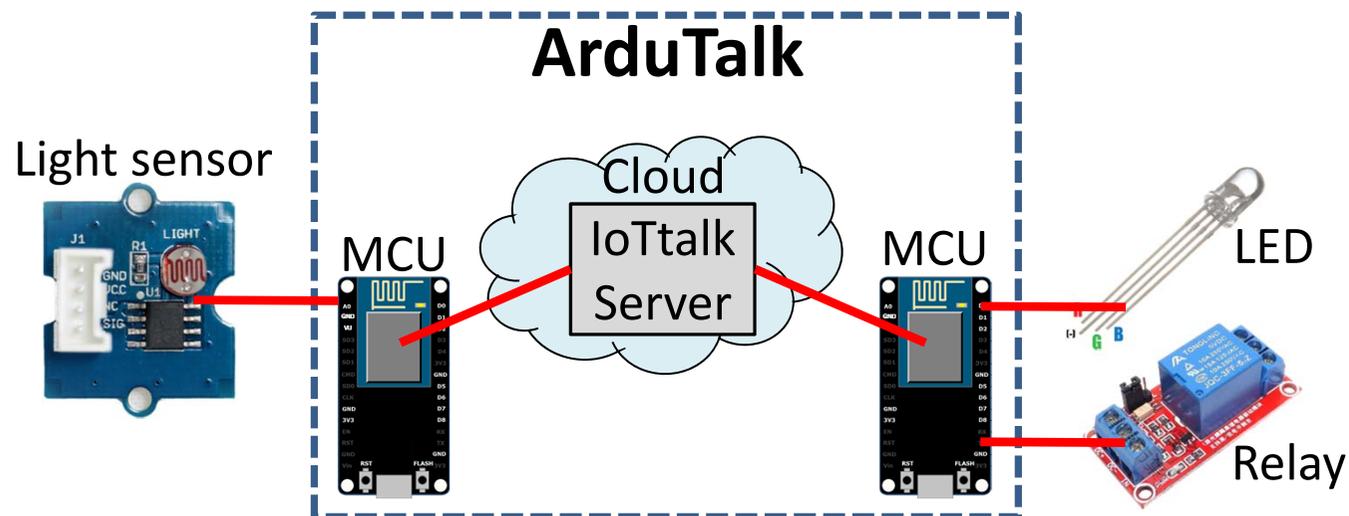




# ArduTalk是什麼?

- ArduTalk為基於IoTtalk上提供快速Arduino網路應用開發環境
- 透過ArduTalk可以快速實現單一板子之物聯網應用或是多個板子互聯之應用

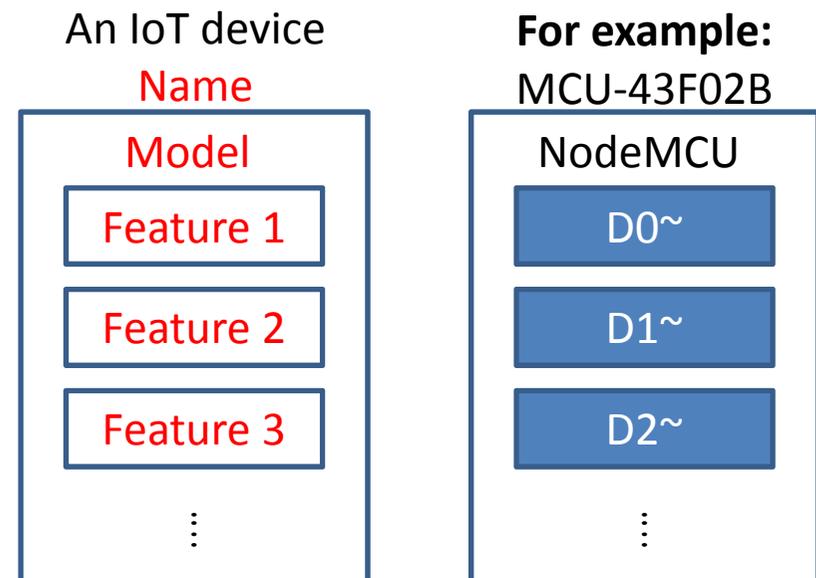


# IoTtalk是什麼?

- IoTtalk 是一物聯網管理平台
- IoT 設備管理概念
  - **Device Feature (DF)**
    - 一個物聯網設備所提供之功能/能力
    - 輸入功能 (Input device feature, **IDF**)
    - 輸出功能 (Output device feature, **ODF**)

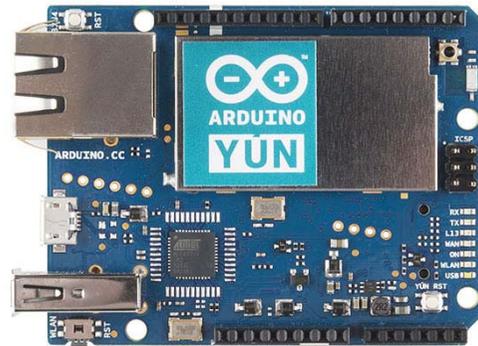
- **Device Model (DM)**

- DM為數個DF之集合
- 一個 DM為對應著某一個物聯網設備



# ArduTalk可使用之微控板

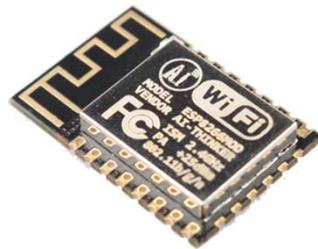
Arduino Yun



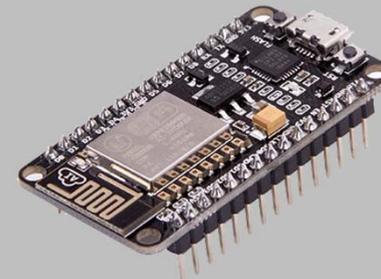
LinkIt Smart 7688 Duo



ESP8266

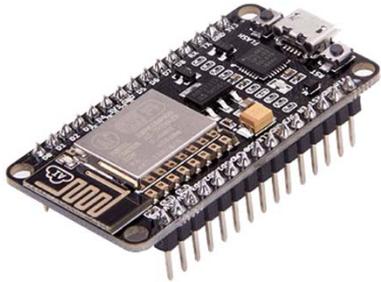


NodeMCU



# ArduTalk物聯網應用開發實驗材料

NodeMCU



麵包板 X 2



Micro USB  
電源線



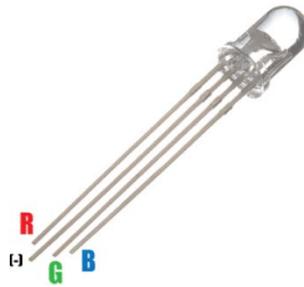
杜邦線



Light sensor



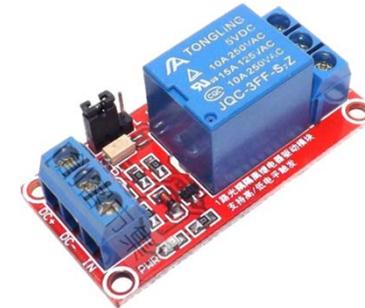
RGB LED



220R電阻



Relay



# NodeMCU (已燒錄ArduTalk)

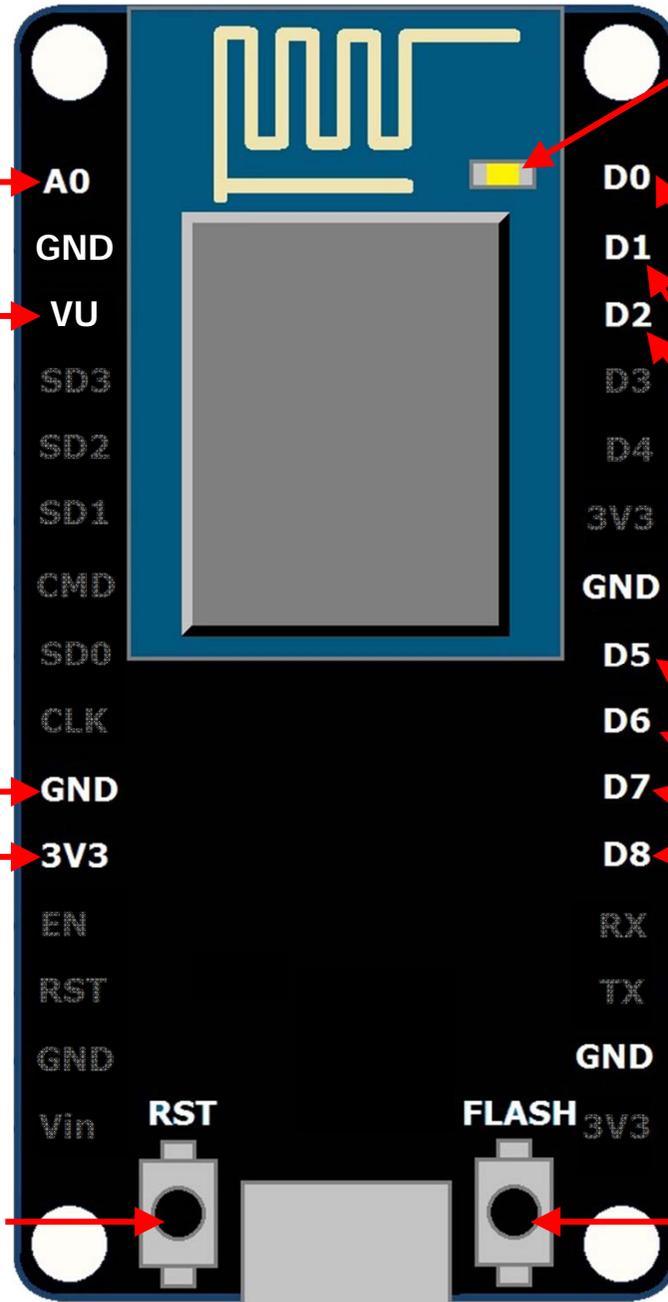
A0 類比輸入Pin腳

供應5V電源

負極  
供應3.3V電源

按一下後重新啟動板子

插入Micro USB供電 (5V)



過電後燈號意義：

沒亮:AP模式(需設定WiFi)

恆亮:無法連上IoTtalk主機

每兩秒閃一下:連上IoTtalk

並可以開始使用

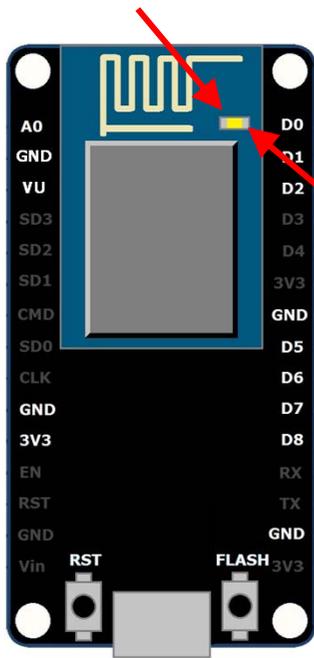
D0, D1, D2  
PWM訊號  
輸出Pin腳

D5, D6, D7, D8  
數位輸出Pin腳

持續按3秒後清除Wi-Fi設定

# ArduTalk聯網設定

1. 過電後燈號沒亮:在 AP 模式(需設定WiFi)



