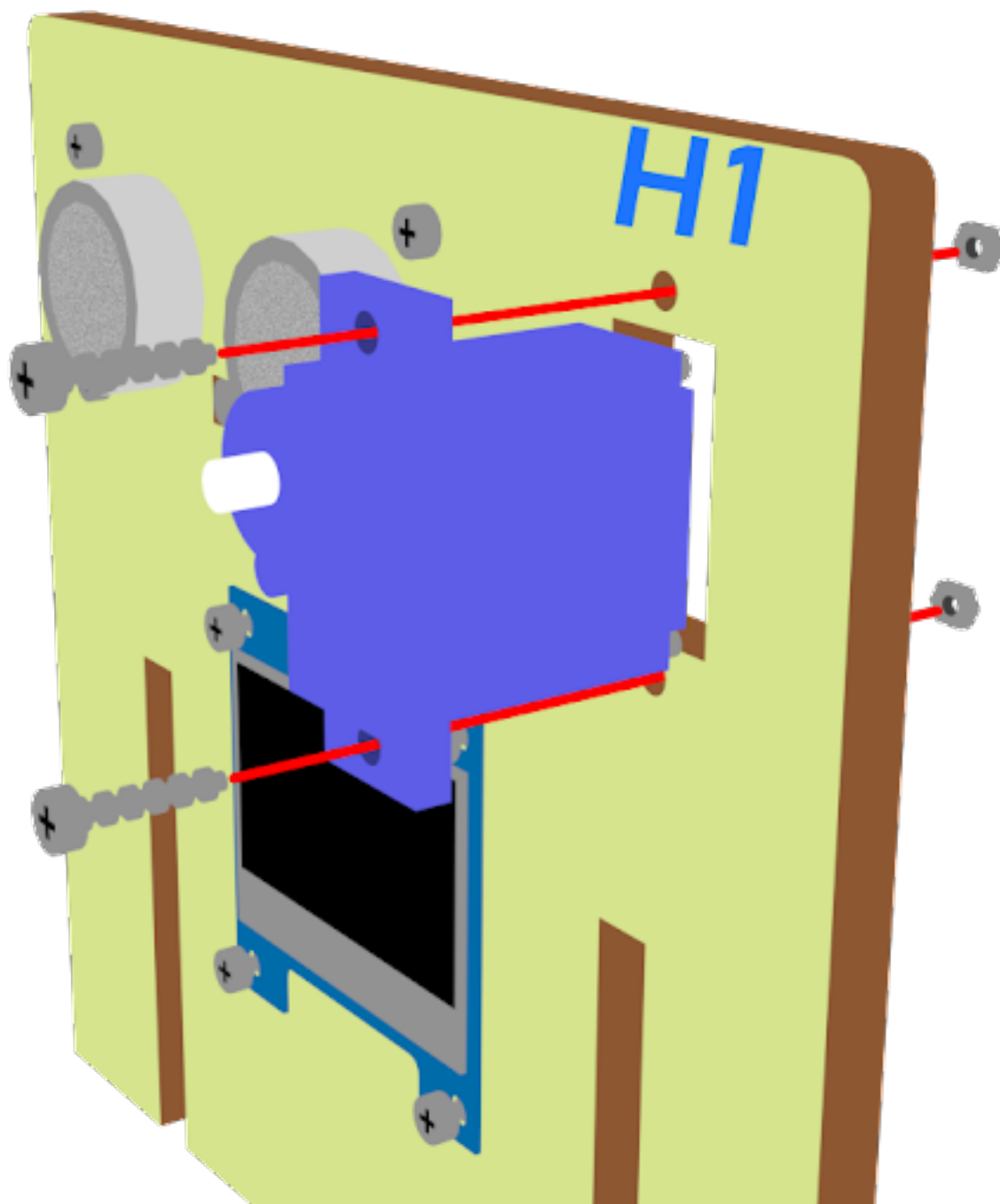
Step 1 第一步



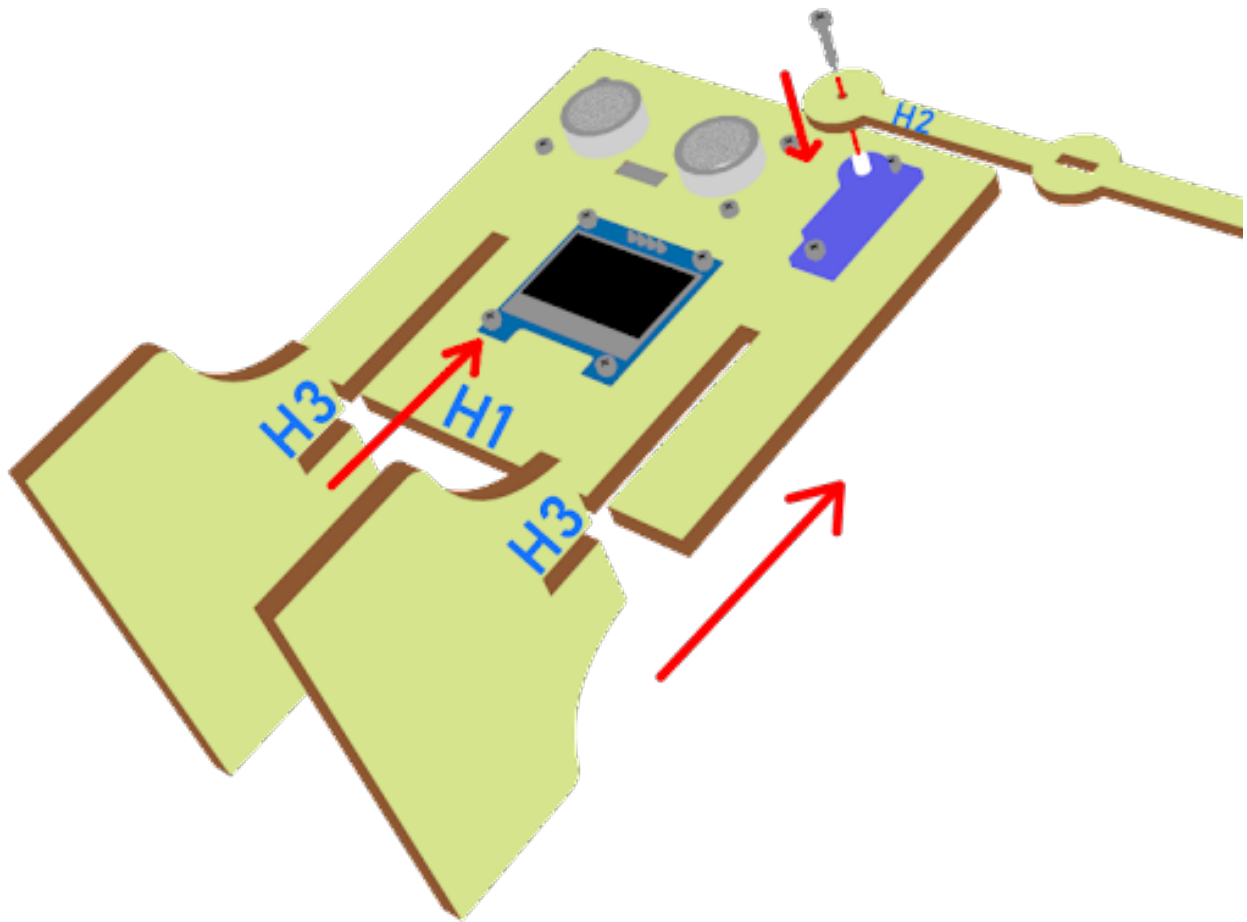
Step 2 第二步



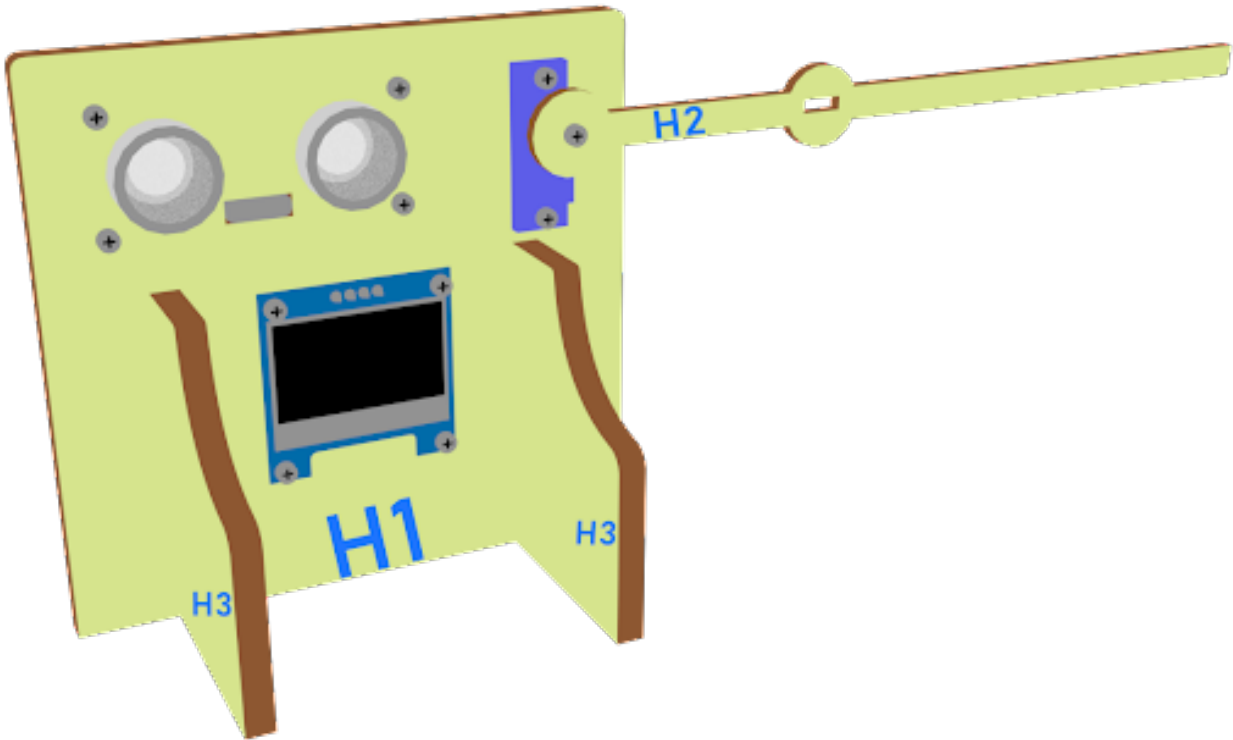
Step 3 第三步



Step 4 第四步



Step 5 第五步



Hardware connect 硬件連接

Programming (MakeCode) 編程

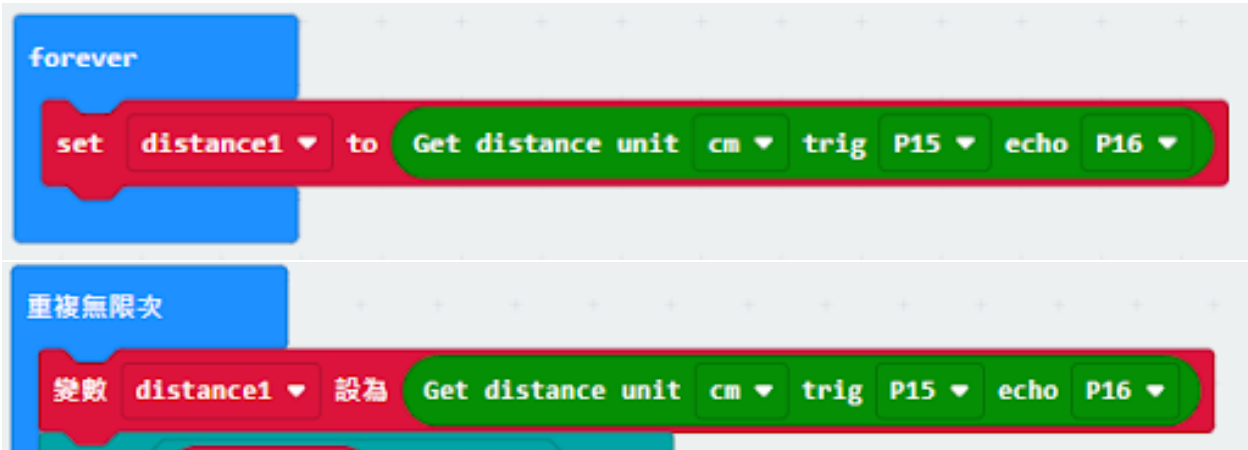
Step 1. Set variables, initialize OLED screen and servo at start position 在起始位置設置變量，初始化 OLED 屏幕及舵機裝置

- Drag Initialize OLED with width:128, height: 64 to on start 拖動 OLED 初始化寬：128 高:64，至當啟動時。
- Inside on start, snap set variable distance1 to 0, set variable distance2 to 0 and set number to 0 from variables. 在當啟動時中，從變數中拖入變數 distance1 設 0，變數 distance2 設 0 及變數 number 設 0。
- Snap set colorLED to color led pin setting ...拖入 set colorLED to color led pin setting ...。
- Snap Turn Servo to 0 degree at P0. 拖入 Turn Servo to 0 degree at P0。
- Snap pause to wait 5 seconds 拖出暫停 5 秒



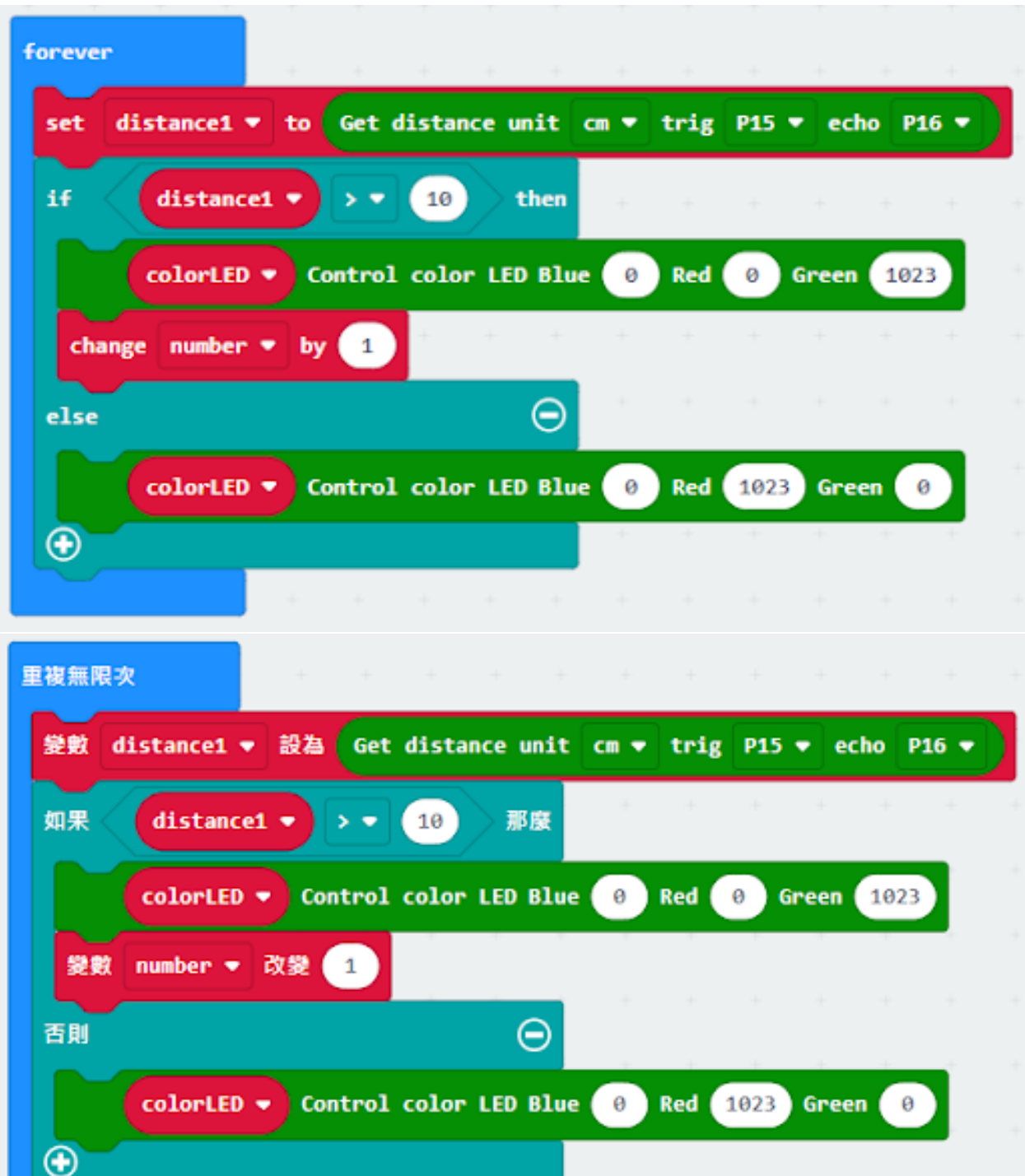
Step 2. Get distance 獲得距離的數值

- Drag set distance1 to distance unit cm trig P15 echo P16, store the value to variable distance1. 拖動變數 distance1 設 get distance unit cm trig P15 echo P16, 將該值存儲到變量 distance1。



Step 3. Show indicating colours and count the number of vacancies 顯示指示色及計算空置車位數量

- Snap if statement into forever, set variable distance1 > 10 將如果語句放入重無數次，設變數 distance1>10
- If distance1 >10, then colorLED shows color green, else colorLED shows color red 如果 distance1>10，則顯示色，否則顯示紅色。
- Snap change number by 1 if distance1>10



Step 4 display on OLED 在 OLED 上顯示空置車位數量

- Snap clear OLED display from OLED to avoid overlap 從 OLED 中拖出清除 OLED 顯示，以避免重疊。
- Snap show number and show value of variables number 拖出新行數字顯示變數 number 的值。



Step 5. Open/close gate with distance value 打開及放下欄杆

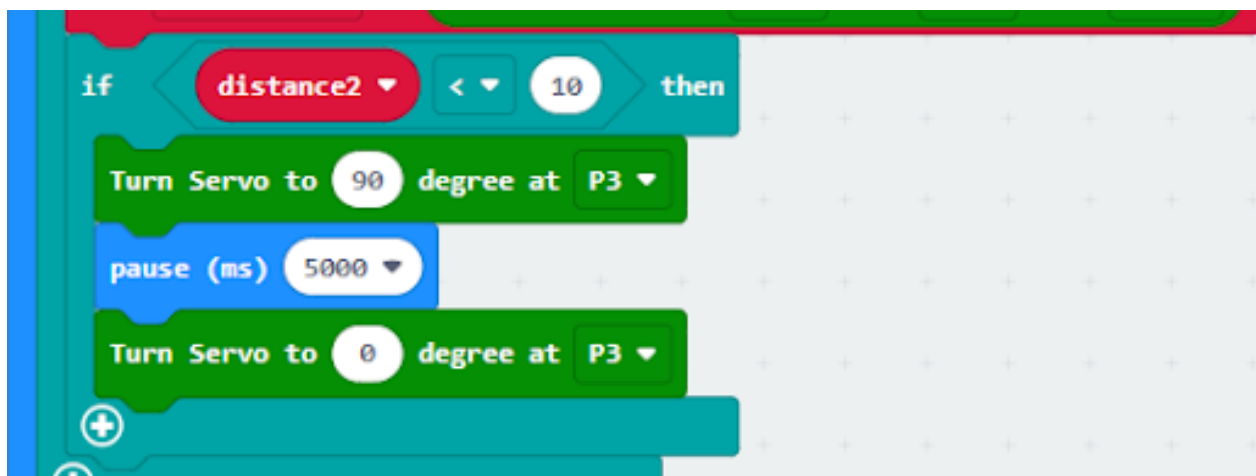
- Snap if statement into forever, set variable number>0 將如果語句放入重疊無數次，設變數 number>0
- Drag get distance2 to distance unit cm trig P8 echo P12, store the value to variable distance2. 拖動變數 distance2 設 get distance unit cm trig P8 echo P12，將該值存儲到變量 distance2。
- Snap if statement into forever, set variable distance2 < 10 將如果語句放入重疊無數次，設變數 distance2<10
- Snap Pause to the loop to wait 1 second for next checking 把暫停拖入循環，下一次檢查等待 1 秒。
- Reset number to 0 before next checking 重置 number 至 0 以開始新的檢查。





Step 6. Set servo position 設置舵機位置

- Snap Turn Servo to 90 degree at P3 as the gate is opened. 在 P3 處將舵機轉到 90 度即打開欄杆。
- Snap pause to the loop to wait 5 seconds 暫停循環，等待 5 秒。
- Snap Turn Servo to 0 degree at P3 as the gate is closed. 在 P3 處將舵機轉到 0 度即放下欄杆。

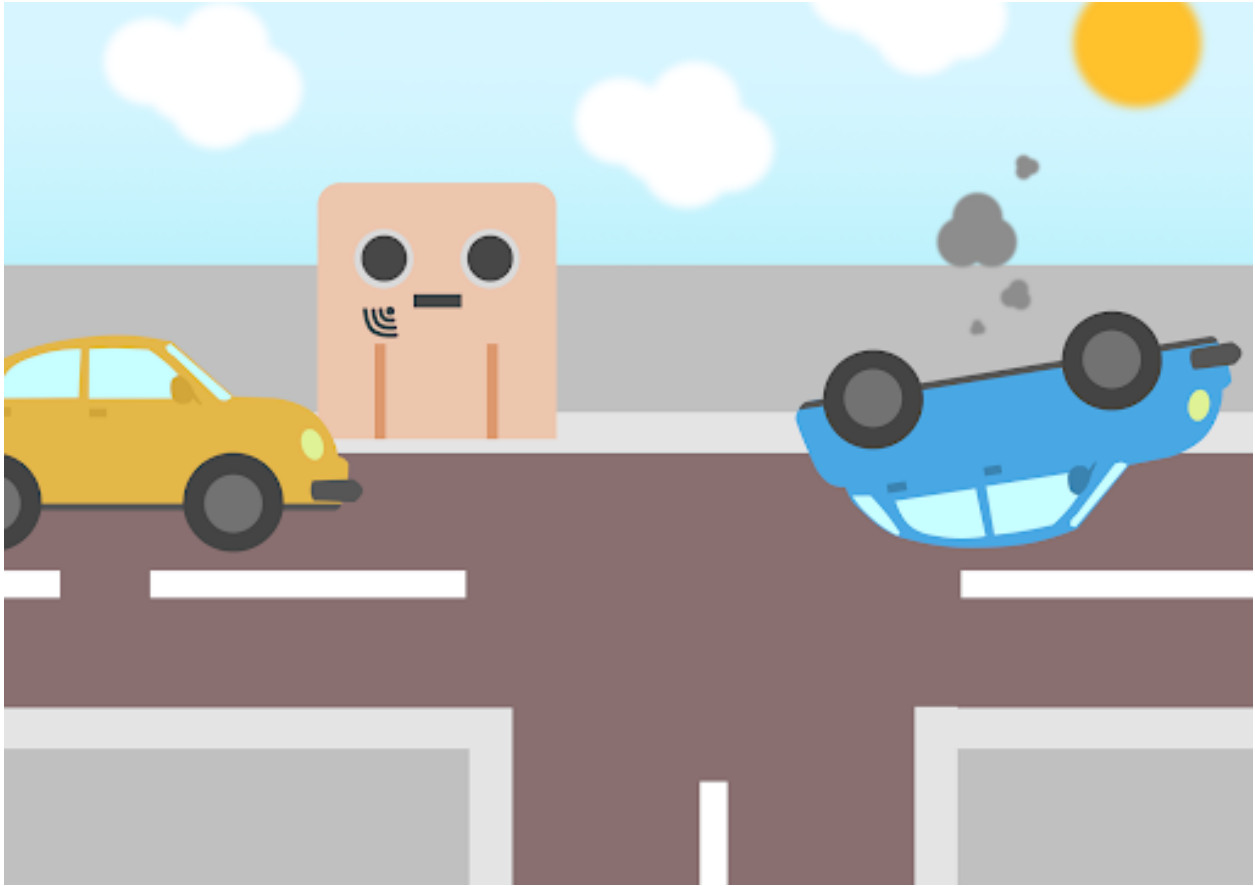




Result 總結

Think 思考

1.2.7 Broken Car 壞車



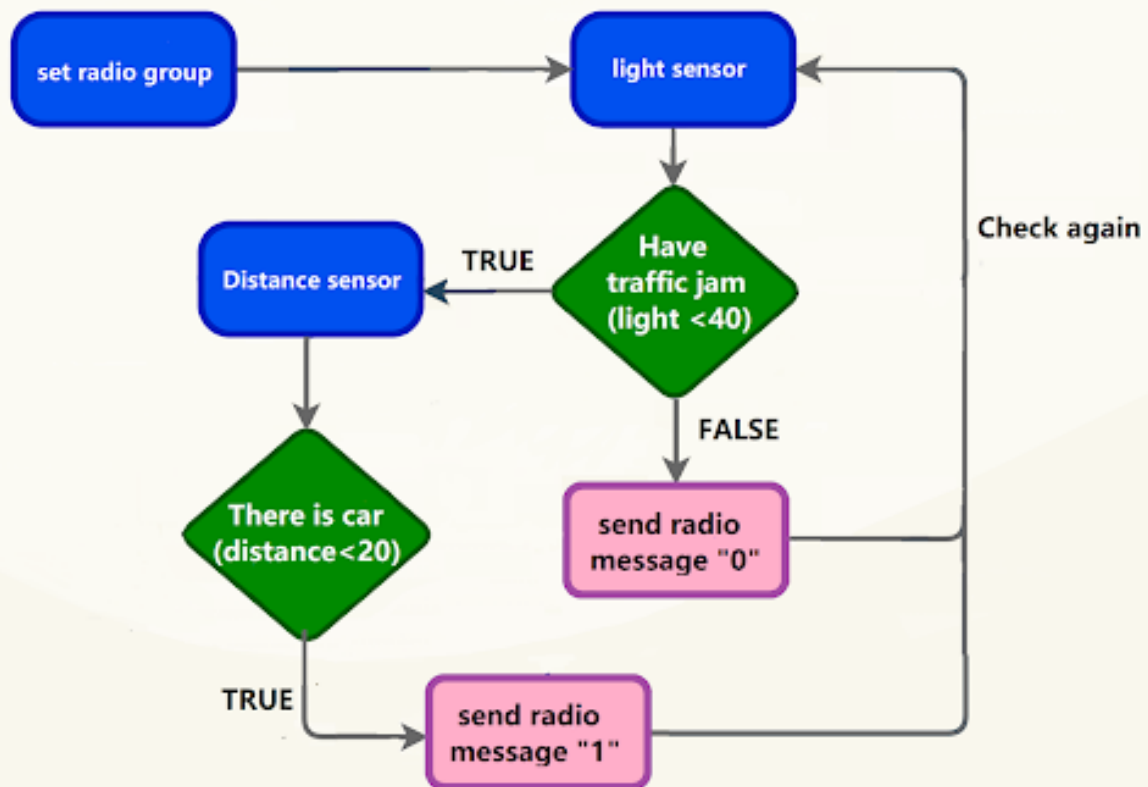
Goal 目標

Background 背景

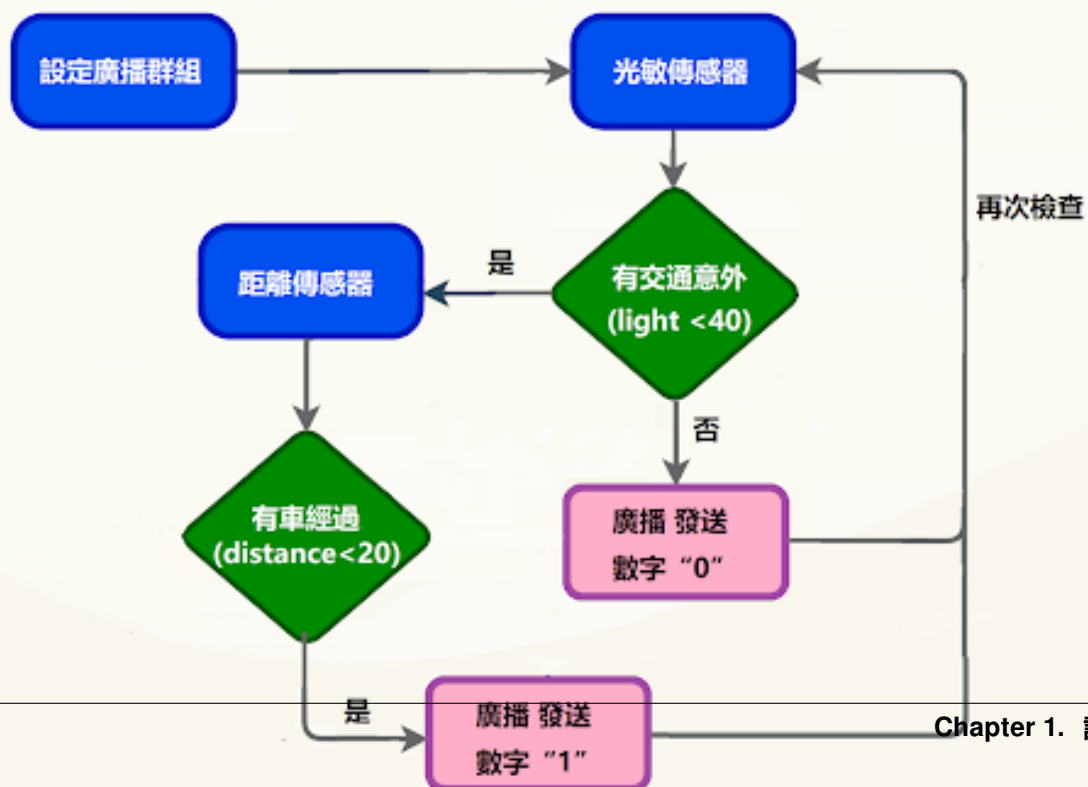
What is a smart traffic system ? 什麼是智能交通系統 ?

Smart traffic system Operation 智能交通系統運作

Case 06 Concept Diagram



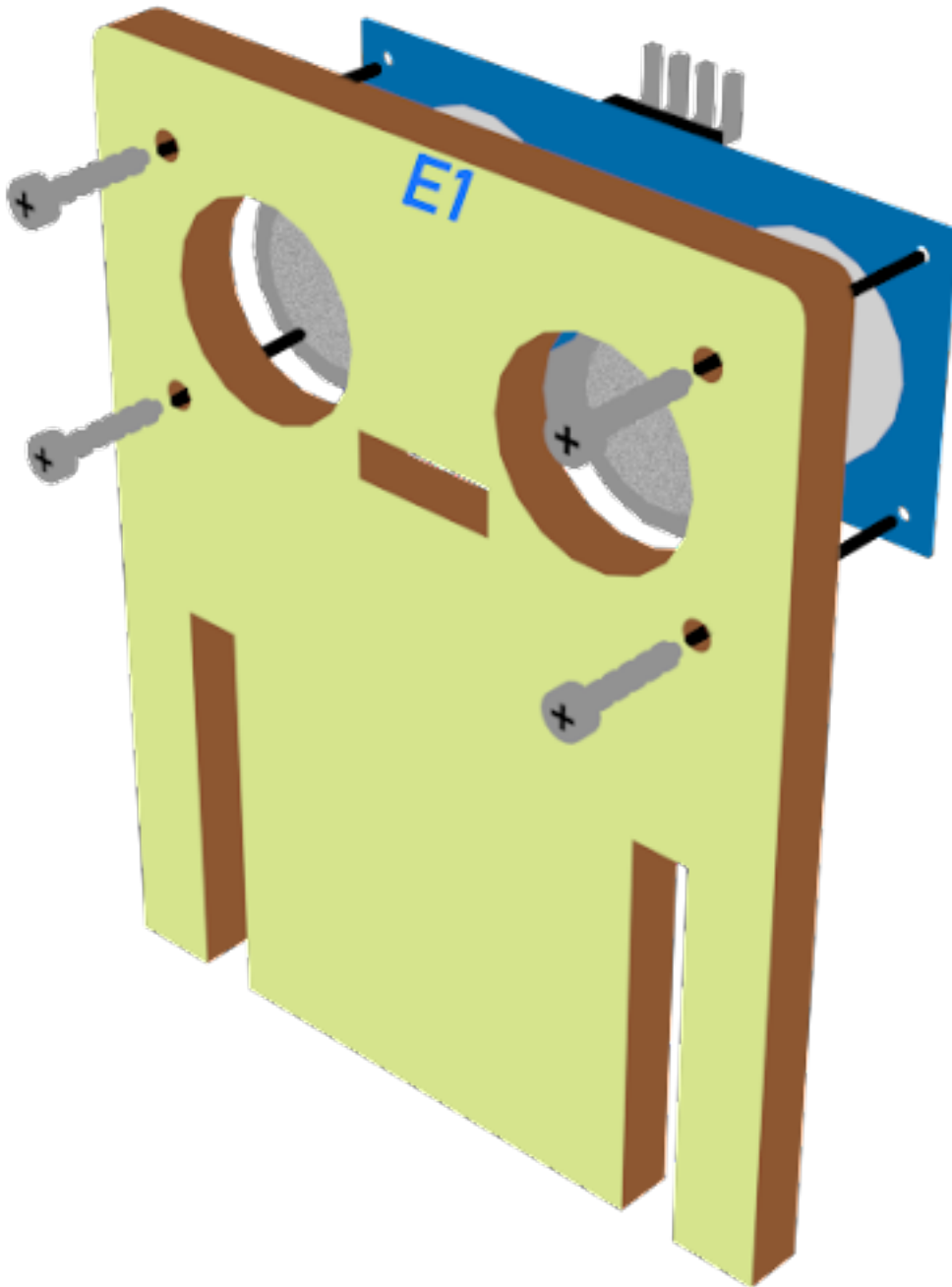
Case 06 概念圖



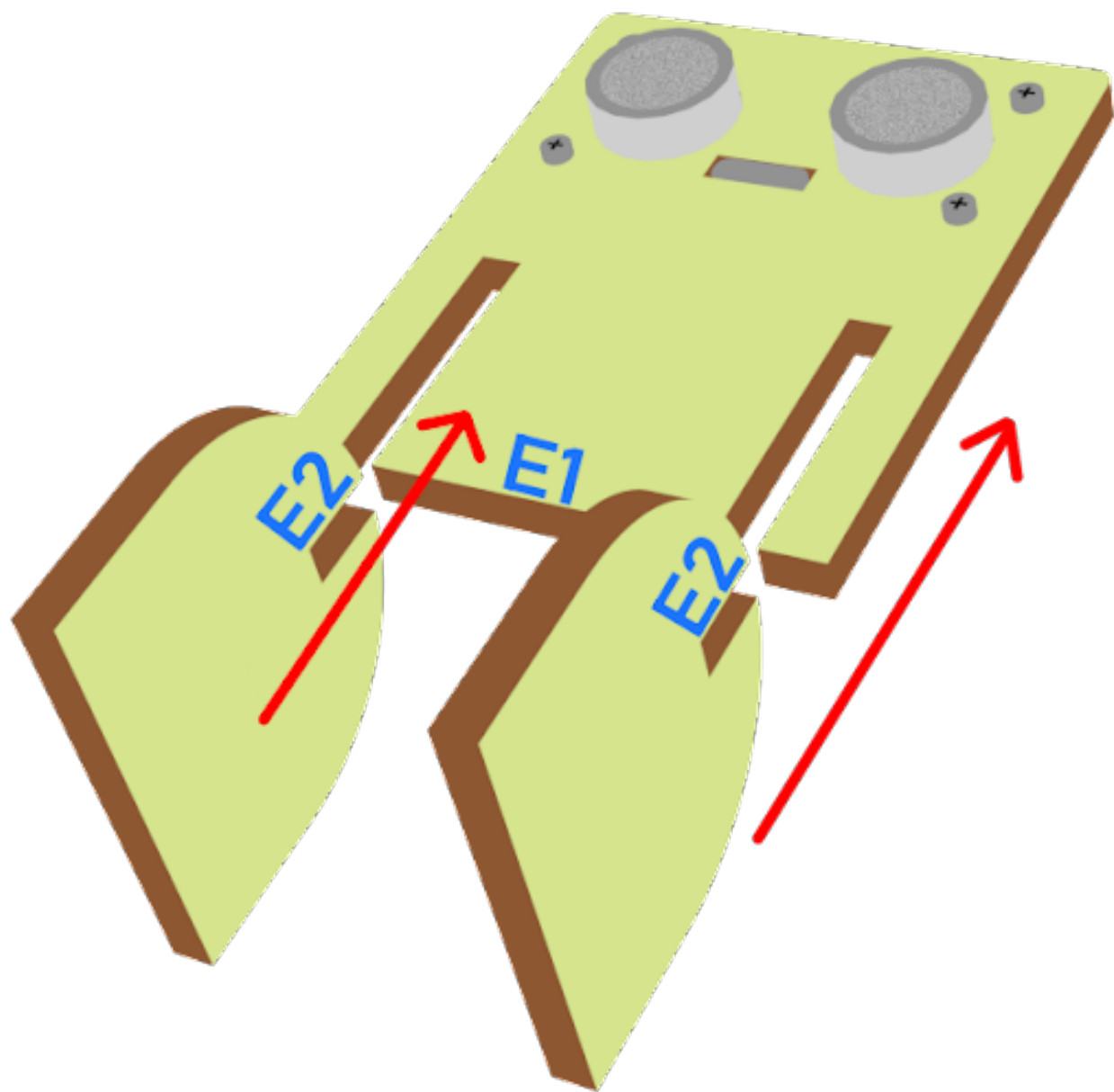
Part List 材料準備

Assembly step 組裝步驟

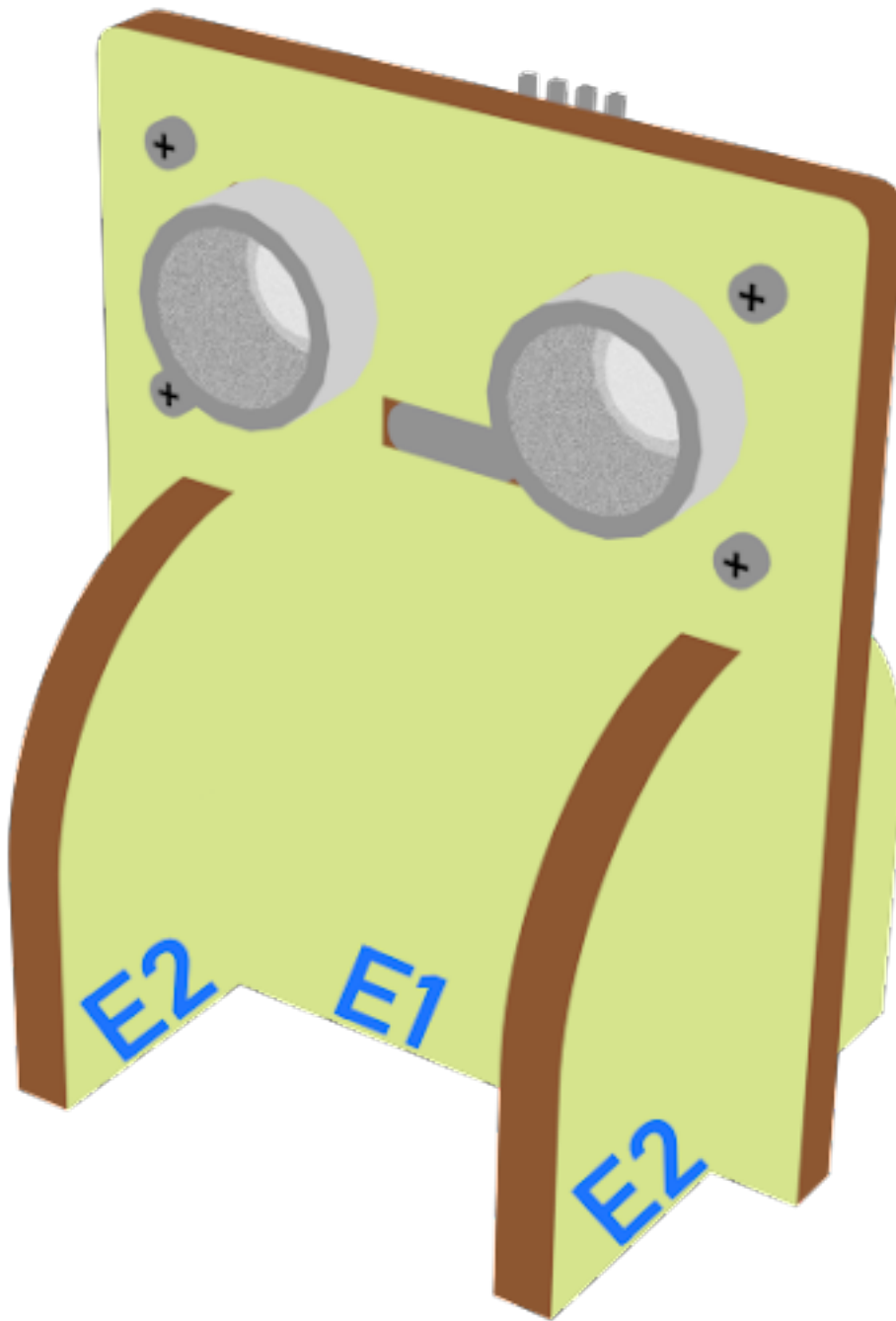
Step 1 第一步



Step 2 第二步



Step 3 第三步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Sender:

