

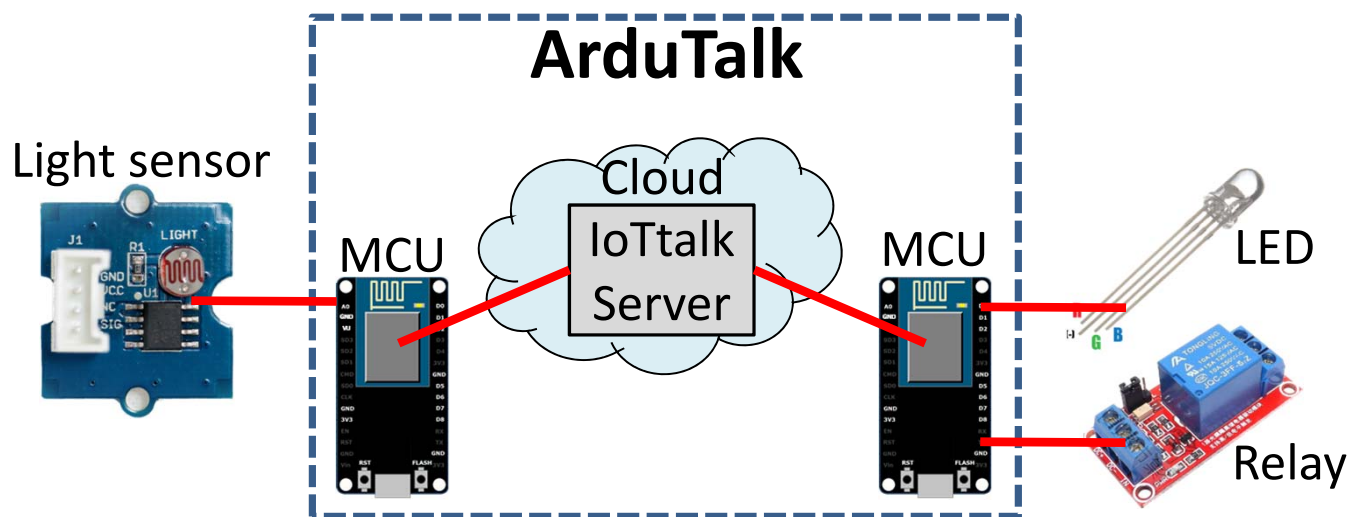
輕鬆使用ArduTalk 開發物聯網應用

Yun-Wei Lin



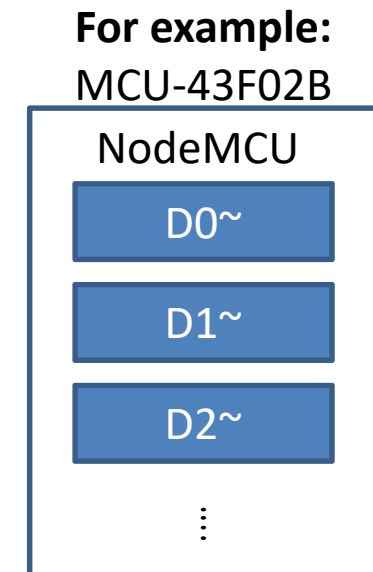
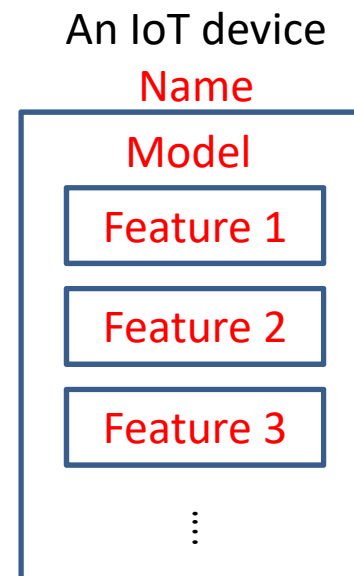
ArduTalk是什麼？

- 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



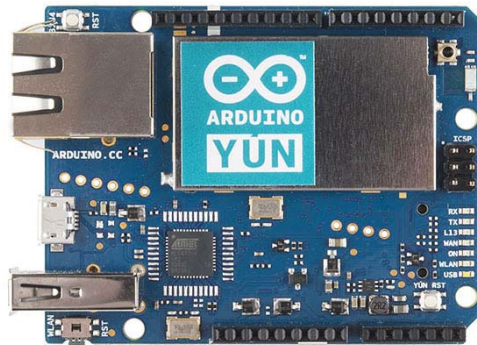
IoTtalk是什麼?