2. 經由自己的手機或電腦  
掃描WiFi AP, 找尋自己所屬的  
MCU-xxxxxxxxxxxx  
六個x是MAC代號



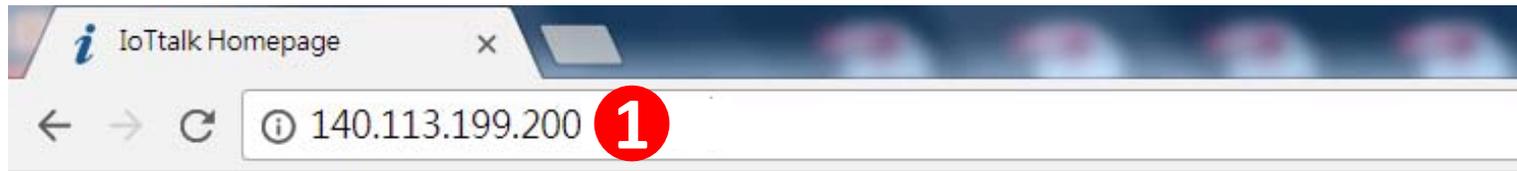
若等一陣子還是  
沒看到可按一下  
RST按鈕再找找

3. 用手機或電腦  
開啟瀏覽器, 網址輸入  
192.168.0.1



6. 連線成功後燈號每兩秒閃一下  
表示已連上IoTtalk並可以開始使用

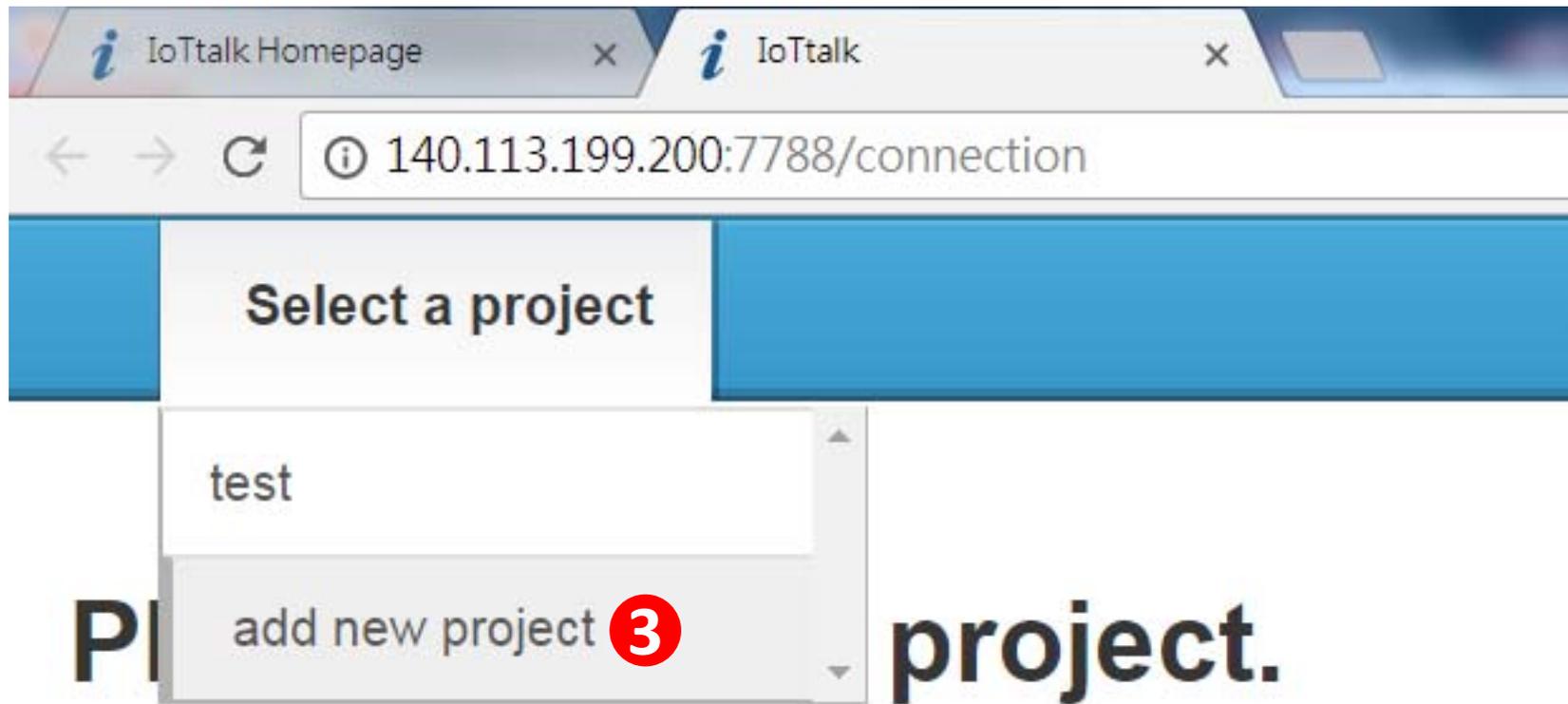
# 如何在IoTalk上叫出NodeMCU?



## IoTalk:

- Project 2
- Device Feature Management
- Download Device Feature
- Device Monitor

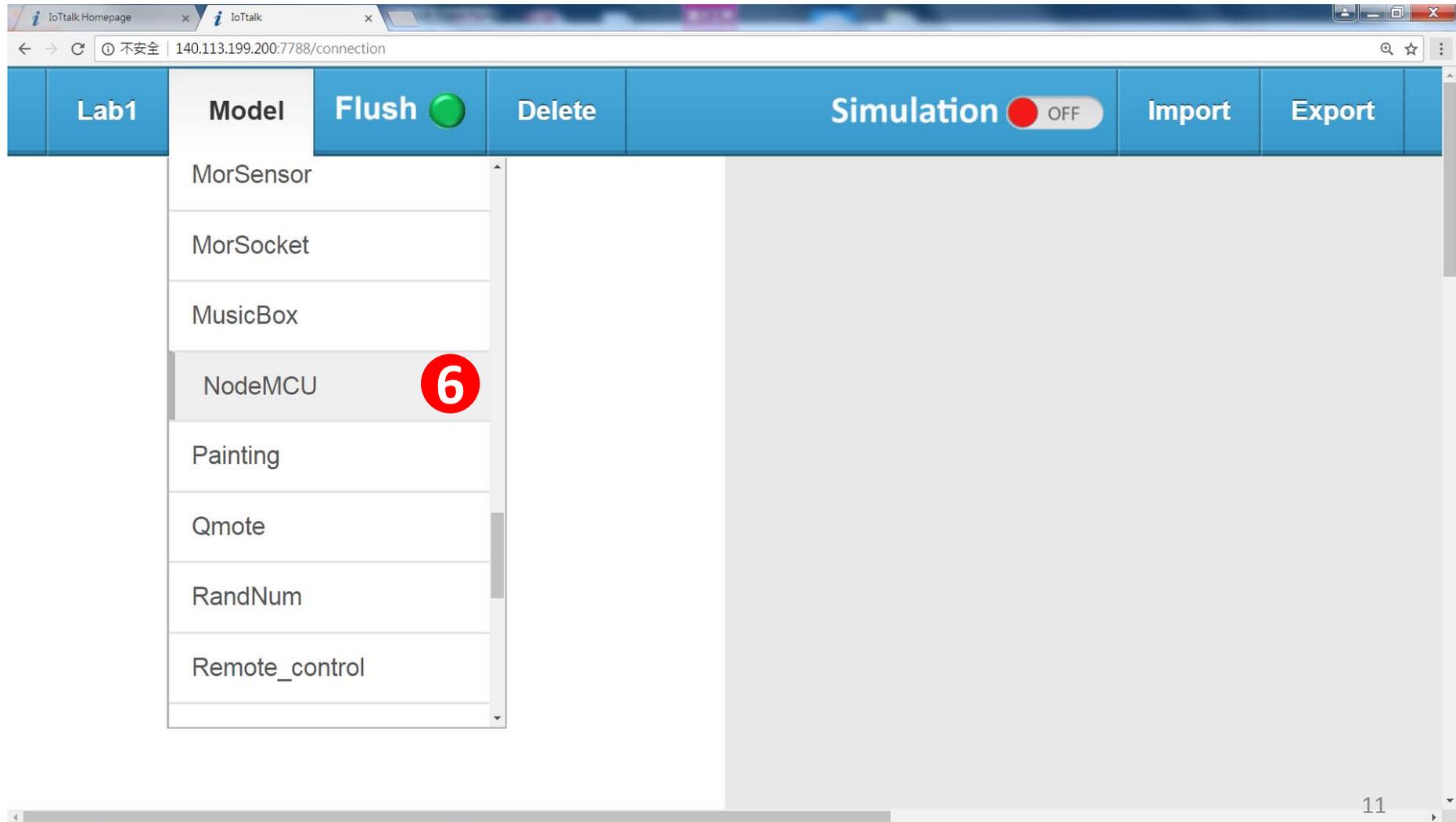
## 新增屬於自己的專案Project



## 命名專案並指定密碼



## 在Model選單中點擊NodeMCU



# 勾選需要的IDF/ODF

Lab1 Model Flush Delete Simulation OFF Import Export

DA Installation

Send DA To Email Address: Please enter your email address send

Send DA To Phone Number: Please enter your phone number send

NodeMCU

7 Input Device Features 勾選需要使用的 Input Device Feature

- A0

Output Device Features

8 勾選需要使用的 Output Device Feature

- D0~
- D1~
- D2~
- D5
- D6
- D7
- D8

9 Save

12

# 連接正確的板子

The screenshot shows the IoTalk web interface. At the top, there is a navigation bar with buttons for 'Lab1', 'Model', 'Flush' (with a green indicator), 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. Below this, there are two main panels. The left panel shows a 'NodeM' device with a gear icon circled in red. Below it is a text box: '若為灰色字體可點擊此處連接裝置'. The right panel shows a list of devices: 'NodeM' (with a gear icon circled in red), 'D D0~', 'D D1~', 'D D2~', 'D D5', 'D D6', 'D D7', and 'D D8'. To the right of this list is a larger panel showing MAC addresses: '420fdf', '520cff', and '5409fd' (circled in red). A red circle with the number '10' is next to '5409fd'. Below this panel is a text box: '選擇自己的裝置 可比對板子背面的MAC編號後六碼 例如MAC編號為 2c3ae85409fd 則5409fd為自己的板子'. A red arrow points from the circled '5409fd' to the text box.

若為灰色字體可點  
擊此處連接裝置

選擇自己的裝置  
可比對板子背面的MAC編號後六碼  
例如MAC編號為 2c3ae85409fd  
則5409fd為自己的板子

# IoTtalk操作畫面

IoTtalk Homepage x IoTtalk x

← → ↻ 不安全 | 140.113.199.200:7788/connection 🔍 ☆ ⋮

Lab1 Model Flush ● Delete Simulation ● OFF Import Export

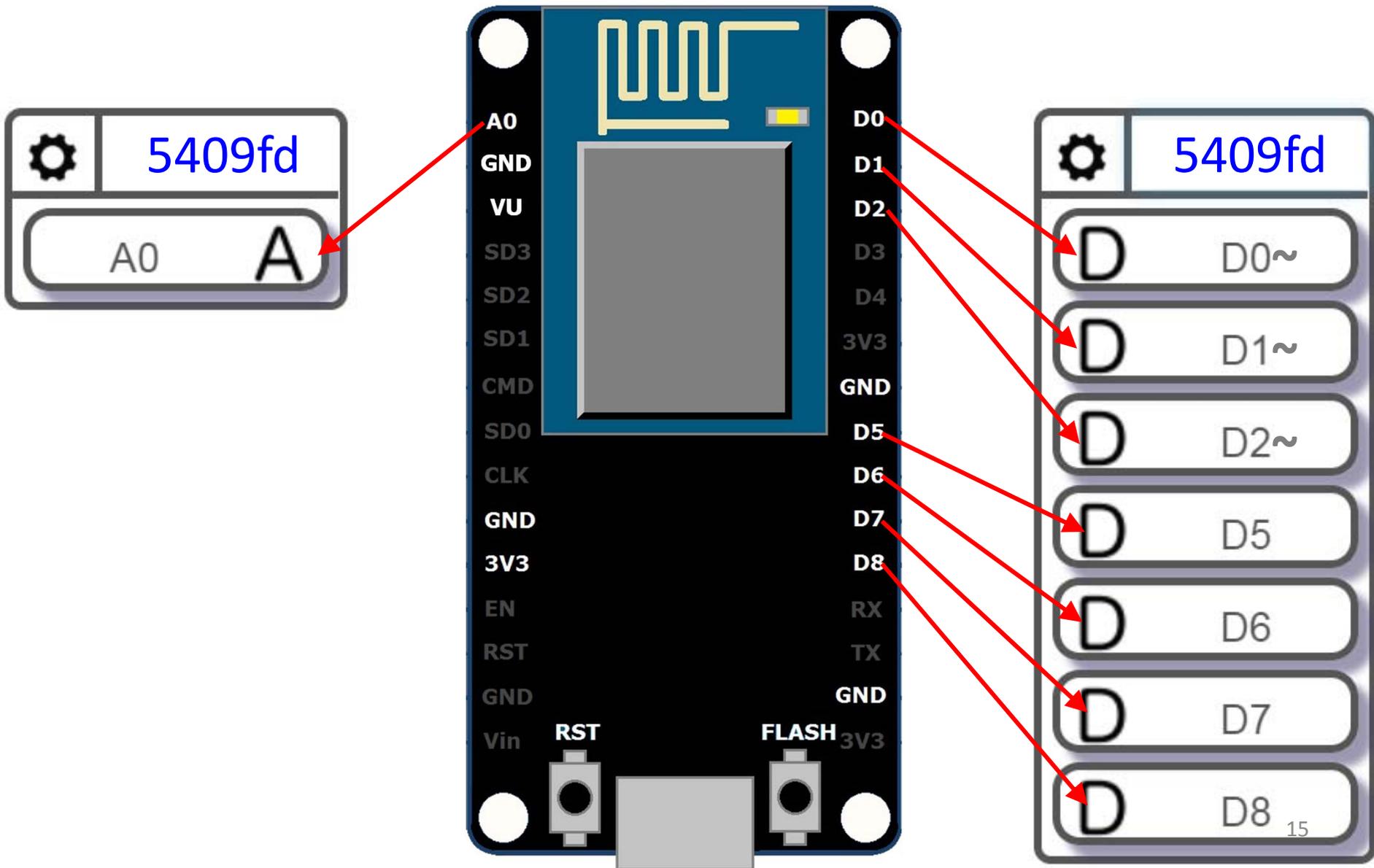
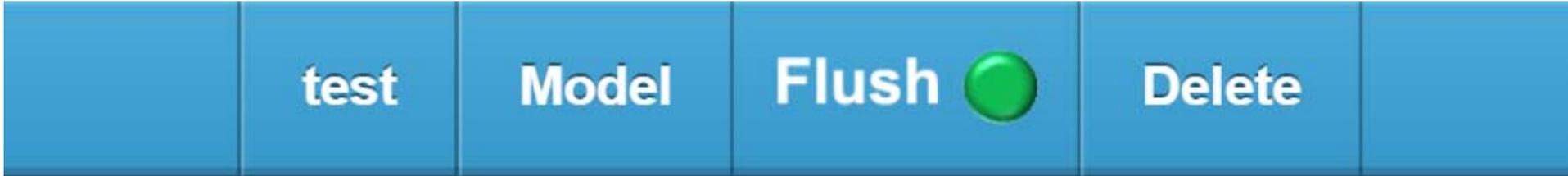
5409fd A0 A