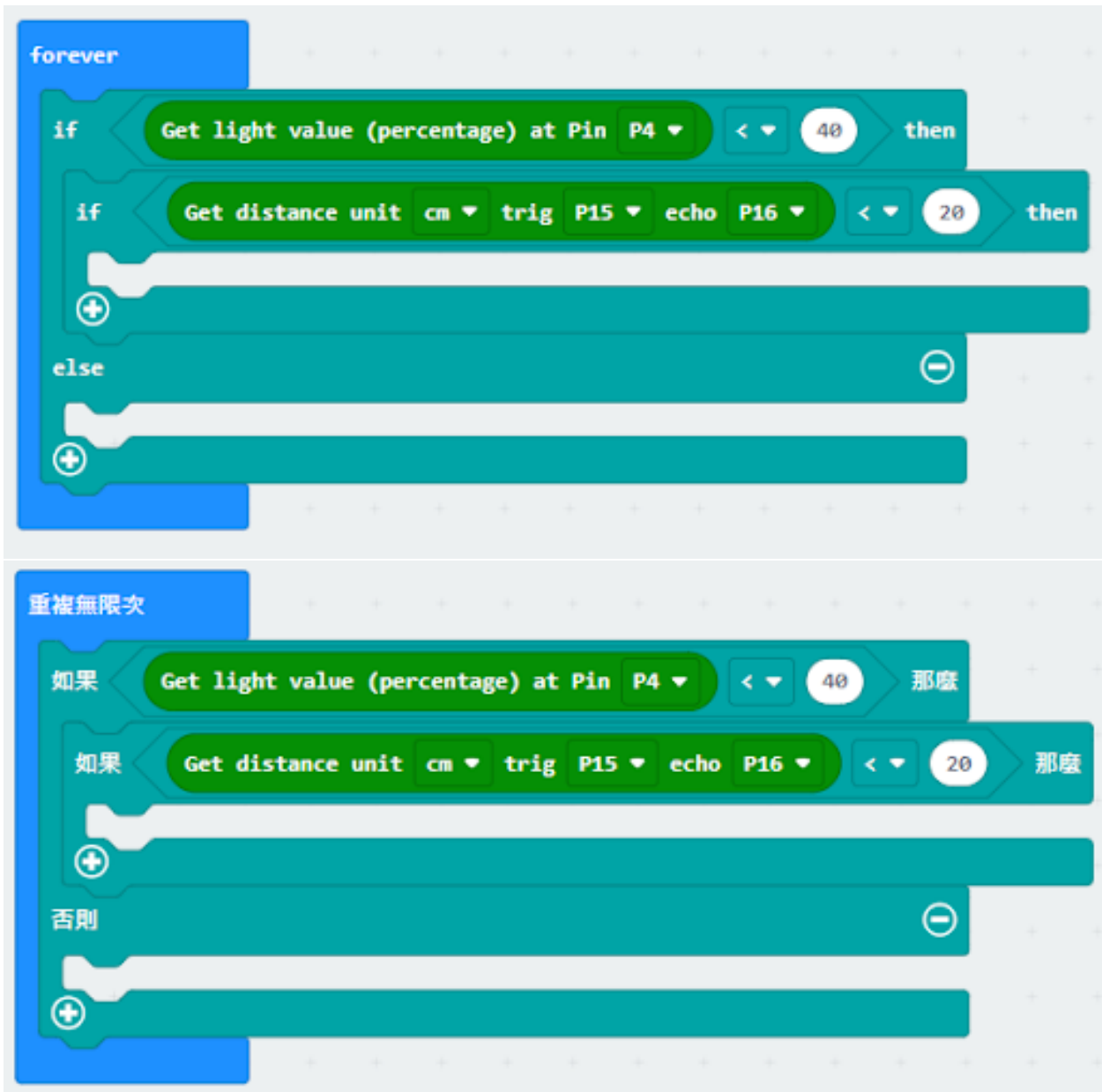
Step 1. Set radio set group at start position 在起始位置設置廣播群組

- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時



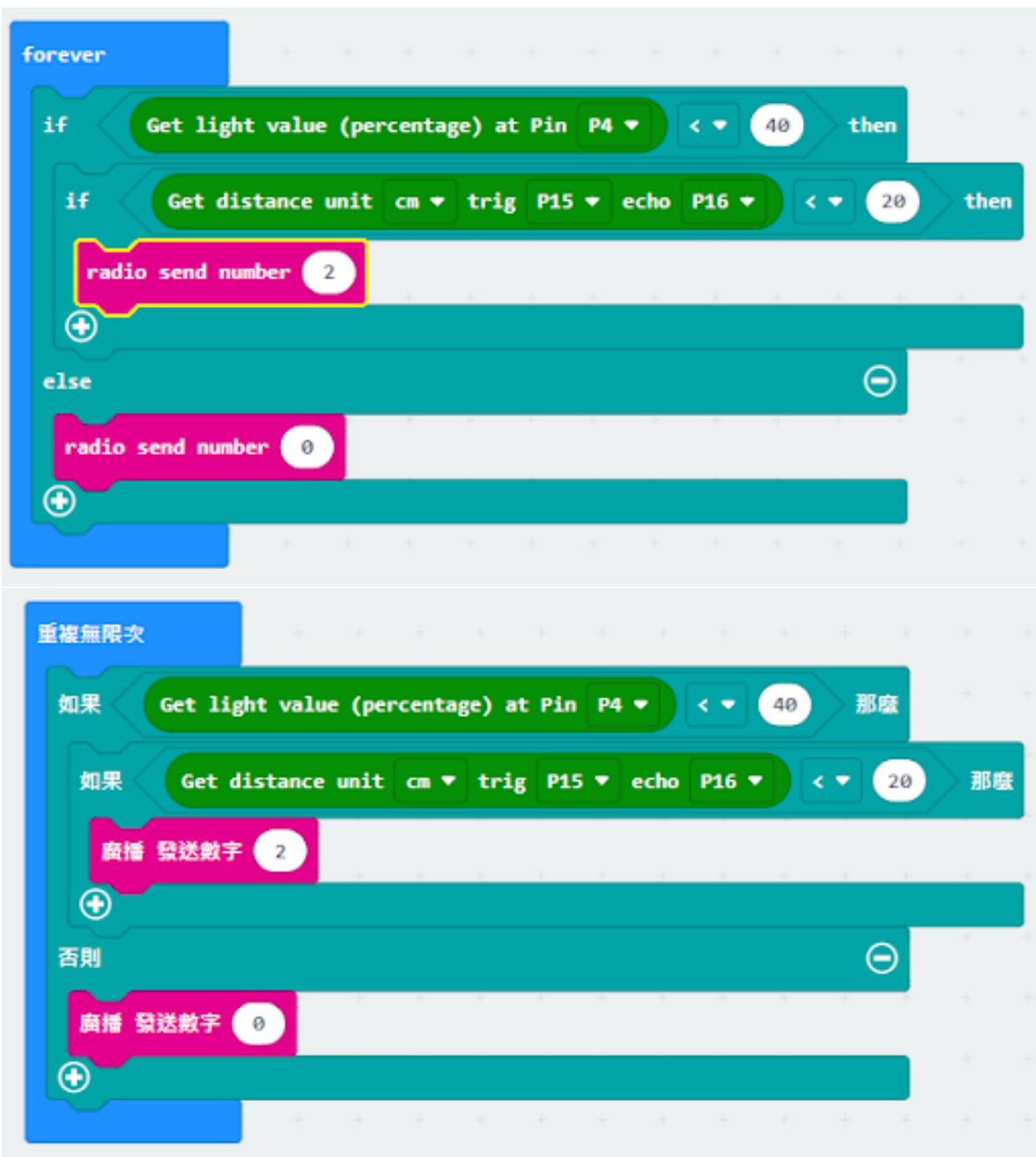
Step 2. Get light and distance value 獲得光及距離的數值

- Snap if statement into forever, set get light value (percentage) at pin P4 < 40
- 將如果語句放入重覆無數次，設 get light value (percentage) at pin P4 < 40
- If get light value (percentage) at pin P4 < 40, and else if get distance unit cm trig P15 echo 16 < 20
- 如果 get light value (percentage) at pin P4 < 40，再拖入如果 get distance unit cm trig P15 echo 16 < 20



Step 3. Control the car by sending radio number 發送廣播數字以控制車輛

- Drag radio send number to 2 into if 將廣播發送數字 2 拖入 if 句式
- Drag radio send number to 0 into else 將廣播發送數字 0 拖入 else 句式



Receiver:

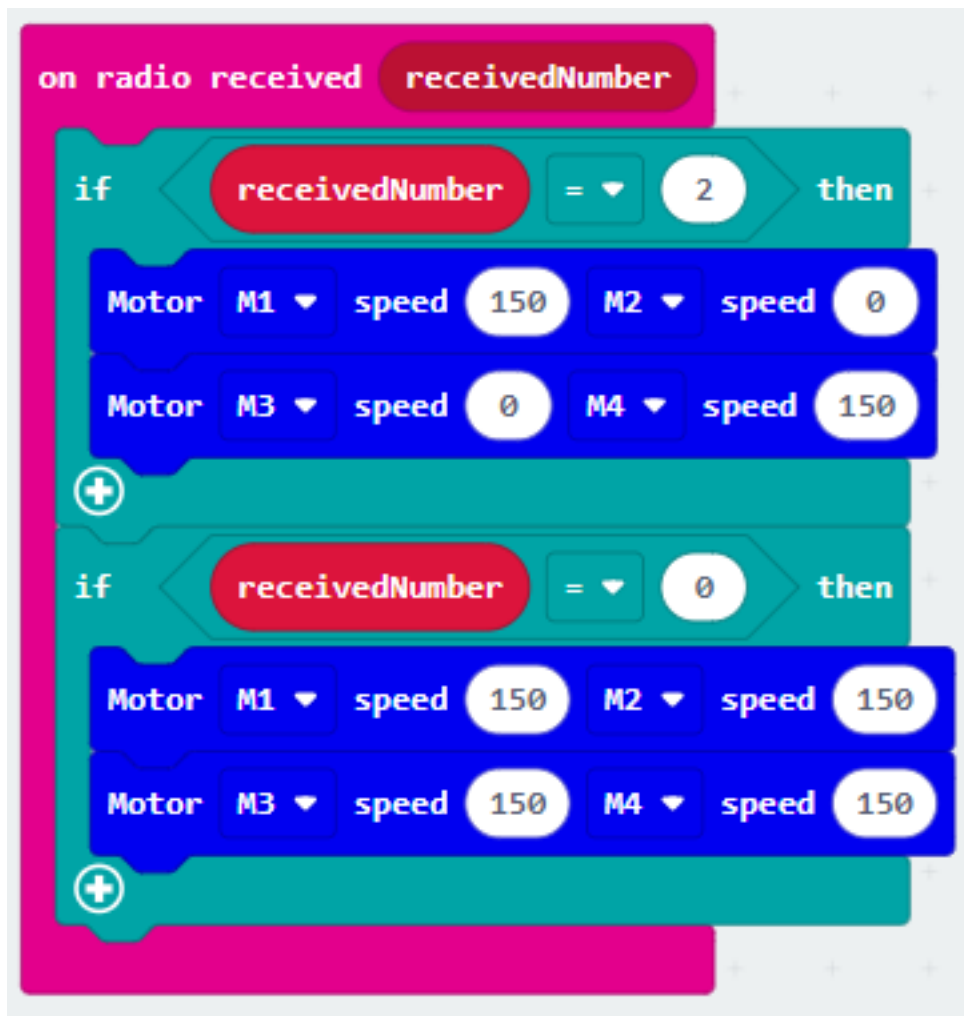
Step 1. Set radio set group at start position 在起始位置設置廣播群組

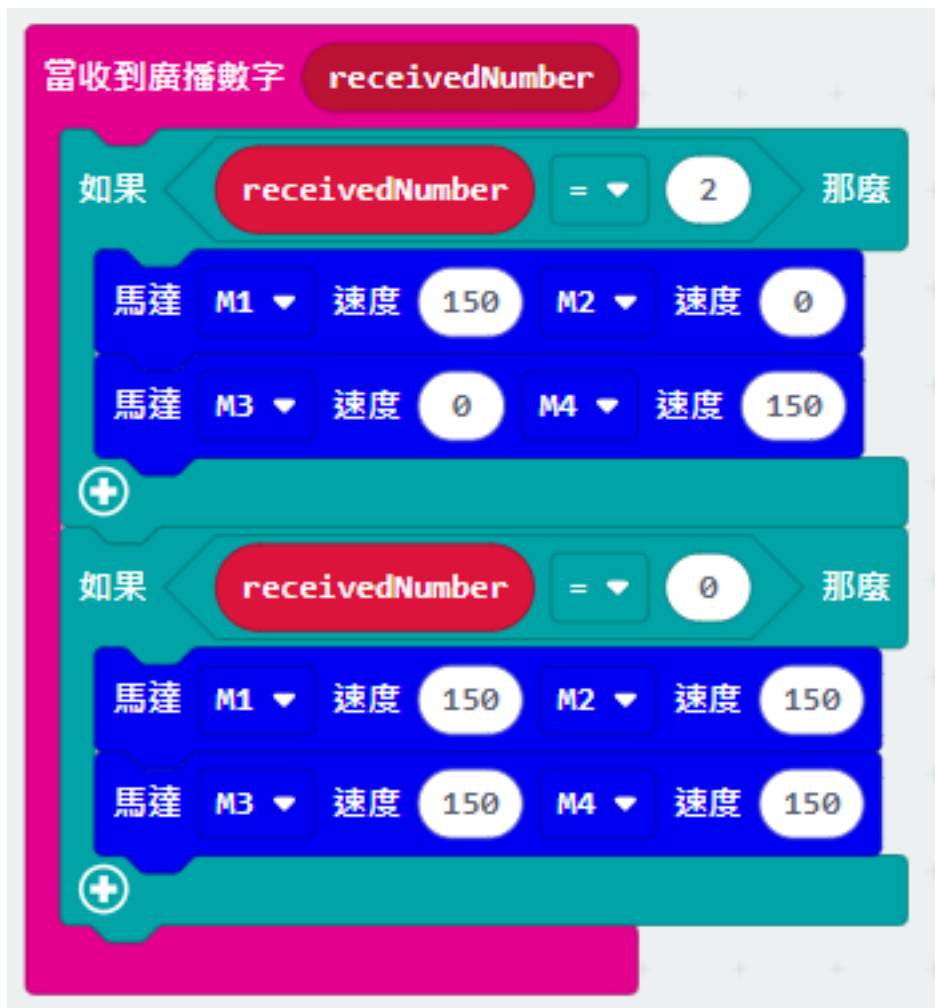
- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- Initially, the car moves forward by default



Step 2. Control car by receiving different number 通過接收不同數字來控制車輛

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =2 and make the car turn left 設 receivedNumber =2, F讓車向左移動。
- Set receivedNumber=0 and make the car move forward 設 receivedNumber=0, F讓車向前移動。

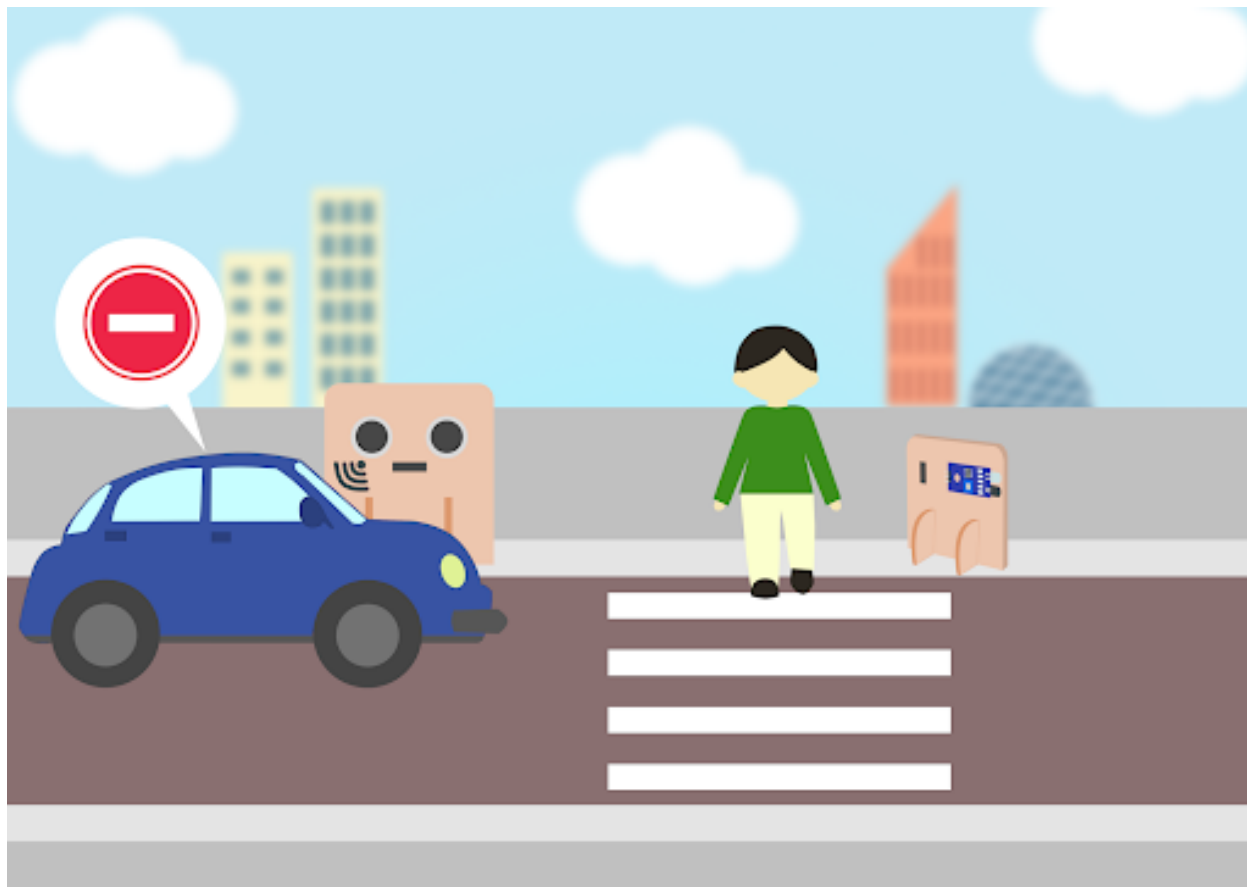




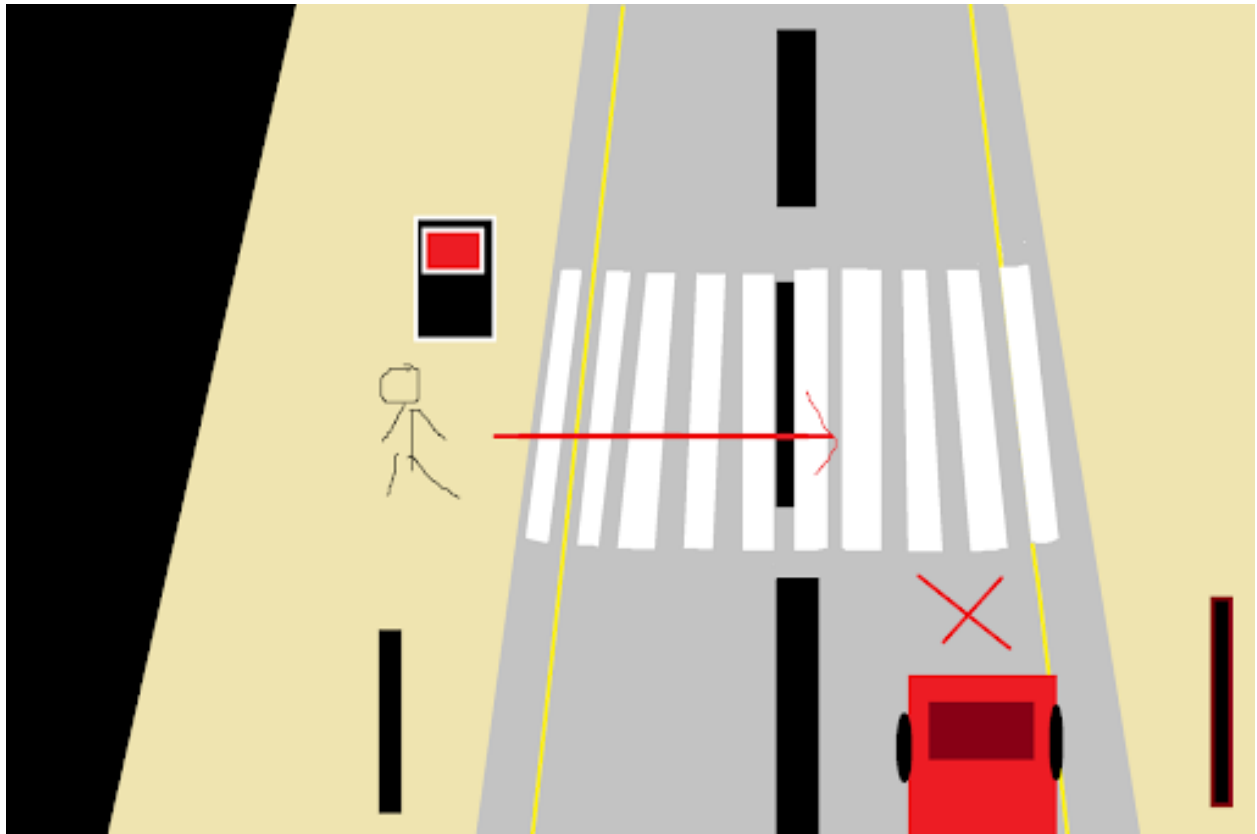
Result 總結

Think 思考

1.2.8 Crosswalk 斑馬線



Goal 目標

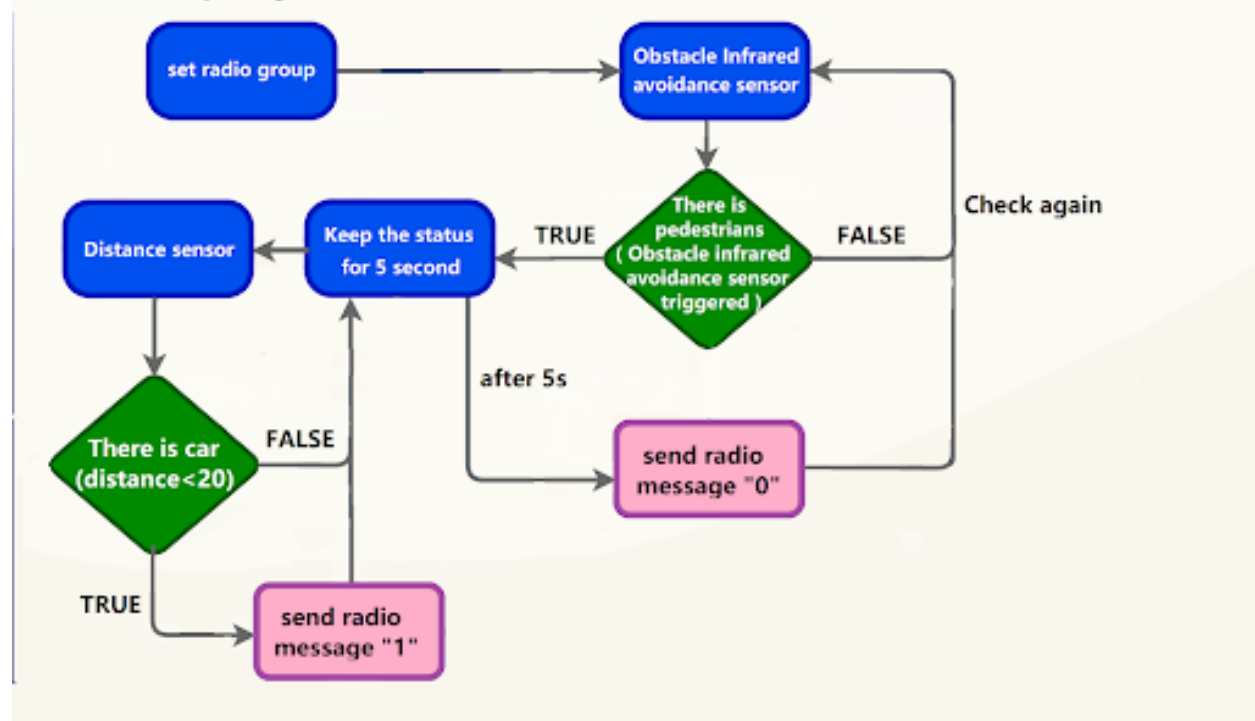


Background 背景

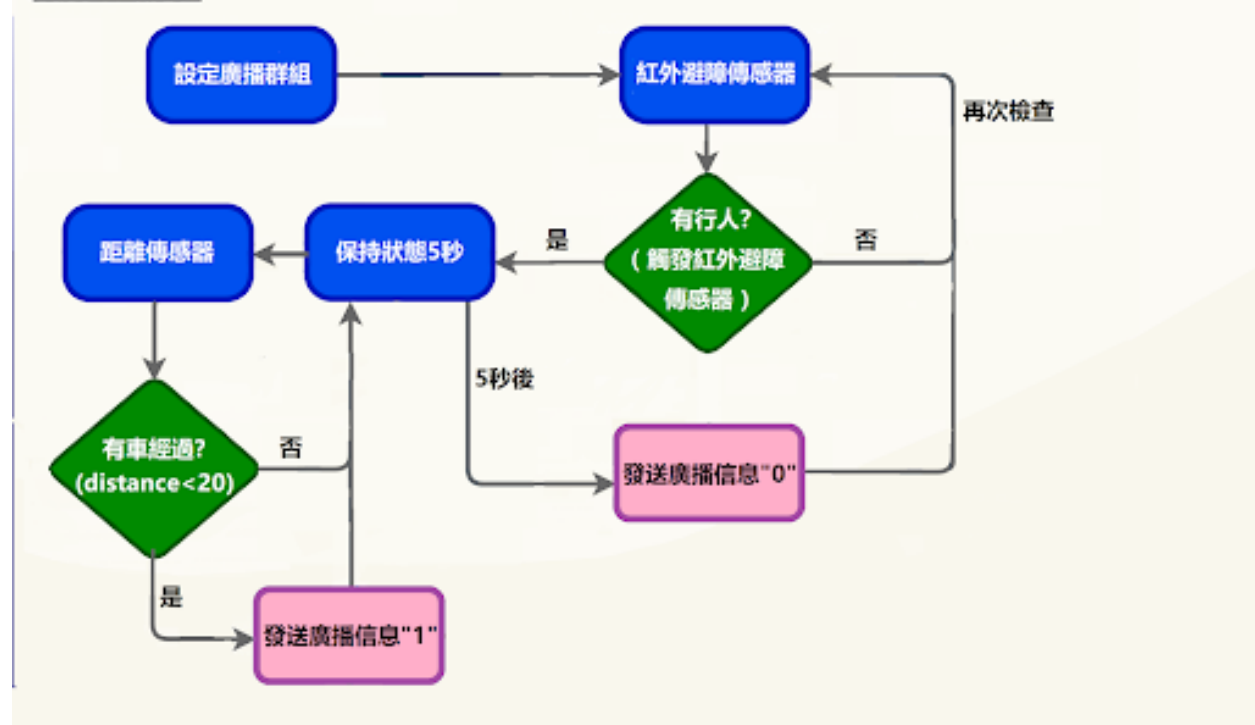
What is a smart crosswalk system? 什麼是智能斑馬線系統？