- **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



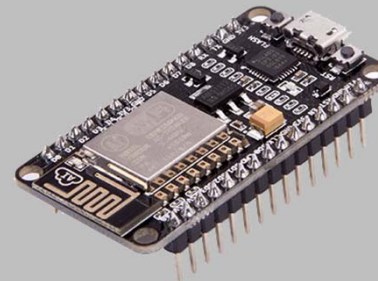
LinkIt Smart 7688 Duo



ESP8266

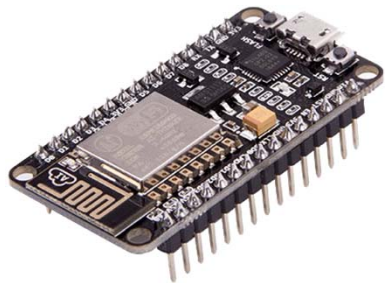


NodeMCU



ArduTalk物聯網應用開發實驗材料

NodeMCU



麵包板



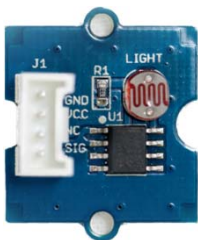
**Micro USB
電源線**



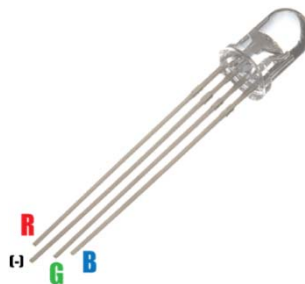
杜邦線



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IoTalk主機

每兩秒閃一下:連上IoTtalk
並可以開始使用

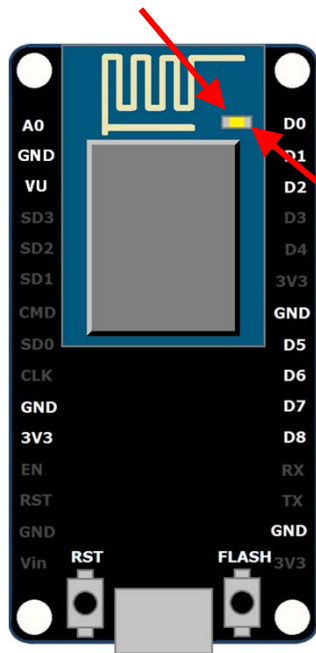
D0, D1, D2
PWM訊號
輸出Pin腳

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



找到後連上去

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

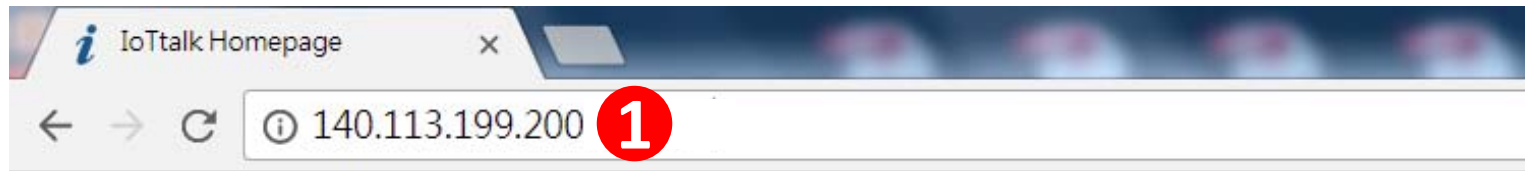


4. 選擇正確的AP

5. 輸入密碼

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

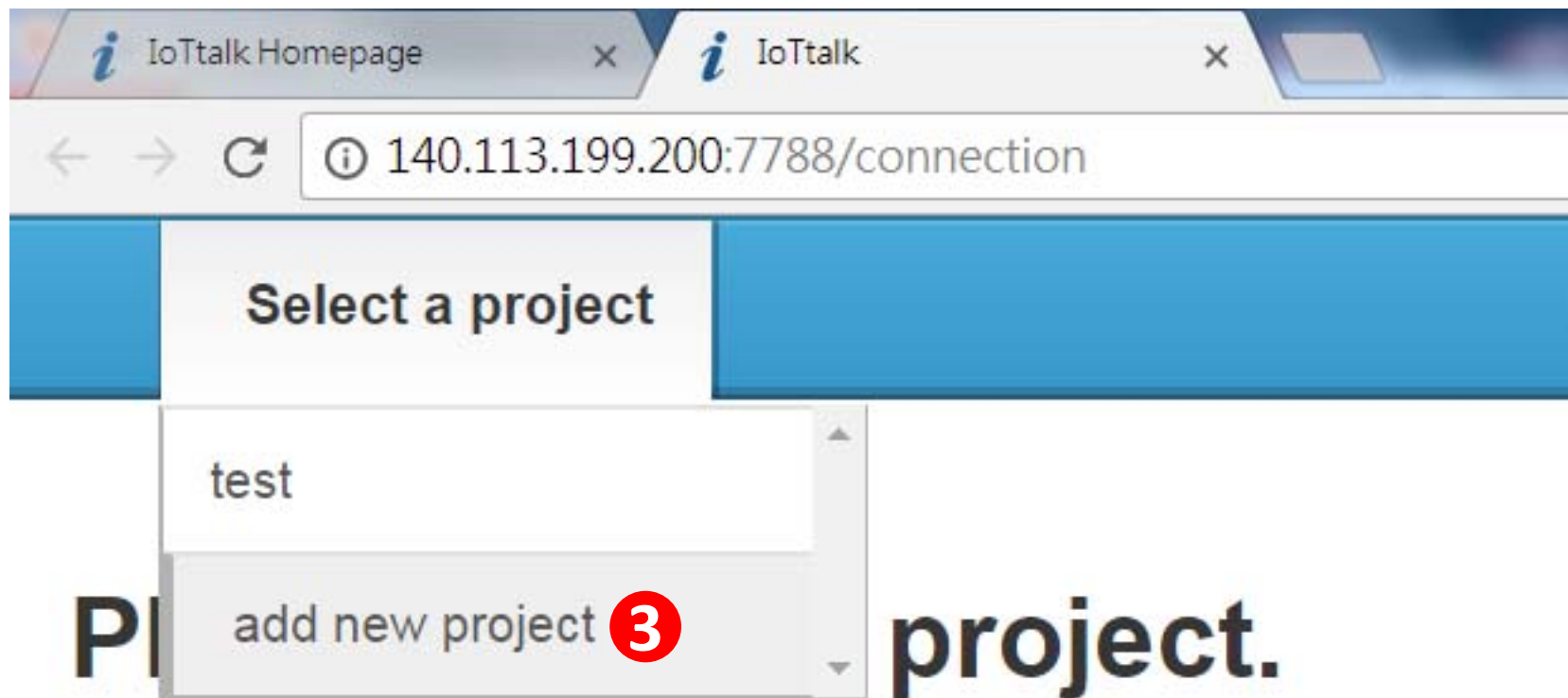
如何在IoTalk上叫出NodeMCU?



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

The screenshot shows a web browser window with the address bar displaying "140.113.199.200:7788/connection". The page has a dark blue header with "Add new project" and "Import" buttons. The main content area is grey and says "Please add a project." A modal dialog is open in the center. The dialog has two sections: "Enter Project Name" and "Enter Project Password". The first section has a text input field containing "Lab1" and a blue label "命名專案名稱" to its right. The second section has an empty text input field and a blue label "設定專案密碼" to its right. At the bottom right of the dialog are "Cancel" and "OK" buttons. Red circles with numbers 4 and 5 are placed to the left of the first and second input fields, respectively.