5409fd D D0~ D D1~ D D2~ D D5 D D6 D D7 D D8

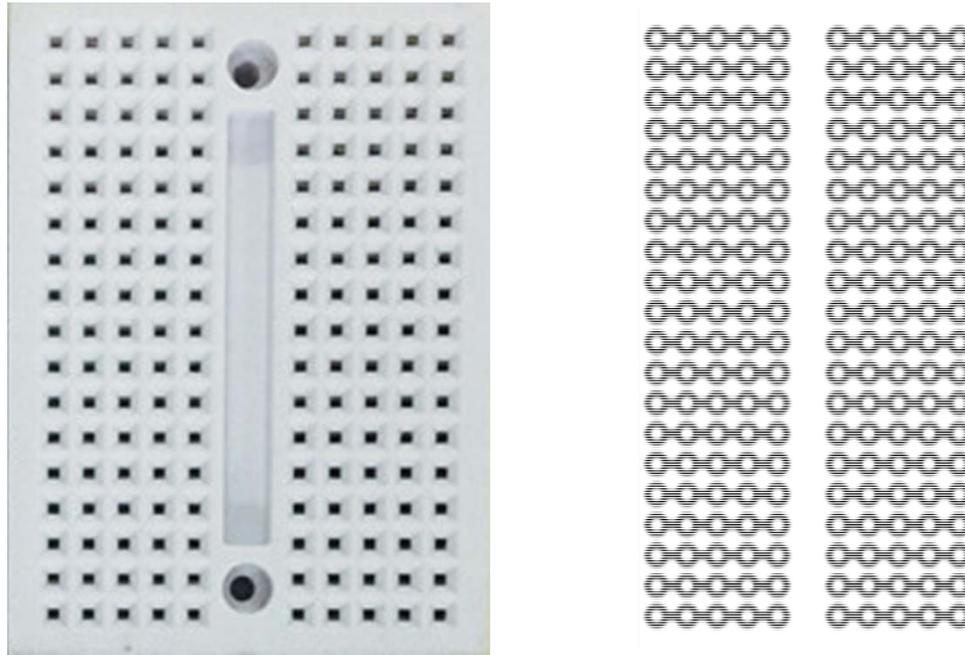
輸入端  
Input Device  
Feature

輸出端  
Output Device  
Feature

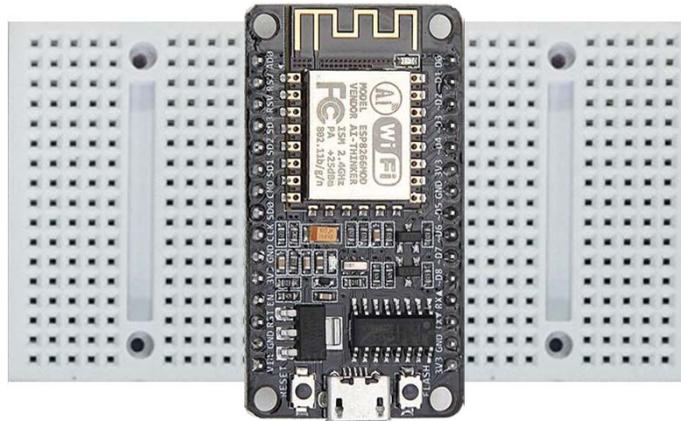
藍色字體且是正確號碼的板子即連結完成



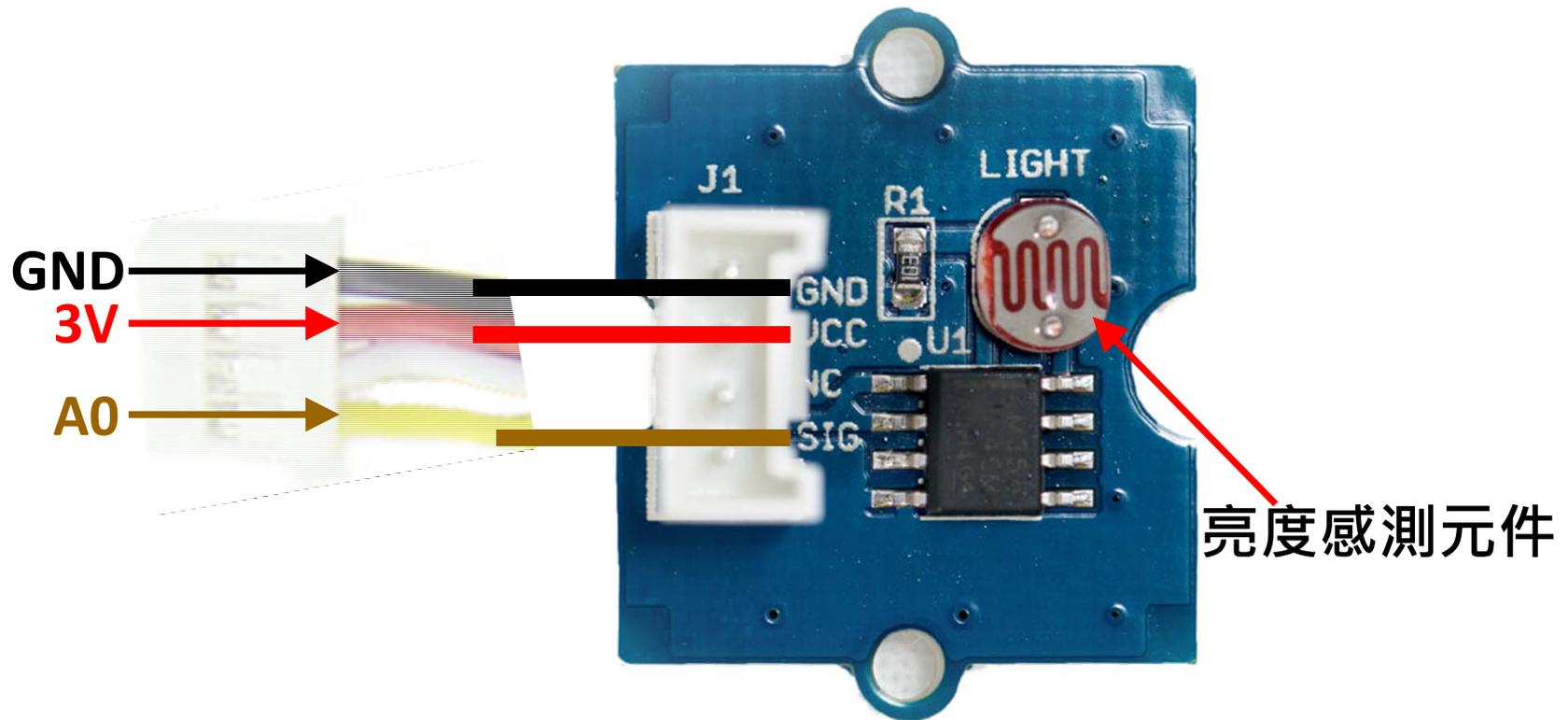
## 麵包板



將兩塊麵包板與NodeMCU組合方便後續實作

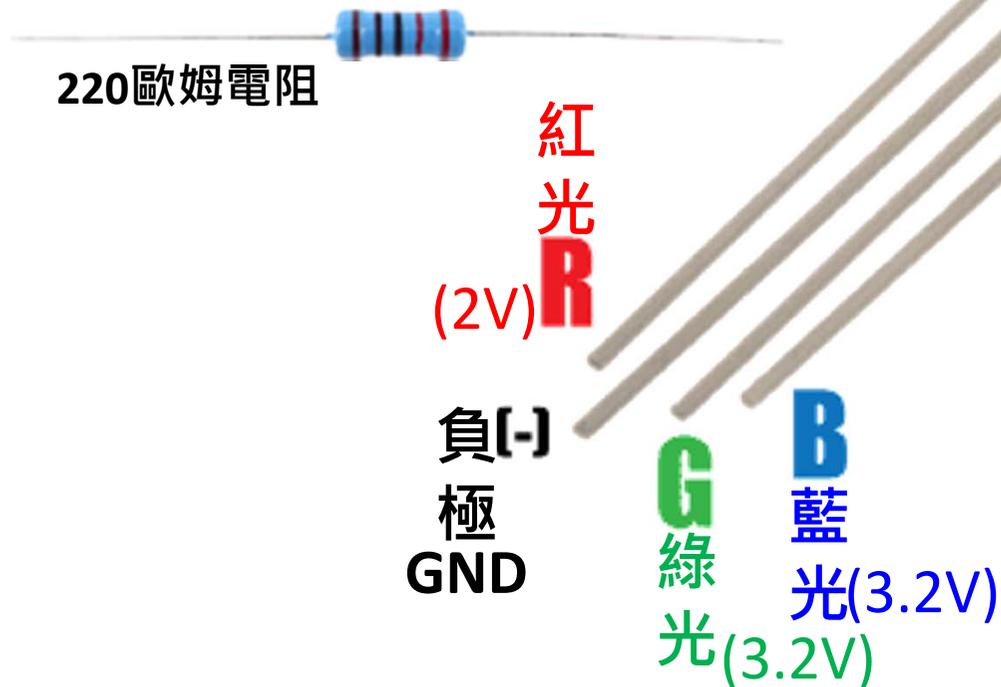


# 亮度感測器模組 Light sensor

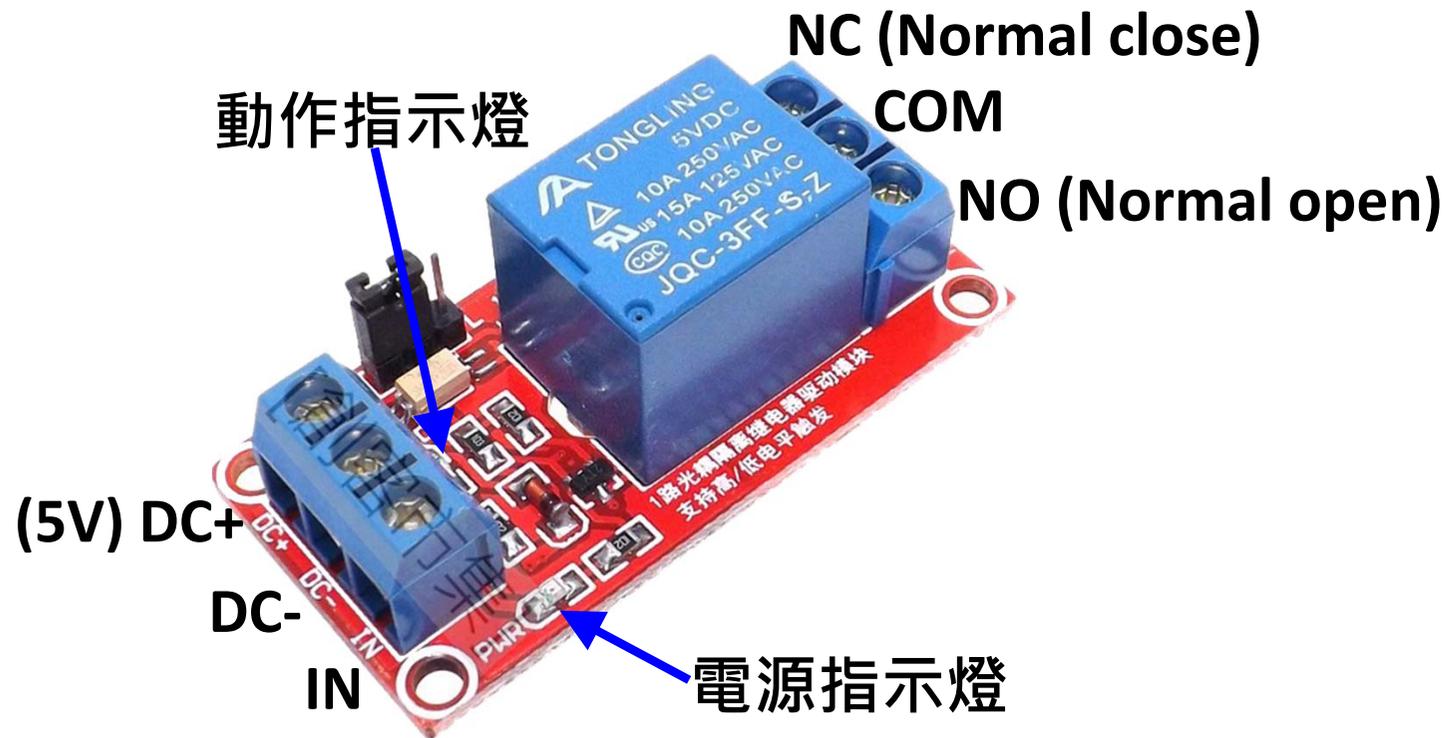


## RGB三色發光二極體LED針腳定義

NodeMCU針腳輸出電壓為3.3V  
使用紅光LED時要串接220歐姆  
之電阻，避免LED燒毀。



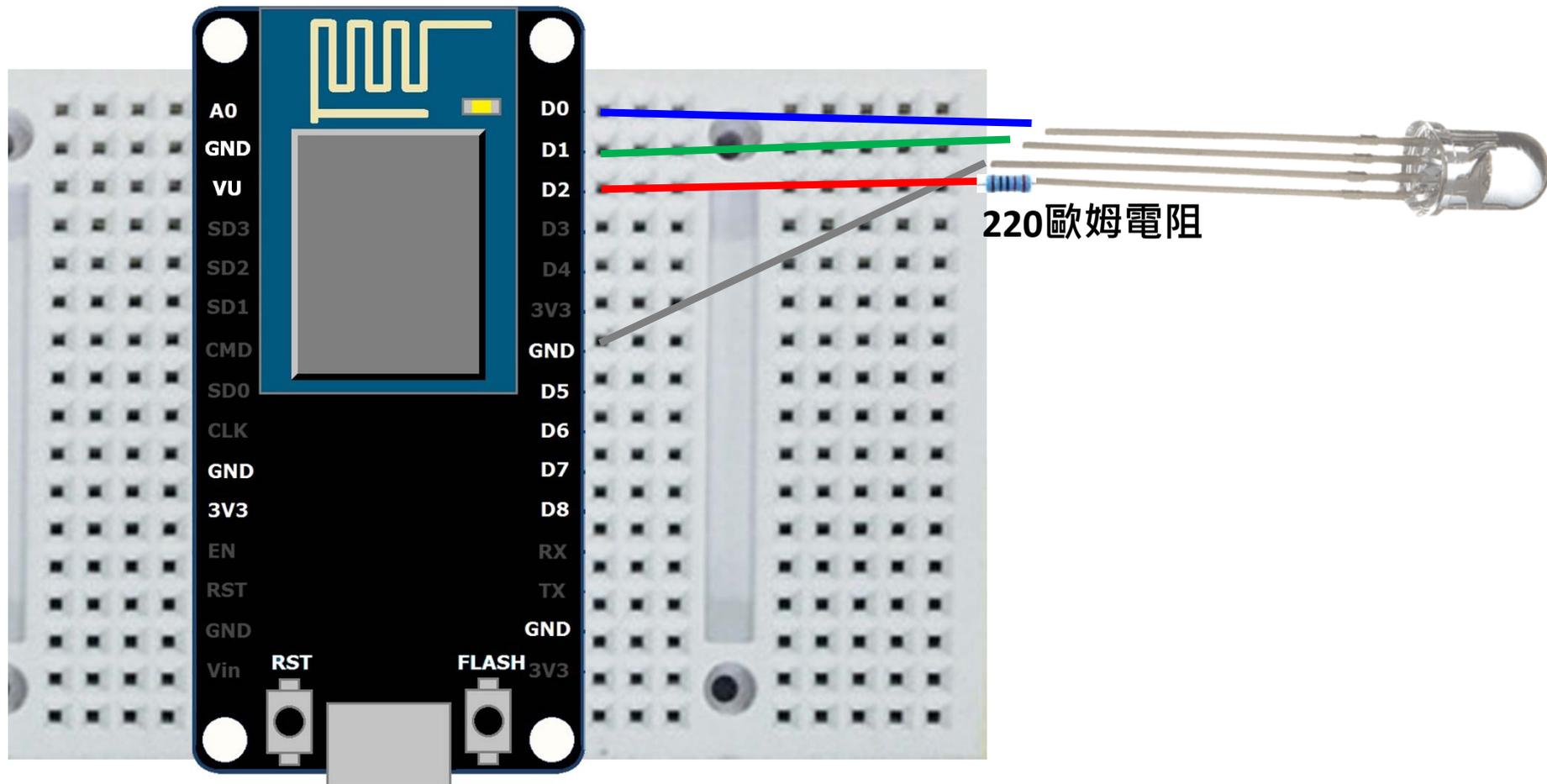
# 繼電器Relay模組



# ArduTalk實作範例

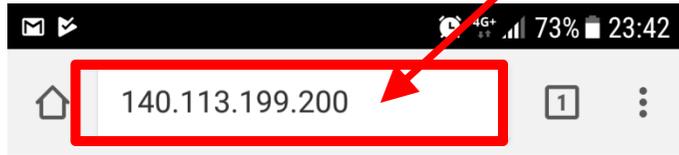
- Lab 1: RGB LED燈控制
  - 以Knob控制
  - 以Smartphone控制
- Lab 2: 亮度感測模組連接 (光感應燈)
- Lab 3: 多板子合作運用
- Lab 4: 虛實整合
- Lab 5: 實作智慧開關
- LAB6: 光感丟球

# LAB1 – RGB LED控制



# LAB1.1 – 以Knob控制LED

1. 打開手機上的瀏覽器  
網址輸入140.113.199.200



## IoTtalk:

- [Project](#)
- [Device Feature Management](#)
- [Download Device Feature](#)
- [Device Monitor](#)

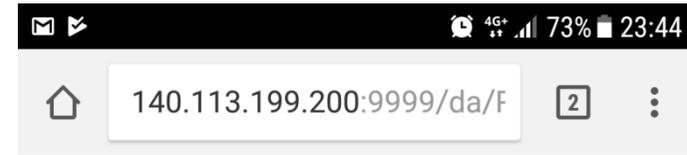
## Cyber Device List:

- [Bulb](#)
- [CHT Dashboard](#)
- [GPS](#)
- [Graph](#)
- [Map](#)
- [Message](#)
- [RandNum](#)
- [Remote\\_control](#)