Smart crosswalk system operation 智能斑馬線運作

Case 07 Concept Diagram



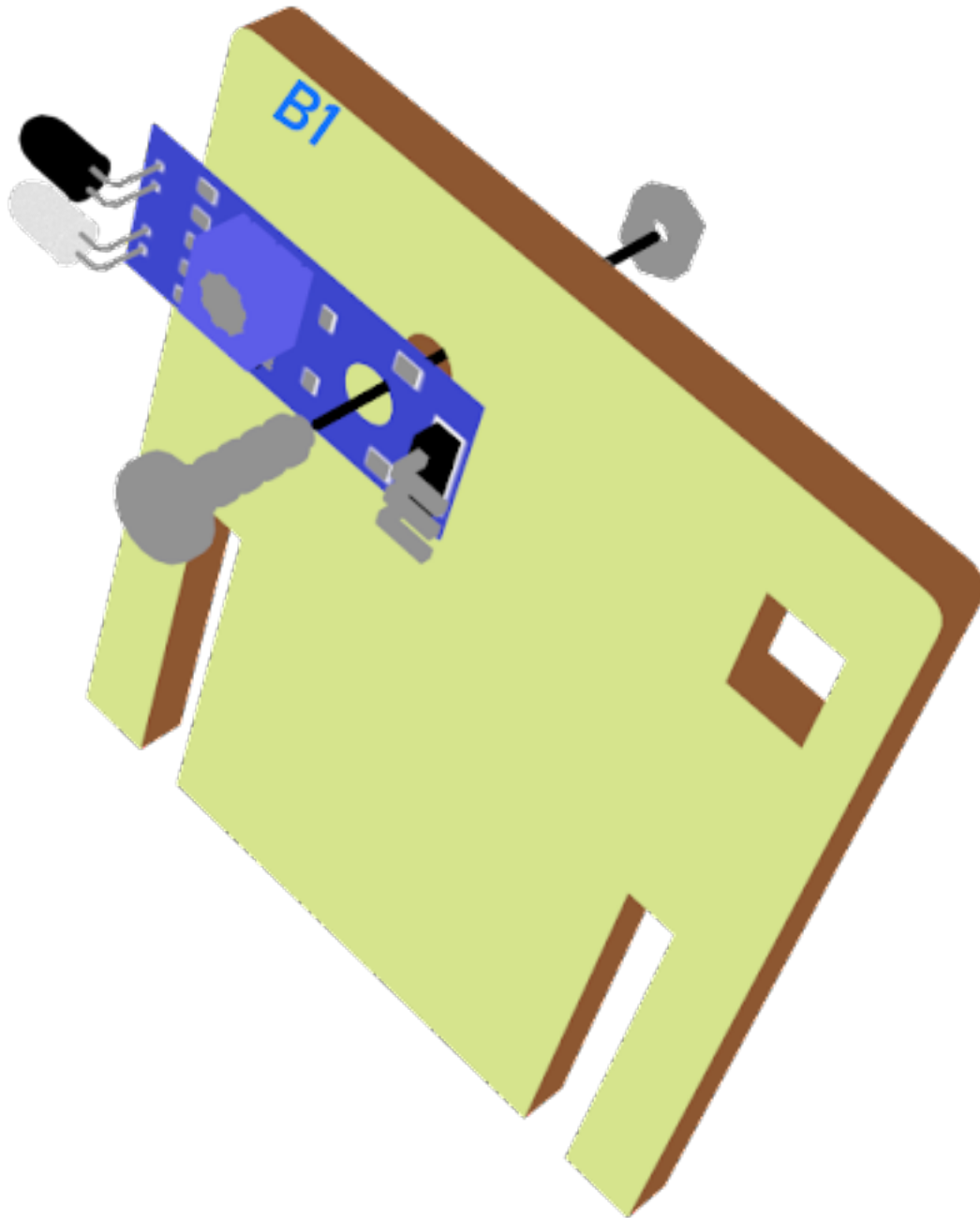
Case 07 概念圖



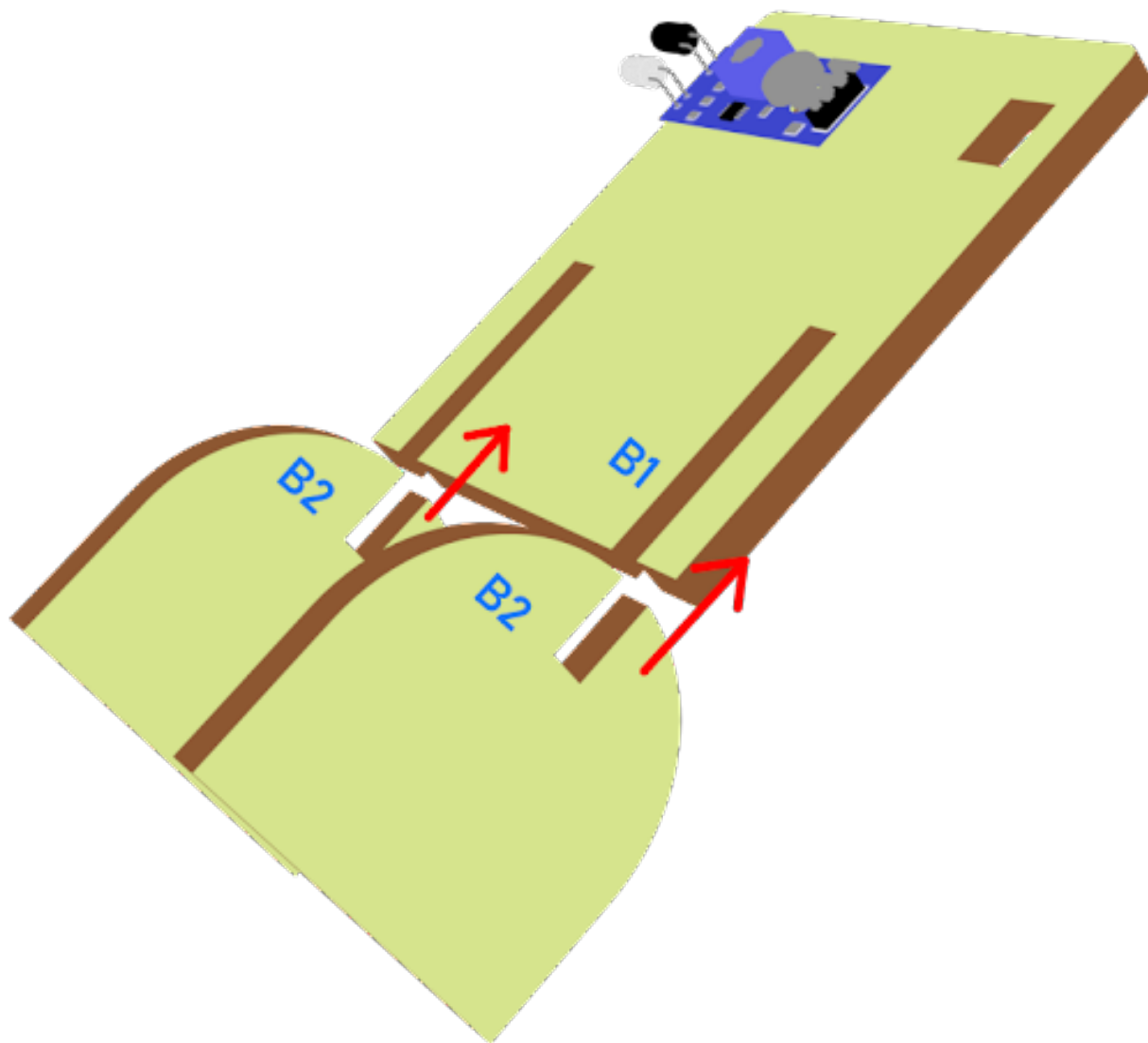
Part List

Assembly step 組裝步驟

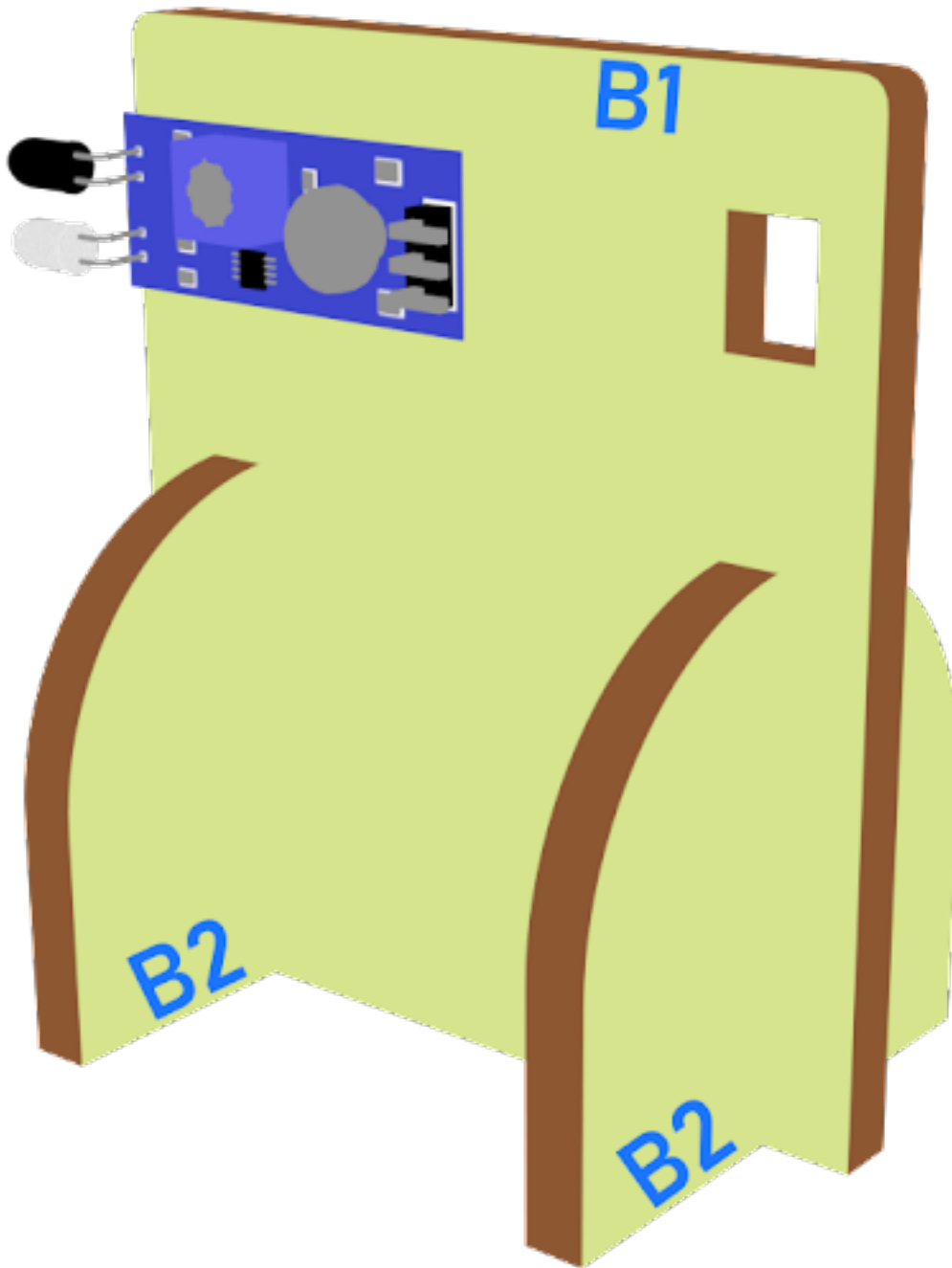
Step 1 第一步



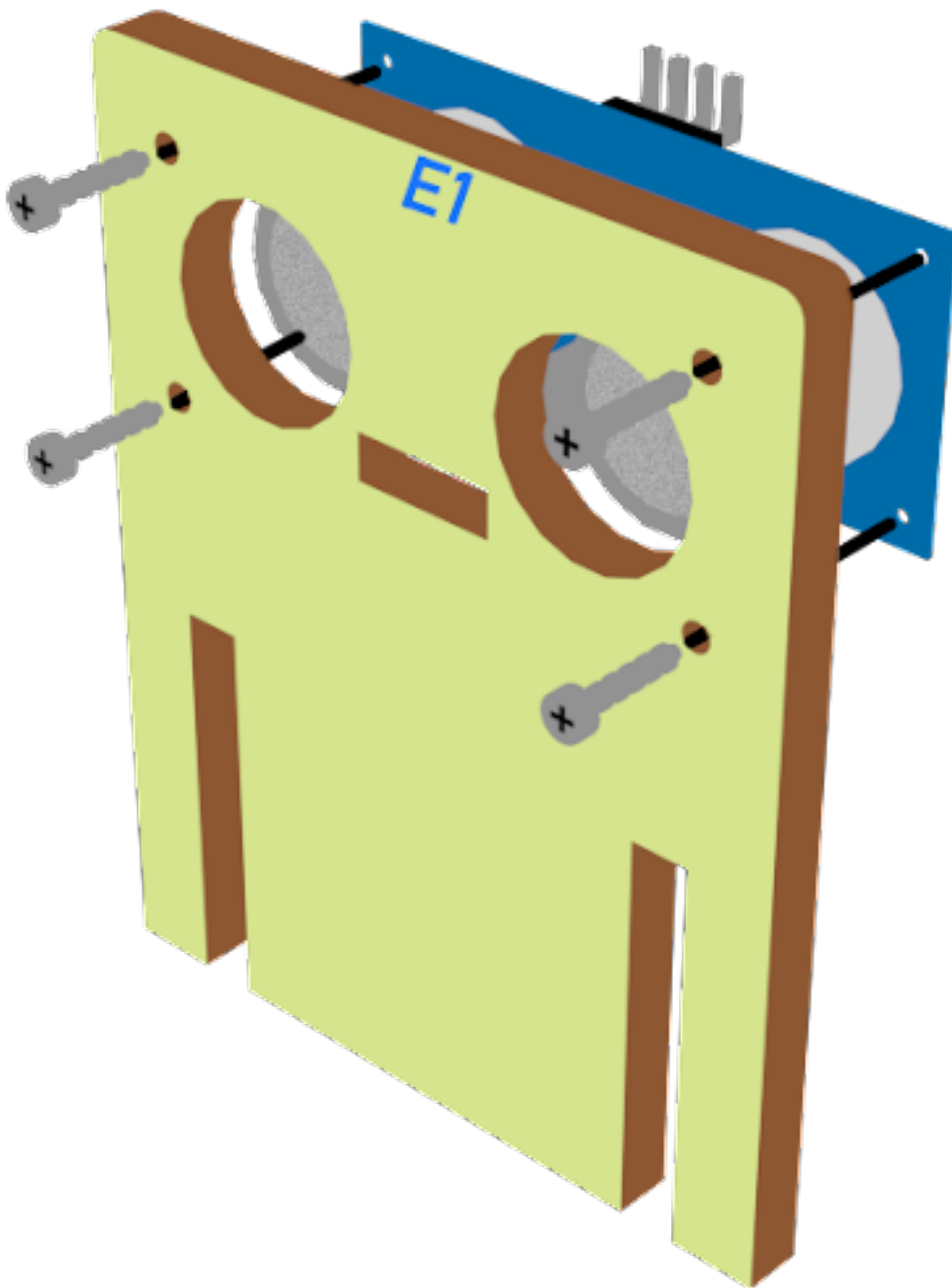
Step 2 第三步



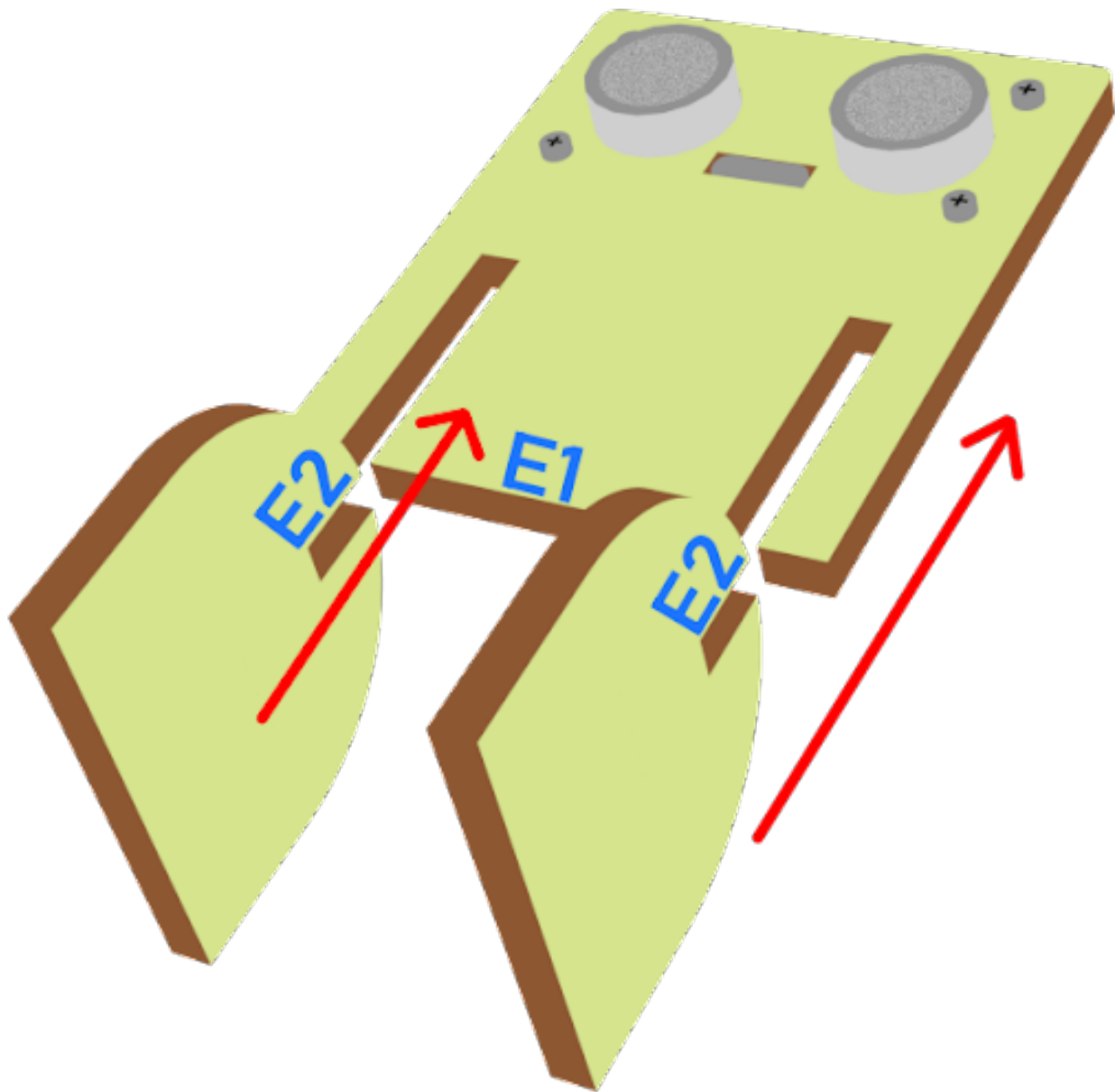
Step 3 第三步



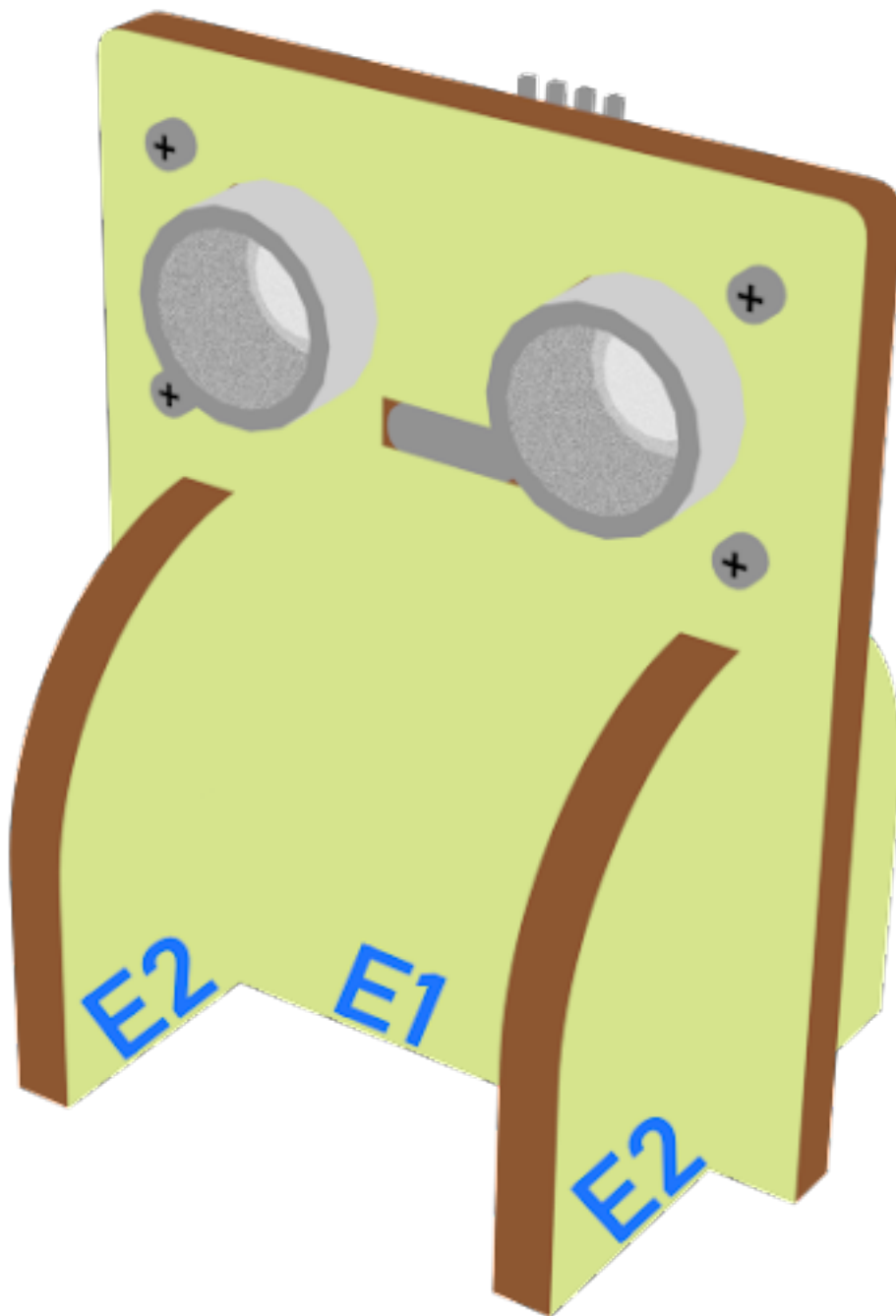
Step 4 第四步



Step 5 第五步



Step 6 第六步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Sender:

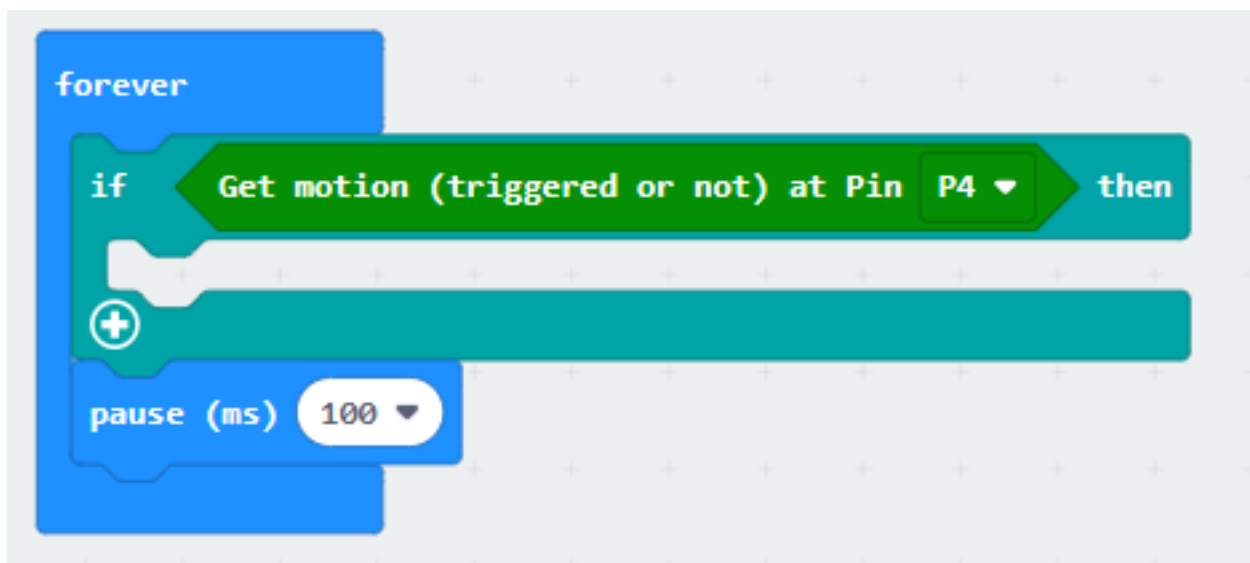
Step 1. Set radio set group at start position 在起始位置設置 radio group

- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時



Step 2. When trigger a motion 當觸發紅外傳感器

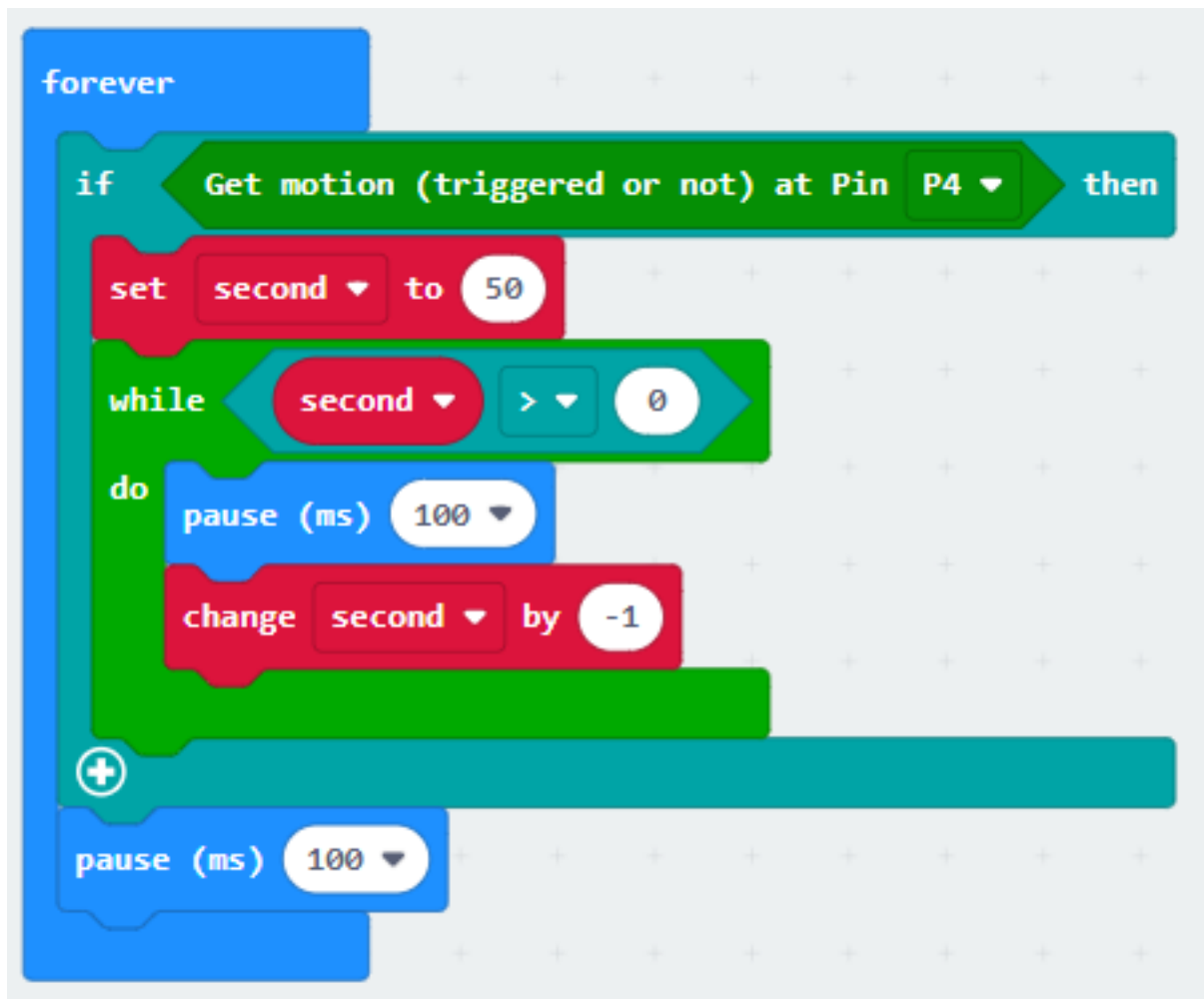
- Snap if statement into forever, set get motion (triggered or not) at pin P4 將 get motion (triggered or not) at pin P4 的如果句式放入重 無限次
- Snap pause to the loop to wait for 0.1 second for next checking 把暫停拖入循環，下一次檢查等待 0.1 秒。

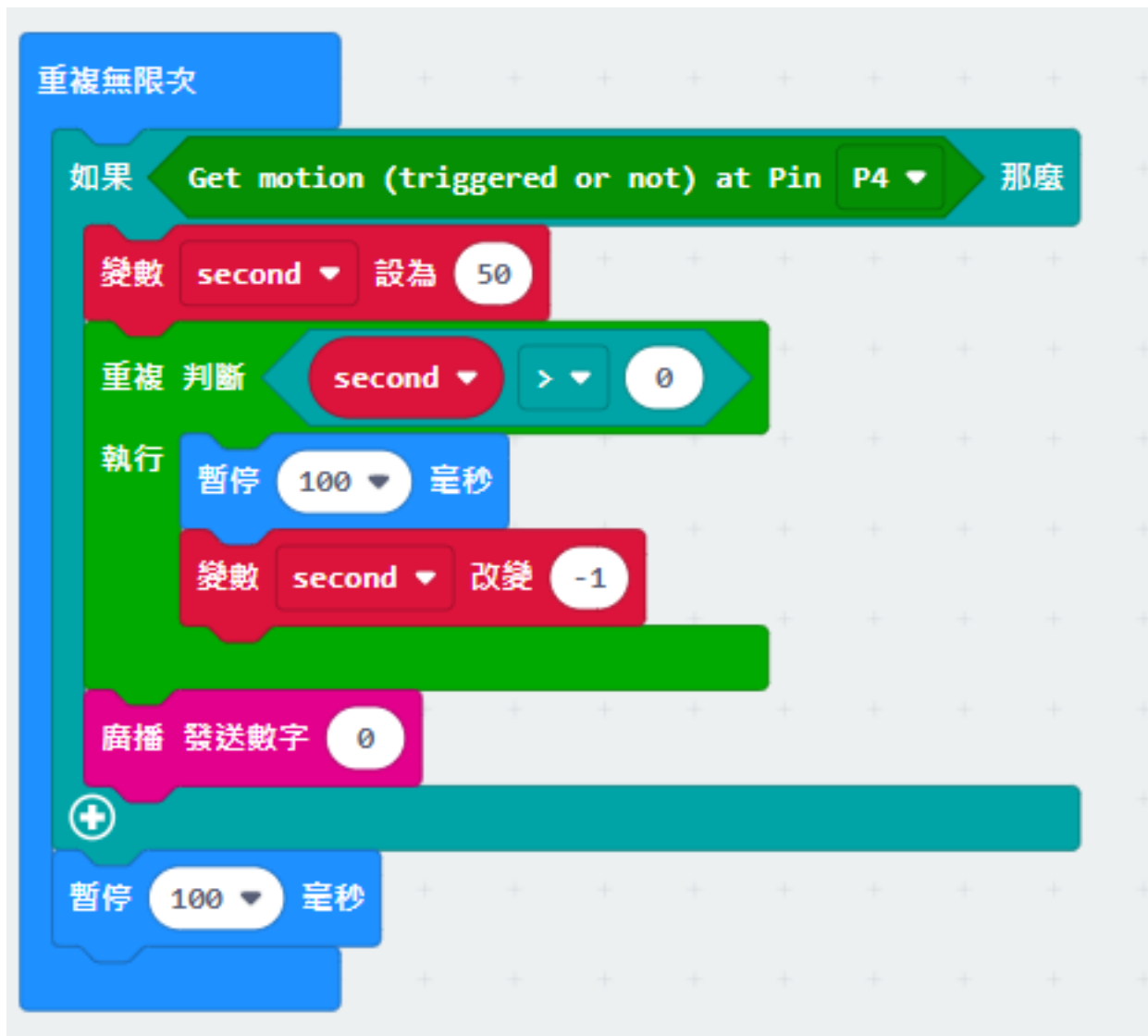




Step 3. Keep the status for 5 second 保留觸發狀態五秒

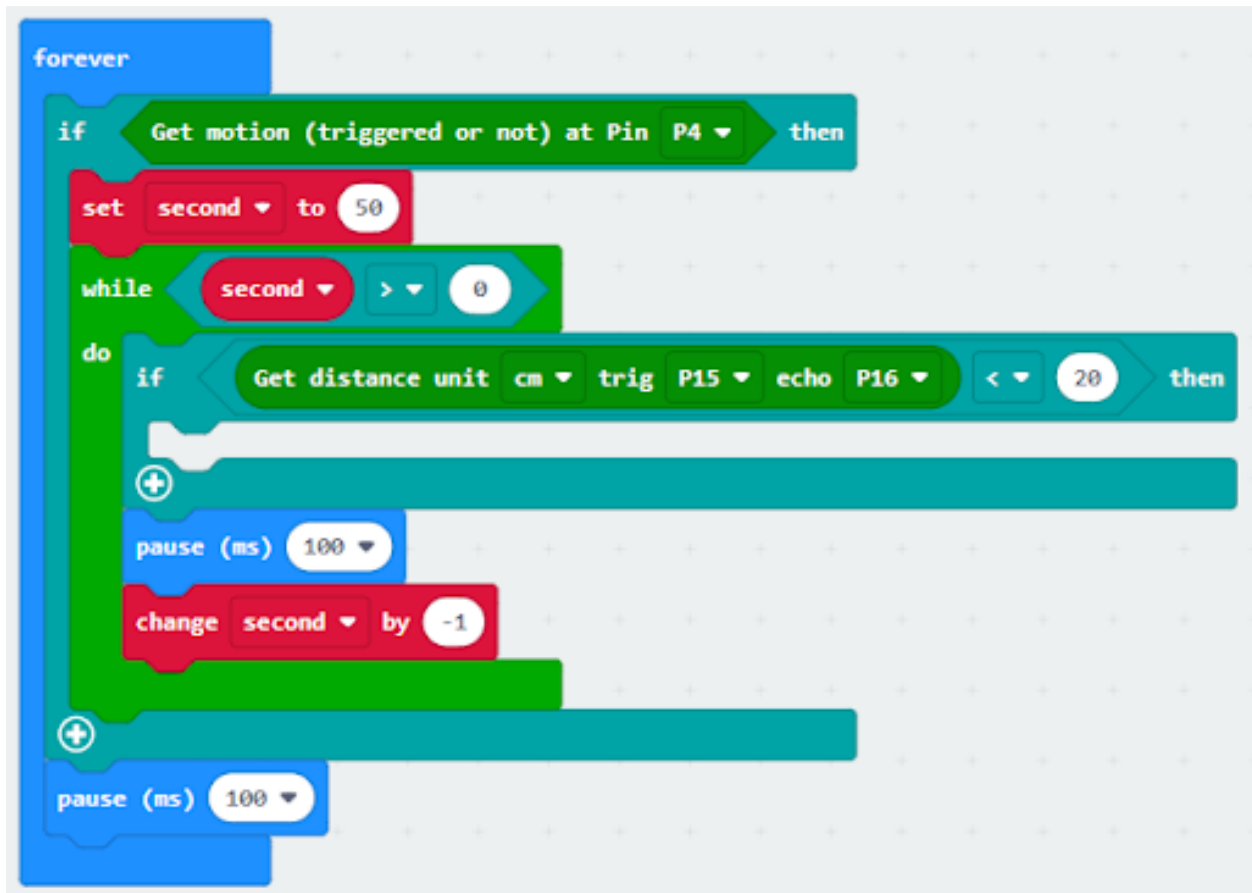
- set variable second to 50 設定變數 second 50
- While second > 0, snap pause to 0.1 second and change second by -1. 當 second 大於 0，停止 0.1 秒，改變 second 少 1

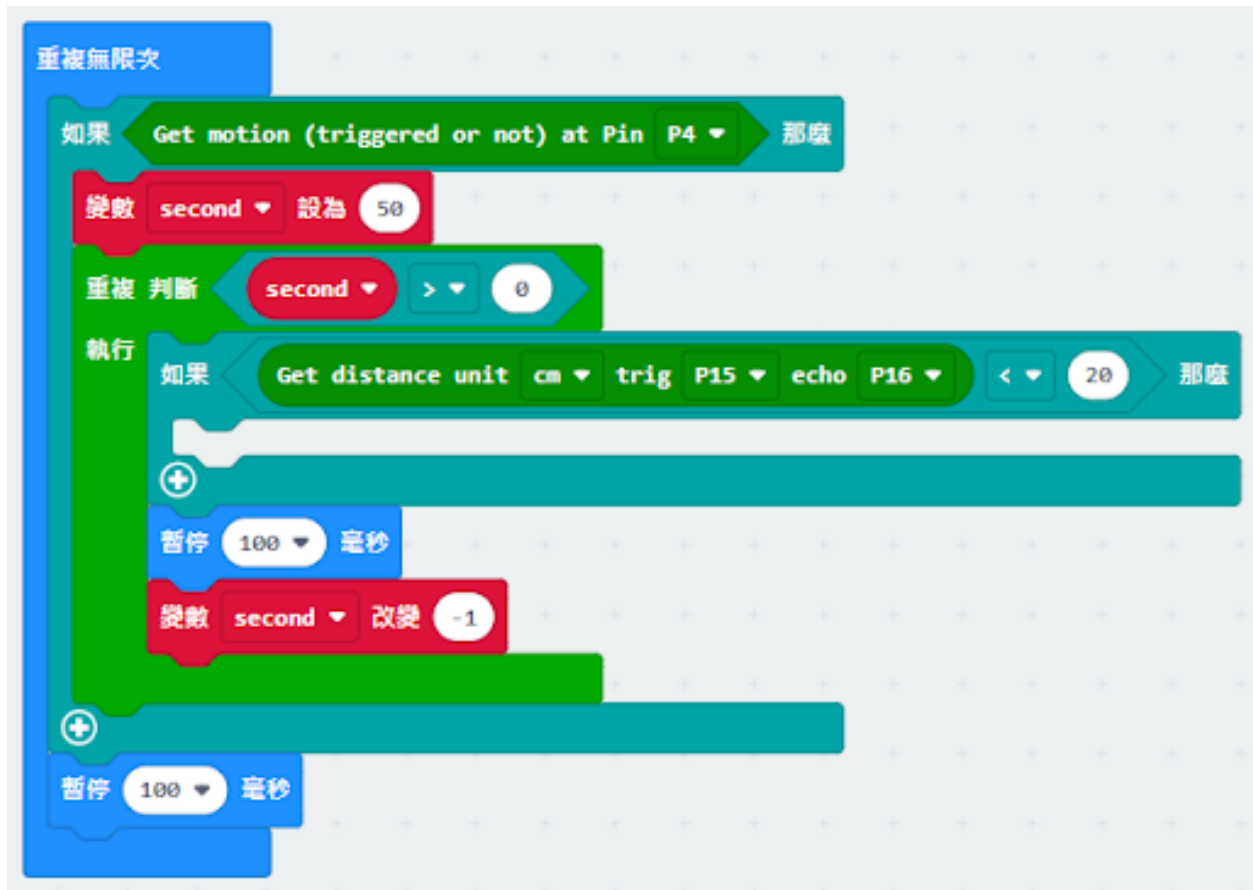




Step 4. Get distance value 獲得距離數值

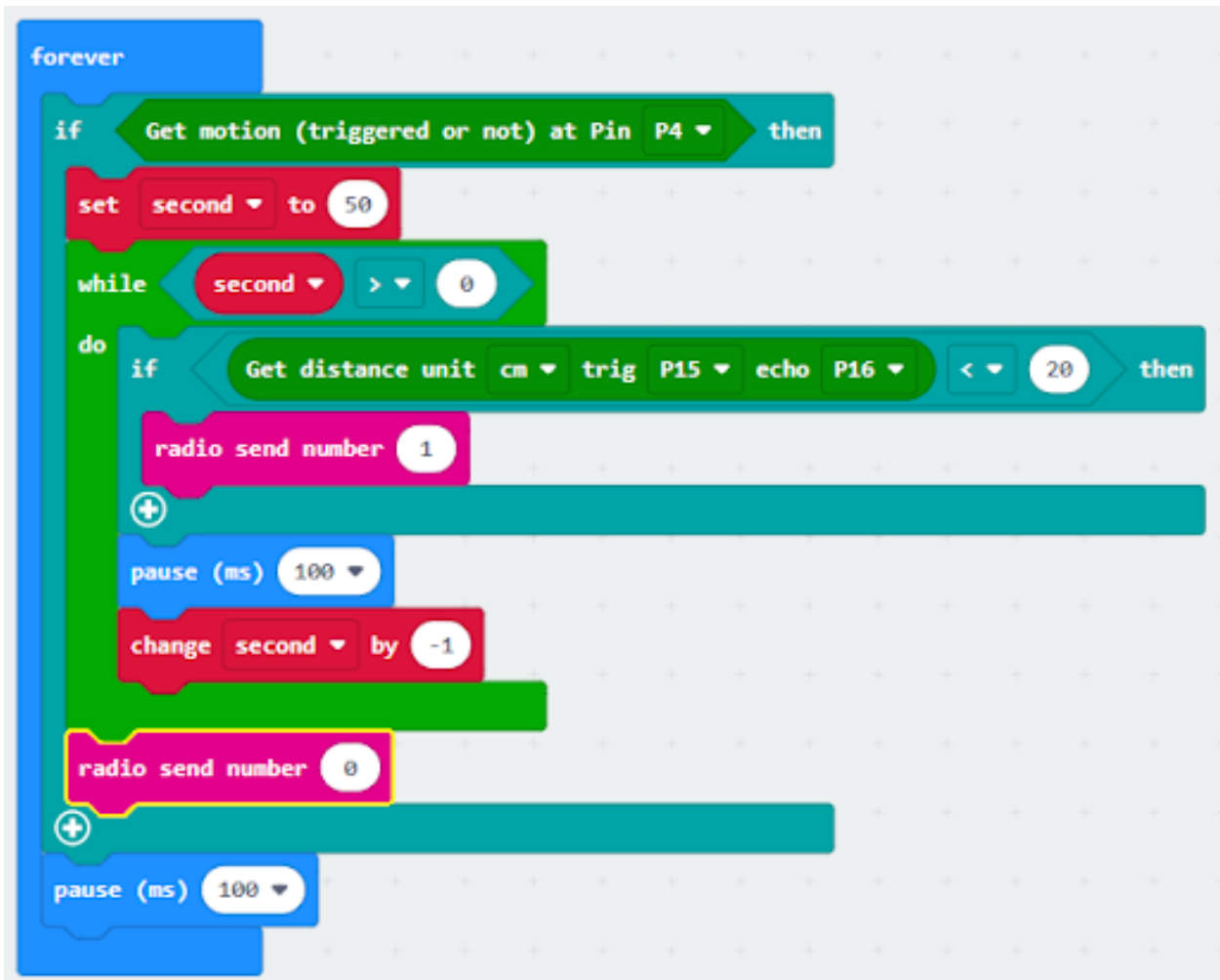
- Snap if statement into while loop, set get distance unit cm trig P15 echo P16 < 20
- 將 get distance unit cm trig P15 echo P16 < 20 的如果句式拖入循環中

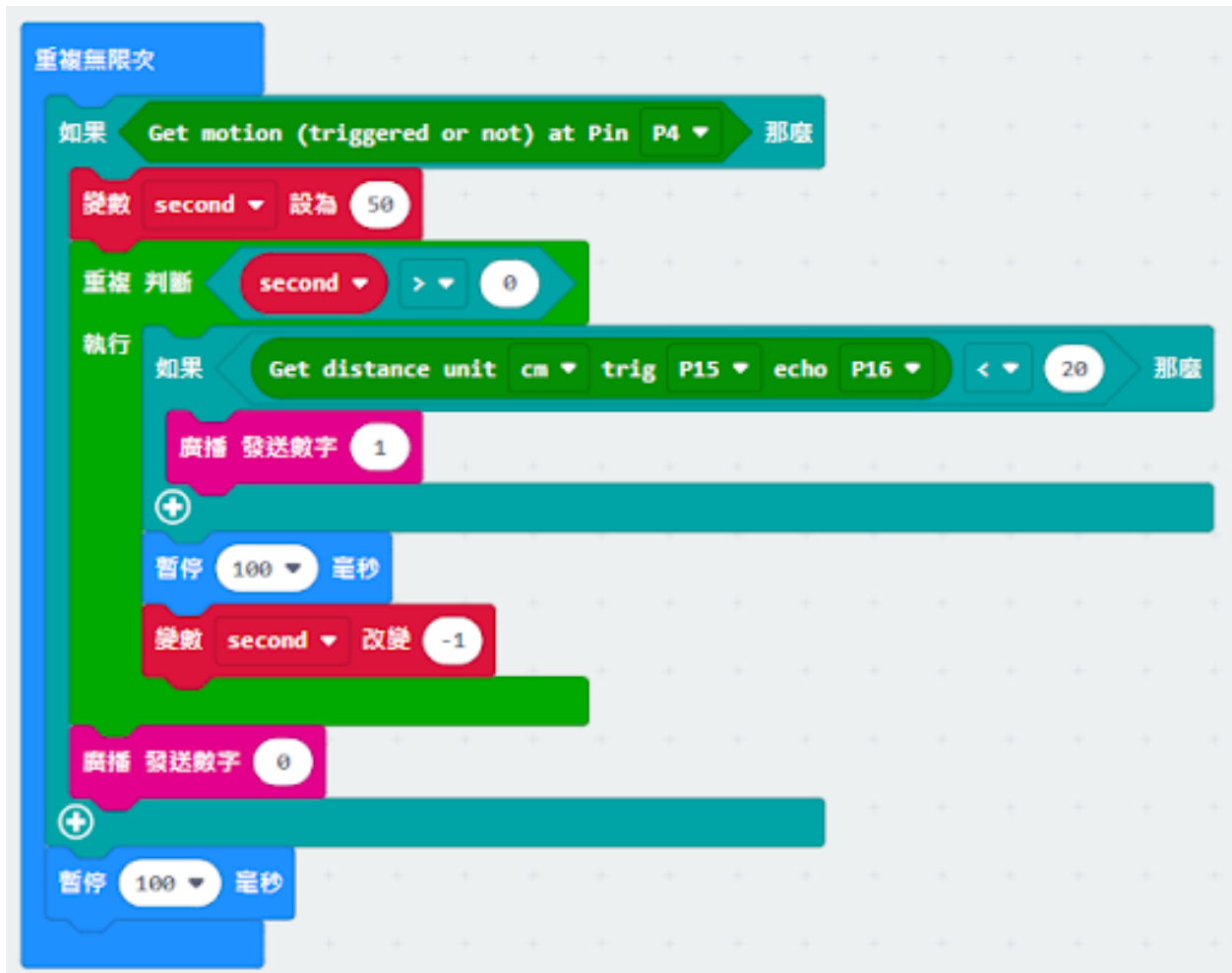




Step 5. Control the car by sending radio number 發送廣播數字以控制車輛

- Drag radio send number to 1 into if 將廣播發送數字 1 拖入 if 句式
- Drag radio send number to 0 outside the while loop 將廣播發送數字 0 拖到循環外





Receiver:

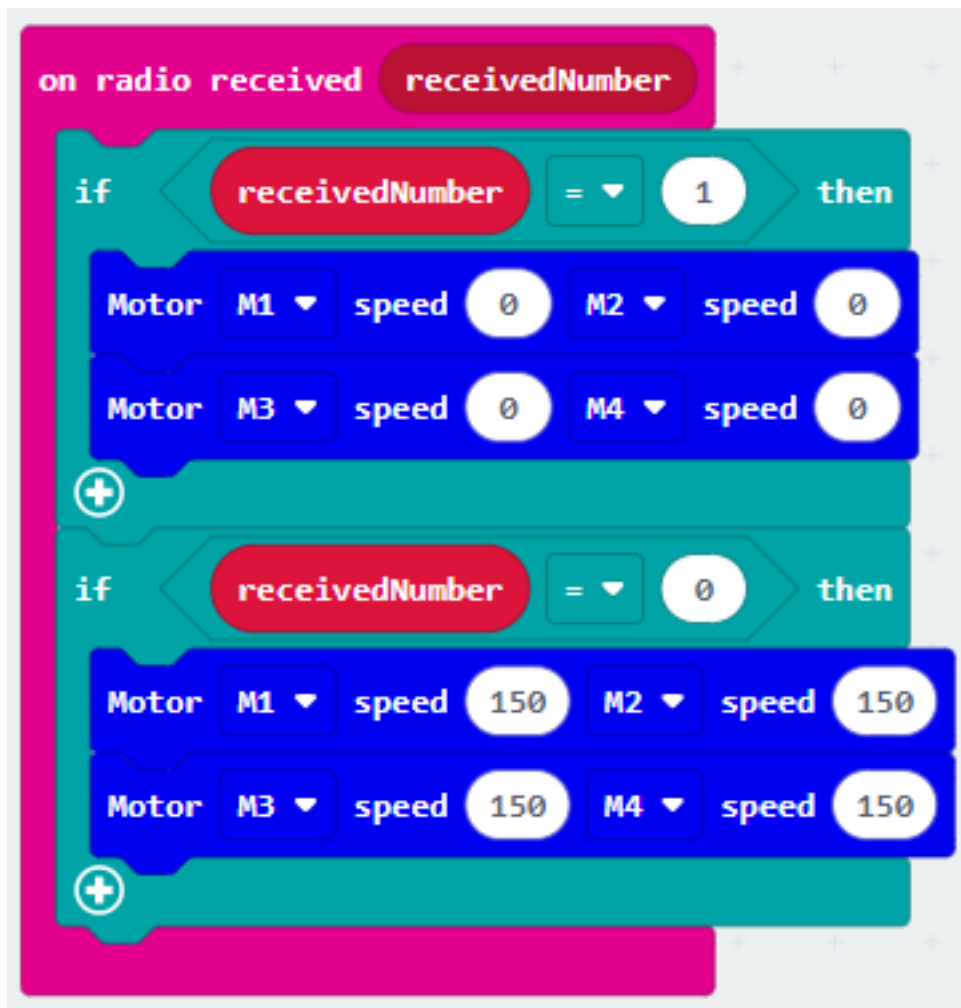
Step 1. Set radio set group at start position 在起始位置設置廣播群組

- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- Initially, the car moves forward by default



Step 2. Control car by receiving different number 通過接收不同數字來控制車輛

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =1 and make the car stop 設 receivedNumber =1, 控制制剎車。
- Set receivedNumber=0 and make the car move forward 設 receivedNumber=0, 讓車向前移動。

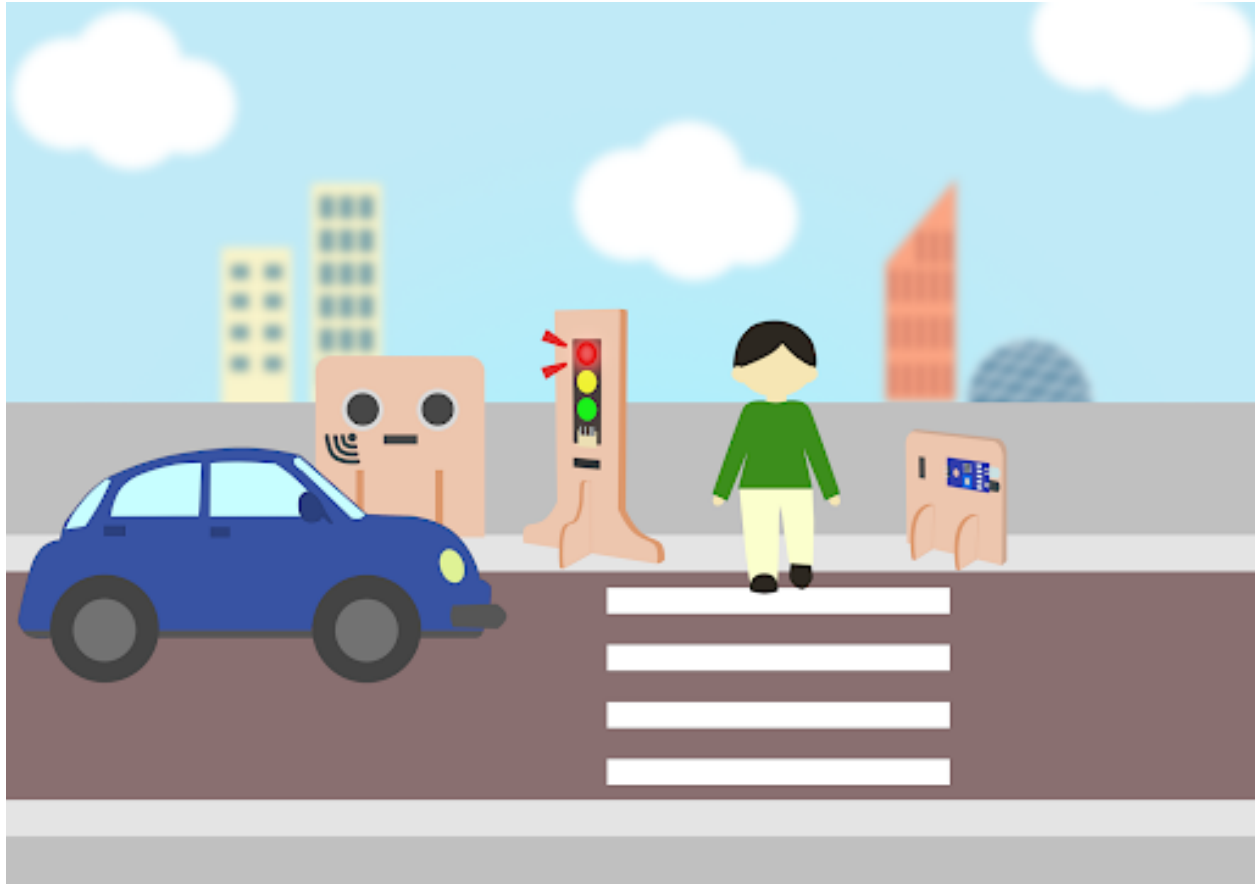




Result 總結

Think 思考

1.2.9 Smart Traffic Lights 智能交通燈

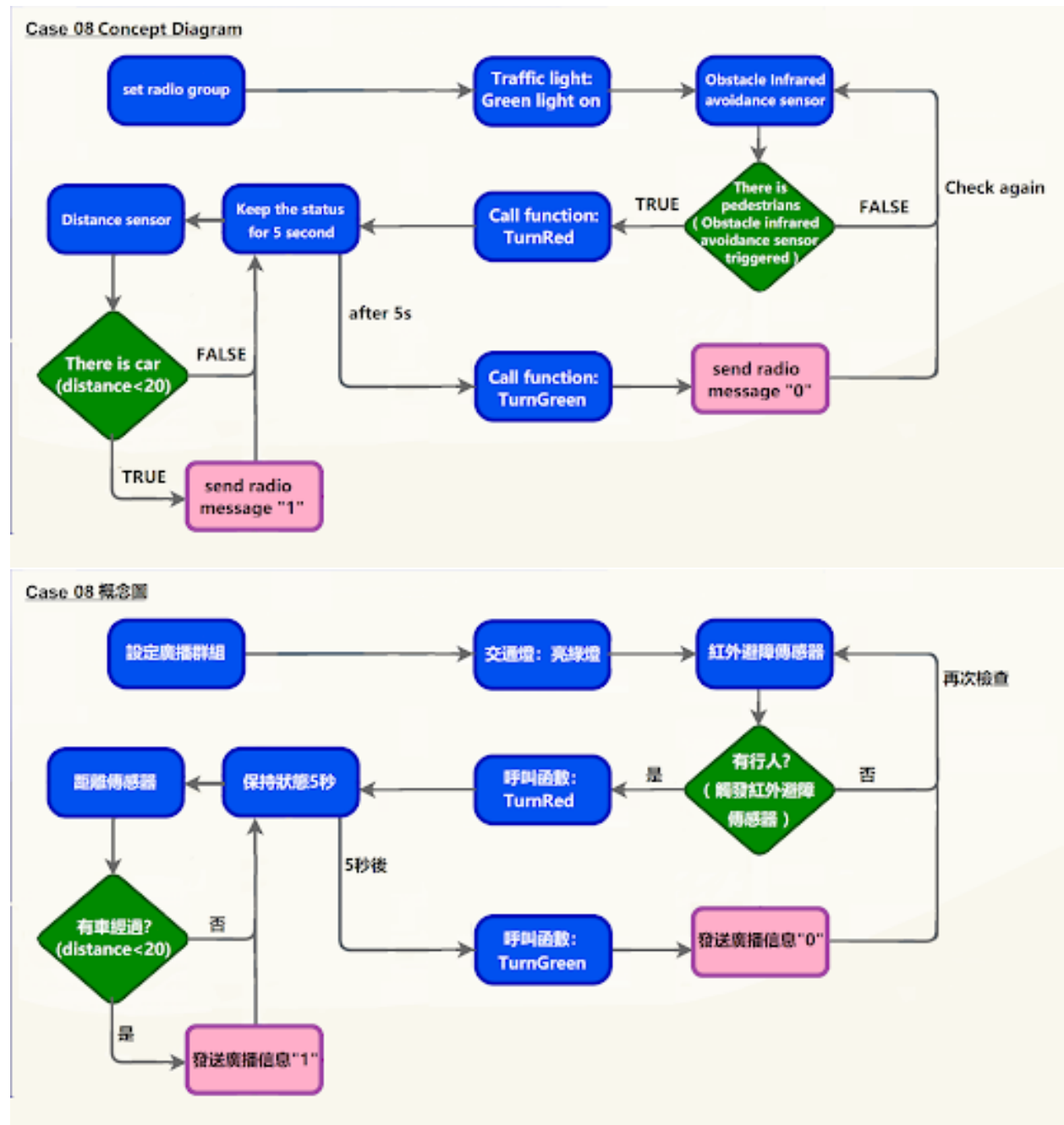


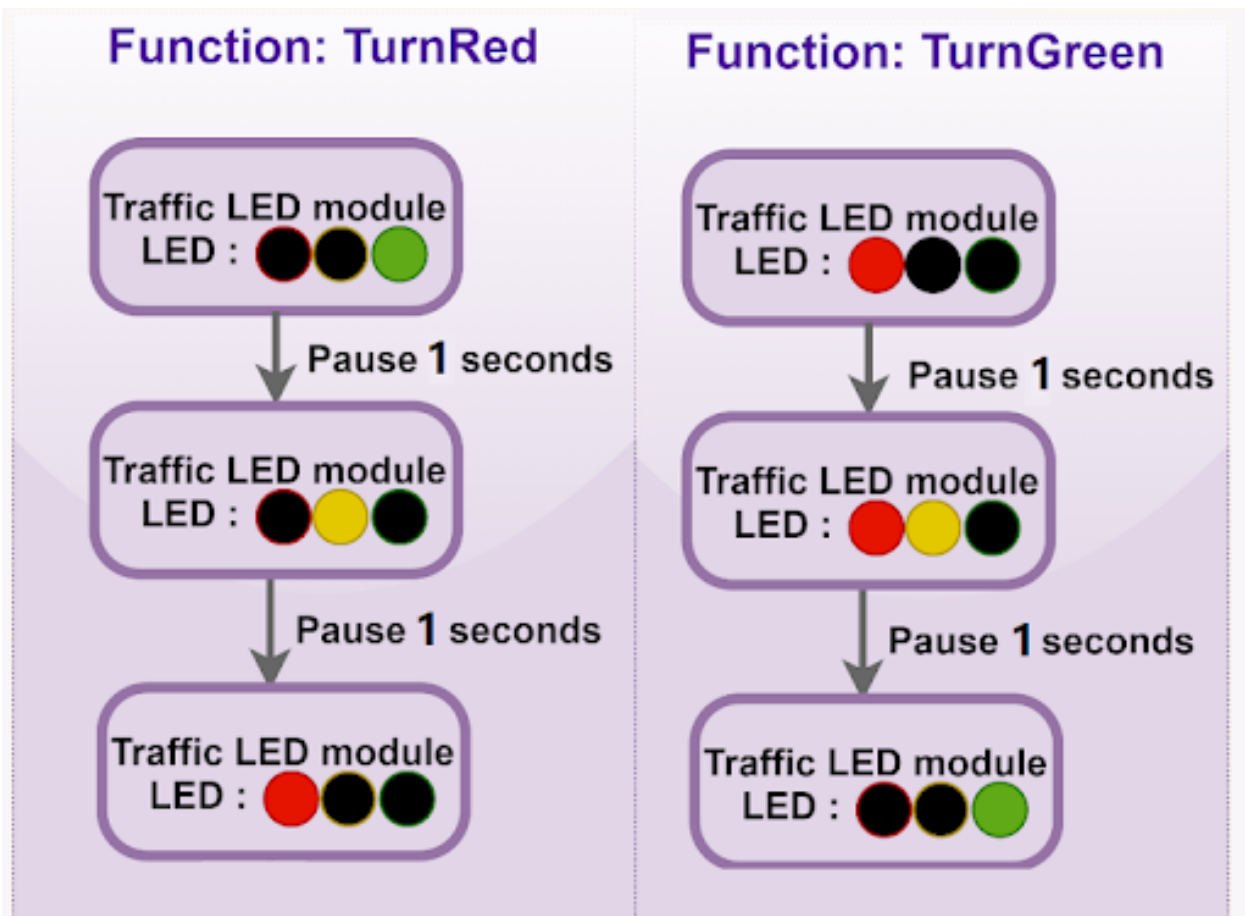
Goal 目標

Background 背景

What is a smart traffic light? 什麼是智能交通燈？

Smart traffic light operation 智能交通燈運作



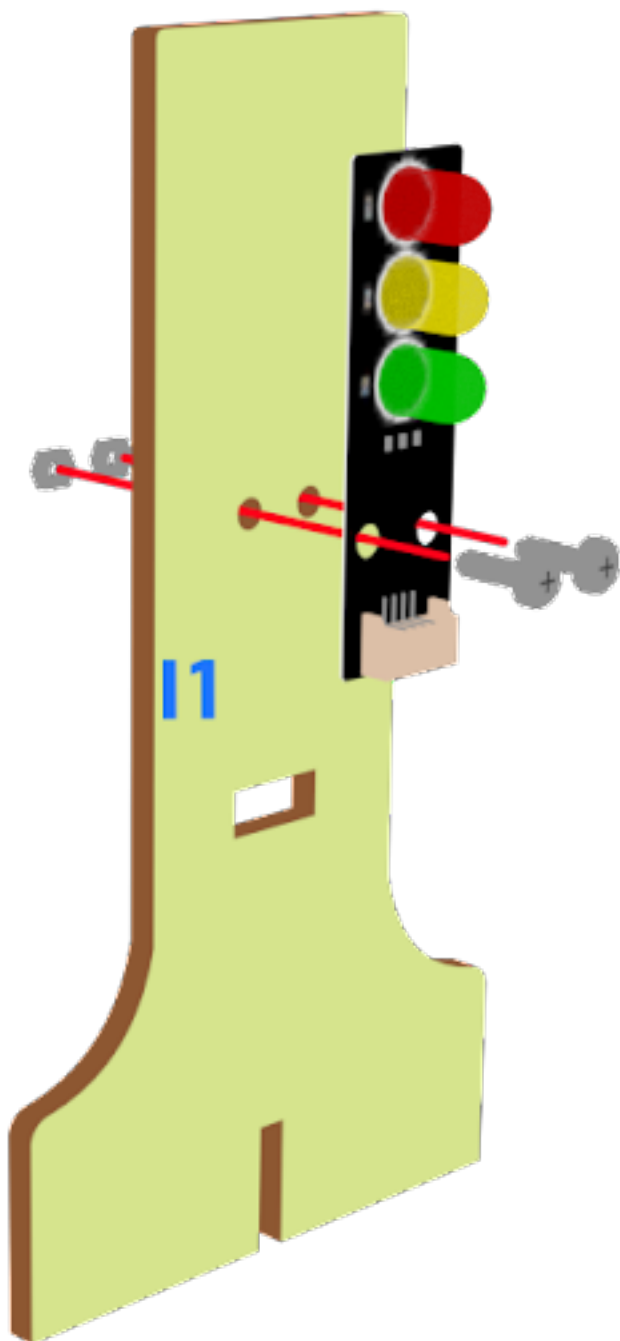




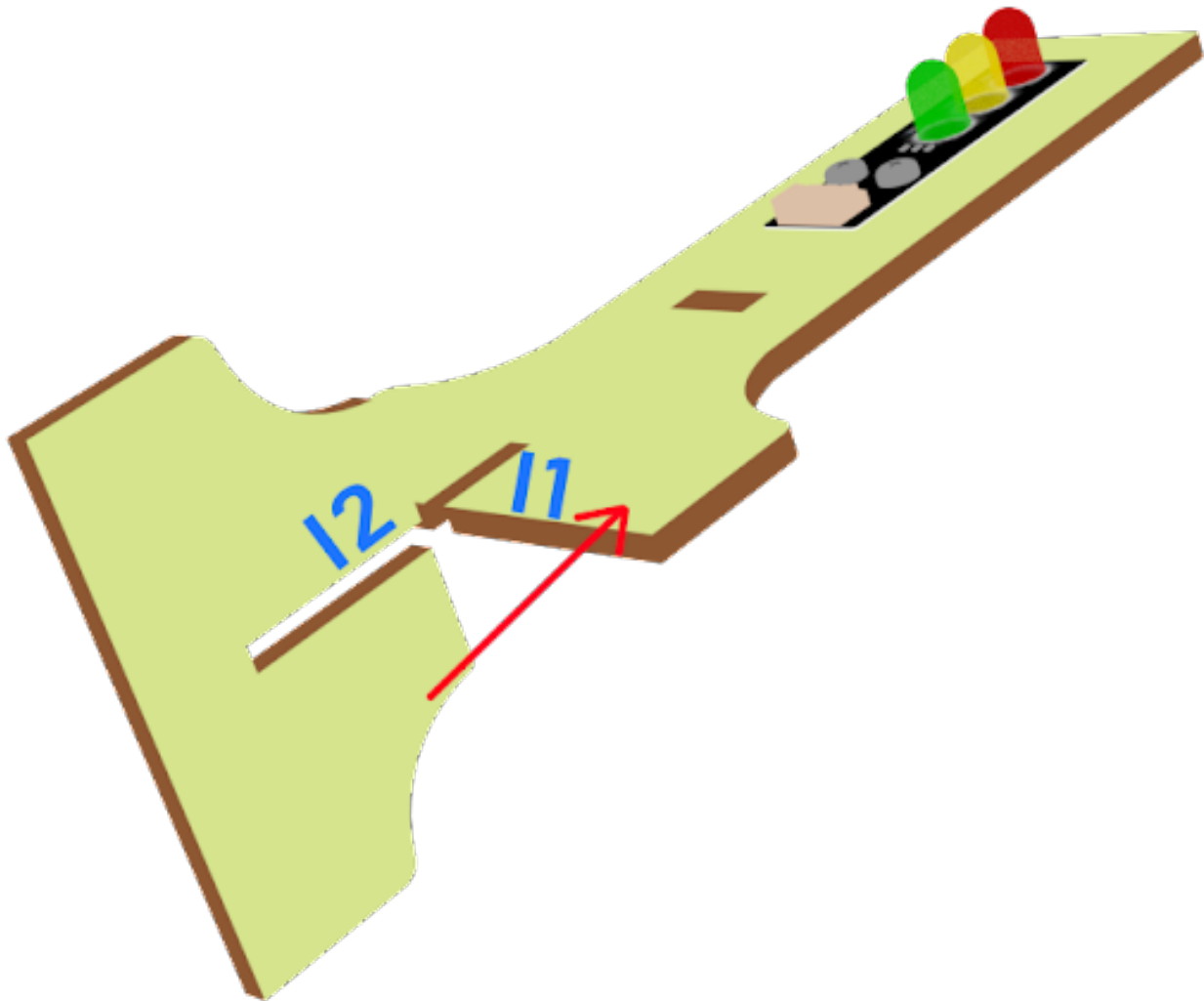
Part List 材料準備

Assembly step 組裝步驟

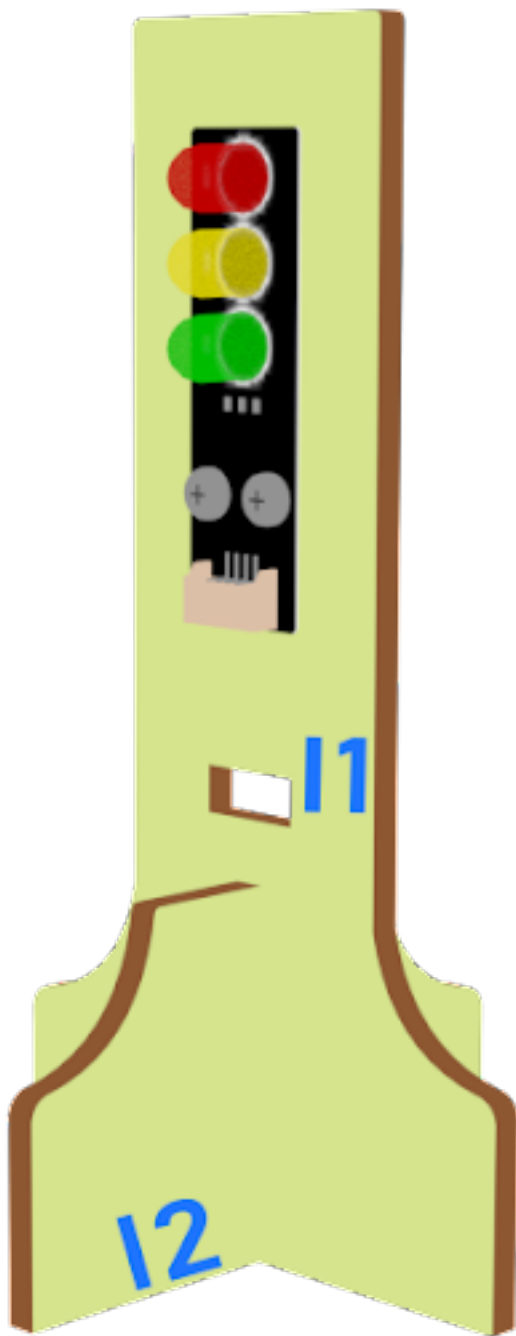
Step 1 第一步



Step 2 第二步



Step 3 第三步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Sender:

Step 1. Set up a new function (TurnRed) 設置一個新的功能 (TurnRed)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on
- Snap pause to wait 1 second 暫停一秒
- Control traffic light red on



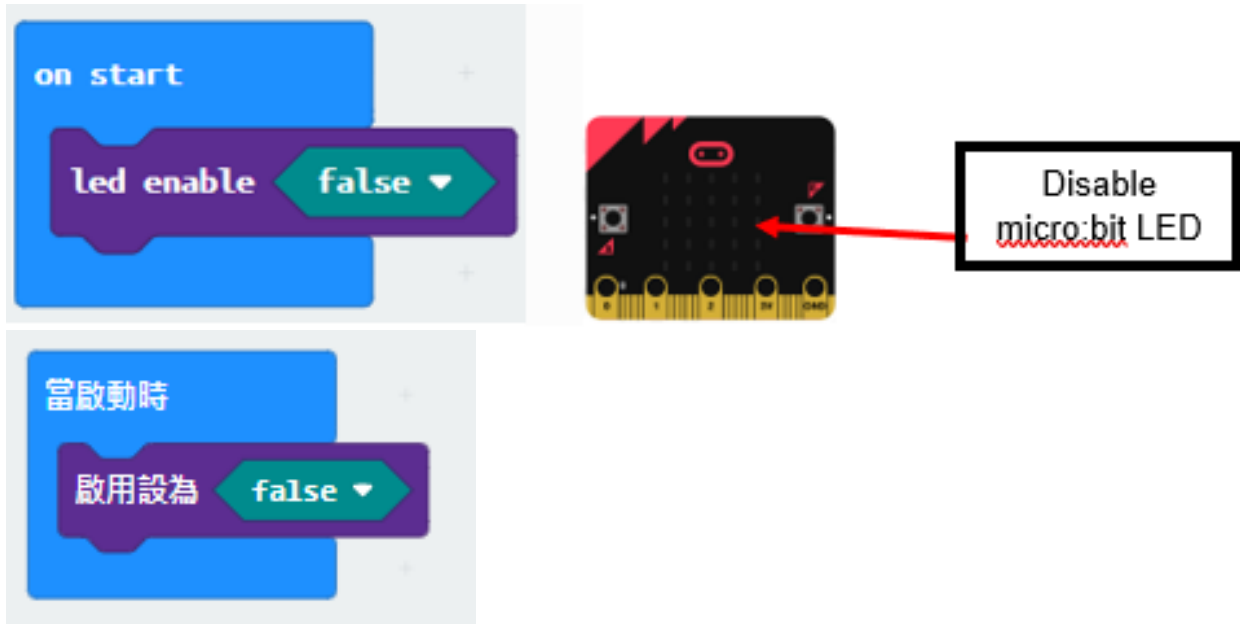
Step 2. Set up a new function (TurnGreen) 設置一个新的功能 (TurnGreen)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on
- Snap pause to wait 1 second 暫停一秒
- Control traffic light green on