- [Remote\\_control\(mobile\)](#)
- [Smartphone](#)
- [Voice Control](#)
- [vibration](#)
- [MusicBox](#)
- [MusicBoxCor](#)

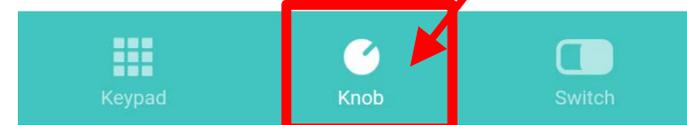
2. 叫出一個  
Remote\_control備用

## VPython List:

- [3DMotion1](#)
- [3DMotion2](#)



4. 記住這設備名稱



3. 選取類型

# LAB1.1 – 以Knob控制LED

在IoTalk介面操點選Remote\_control，選3個Knob

The screenshot displays the IoTalk web interface for configuring a device. The browser address bar shows the URL `140.113.199.200:7788/connection#`. The interface includes a top navigation bar with buttons for 'Lab1', 'Model', 'Flush', 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. A left sidebar lists various models, with 'Remote\_control' highlighted in a red box. The main content area shows the configuration for the 'MCU.420fc' device, including three digital output pins (D0~, D1~, D2~). The 'Remote\_control' section is expanded to show 'Input Device Features', where 'Knob' is set to 3, also highlighted in a red box. Below this, the 'Output Device Features' section is visible. A 'Save' button is highlighted in a red box at the bottom of the configuration area.