Step 3. Disable micro:bit LED. 第一步停用 micro:bit LED。

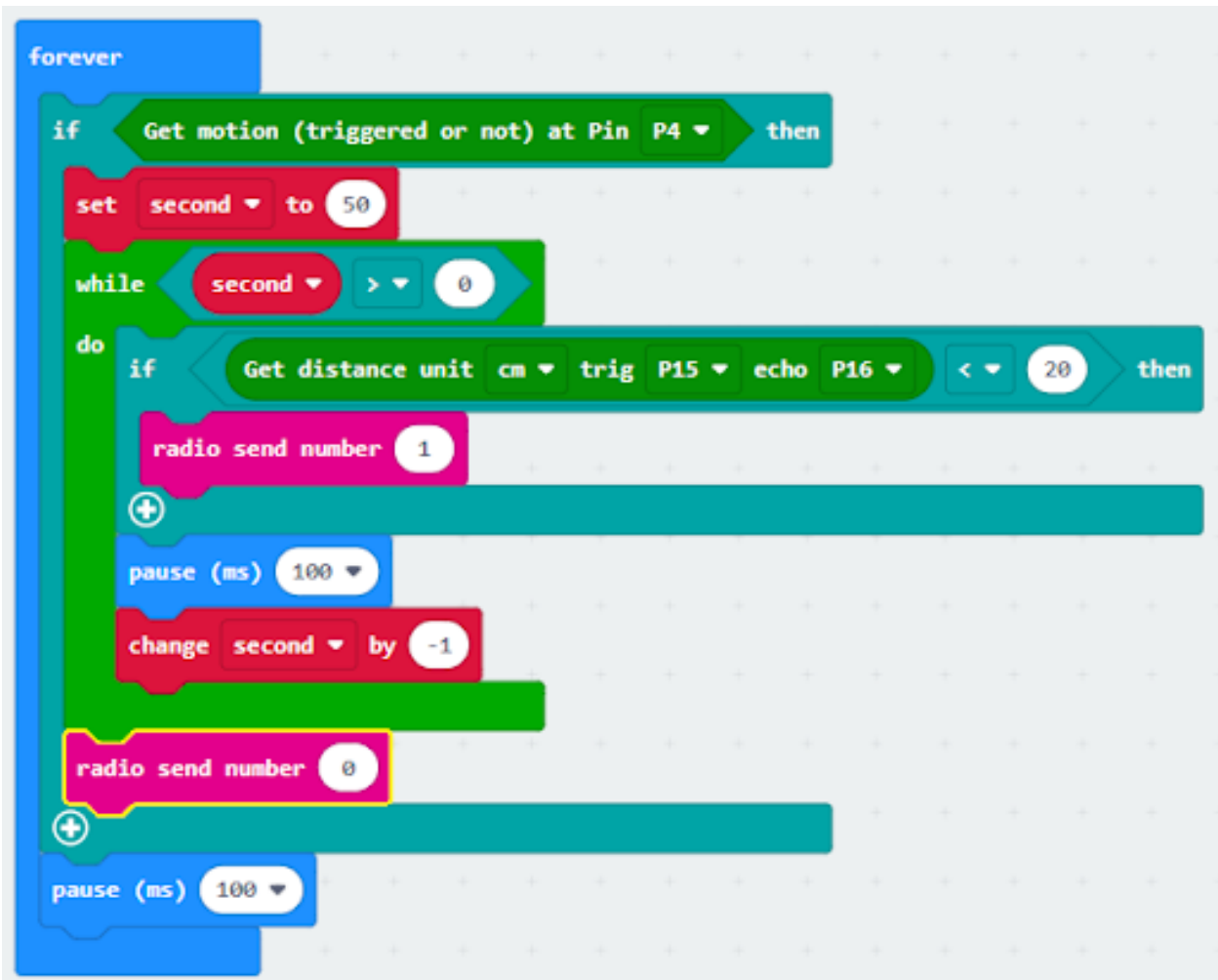
- Snap led enable false to on start 將積木啓用設爲 false 拖放到當啓動時
- Note that P3 is used as LED in default setting, LED need to be disable 注意，P3 在默认设置中被用作 LED，因此 LED 需要被禁用。

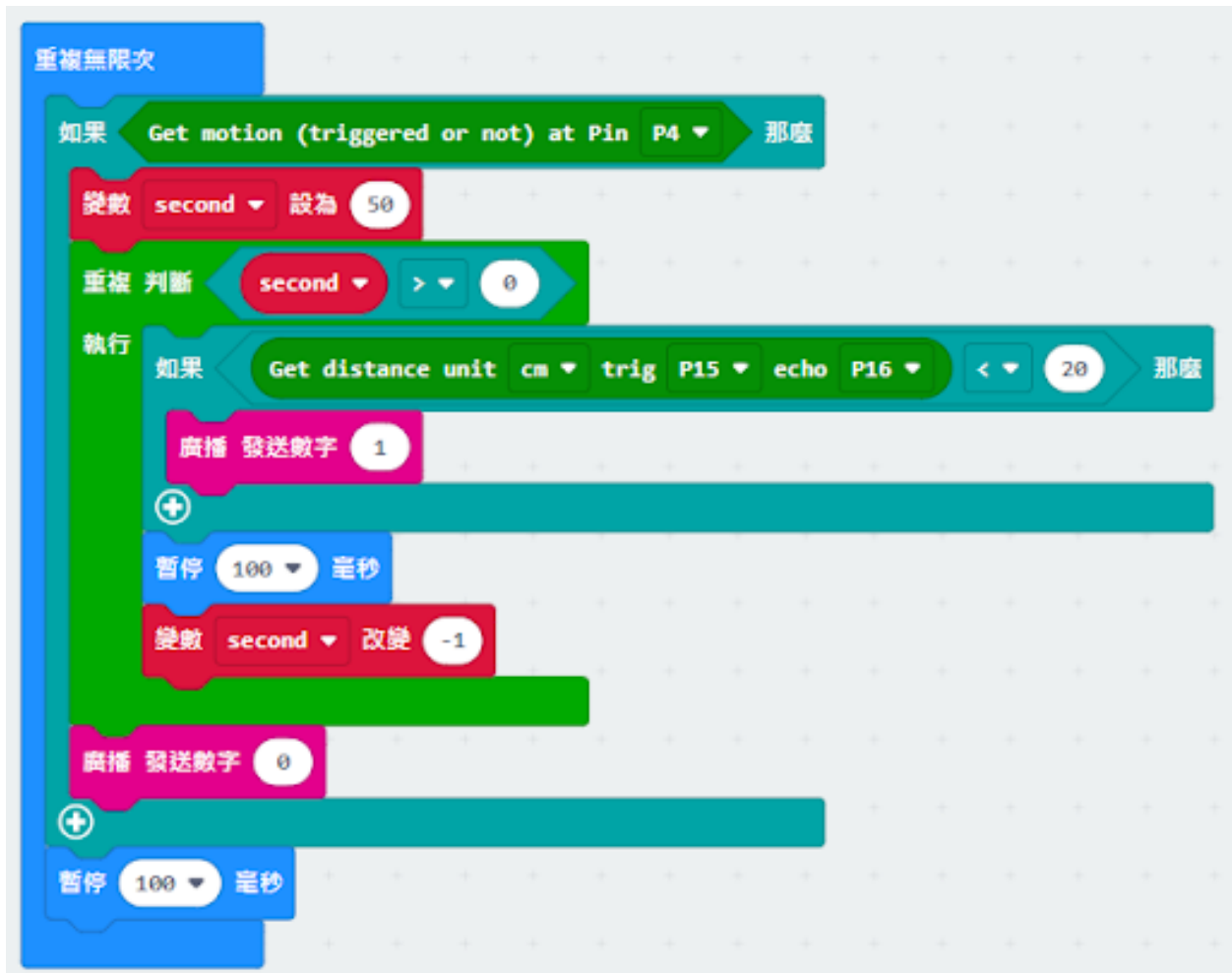


Step 4. Initialize the program similar as last lesson

- Drag set variable trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 to on start 將 trafficLight 到 Traffic light pin setting Red P0 Yellow P1 Green P2 拖入當啟動時
- Control traffic light green on
- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時

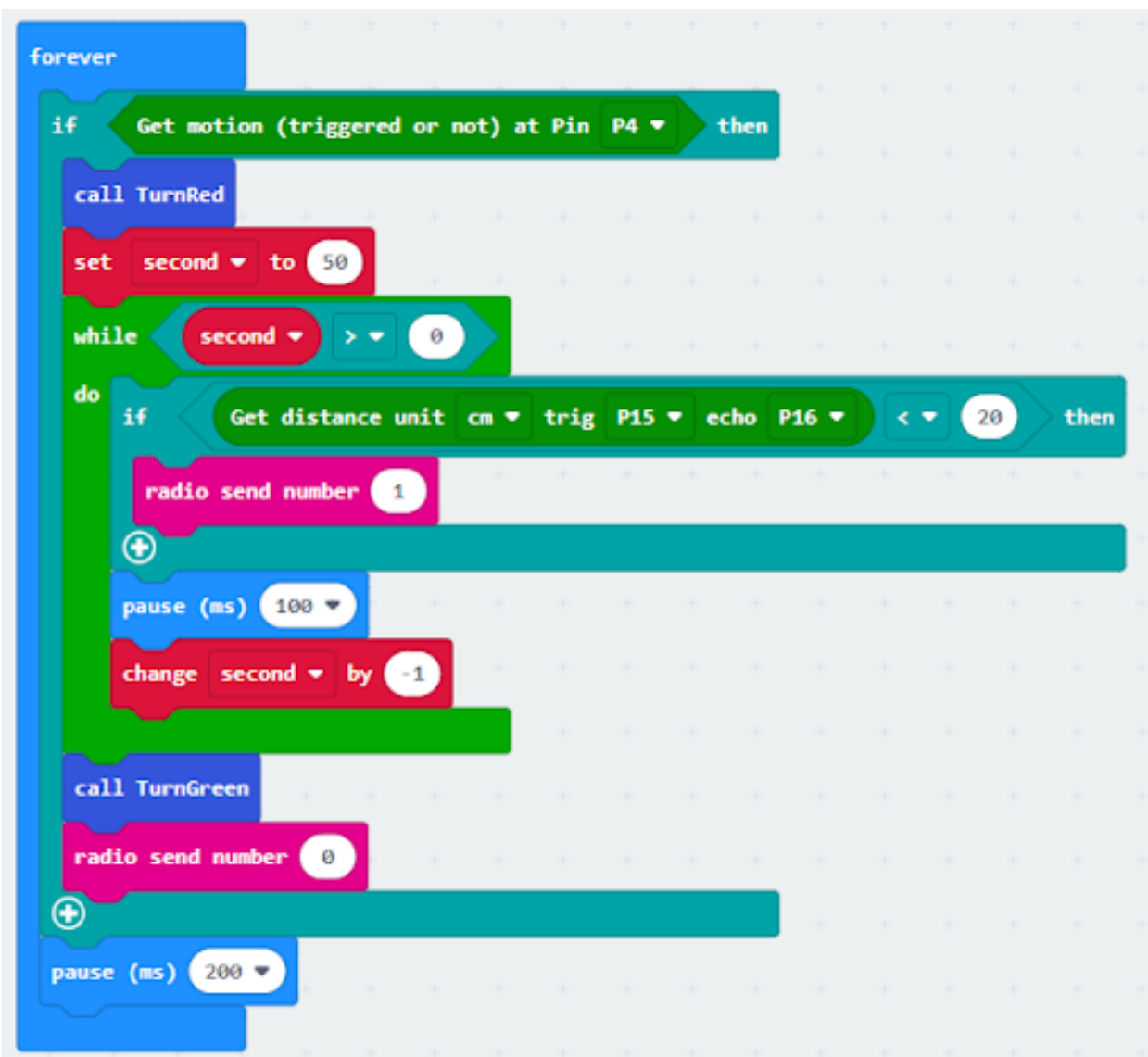


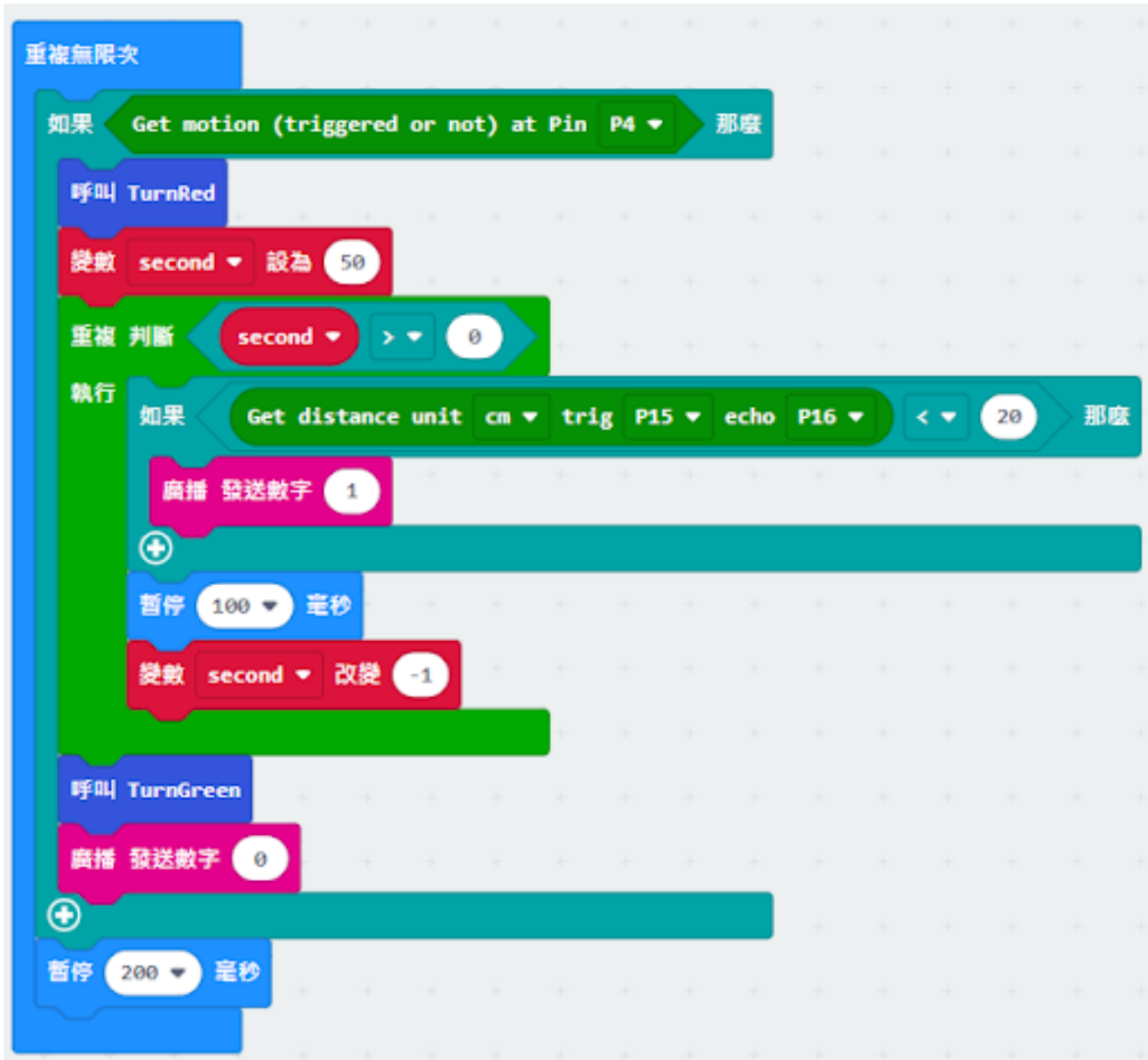




Step 5. Call function 呼叫函數

- Snap function TurnRed into if get motion (triggered or not) at pin P4 case 將呼叫 TurnRed 拖入 get motion (triggered or not) at pin P4 的如果句式
- Drag function TurnGreen after the while loop 將呼叫 TurnGreen 拖到循環后





Receiver:

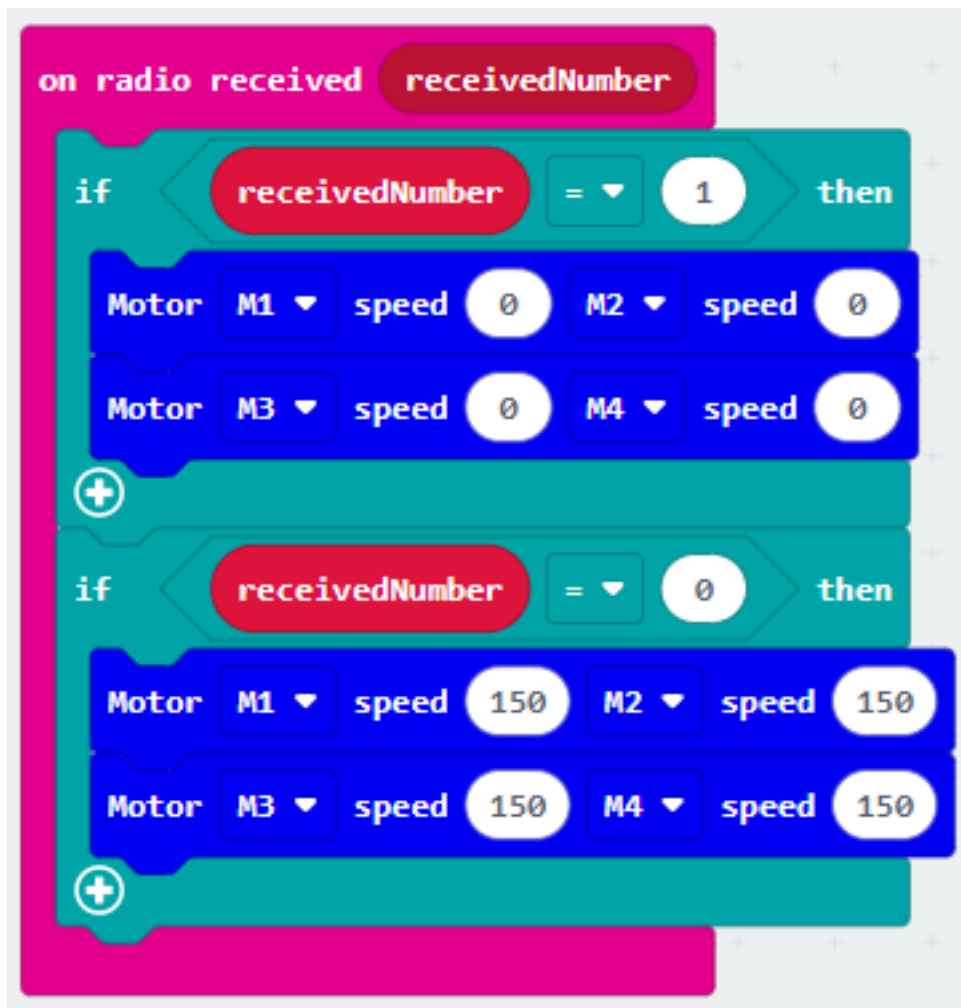
Step 1. Set radio set group at start position 在起始位置設置廣播群組

- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- Initially, the car moves forward by default



Step 2. Control car by receiving different number 通過接收不同數字來控制車輛

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =1 and make the car stop 設 receivedNumber =1, 控制制車。
- Set receivedNumber=0 and make the car move forward 設 receivedNumber=0, 讓車向前移動。