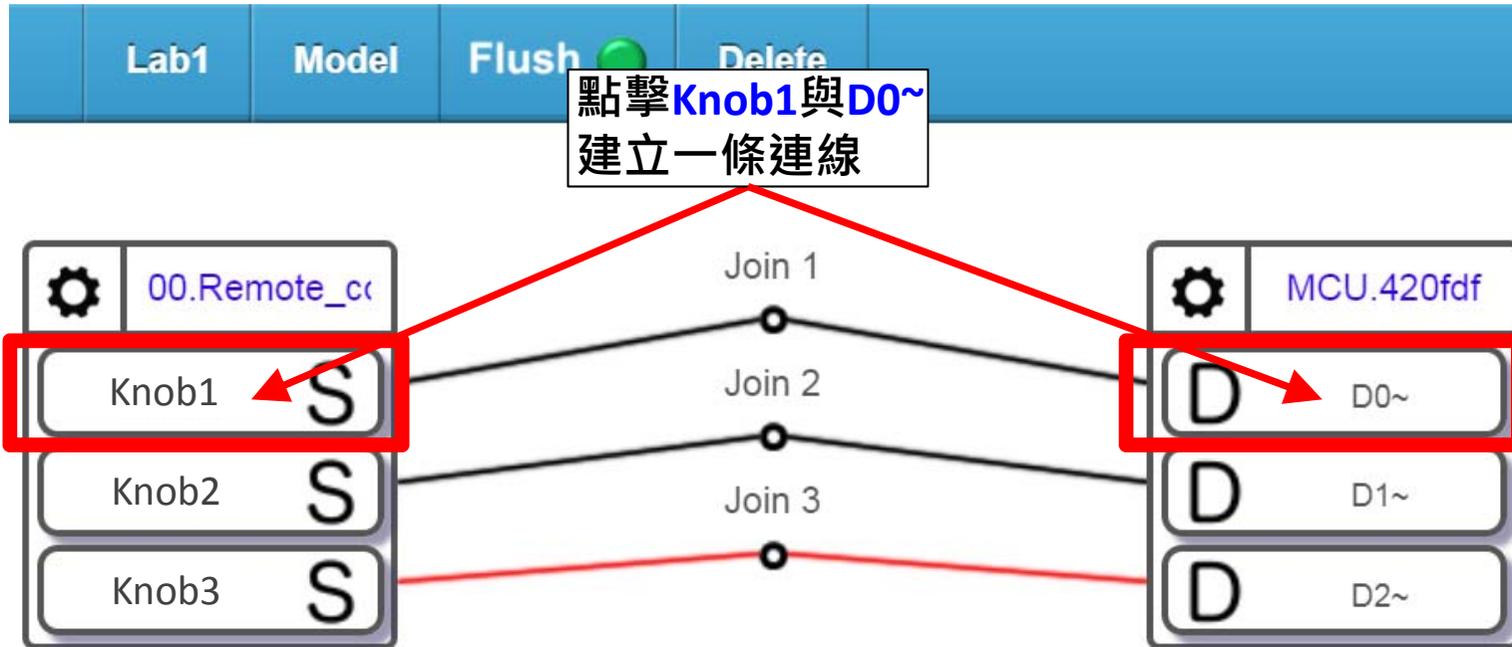
# LAB1.1 – 以Knob控制LED

將叫出來的Model連接上Remote\_control

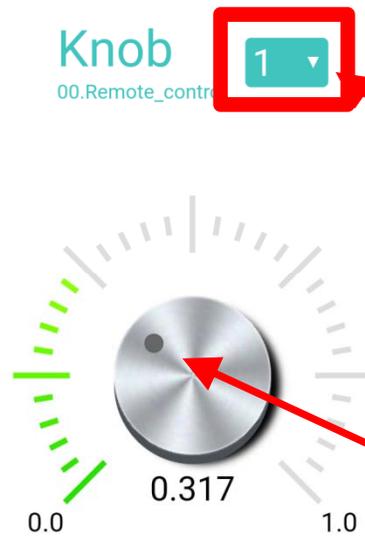
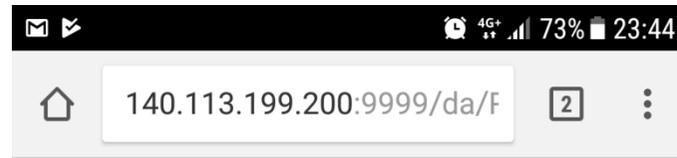
The screenshot shows the IoTalk web interface. At the top, there are tabs for 'Lab1', 'Model', 'Flush' (with a green indicator), 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. Below the tabs, there are two panels: '00.Rem' containing 'Knob1 S', 'Knob2 S', and 'Knob3 S'; and 'MCU.4' containing 'D D0~', 'D D1~', and 'D D2~'. A red arrow points from the '00.Rem' panel to a 'Controller' panel. In the 'Controller' panel, '00.Remote\_control' is highlighted with a red box. A text box with Chinese text '要選擇一模一樣名字的設備' (Choose a device with the same name) points to this box. Below the controller panel, a dropdown menu shows 'Knob' selected, and '00.Remote\_control' is highlighted with a red box. A red arrow points from this dropdown to the '00.Remote\_control' box in the controller panel. Another text box with Chinese text '選完設備後變成藍色才是正確連接 (設備名字要選對)' (After selecting the device, it becomes blue, which is the correct connection (device name must be correct)) points to the '00.Rem' panel.



# LAB1.1 – 以Knob控制LED



# LAB1.1 – 以Knob控制LED



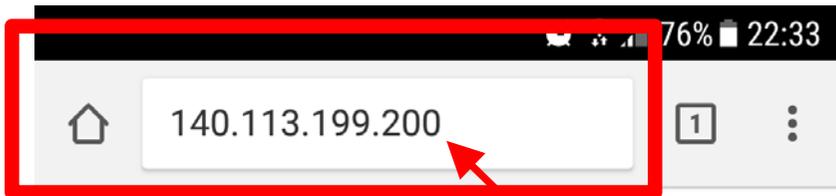
切換Knob1~Knob3  
試著調整三個Knob1~Knob3  
控制RGB三個LED, 可以調出  
很多種顏色喔!

轉轉旋鈕看看  
會發生甚麼事?

也可以試試看用Keypad、Switch  
會發生甚麼事?  
(要先去IoTtalk頁面建立  
Keypad、Switch與D1~之間的連線)



選取類型



#### IoTtalk:

- [Project](#)
- [Device Feature](#)
- [Download Device Feature](#)
- [Device Monitor](#)

#### Cyber Device List:

- [Bulb](#)
- [CHT Dashboard](#)
- [GPS](#)
- [Graph](#)
- [Map](#)
- [Message](#)
- [RandNum](#)
- [Remote control](#)
- [Remote control\(mobile\)](#)
- [Smartphone](#)
- [voice control](#)
- [vibration](#)
- [MusicBox](#)
- [MusicBoxController](#)

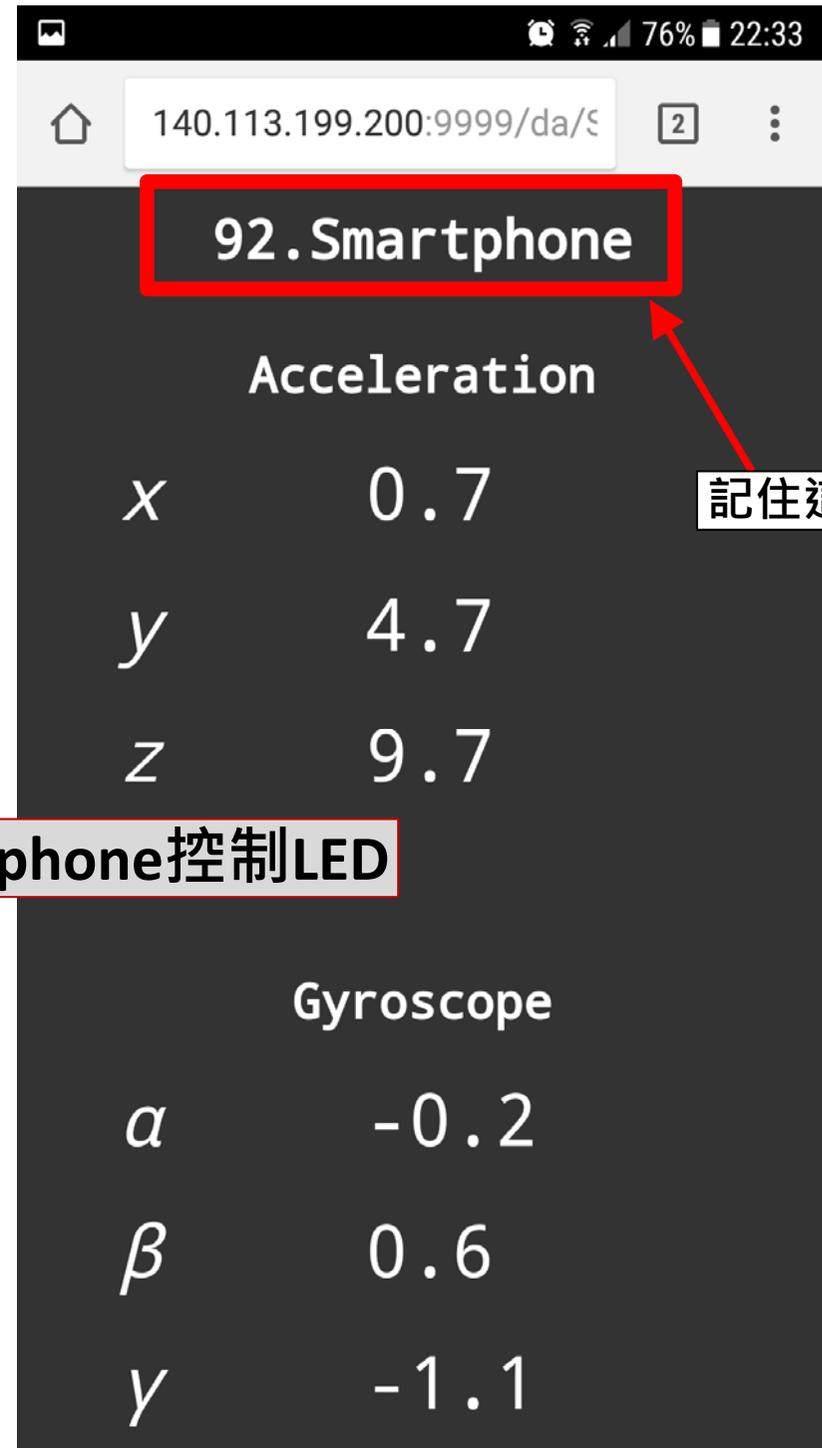
#### VPython List:

- [3DMotion1](#)
- [3DMotion2](#)

使用手機Chrome瀏覽器  
輸入此網址

點擊Smartphone

## LAB1.2 – 以Smartphone控制LED



記住這名稱

# LAB1.2 – 以Smartphone控制LED

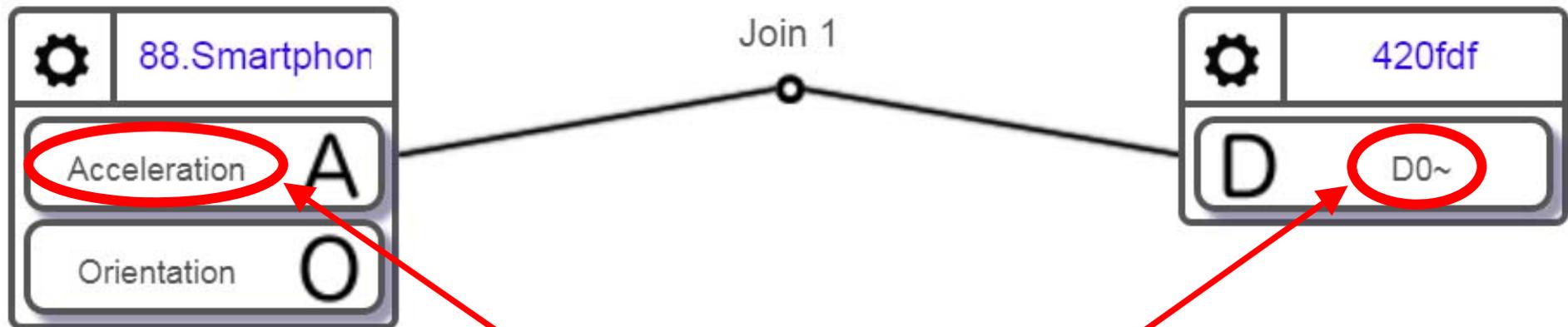
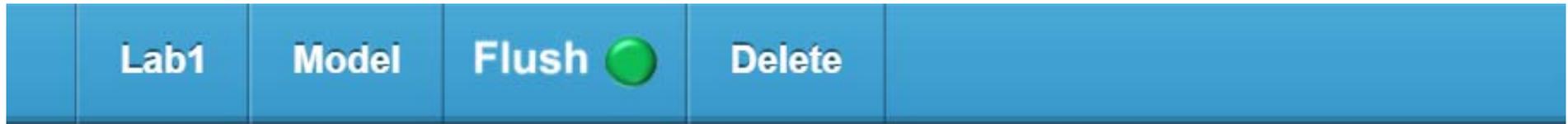
The screenshot displays the IoTalk web interface for configuring a model. The top navigation bar includes 'Lab1', 'Model', 'Flush', 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. The left sidebar lists models: SMS, ScratchX, Simple\_Pendulum, Skeleton, Smartphone (highlighted with a red box and a red circle with the number '1'), Spring-SHM, Spring-SHM1, and Spring-SHM2. The main configuration area shows a 'Smartphone' model configuration. A red box and a red circle with the number '2' highlight the 'Acceleration' checkbox under 'Input Device Features'. A red box and a red circle with the number '3' highlight the 'Orientation' checkbox. A red box and a red circle with the number '4' highlight the 'Save' button. The configuration panel also includes 'DA Installation' with email and phone number fields, and 'Output Device Features' with a 'Display' checkbox.