Result 總結

Think 思考

1.2.10 Smart Pedestrian Lights 2 行人過路交通燈二

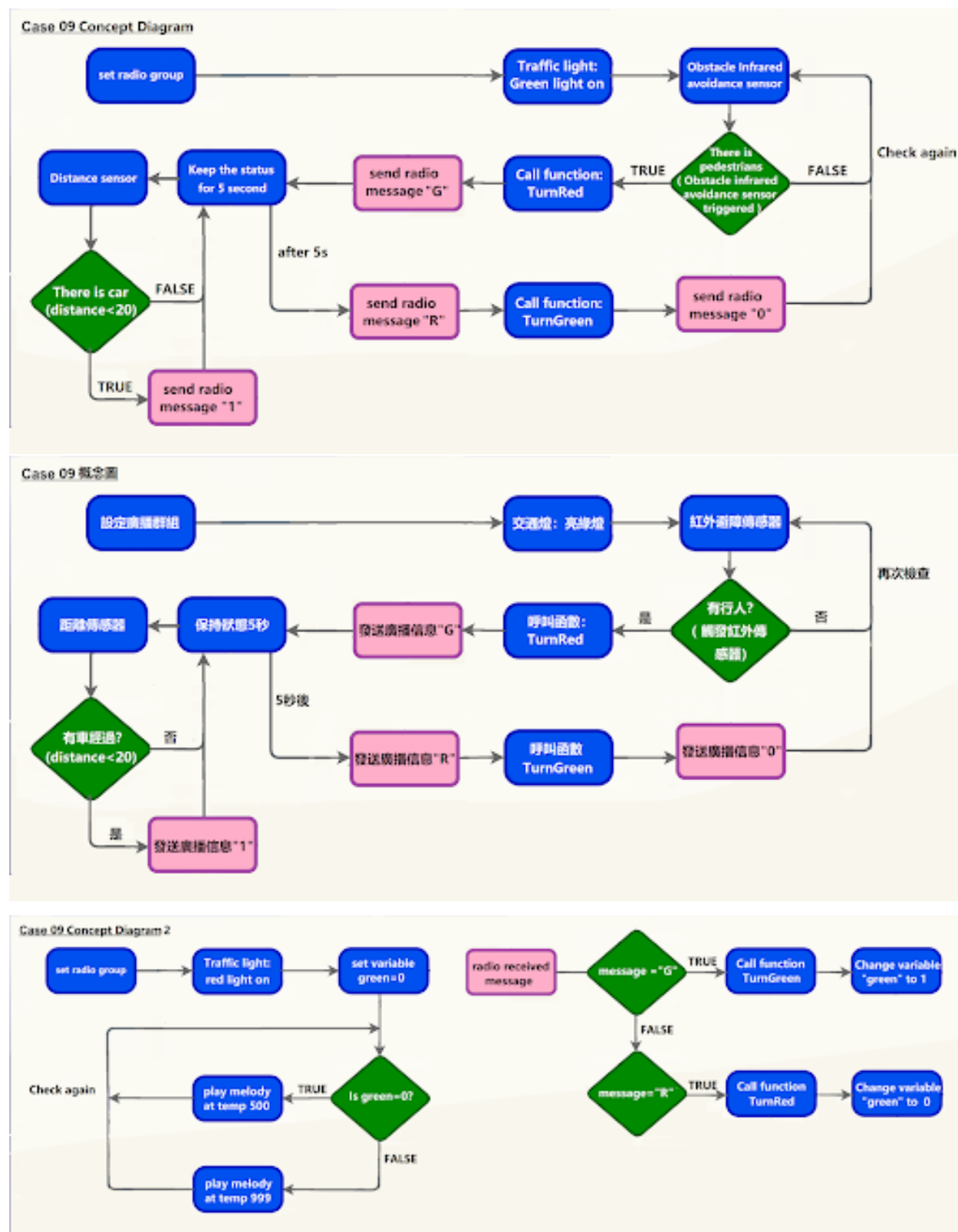


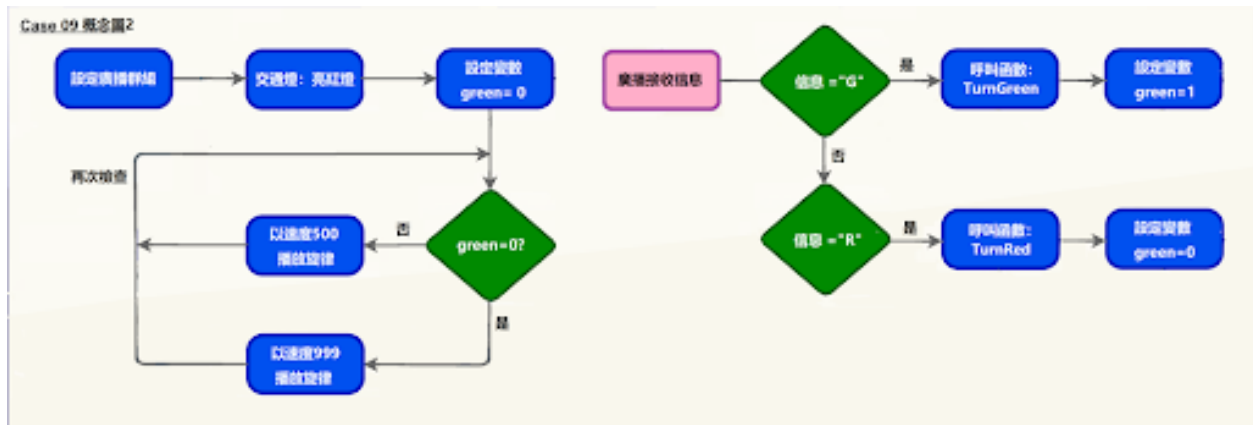
Goal 目標

Background 背景

What is a smart pedestrian light? 什麼是智能行人過路燈？

Smart traffic light operation 智能交通燈運作

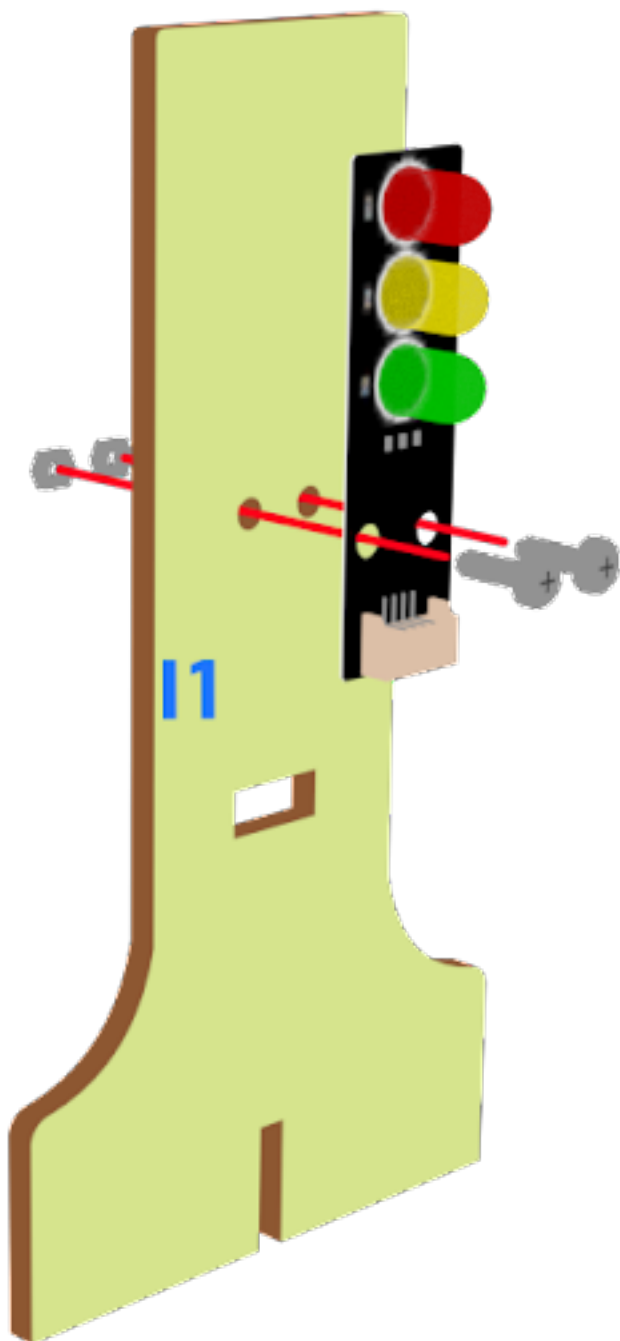




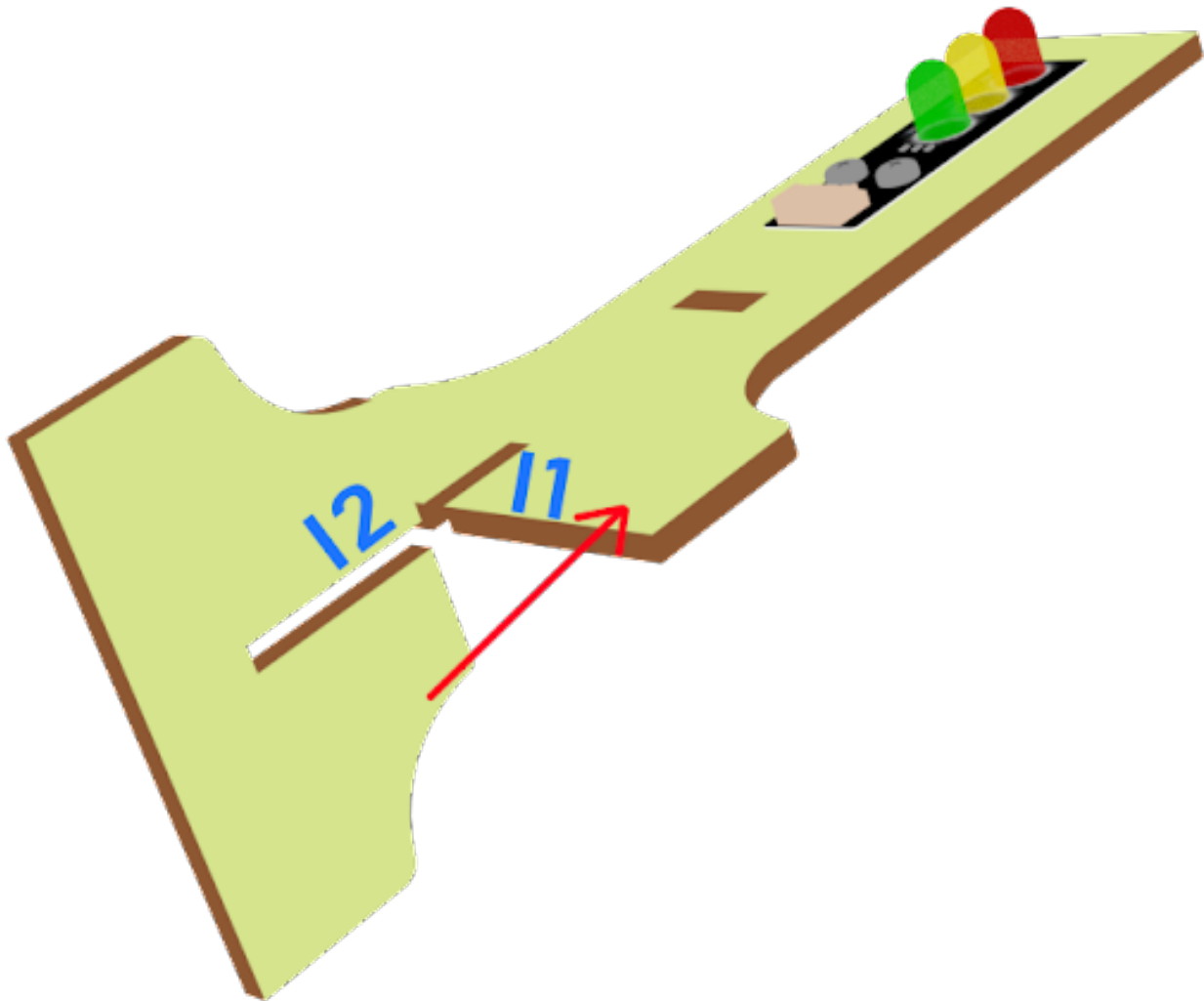
Part List 材料準備

Assembly step 組裝步驟

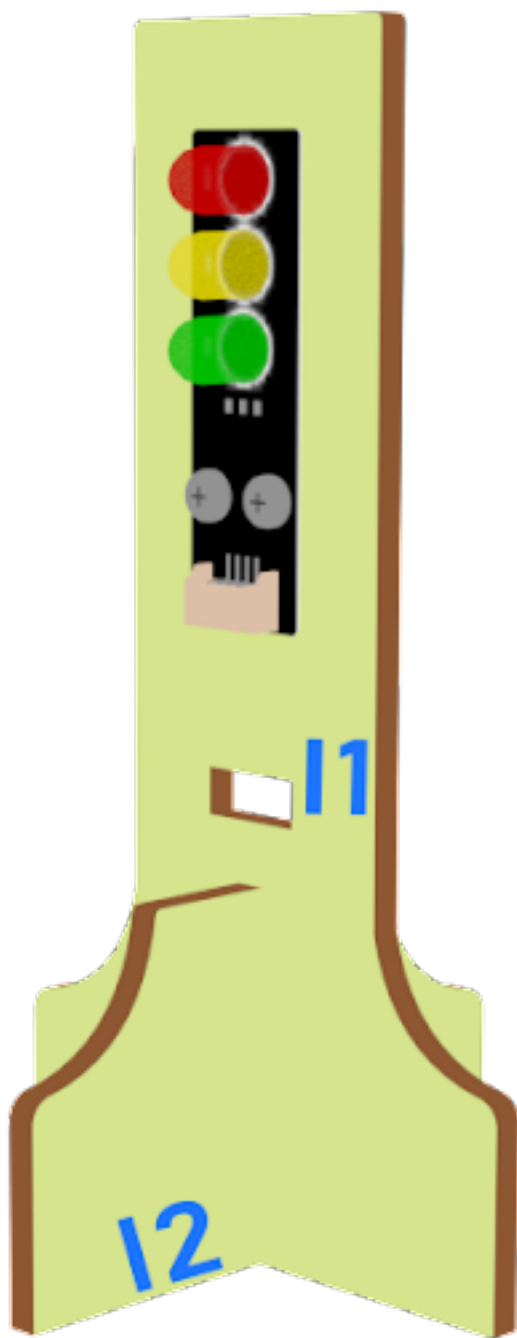
Step 1 第一步



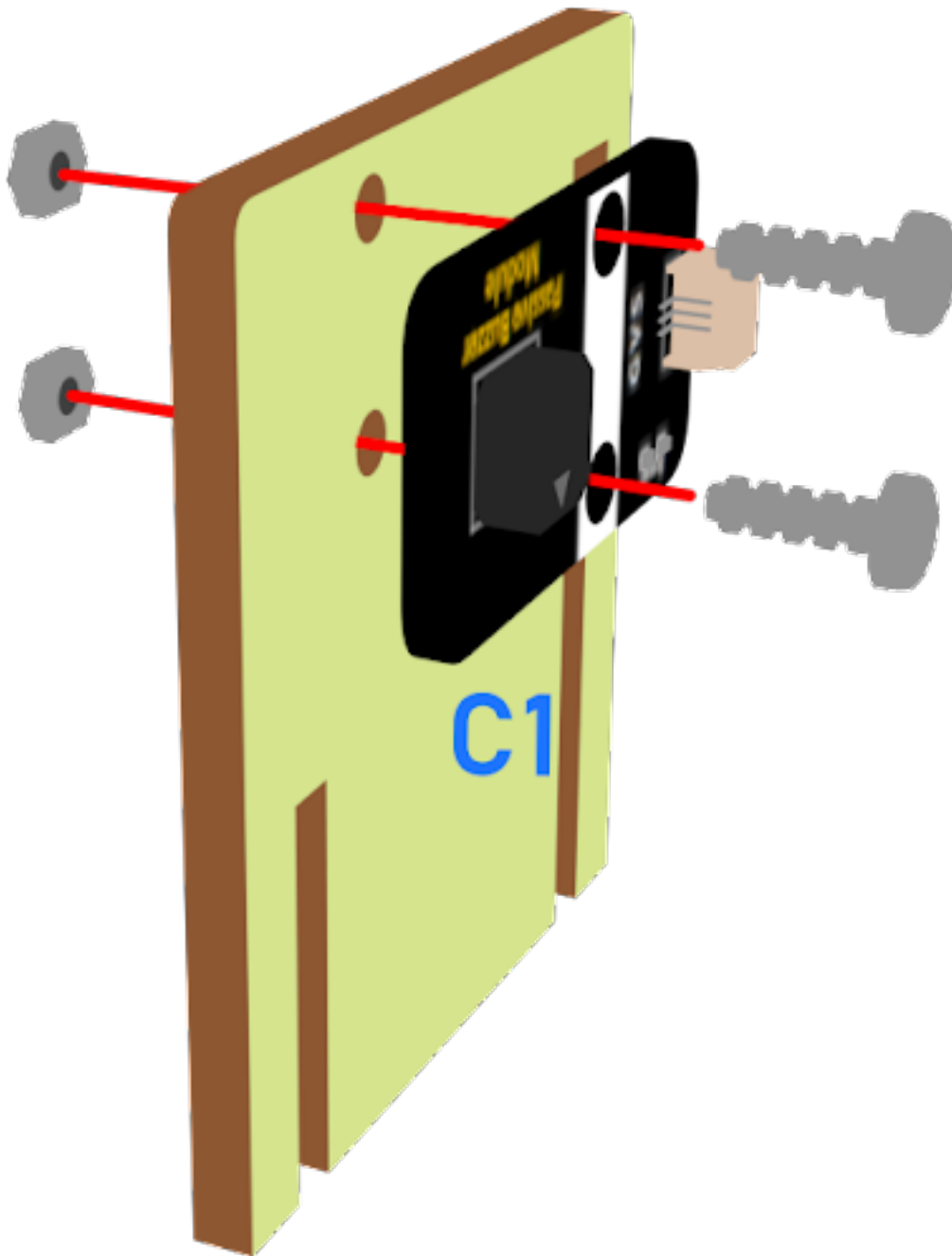
Step 2 第二步



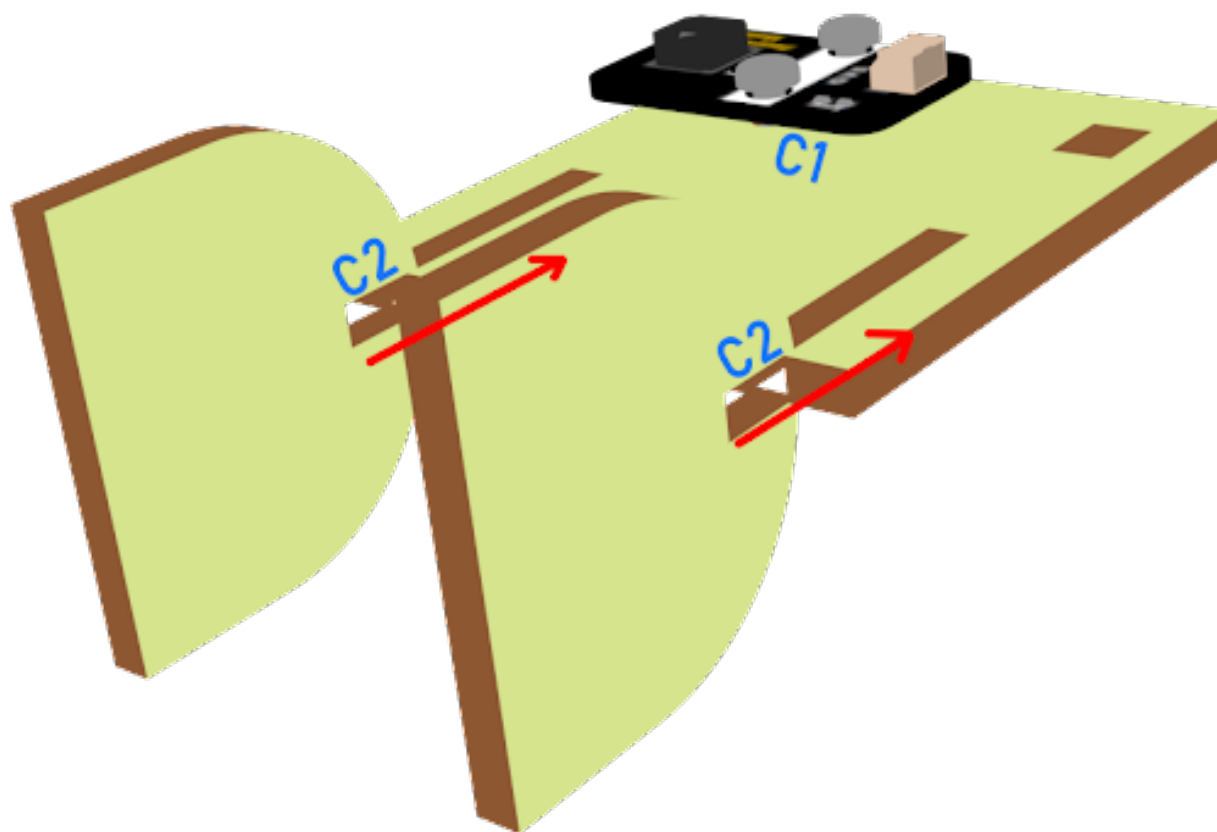
Step 3 第三步



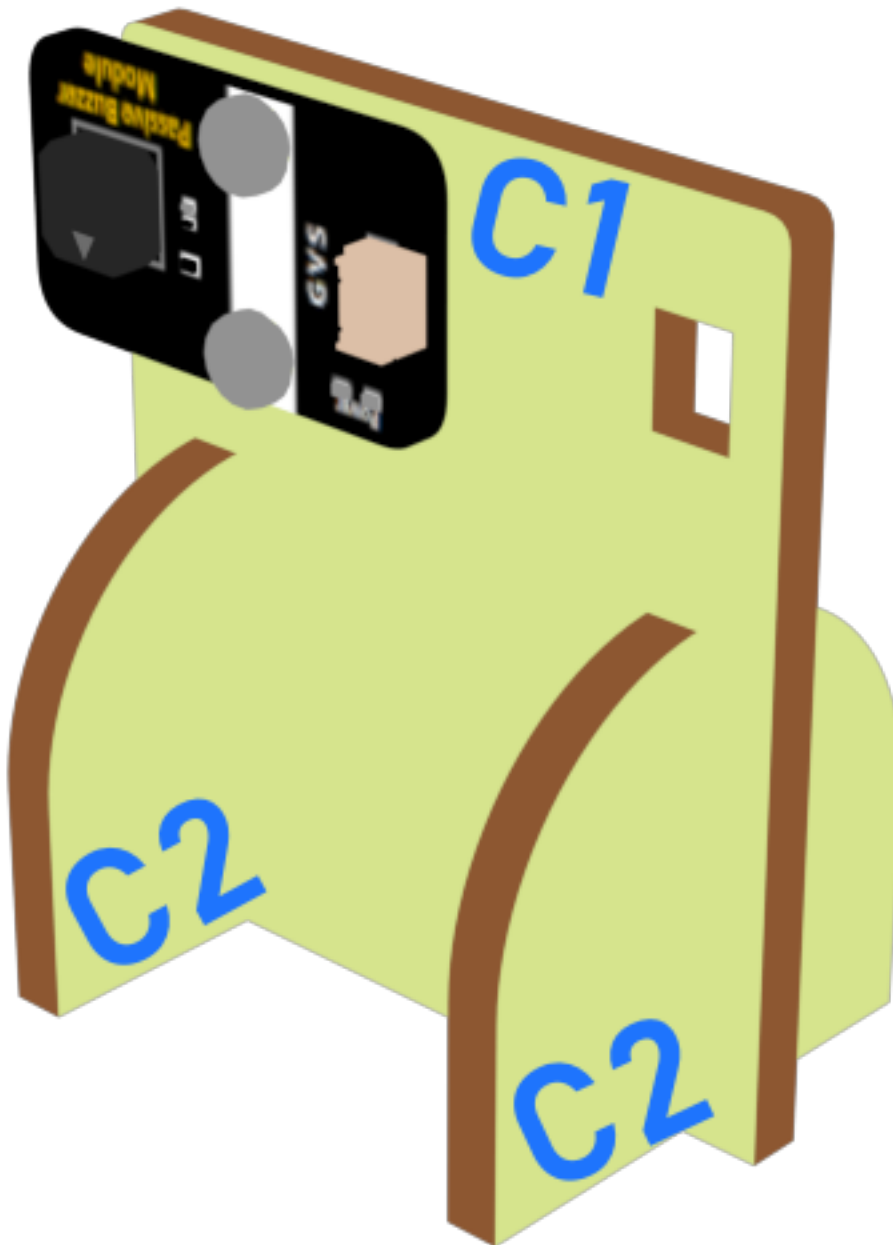
Step 4 第四步



Step 5 第五步



Step 6 第六步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Traffic light 1:

Step 1. Set up a new function (TurnRed) 設置一個新的功能 (TurnRed)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on 控制交通燈亮黃燈
- Snap pause to wait 1 second 暫停一秒
- Control traffic light red on 控制交通燈亮紅燈



Step 2. Set up a new function (TurnGreen) 設置一个新的功能 (TurnGreen)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on 控制交通燈亮黃燈
- Snap pause to wait 1 second 暫停一秒
- Control traffic light green on 控制交通燈亮綠燈

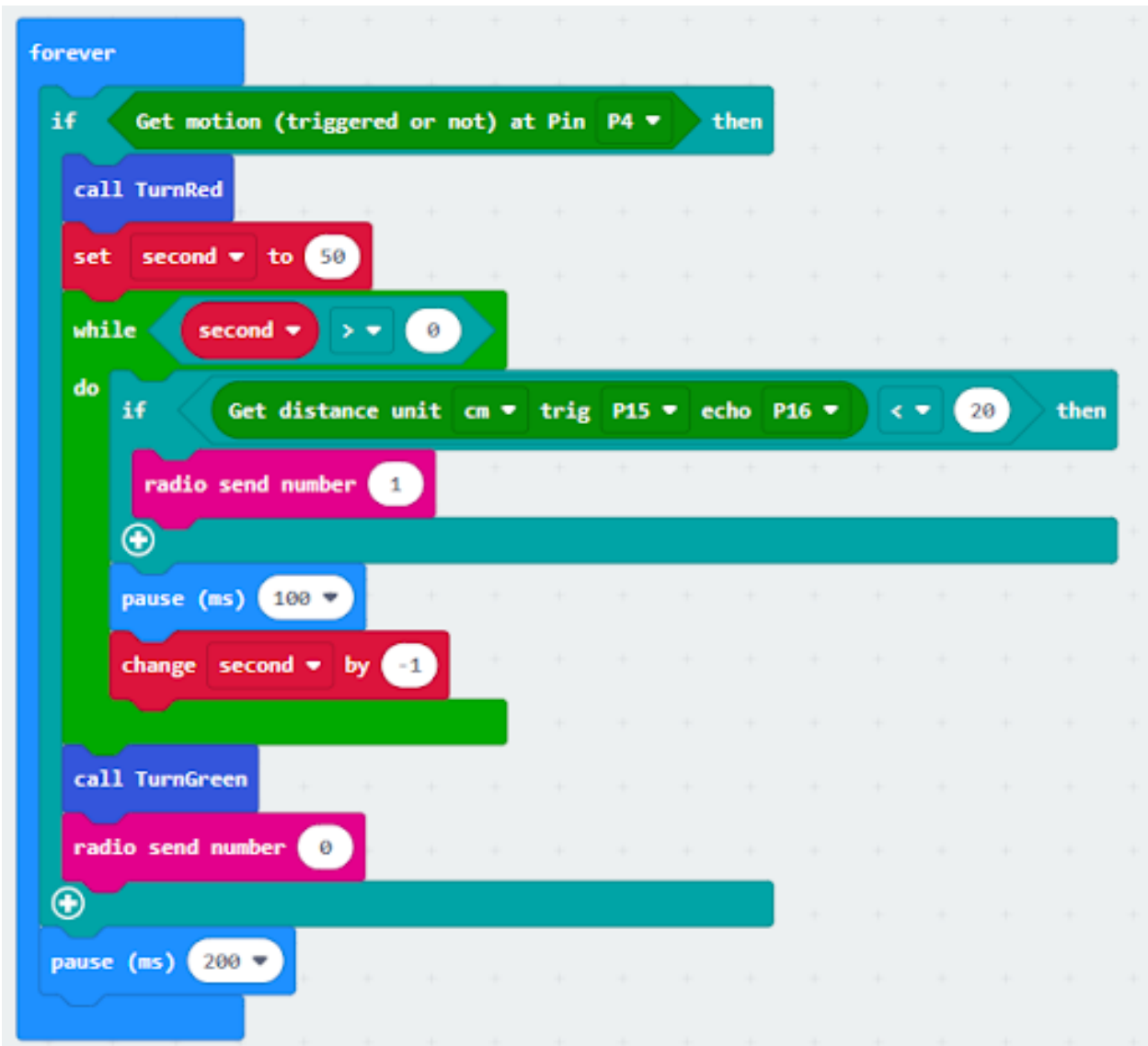


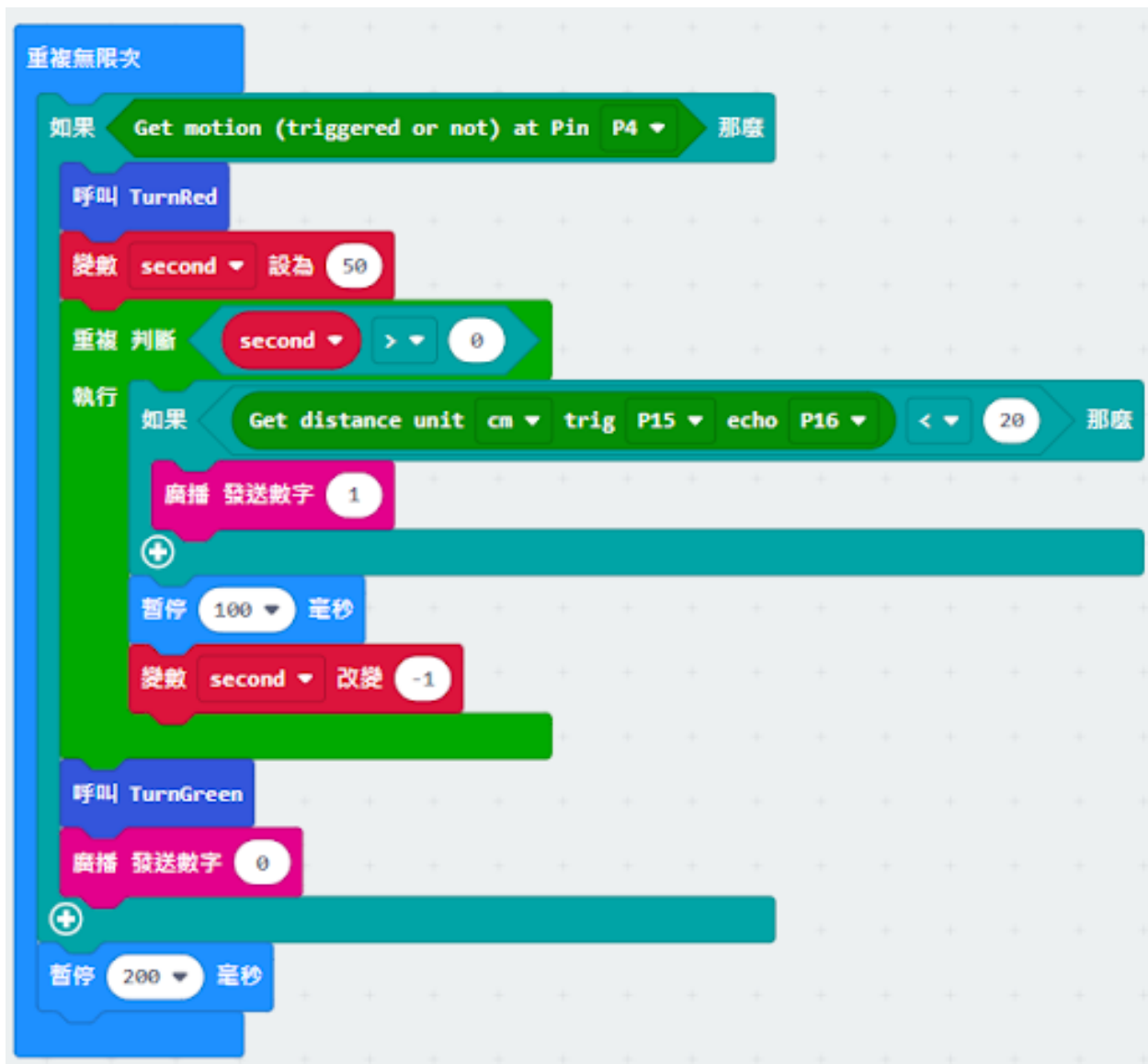
Step 3. Initialize the program

- Drag set variable trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 to on start 將 trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 拖入當啟動時
- Control traffic light green on
- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- In forever, snap function TurnRed into if get motion (triggered or not) at pin P4 case 在循環無數次中，將呼叫 TurnRed 拖入 get motion (triggered or not) at pin P4 的如果句式

- Drag function TurnGreen after the while loop 將呼叫 TurnGreen 拖到循環后

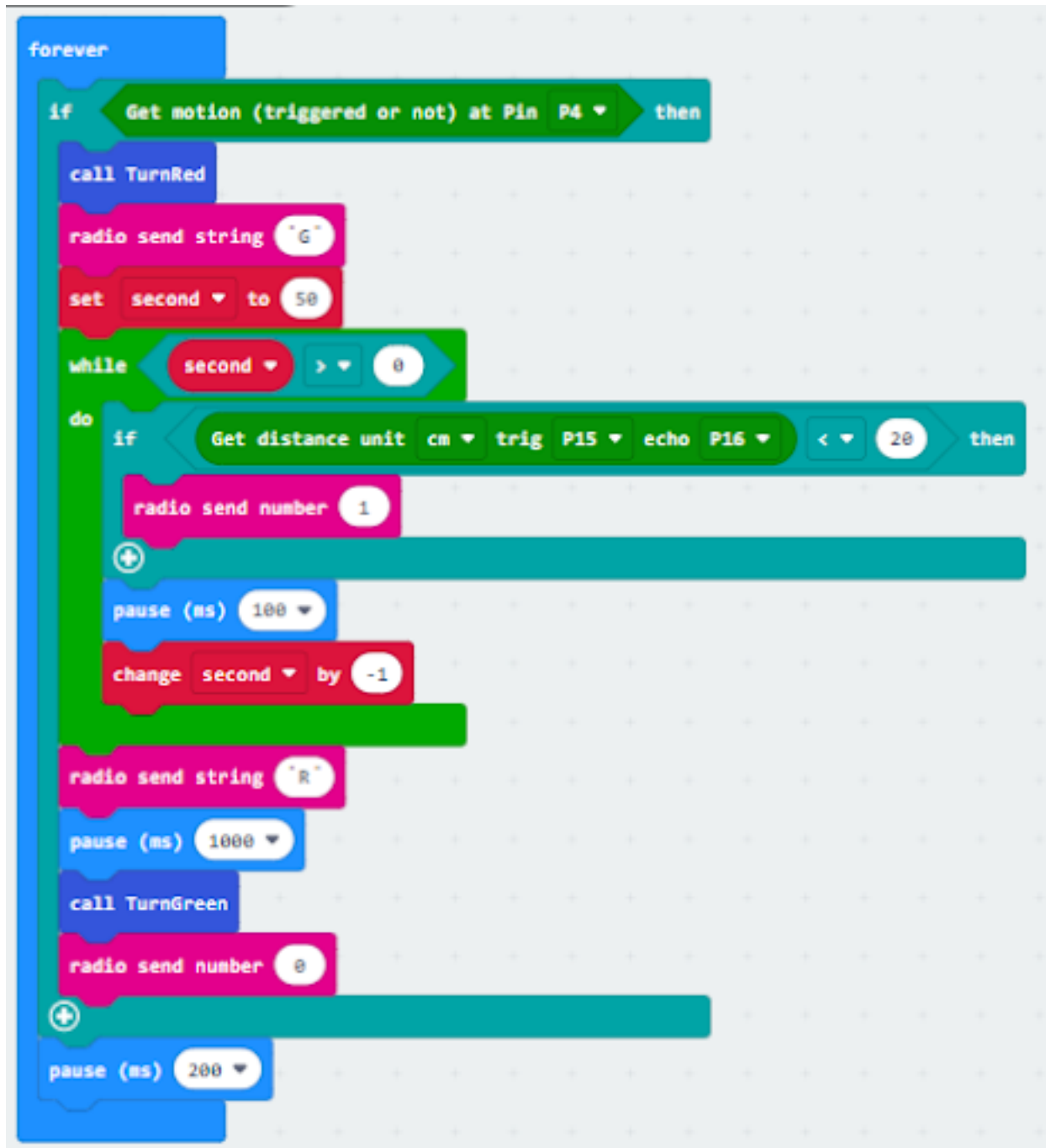


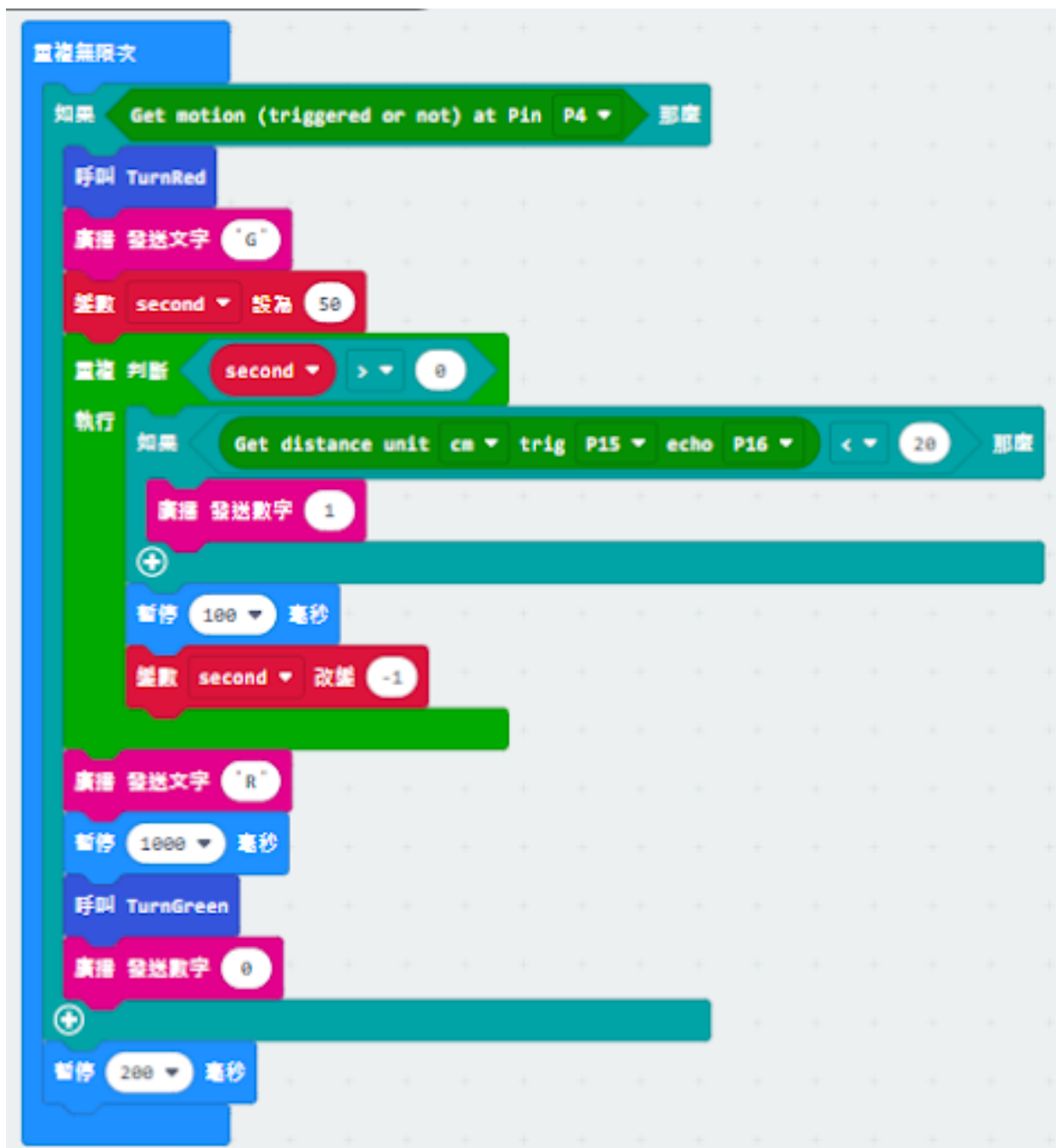




Step 4. Control traffic light 2 by sending radio string 發送廣播字串以控制交通燈

- Drag radio send string “R” before TurnGreen 將廣播發送字串 “R” 拖到 TurnGreen 前
- Drag radio send string “G” after TurnRed 將廣播發送字串 “G” 拖到 TurnRed 前





Traffic light 2:

Step 1. Set up new functions 設置新的功能。



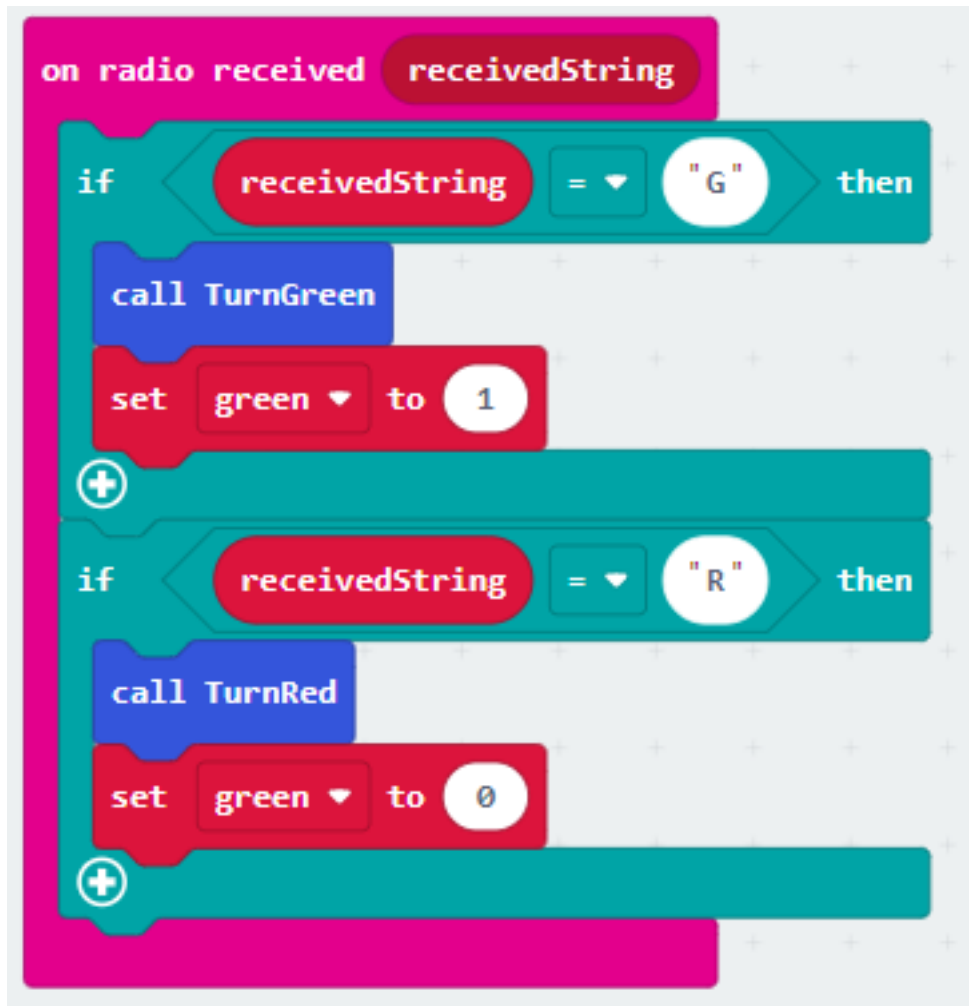
Step 2. Initialize the program

- Drag set variable trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 to on start 將 trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 拖入當啟動時
- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- Control traffic light green on 控制交通燈亮燈
- Set a variable green=0 設變數 green=0



Step 3. Control traffic light by receiving different number 通過接收不同數字來控制交通燈及車輛

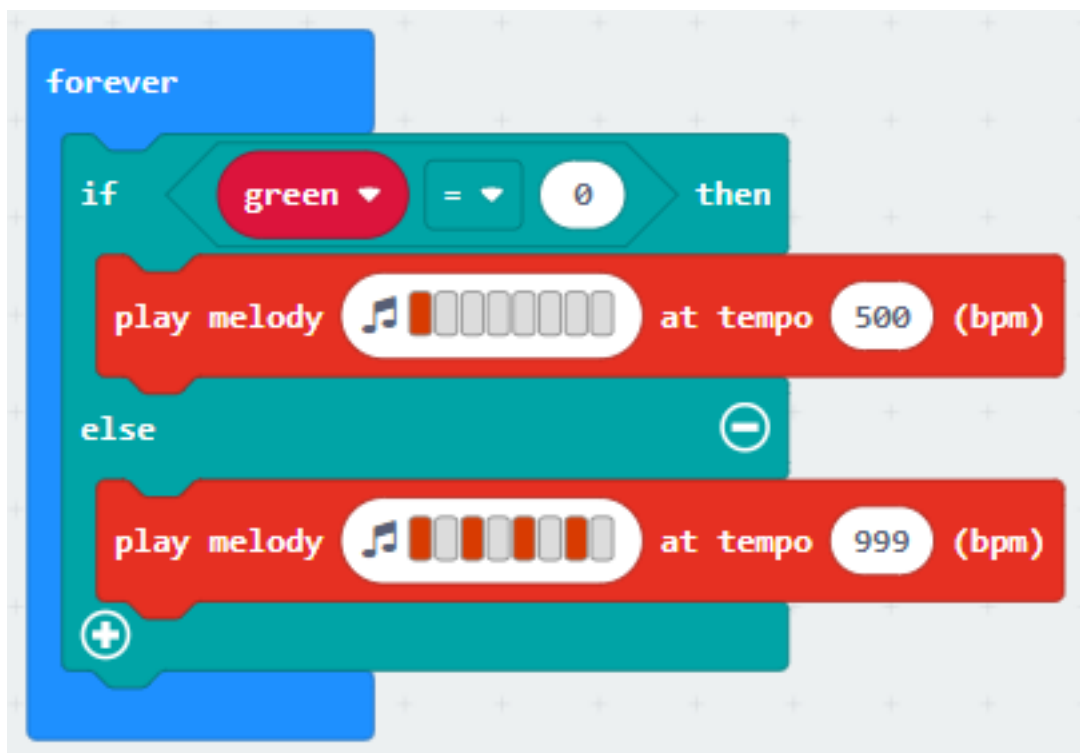
- Snap if statement into on radio received receivedString 將如果語句放入當收到廣播數字 receivedString
- Set receivedString = "R" and call TurnRed 設 receivedString=" R", 呼叫 TurnRed
- Set receivedString = "G" and call TurnGreen 設 receivedString=" G", 呼叫 TurnGreen
- Change variable green depend on the light 根據燈光改變變數 green 的數值





Step 4. Play sound effect depend on the light status 根據燈光播放聲效

- Snap if statement into forever 將如果語句放入循環無數次
- Play melody with different tempo



Receiver:

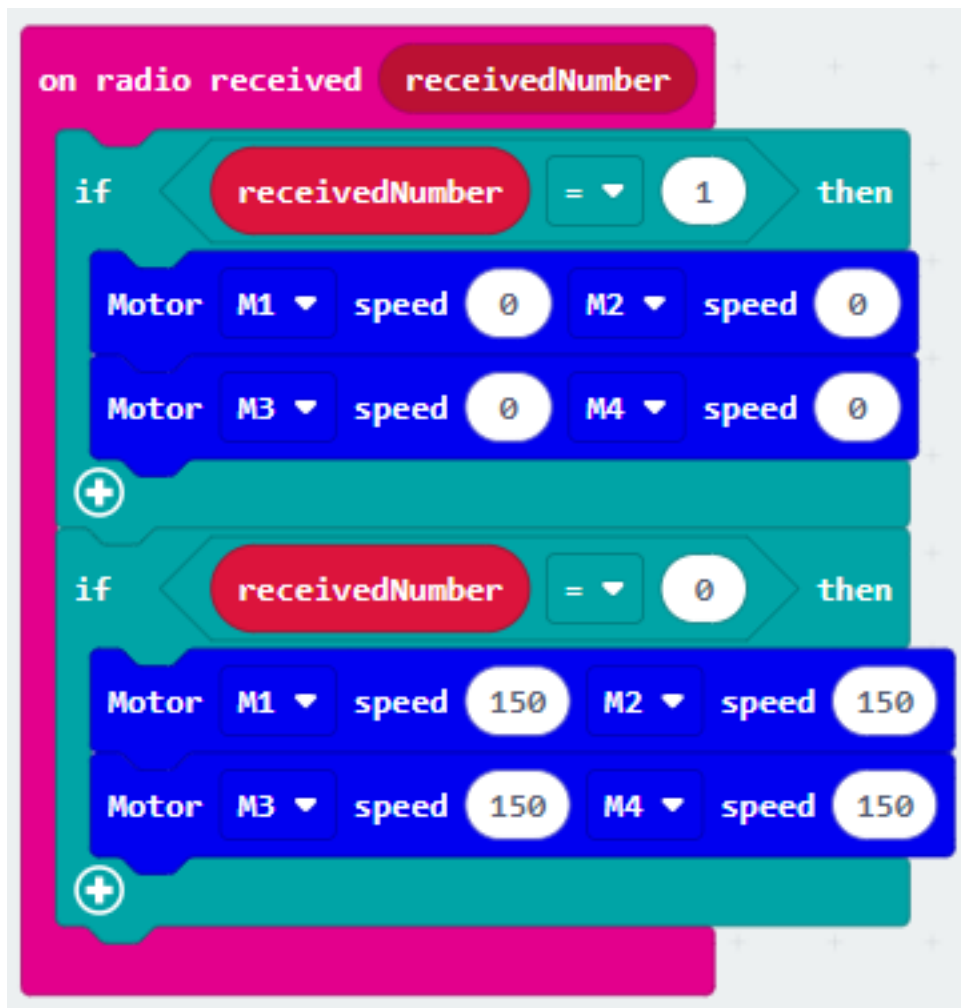
Step 1. Set radio set group at start position 在起始位置設置廣播群組

- Drag radio set group 6 to on start 將廣播群組設為 6 拖入當啟動時
- Initially, the car moves forward by default



Step 2. Control car by receiving different number 通過接收不同數字來控制車輛

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =1 and make the car stop 設 receivedNumber =1, 控制制動。
- Set receivedNumber=0 and make the car move forward 設 receivedNumber=0, 讓車向前移動。

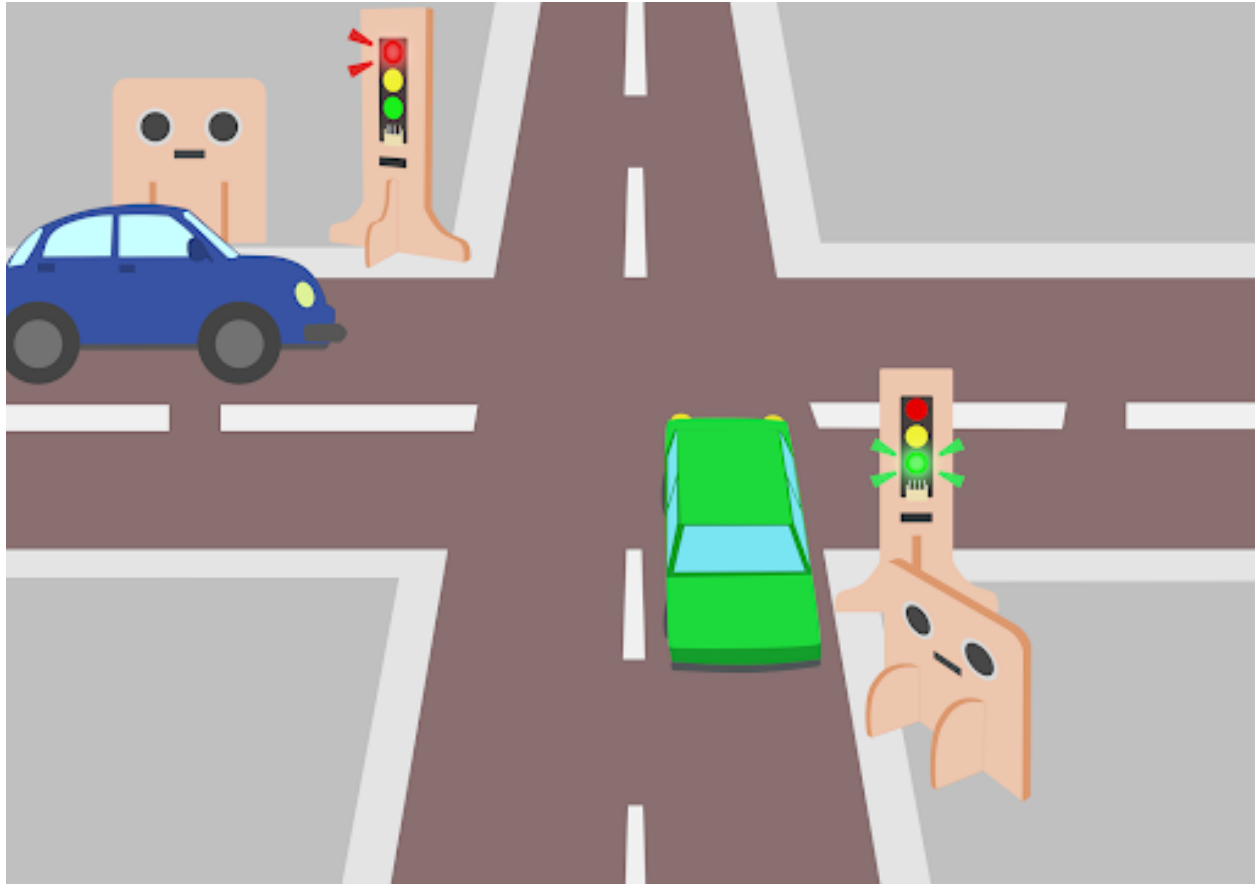




Result 總結

Think 思考

1.2.11 Intersection 十字路口



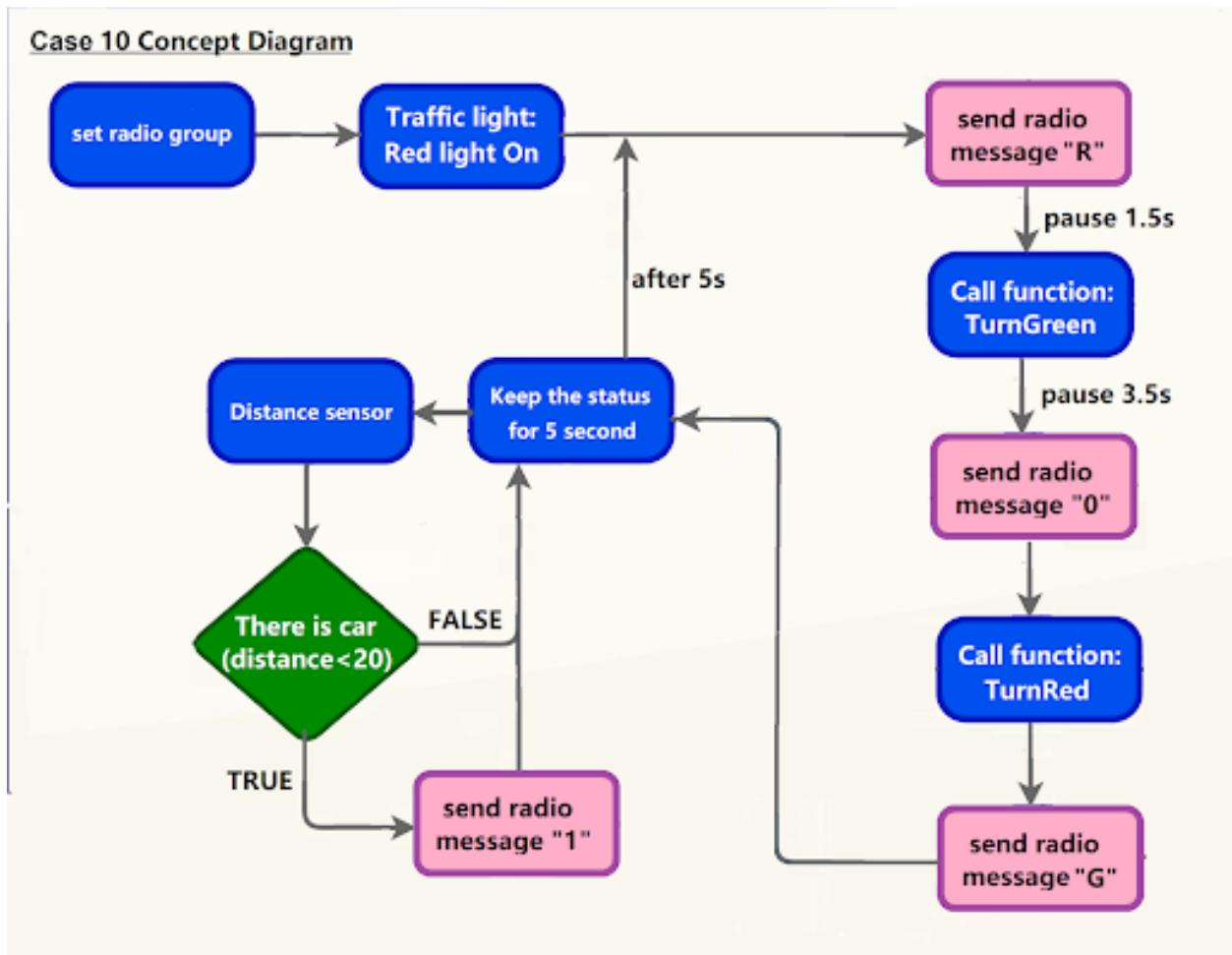
Goal 目標

Background 背景

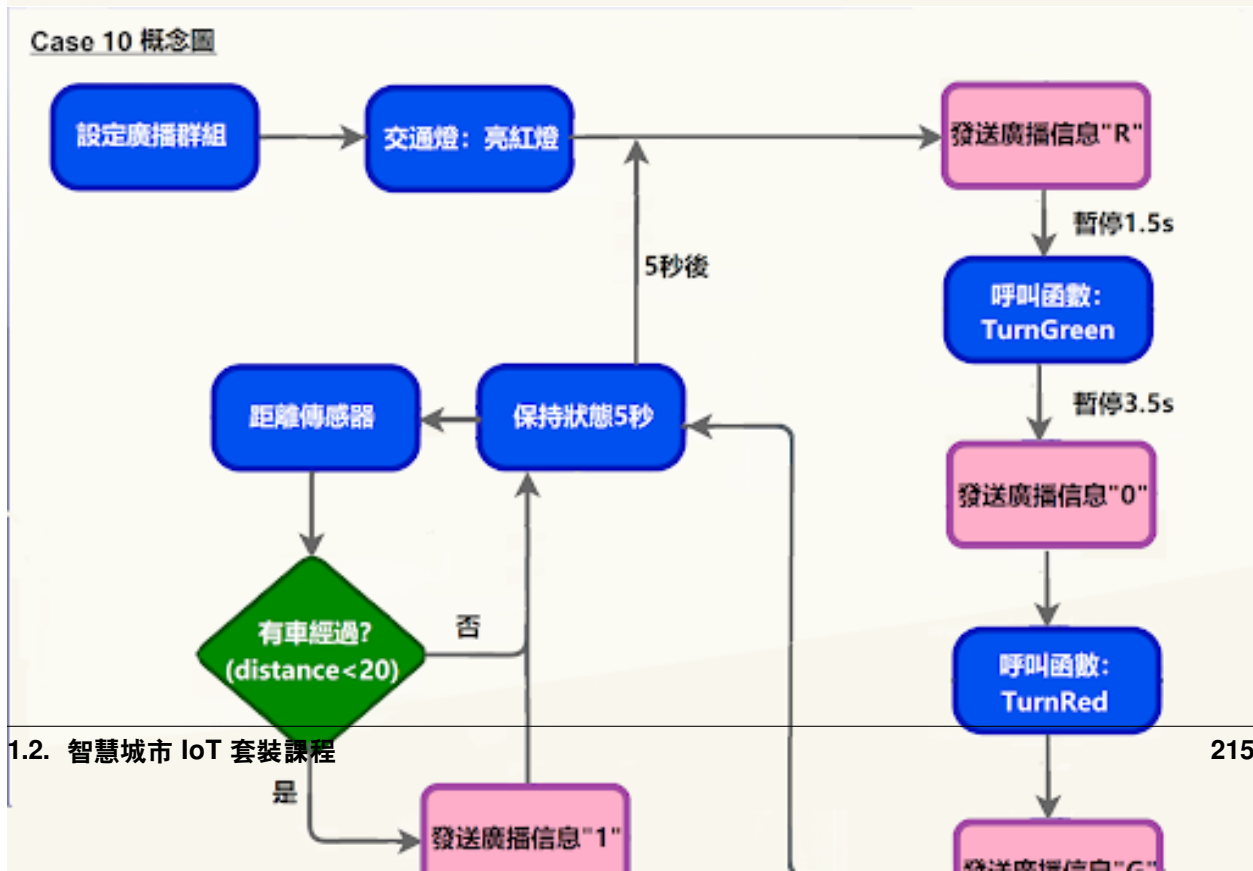
What is a smart traffic light? 什麼是智能交通燈？

Smart traffic light operation 智能交通燈運作

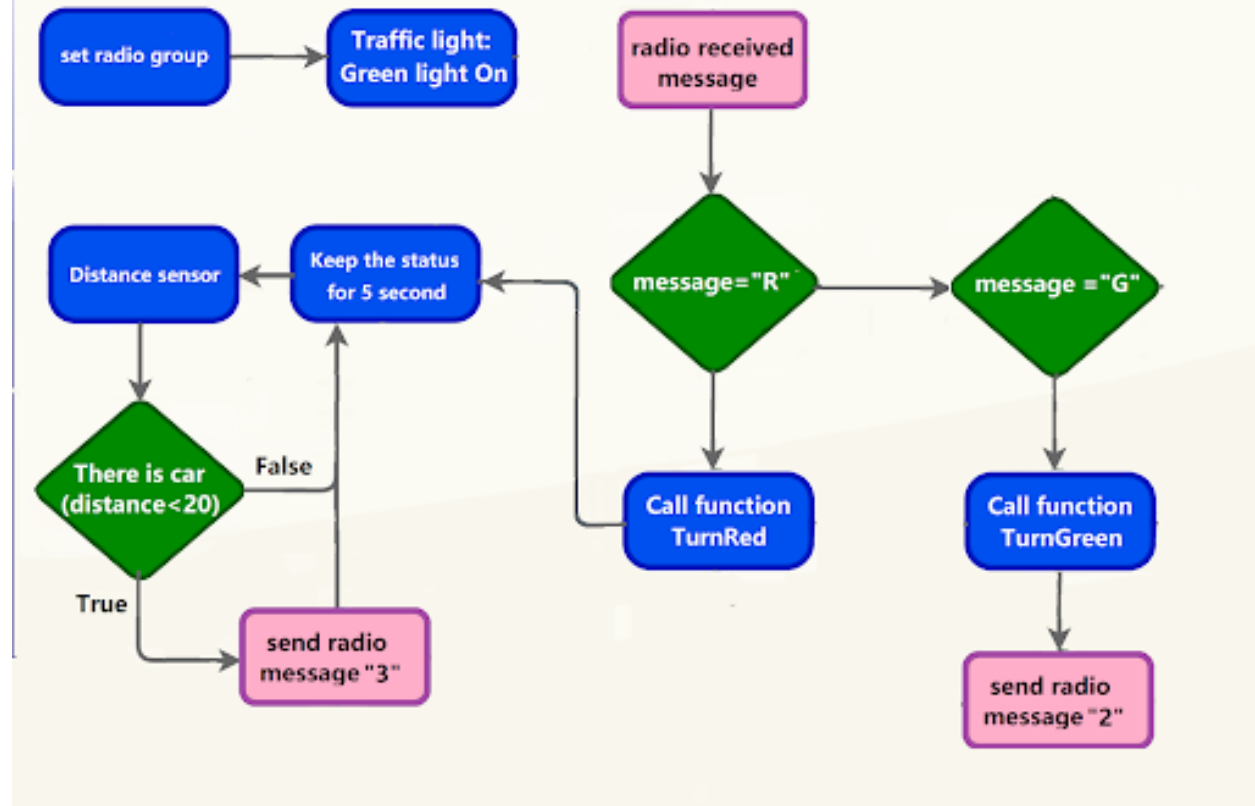
Case 10 Concept Diagram



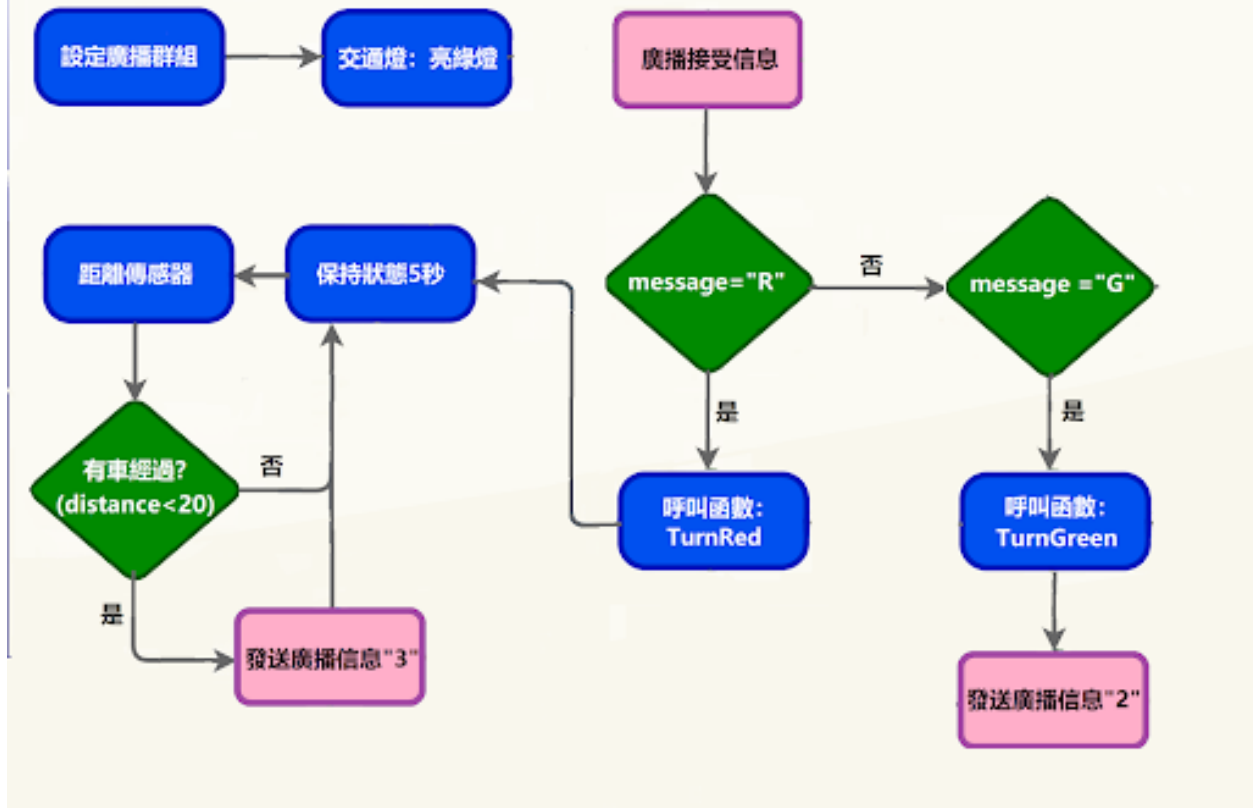
Case 10 概念圖



Case 10 Concept Diagram 2



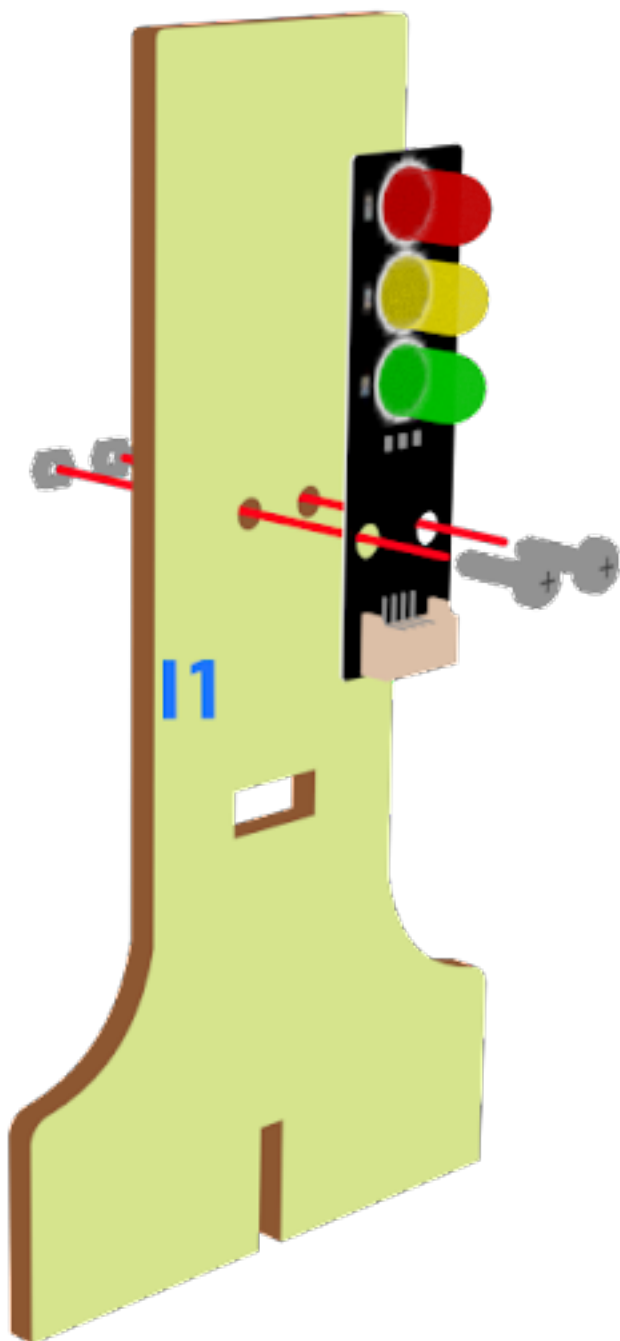
Case 10 概念圖 2



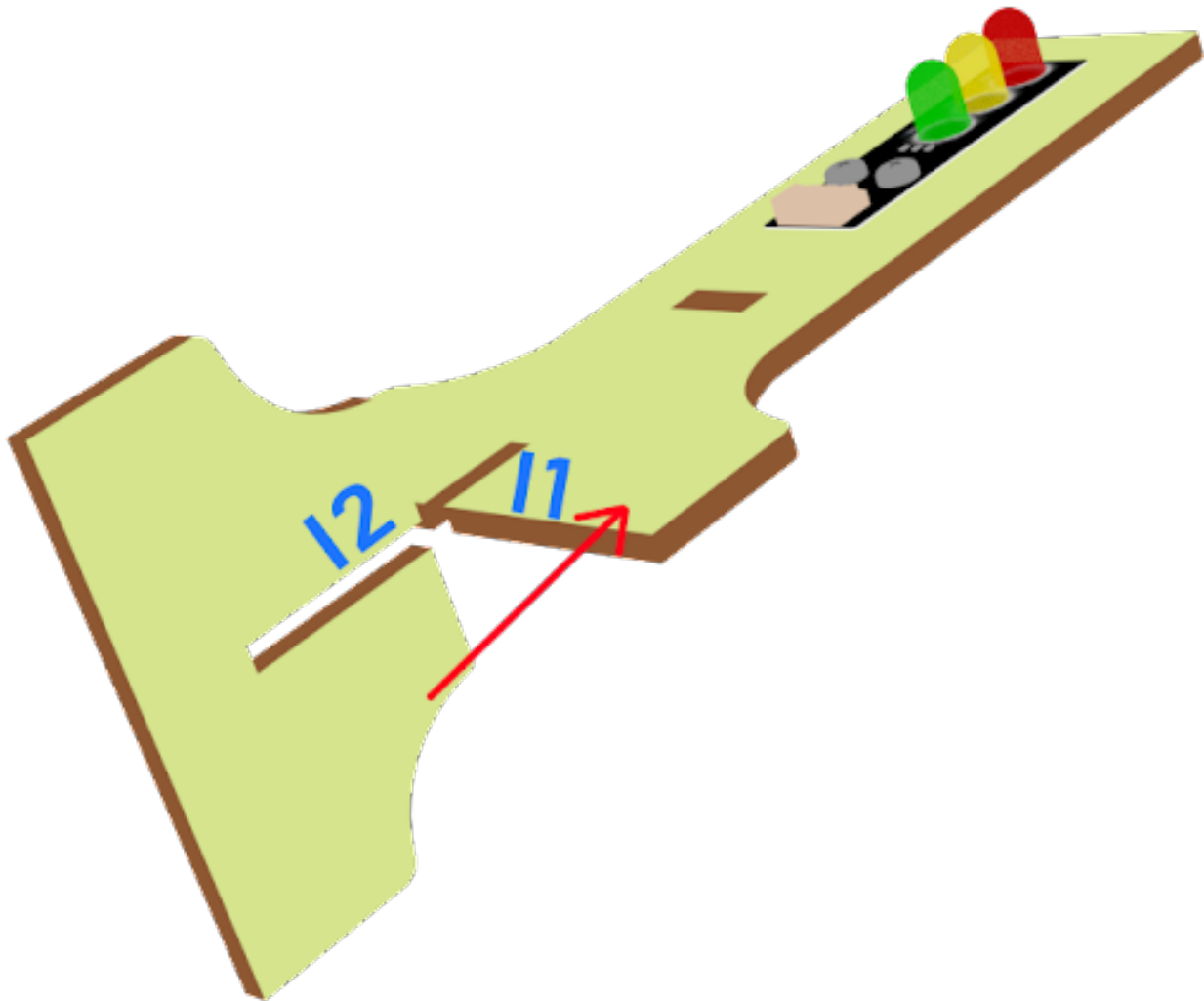
Part List 材料準備

Assembly step 組裝步驟

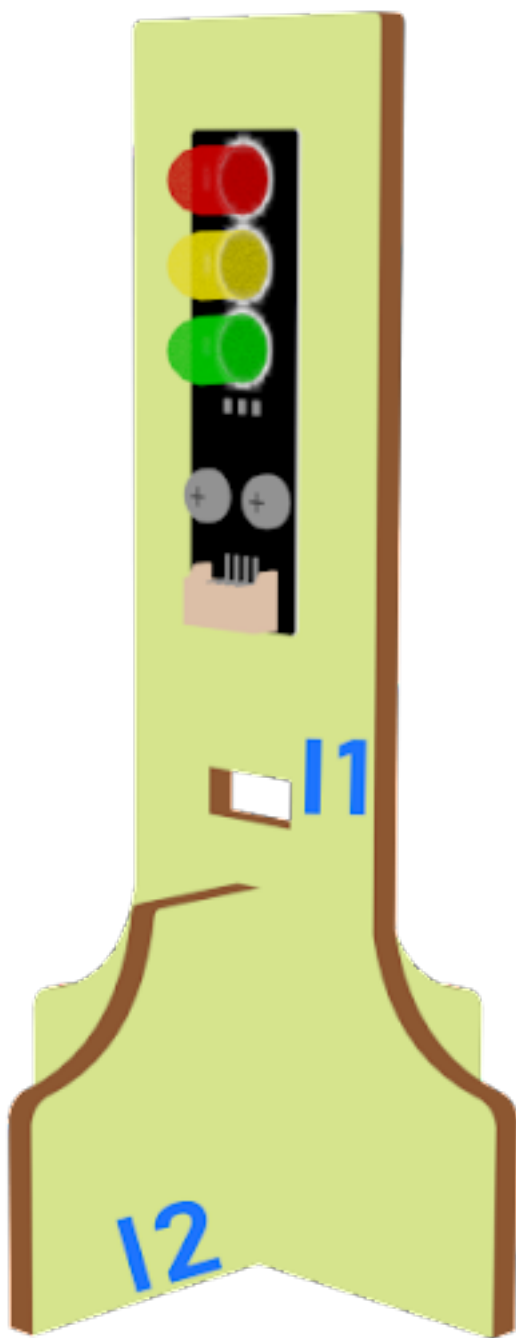
Step 1 第一步



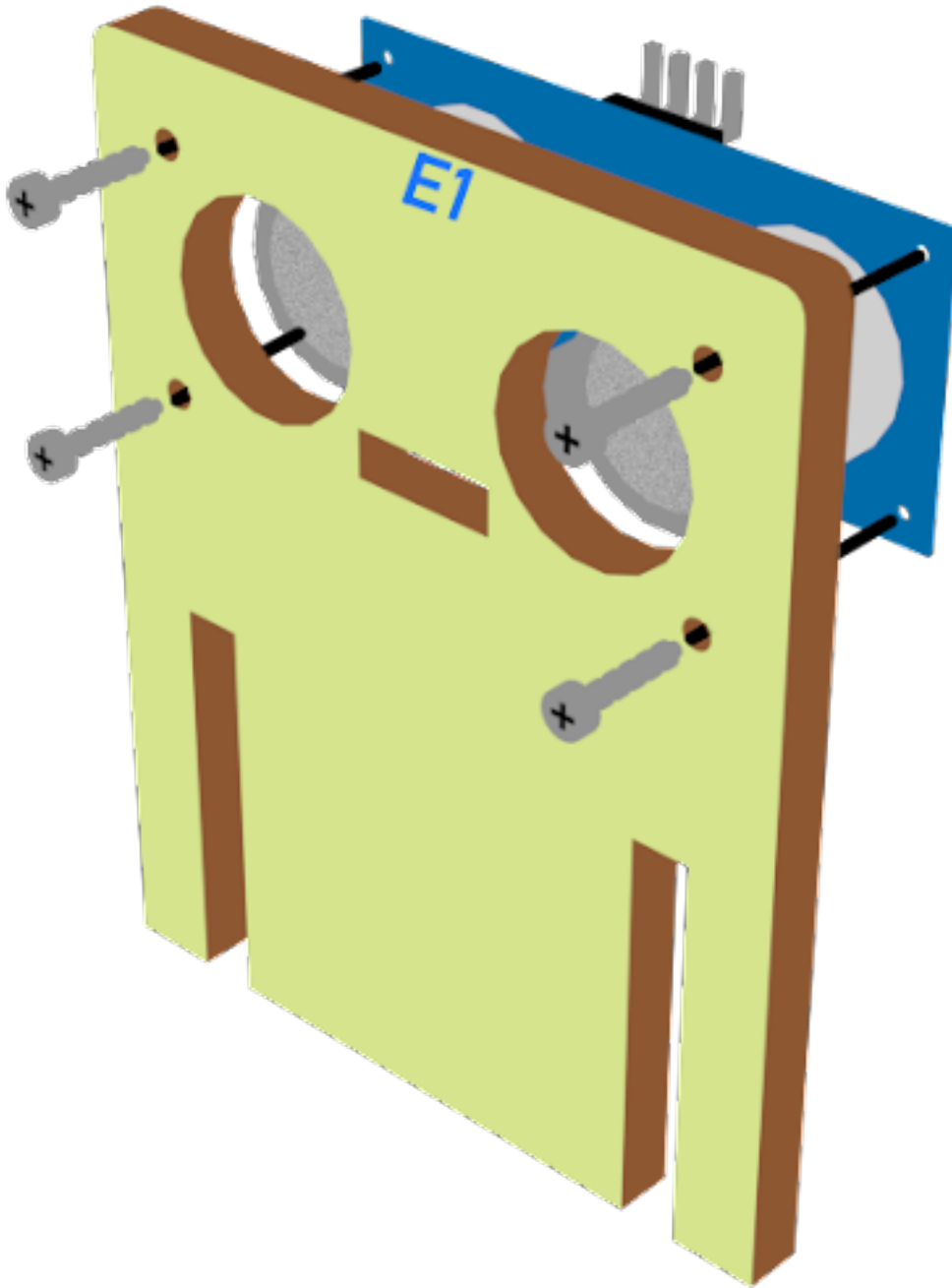
Step 2 第二步



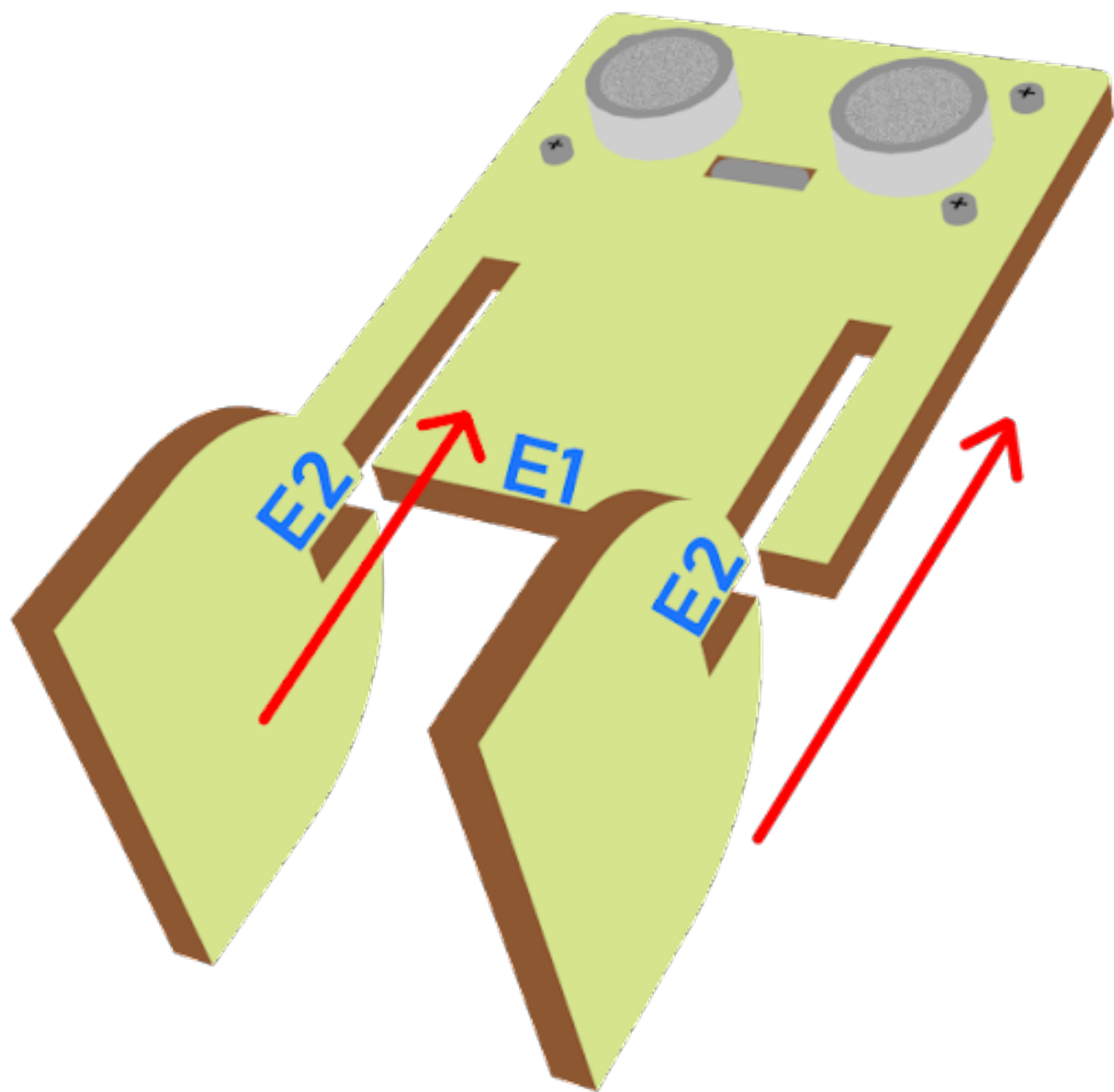
Step 3 第三步



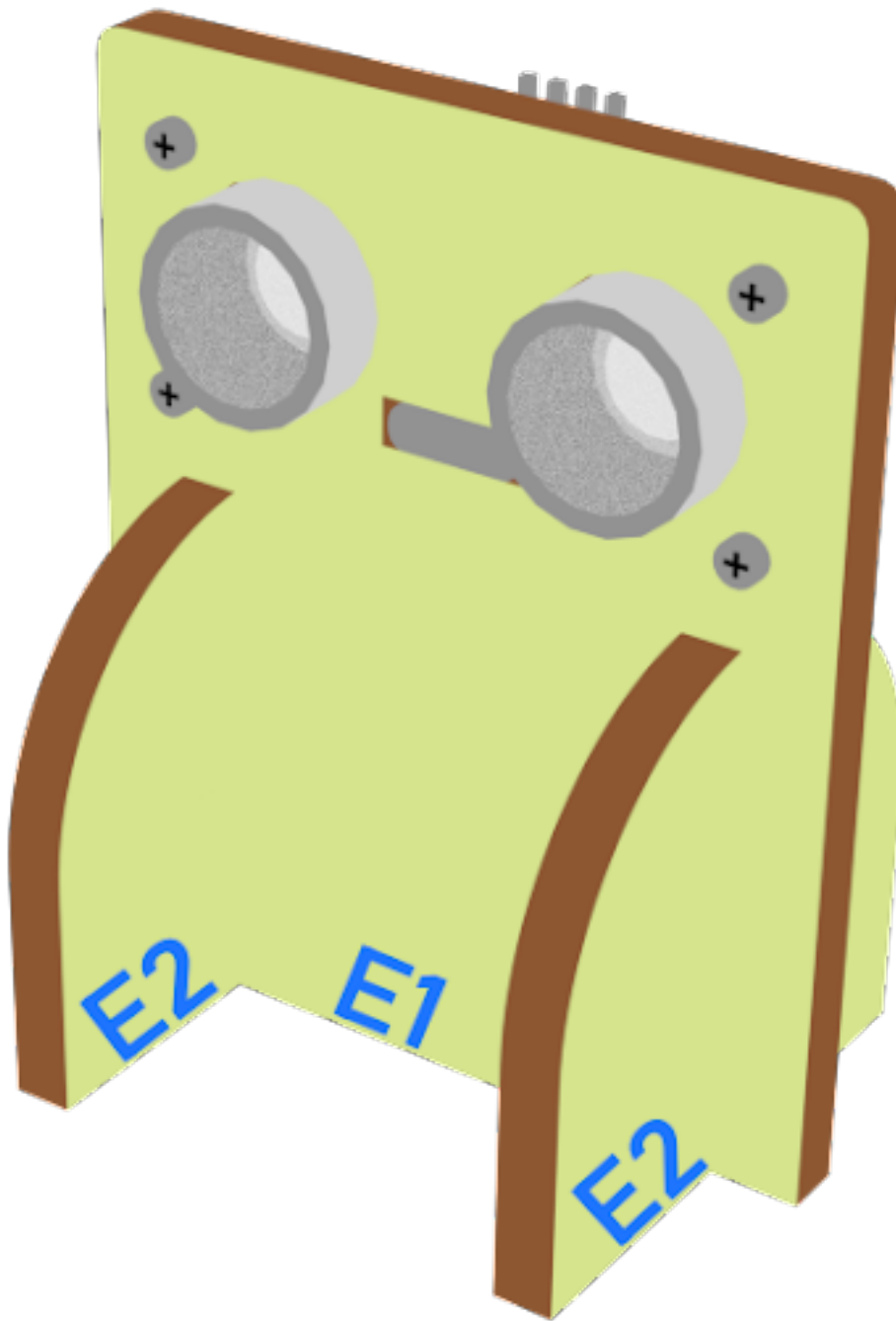
Step 4 第四步



Step 5 第五步



Step 6 第六步



Hardware connect 硬件連接

Programming (MakeCode) 編程

Traffic light 1:

Step 1. Set up a new function (TurnRed) 設置一個新的功能 (TurnRed)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on 控制交通燈亮黃燈
- Snap pause to wait 1 second 暫停一秒
- Control traffic light red on 控制交通燈亮紅燈



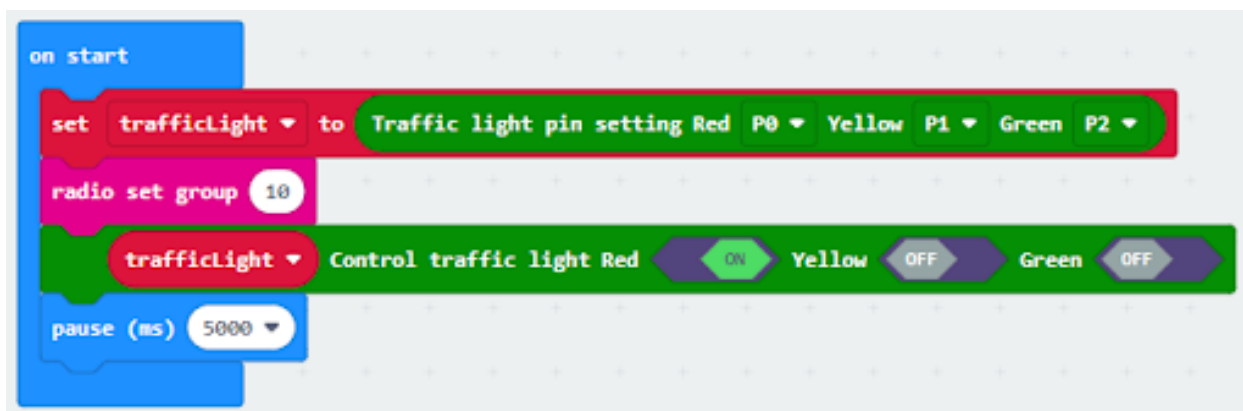
Step 2. Set up a new function (TurnGreen) 設置一个新的功能 (TurnGreen)。