# LAB1.2 – 以Smartphone控制LED

The screenshot shows a web-based IoT simulation interface. The browser address bar displays `140.113.199.200:7788/connection#`. The interface includes a top navigation bar with buttons for **Lab1**, **Model**, **Flush** (with a green indicator), **Delete**, **Simulation** (with a red indicator and **OFF** label), **Import**, and **Export**. On the left, there are control panels for **Smartphon** (with **Accelerator A** and **Orientation O**) and **420fdf** (with **D** and **D0~**). The main area shows a list of devices, with **43.Smartphone** and **92.Smartphone** visible. The **92.Smartphone** entry is highlighted with a red box. A red arrow points from this box to a smartphone interface below, which also has **92.Smartphone** highlighted in a red box. A text box with the Chinese text "要選擇一模一樣名字的設備" (Select a device with the same name) is positioned between the two red boxes. The smartphone interface shows a URL `140.113.199.200:9999/da/9` and displays the following acceleration data:

Acceleration	
x	0.7
y	4.7
z	9.7

## LAB1.2 – 以Smartphone控制LED



點擊Acceleration與D0~  
建立之連線後, 揮動手機看看

注意：手機要停在Smartphone頁面  
且螢幕不可以暗掉

# LAB1.2 – 以Smartphone控制LED

100 IoTalk Homepage x IoTalk x Remote\_control x

140.113.199.200:7788/connection#

Lab1 Model Flush Delete Simulation OFF Import Export

92.Smartph

Acceleration A

Orientation O

Join 1

420fdf

D D0~

左鍵點擊Join1小圓圈

Connection Name: Join 1

Delete Save

92.Smartphone (IDF)

Acceleration	Type	Function
x1	variant	
x2	variant	flip
x3	sample	

MCU.420fdf (ODF)

D2~	Function
y1	disabled

變成用手機正翻/反翻控制LED亮/滅

# LAB1.2 – 以Smartphone控制LED

The screenshot shows the IoTalk simulation environment. At the top, there are tabs for 'Lab1', 'Model', 'Flush' (with a green indicator), and 'Delete'. A 'Simulation' toggle is set to 'OFF'. Below the tabs, there are two device blocks connected by a 'Join 1' node. The left block is labeled '88.Smartphon' and contains 'Acceleration A' and 'Orientation O'. The right block is labeled '420fdf' and contains 'D D0~'. A red circle highlights the 'Join 1' node, with a red arrow pointing to it and a text box that says '右鍵點擊Join1小圓圈'. To the right, there are two data monitors: 'IDF Monitor' and 'ODF Monitor'. The 'IDF Monitor' table shows acceleration data over time, and the 'ODF Monitor' table shows function data over time. A red box highlights the 'IDF Monitor' table, and a text box below it says '可觀察到手機加速度計的即時偵測狀態'.

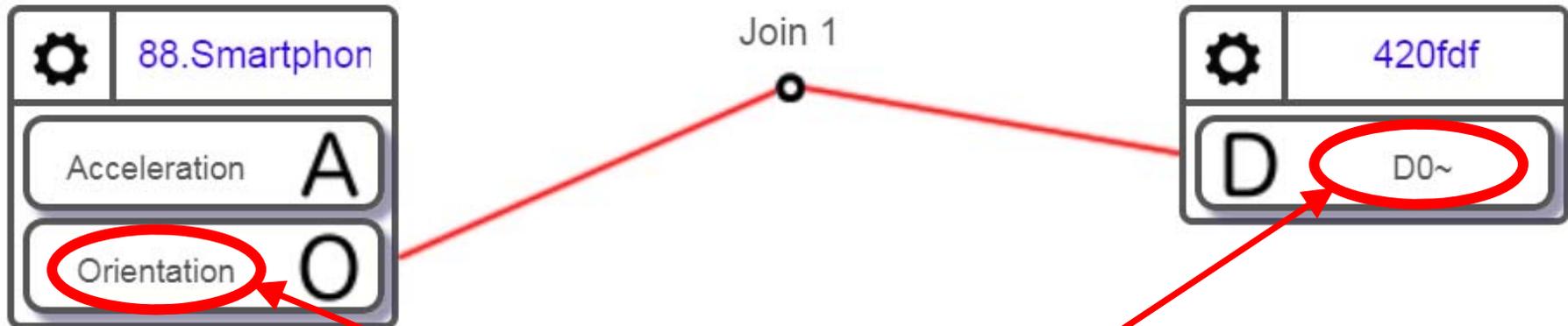
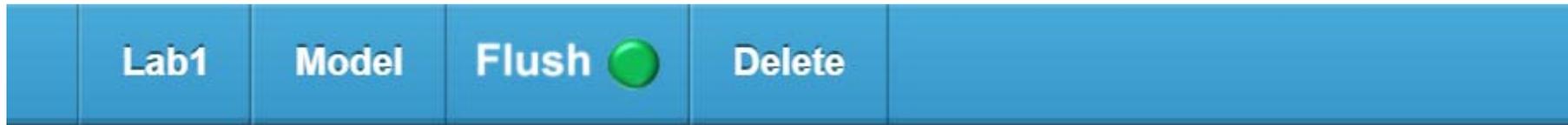
右鍵點擊Join1小圓圈

Sub-stage:	Input	Continue	Next	Table	1 Acceleration
23:19:38	0.00	-0.10	9.80		
23:19:39	0.00	-0.10	9.80		
23:19:40	0.00	-0.10	9.80		
23:19:41	0.00	-0.10	9.80		
23:19:42	0.00	-0.10	9.80		
23:19:43	0.00	-0.10	9.80		

Sub-stage:	Function	1 D2~	Table
23:19:38		0.10	
23:19:39		0.00	
23:19:40		0.00	

可觀察到手機加速度計的即時偵測狀態

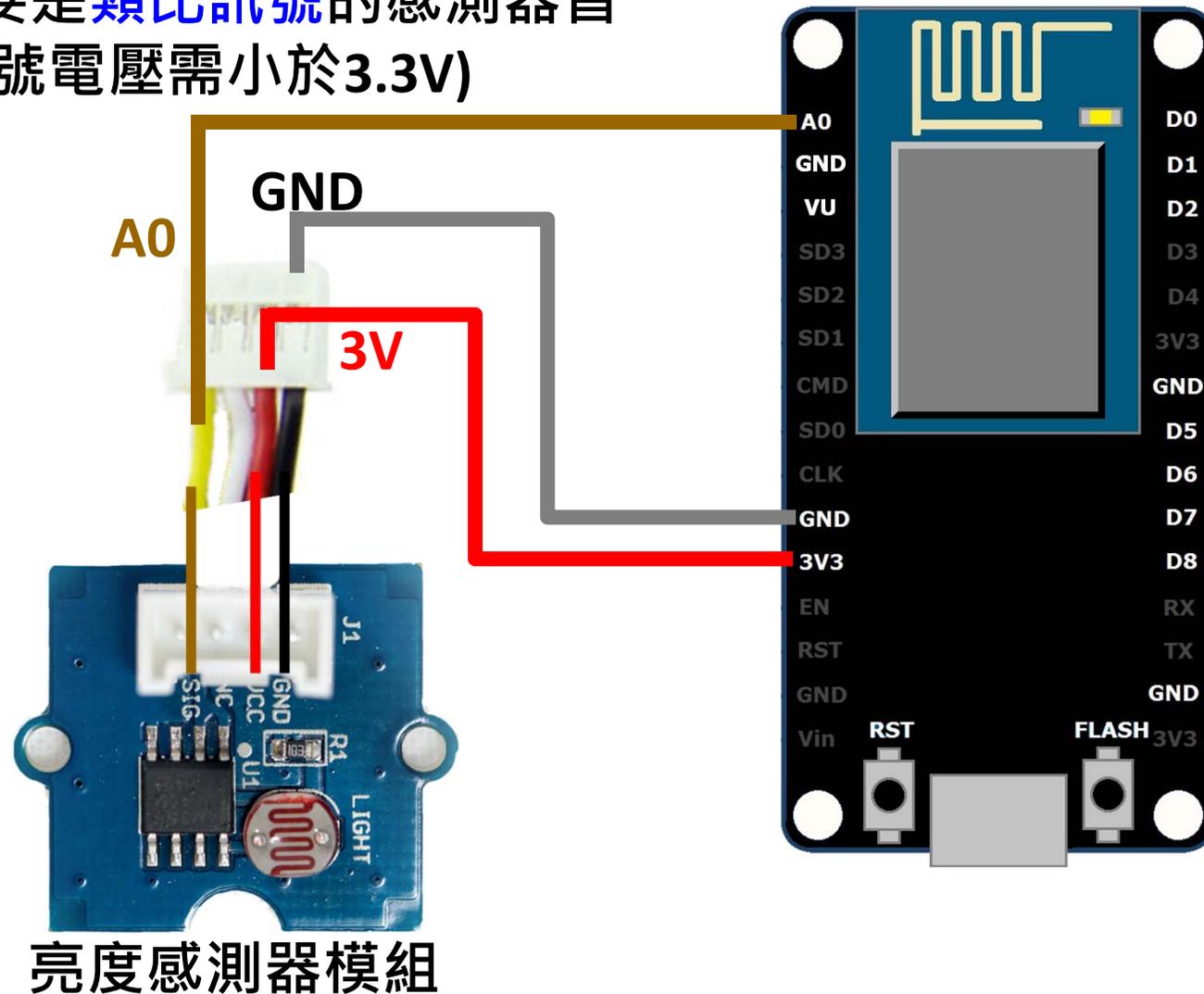
## LAB1.2 – 以Smartphone控制LED



也可以試試看用Orientation控制LED  
把手機變成Knob一樣，旋轉手機即可控制LED亮度  
注意：舊的連線Acceleration/D0~要刪掉  
不然舊連線運作會干擾LED反應

# LAB2 – 連接感測器當輸入信號

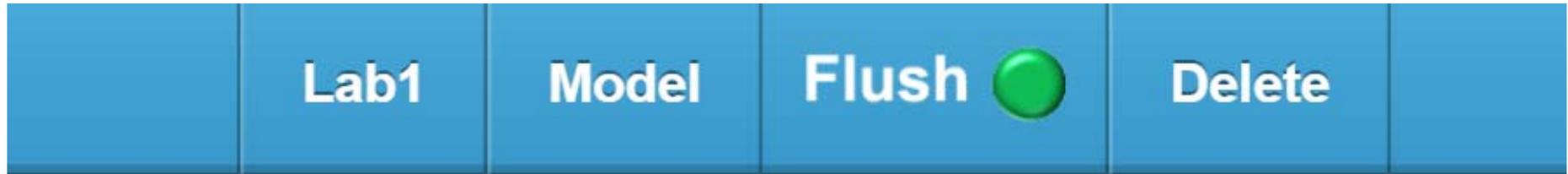
本次實作使用亮度感測器當試驗，  
但其實只要是**類比訊號**的感測器皆  
可使用(訊號電壓需小於3.3V)



# LAB2 – 亮度感測模組連接

The screenshot displays the IoTalk web interface for configuring a simulation. The top navigation bar includes buttons for 'Lab1', 'Model', 'Flush', 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. The left sidebar shows a list of models, with 'NodeMCU' highlighted and circled in red. The main workspace shows a 'MCU.420fc' module with three digital input devices (D0~, D1~, D2~) and one analog input device (A0). The right panel contains configuration options for 'NodeMCU', including 'DA Installation' and 'Input Device Features'. Under 'Input Device Features', the 'A0' checkbox is checked and circled in red, with a text box containing the instruction '把NodeMCU的A0叫出來'. Below this, the 'Output Device Features' section lists digital output devices (D0~ through D8) with unchecked checkboxes.

## LAB2 – 亮度感測模組連接



**錯誤示範：房間亮LED就亮，房間暗LED就暗**

## LAB2 – 亮度感測模組連接

左鍵點擊Join1小圓圈

A0	Type	Function
x1	sample	reverse

選取reverse後，房間越暗，LED就越亮。變成光感應調節燈  
如何寫reverse功能？

# LAB2 – 亮度感測模組連接

IoTalk Homepage | IoTalk | Remote\_control | 140.113.199.200:7788/connection#

Lab1 | Model | Flush | Delete | Simulation OFF | Import | Export

MCU.42I (A0) --- Join 1 --- MCU.42I (D0~)

Connection Name: Join 1 [Delete] [Save]

MCU.420fdf (IDF)			[Delete]
A0	Type	Function	
x1	sample	reverse	
			disabled
			reverse
			smooth
			<b>add new function</b>
MCU.420fdf (ODF)			
D1~			
y1	x1		

## IoTalk允許使用者利用Python語言撰寫自己DF 功能

The screenshot shows the IoTalk web interface. At the top, there are navigation tabs: Lab1, Model, Flush (with a green indicator), Delete, Simulation (OFF), Import, and Export. The main area displays a circuit diagram with two MCU.420fc blocks connected via a 'Join 1' component. The right MCU block has three digital output pins labeled D0~, D1~, and D2~. A 'Function Management' window is open, showing a 'Global Function List' with 'average', 'fft', 'flip', and 'flip\_light'. The 'A0 Function List' includes 'add new function' (circled in red), 'reverse', and 'smooth'. The 'Selected Function' is 'reverse'. Below this, the version is '20180107' and there are 'Delete' and 'Save' buttons. A text area contains a simple Python function:

```
def run(*args):  
    return 1024-args[0]
```

This code is highlighted with a red box, and a red arrow points from the Chinese text below to it.

寫了一行很簡單的Python程式

# LAB2 – 亮度感測模組連接

Connection Name: Join 1

MCU.420fdf (IDF)		
A0	Type	Function
x1	sample	gradual_change

MCU.420fdf (ODF)		
D1~		
y1	x1	

選擇gradual\_change後  
讓LED亮度和緩變化

在選擇gradual\_change後，  
若拿LED對著亮度感測器照，  
會發生什麼事情呢？

# LAB3 – 多板子合作運用

在LAB2中，光感應調節燈，我們改使用兩張板子，一張為光感測器，另一張連接LED燈

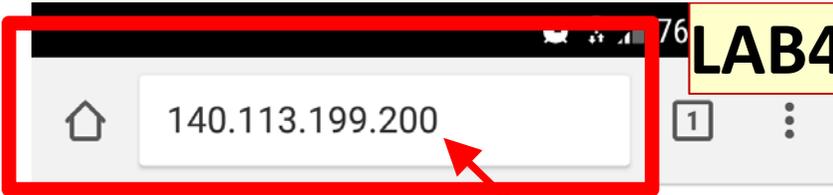
點擊後選擇其他組別の板子  
就可以讓兩張不同的板子遠  
端遙控控制  
(如此光感測器就可以放到遠處)

MCU.420fdf (IDF)		
A0	Type	Function
x1	sample	reverse

MCU.420fdf (ODF)	
D1~	Function
y1	x1

## LAB4 - 虛實整合



使用手機Chrome瀏覽器  
輸入此網址

### IoTtalk:

- [Project](#)
- [Device Feature](#)
- [Download Device Feature](#)
- [Device Monitor](#)

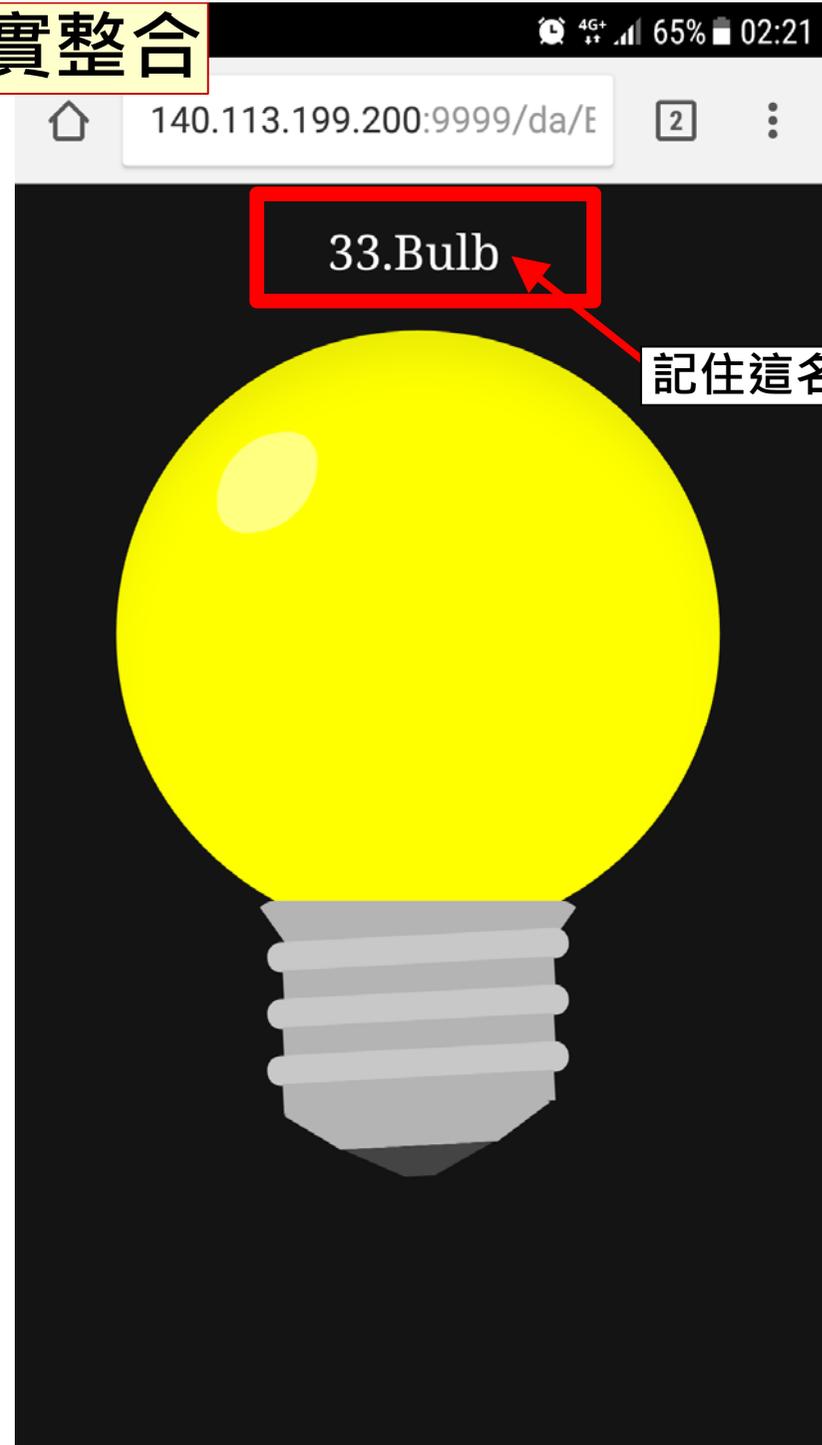
### Cyber Device List:

- [Bulb](#)
- [CHI Dashboard](#)
- [GPS](#)
- [Graph](#)
- [Map](#)
- [Message](#)
- [RandNum](#)
- [Remote control](#)
- [Remote control\(mobile\)](#)
- [Smartphone](#)
- [Voice Control](#)
- [vibration](#)
- [MusicBox](#)
- [MusicBoxController](#)

點擊叫出Bulb備用

### VPython List:

- [3DMotion1](#)
- [3DMotion2](#)



記住這名稱

## 在IoTalk介面操點選Bulb，並勾選Luminance

The screenshot displays the IoTalk web interface. At the top, there is a navigation bar with buttons for 'Lab1', 'Model', 'Flush' (with a green indicator), 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'. Below this, a dropdown menu is open, listing various models. The 'Bulb' model is highlighted with a red box and a red circle containing the number '1'. To the right, the configuration panel for the selected 'Bulb' model is visible. It includes sections for 'DA Installation' (with email and phone number input fields), 'Input Device Features', and 'Output Device Features'. Under 'Output Device Features', the 'Luminance' checkbox is checked and highlighted with a red box and a red circle containing the number '2'. Below this, the 'Save' button is highlighted with a red box and a red circle containing the number '3'.

## 選擇正確的裝置並掛載上Model

The screenshot displays a web-based IoT simulation interface. At the top, there are navigation tabs: 'Lab1', 'Model', 'Flush' (with a green indicator), and 'Delete'. To the right, there are buttons for 'Simulation' (set to OFF), 'Import', and 'Export'. Below the navigation, there are two device configuration panels. The left panel shows a device named '420fdf' with a sensor 'A0' and a value 'A'. The right panel shows a device named 'Bulb' with a sensor 'Luminance'. In the center, a large yellow light bulb model is shown. To the right, a list of devices is displayed, including '9.Bulb', '1.Bulb', '96.Bulb', '41.Bulb', and '33.Bulb'. A red box highlights the '33.Bulb' entry in the list, and another red box highlights the '33.Bulb' label on the light bulb model. A red arrow points from the list entry to the model label. A red circle with the number '4' is next to the list entry. A text box with the Chinese text '要選擇一模一樣名字的设备' (Choose a device with the same name) is positioned below the arrow.