- Snap pause to wait 1 second 暫停一秒
- Control traffic light yellow on 控制交通燈亮黃燈
- Snap pause to wait 1 second 暫停一秒
- Control traffic light green on 控制交通燈亮綠燈



Step 3. Initialize the program 初始化程式

- Drag set variable trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 to on start 將 trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 拖入當啟動時
- Drag radio set group 10 to on start 將廣播群組設為 10 拖入當啟動時
- Control traffic light red on 控制交通燈亮紅燈
- Pause for 5s 暫停 5 秒



Step 4. Keep the green light status for 5 second 保留燈狀態五秒

- Call function TurnGreen 呼叫函數 TurnGreen
- Pause 1.5s before TurnGreen 在此前暫停 1.5s
- Pause 3.5s after TurnGreen 在此後暫停 3.5s



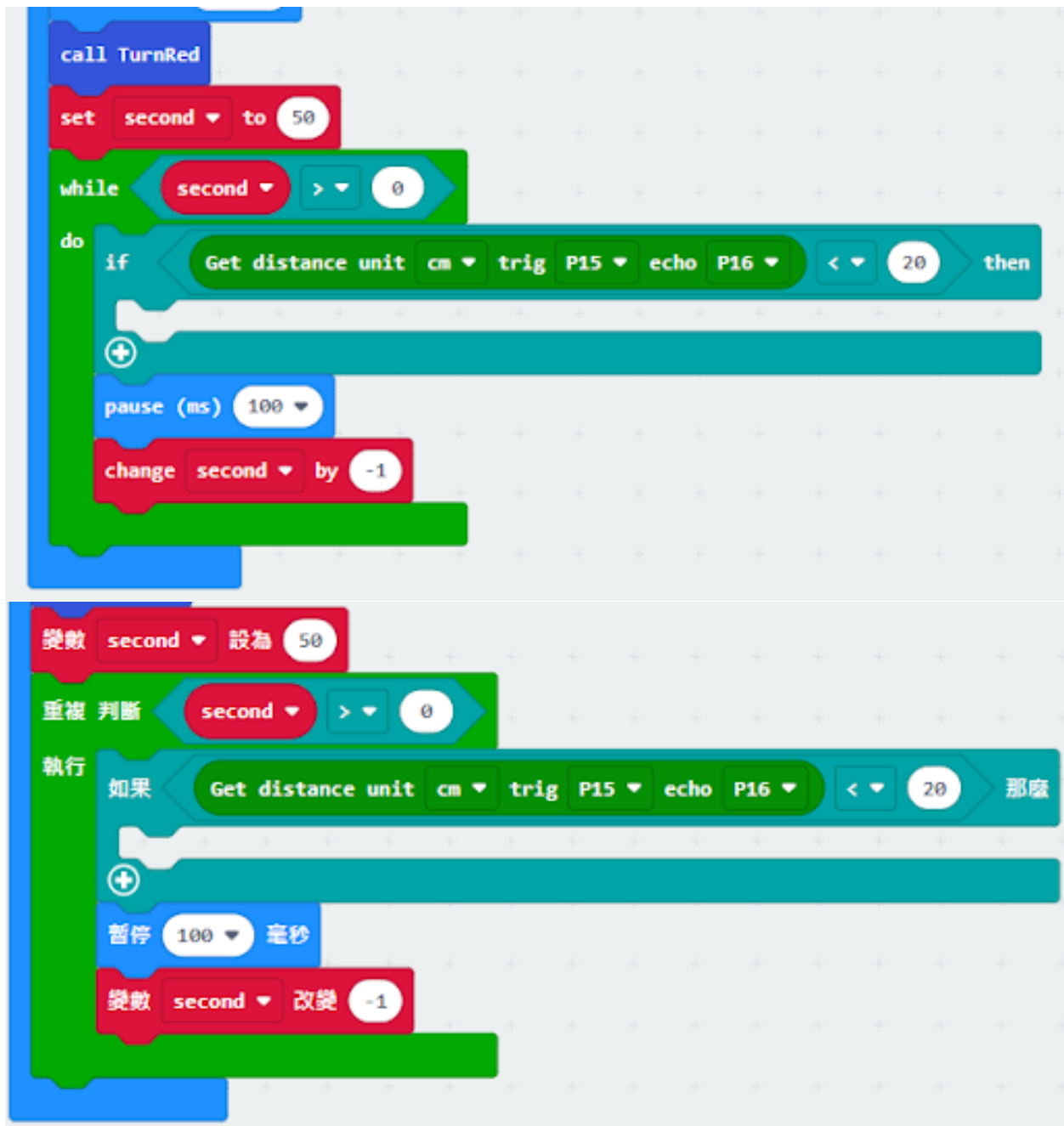
Step 5. Keep the red light status for 5 second 保留紅燈狀態五秒

- Call function TurnRed
- set variable second to 50 設定變數 second 50
- While second > 0, snap pause to 0.1 second and change second by -1. 當 second 大於 0，停止 0.1 秒，改變 second 少 1



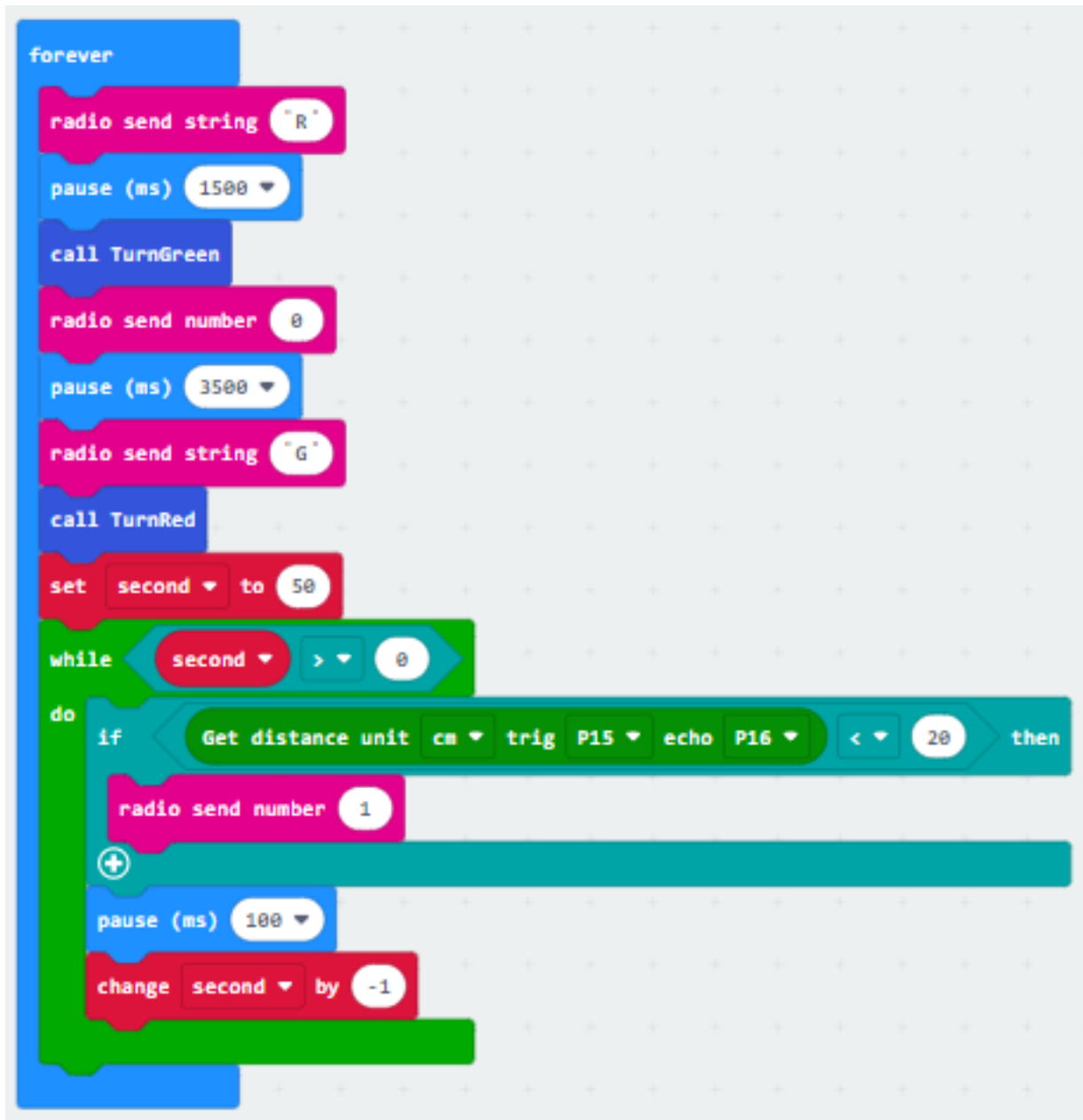
Step 6. Get distance value 獲得距離數值

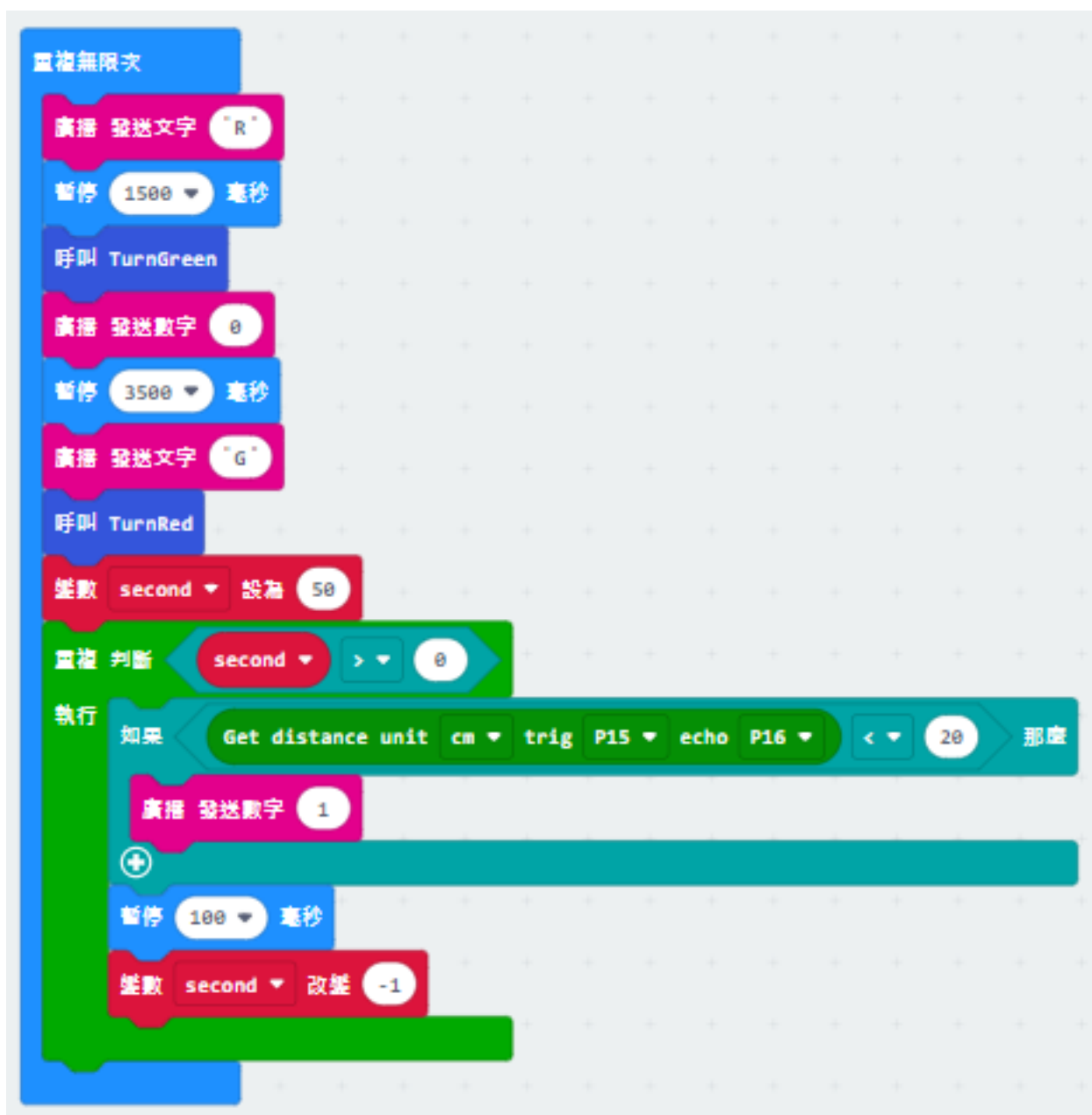
- Snap if statement into while loop, set get distance unit cm trig P15 echo P16 < 20
- 將 get distance unit cm trig P15 echo P16 < 20 的如果句式拖入循環中



Step 7. Control traffic light 2 and car by sending radio number 發送廣播數字以控制交通燈及車輛

- Drag radio send number 1 into if 將廣播發送數字 1 拖入 if 句式
- Drag radio send number 0 after TurnGreen 將廣播發送數字 0 拖到 TurnGreen 後
- Drag radio send string “R” before TurnGreen 將廣播發送字串 “R” 拖到 TurnGreen 前
- Drag radio send string “G” before TurnRed 將廣播發送字串 “G” 拖到 TurnRed 前





Traffic light 2:

Step 1. Set up new functions 設置新的功能。

The image displays three screenshots of a block-based programming environment, showing the setup of two functions: 'TurnRed' and 'TurnGreen'.

TurnRed Function Setup:

- Function Name:** TurnRed
- Block 1:** pause (ms) 1000
- Block 2:** trafficLight Control traffic light Red OFF Yellow ON Green OFF
- Block 3:** pause (ms) 1000
- Block 4:** trafficLight Control traffic light Red ON Yellow OFF Green OFF
- Block 5:** pause (ms) 1000

TurnGreen Function Setup:

- Function Name:** TurnGreen
- Block 1:** pause (ms) 1000
- Block 2:** trafficLight Control traffic light Red OFF Yellow ON Green OFF
- Block 3:** pause (ms) 1000
- Block 4:** trafficLight Control traffic light Red OFF Yellow OFF Green ON
- Block 5:** pause (ms) 1000

Final Setup (Chinese Interface):

- TurnRed Function:**
 - 暫停 1000 毫秒
 - trafficLight Control traffic light Red 關 Yellow 開 Green 關
 - 暫停 1000 毫秒
 - trafficLight Control traffic light Red 開 Yellow 關 Green 關
 - 暫停 1000 毫秒
- TurnGreen Function:**
 - 暫停 1000 毫秒
 - trafficLight Control traffic light Red 關 Yellow 開 Green 關

Step 2. Initialize the program

- Drag set variable trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 to on start 將 trafficLight to Traffic light pin setting Red P0 Yellow P1 Green P2 拖入當啟動時
- Drag radio set group 10 to on start 將廣播群組設為 10 拖入當啟動時
- Control traffic light green on 控制交通燈亮 F 燈
- Pause for 5s 暫停 5 秒



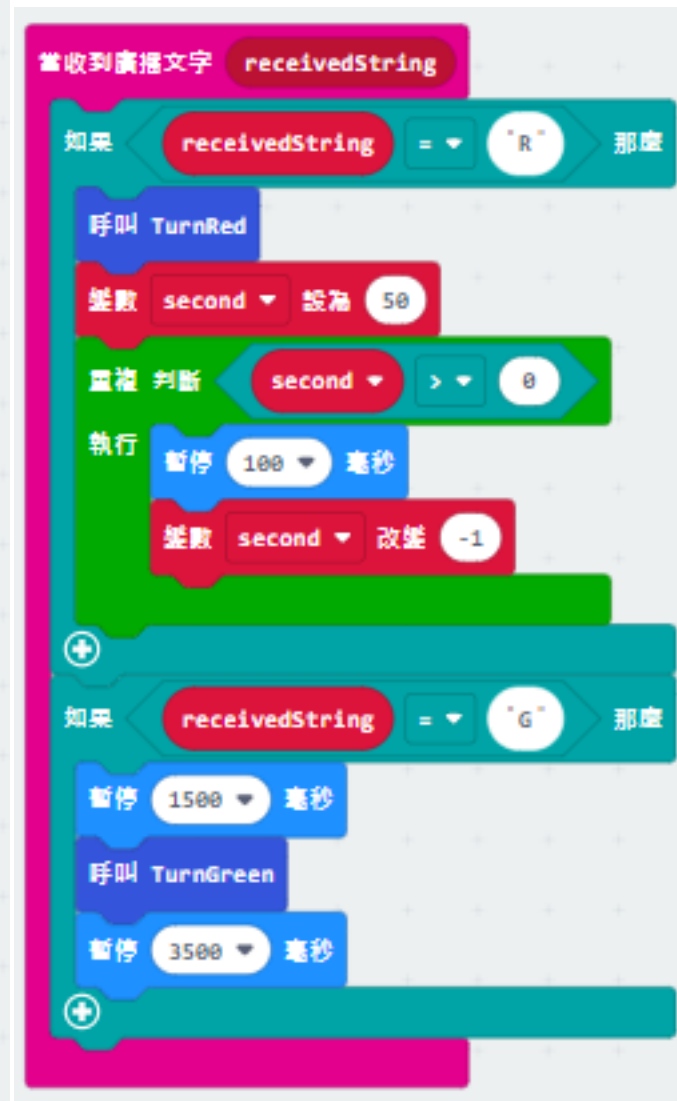
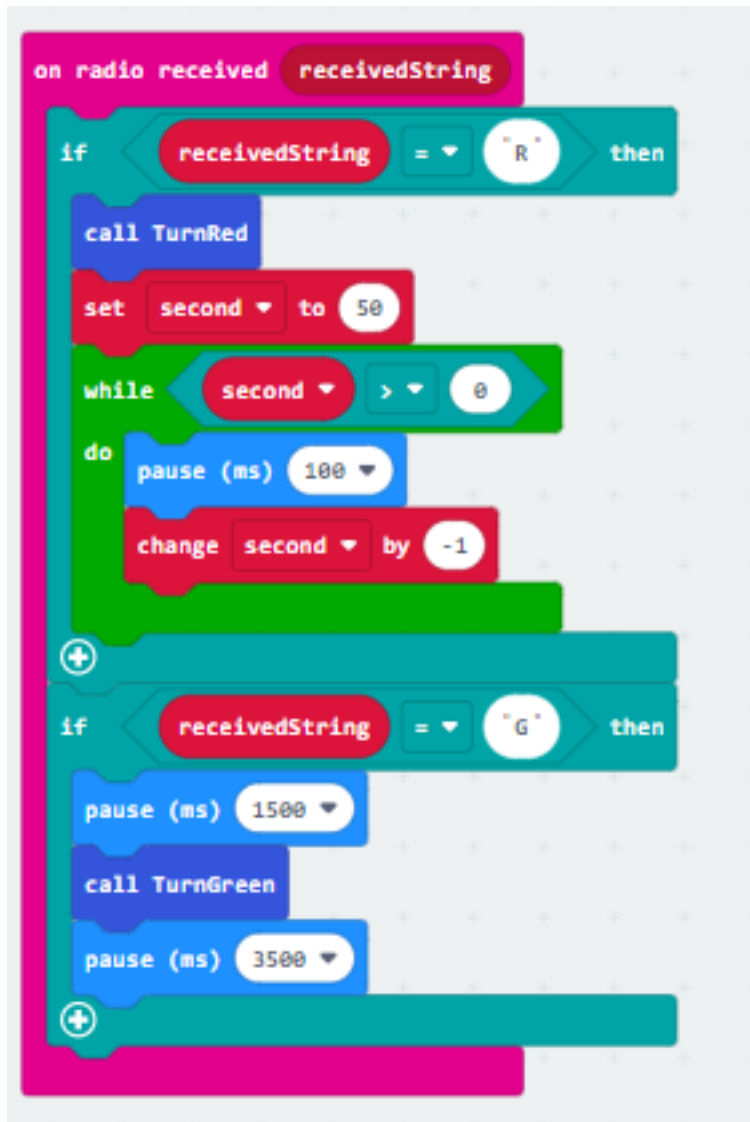
Step 3. Control traffic light and car by receiving different number 通過接收不同數字來控制交通燈及車輛

- Snap if statement into on radio received receivedString 將如果語句放入當收到廣播數字 receivedString
- Set receivedString = "R" and call TurnRed 設 receivedString=" R", F 呼叫 TurnRed
- Set receivedString = "G" and call TurnGreen 設 receivedString=" G", F 呼叫 TurnGreen



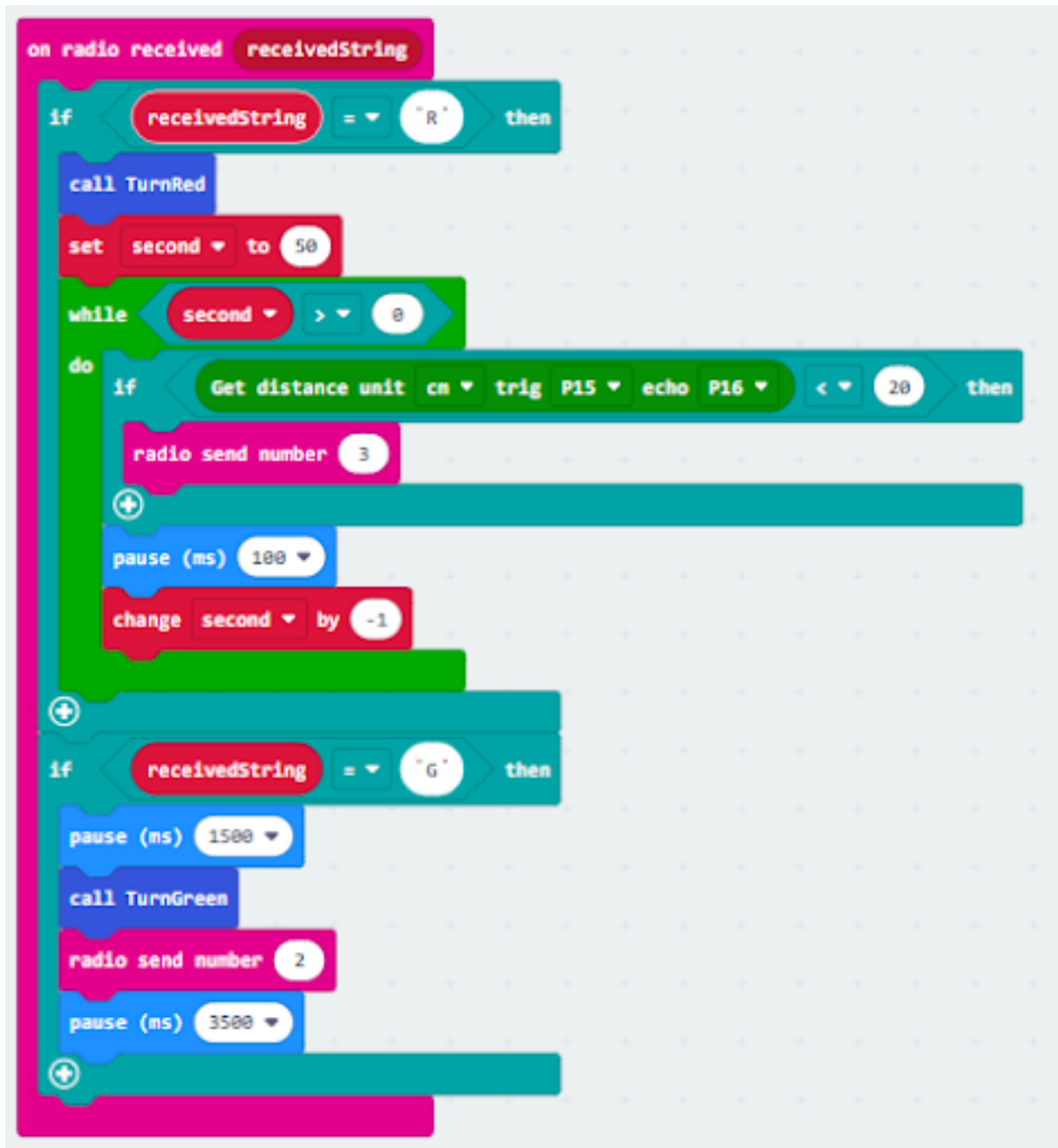
Step 4. Keep the red light status for 5 second 保留紅燈狀態五秒

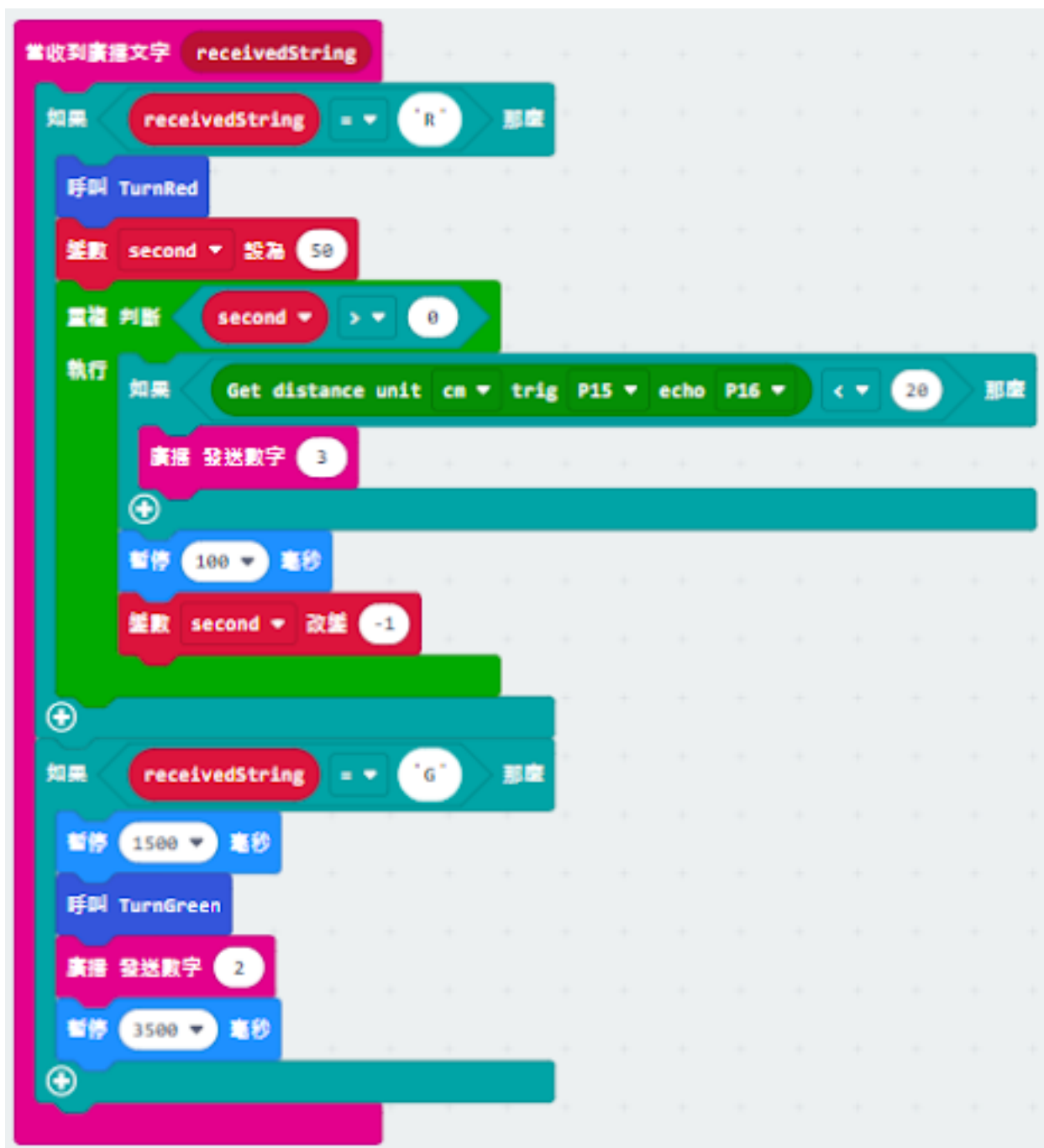
- After TurnRed, set variable second to 50 設定變數 second 50
- While second > 0, snap pause to 0.1 second and change second by -1. 當 second 大於 0，停止 0.1 秒，改變 second 少 1
- Before TurnGreen, pause 1.5s
- After TurnGreen, pause 3.5s



Step 5. Get distance value and control the car 獲得距離數值控制車輛

- Snap if statement into while loop, set get distance unit cm trig P15 echo P16 < 20
- 將 get distance unit cm trig P15 echo P16 < 20 的如果句式拖入循環中
- Drag radio send number 3 into if 將廣播發送數字 1 拖入 if 句式
- Drag radio send number 2 after TurnGreen 將廣播發送數字 0 拖到 TurnGreen 後



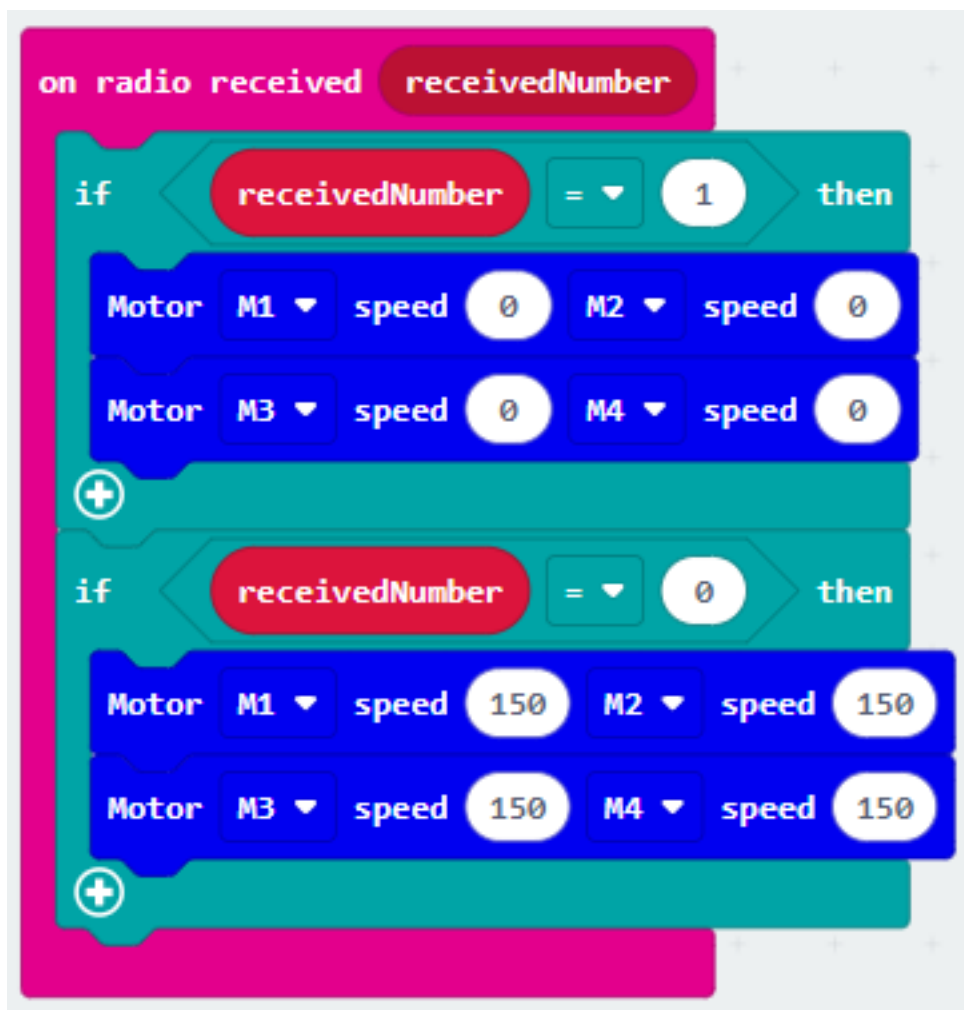


Car 1:**Step 1. Set radio set group at start position 在起始位置設置廣播群組**

- Drag radio set group 10 to on start 將廣播群組設為 10 拖入當啟動時

**Step 2. Control car by receiving different number 通過接收不同數字來控制車輛**

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =1 and make the car stop 設 receivedNumber =1, 控制制車。
- Set receivedNumber=0 and make the car move forward 設 receivedNumber=0, 讓車向前移動。





Car 2:

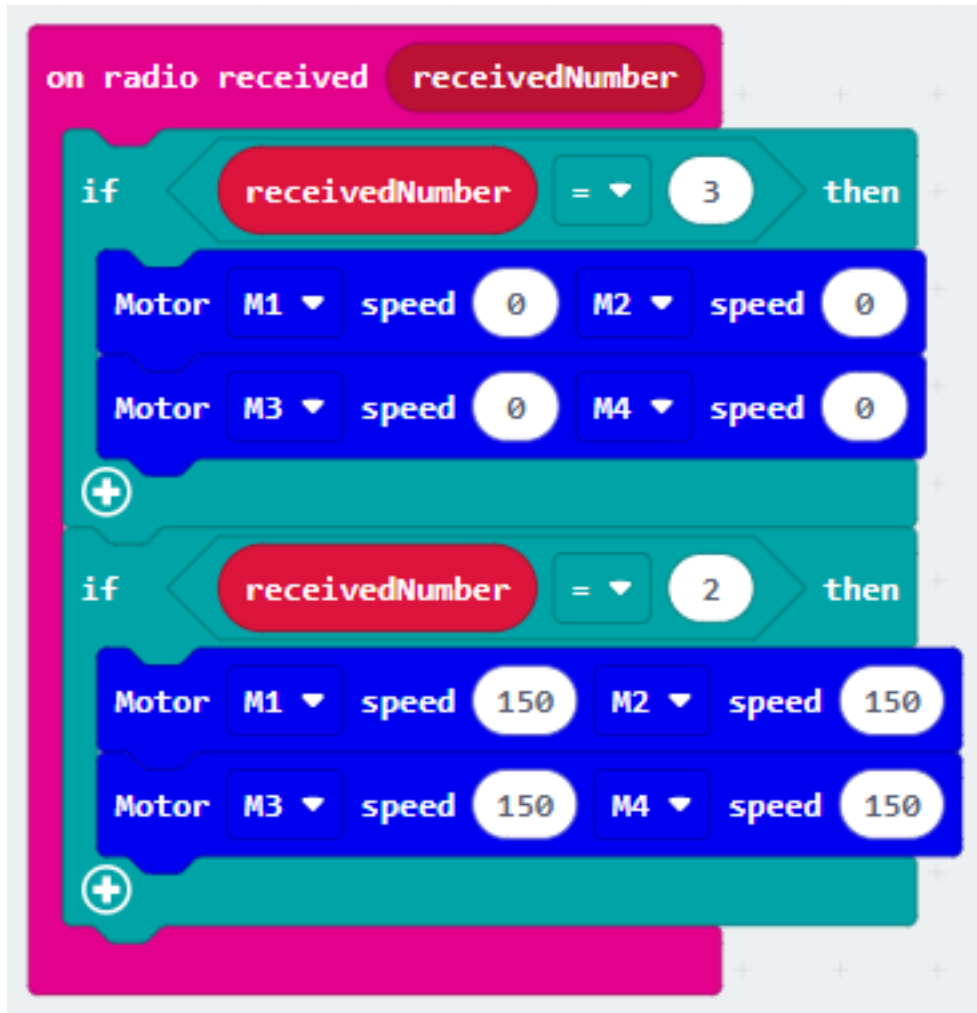
Step 1. Set radio set group at start position 在起始位置設置廣播群組

- Drag radio set group 10 to on start 將廣播群組設為 10 拖入當啟動時



Step 2. Control car by receiving different number 通過接收不同數字來控制車輛

- Snap if statement into on radio received receivedNumber 將如果語句放入當收到廣播數字 receivedNumber
- Set receivedNumber =3 and make the car stop 設 receivedNumber =3, 控制制車。
- Set receivedNumber=2 and make the car move forward 設 receivedNumber=2, 讓車向前移動。





Result 總結

Think 思考