420fdf

A0 A

Bulb

Luminance

Simulation OFF

Import Export

9.Bulb

1.Bulb

96.Bulb

41.Bulb

33.Bulb

33.Bulb

4

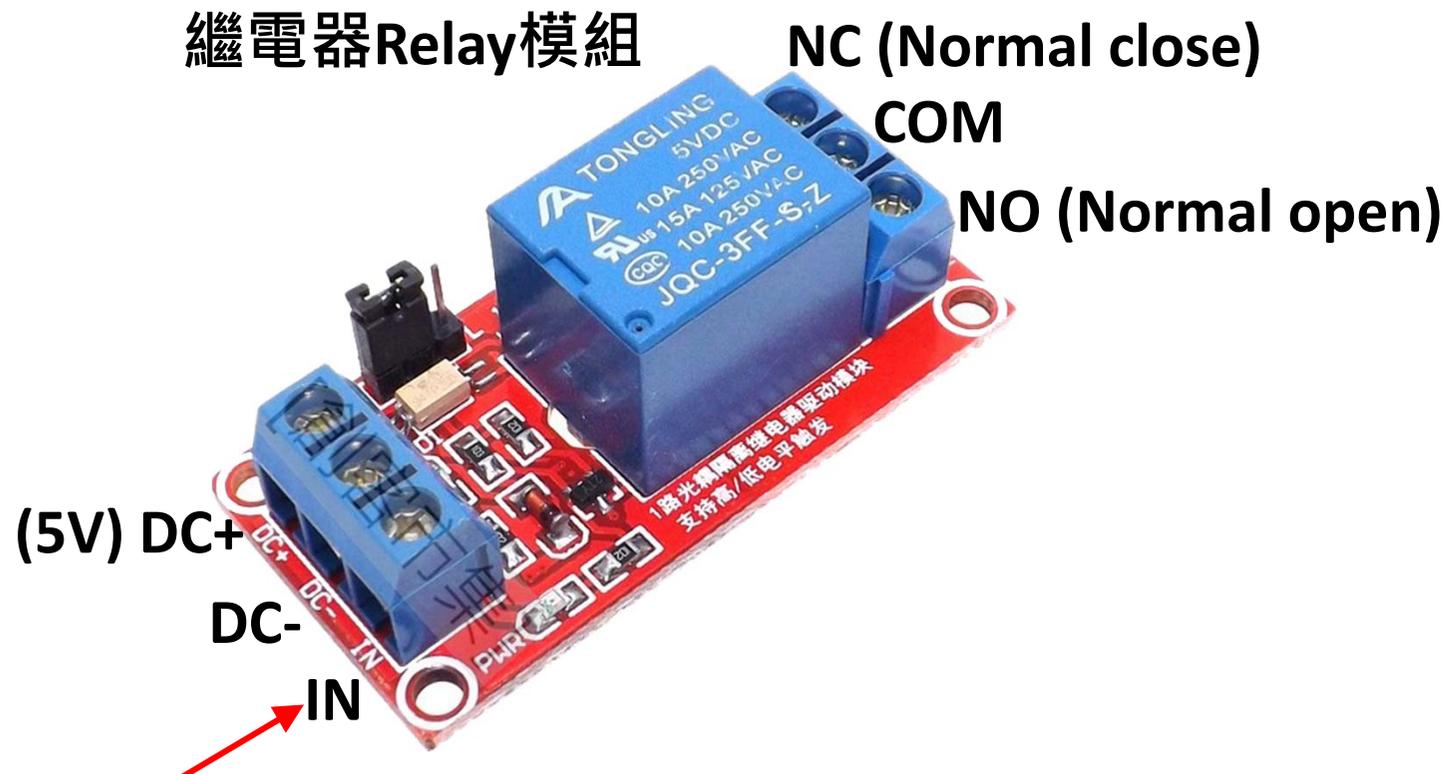
要選擇一模一樣名字的设备

## 連接A0到Luminance



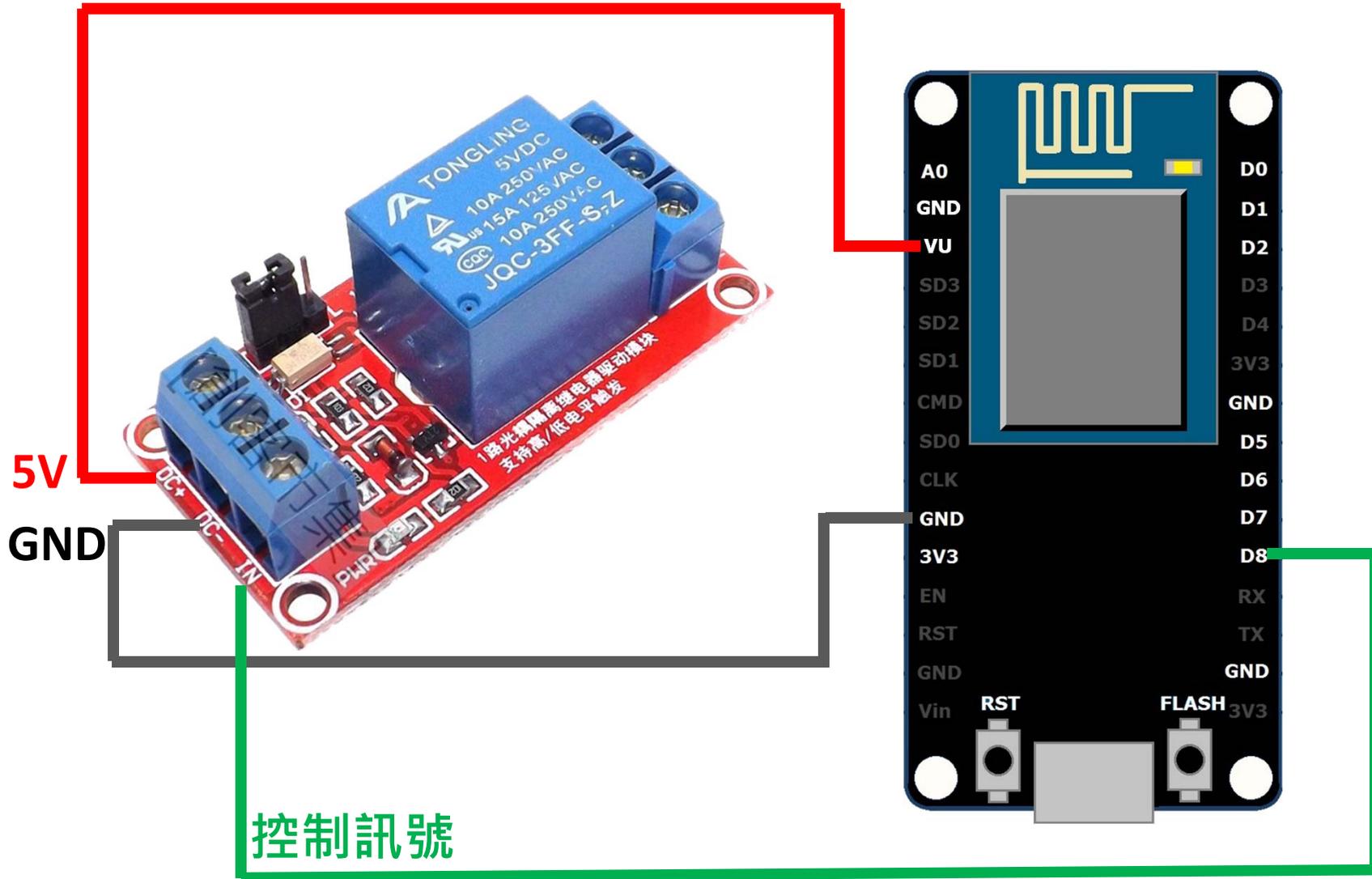
觀察虛擬燈泡的明暗變化是否符合真實LED的模式  
可搭配使用reverse、gradual\_change兩個功能 (參見page 39)

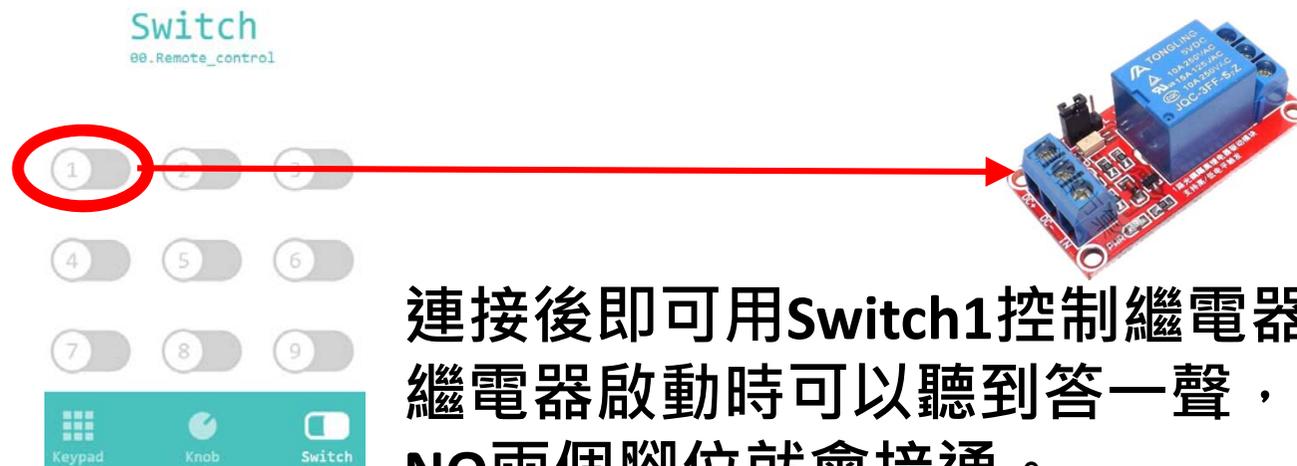
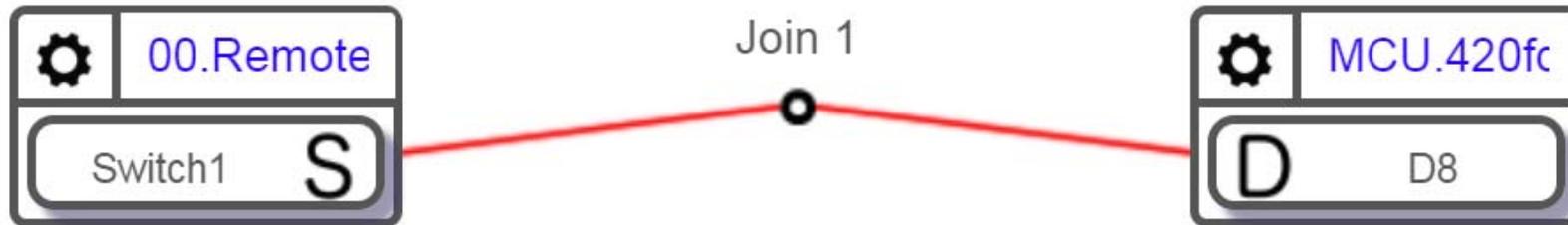
# LAB5 – 智慧開關



只可以連接D5, D6, D7, D8數位輸出腳位  
(連接D0, D1, D2 PWM腳位會沒反應)

# LAB5 – 智慧開關

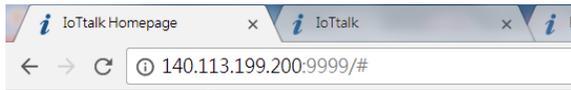




連接後即可用Switch1控制繼電器模組，繼電器啟動時可以聽到答一聲，COM跟NO兩個腳位就會接通。

可嘗試以光感測器模組取代Switch1，變成光感開關。  
或是以Acceleration取代Switch1，就變成體感開關。

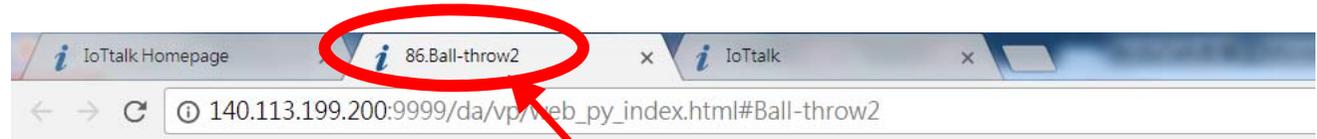
# LAB6 – 光感丟球



- [Voice Control](#)
- [vibration](#)
- [MusicBox](#)
- [MusicBoxController](#)

## VPython List:

- [3DMotion1](#)
- [3DMotion2](#)
- [AirResistance1](#)
- [AirResistance2](#)
- [Ball-Slid](#)
- [Ball-Slide1](#)
- [Ball-Slide2](#)
- [Ball-Spin](#)
- [Ball-throw1](#)
- [Ball-throw2](#)
- [Collision1](#)
- [Collision2](#)
- [Collision3](#)
- [Collision4](#)
- [ConicalPendulum1](#)
- [ConicalPendulum2](#)
- [ElasticCollision1](#)
- [Free-FallandProjectileMotion2](#)
- [Free-Fall1](#)



記住這名稱

點擊Ball-throw2



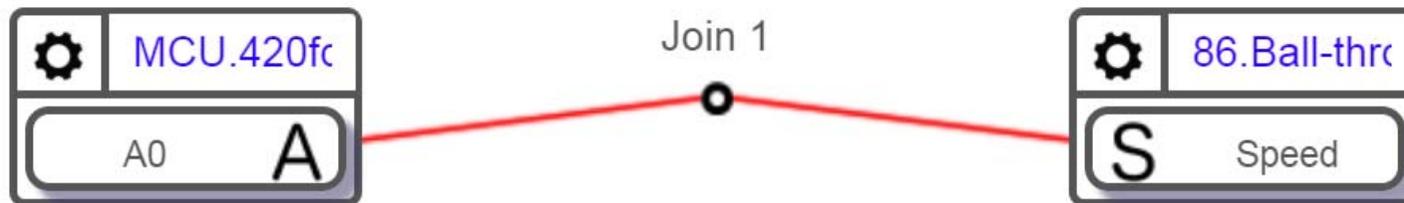
# HW1 – 光感丢球

The screenshot shows a web browser window with the URL `140.113.199.200:7788/connection#`. The interface features a blue header bar with several buttons: **Lab1**, **Model**, **Flush** (with a green indicator), **Delete**, **Simulation** (with a red indicator and **OFF** text), **Import**, and **Export**. Below the header, a dropdown menu is open, listing various models. The model **Ball-throw2** is highlighted with a red oval. To the left of the menu, there is a gear icon and a text input field containing `MCU.4` and `A0`. The main content area of the browser is currently empty.

Lab1	Model	Flush	Delete	Simulation	Import	Export
	Ball-Reflect	<input checked="" type="checkbox"/>		<input type="checkbox"/> OFF		
	Ball-Slid					
	Ball-Spin					
	Ball-throw1					
	<b>Ball-throw2</b>					
	Bulb					
	CHT_AirCondition					
	CHT_AirPurifier					

# HW1 – 光感丟球

The screenshot displays the IoTalk simulation environment. At the top, a navigation bar includes buttons for 'Lab1', 'Model', 'Flush' (with a green indicator), 'Delete', 'Simulation' (set to OFF), 'Import', and 'Export'. The browser address bar shows the URL '140.113.199.200:7788/connection#'. On the left, two device panels are visible: 'MCU.420f' with 'A0' and 'A' ports, and 'Ball-throw2' with an 'S' port and 'Speed' parameter. The main workspace shows a connection diagram with two nodes: '37.Ball-throw2' and '86.Ball-throw2'. The '86.Ball-throw2' node is circled in red, with a red arrow pointing to a text box containing the instruction '要選擇一模一樣名字的設備' (Select a device with the same name). Below this, a second browser window is shown with the URL '140.113.199.200:9999/da/vp/web\_py\_index.html#Ball-thr', where the '86.Ball-throw2' tab is also circled in red.



建立A0到Speed連線後，可以用手遮住光感應器來控制丟球力道

如果試著把A0更換為Smartphone的Acceleration，甩動手機時會怎樣呢？

# 多多嘗試各種可能的連接組合

試著組合不同的IDF/ODF  
來實現不同的創意應用

**聯絡資訊:** 林勻蔚 ( [jyneda@gmail.com](mailto:jyneda@gmail.com) )