4

5

Enter Project Name

Lab1 命名專案名稱

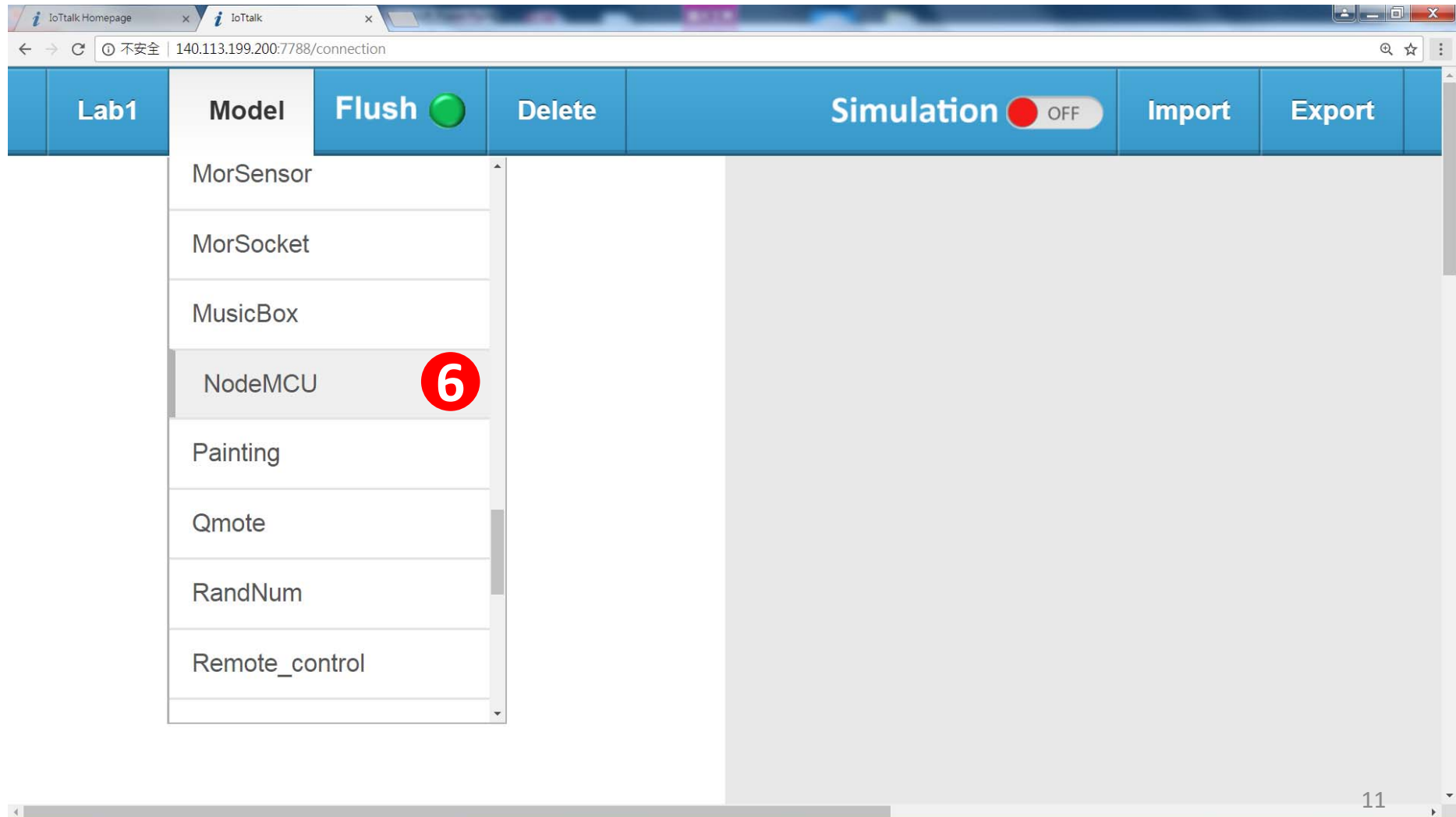
Lab1

Enter Project Password

設定專案密碼

Cancel OK

在Model選單中點擊NodeMCU



勾選需要的IDF/ODF

IoTalk Homepage x IoTalk x

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

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

8 Output Device Features 勾選需要使用的 Output Device Feature

☒ D0~

☒ D1~

☒ D2~

☒ D5

☒ D6

☒ D7

☒ D8

9 Save

連接正確的板子

IoTalk x

140.113.199.200:7788/connection

Lab1 Model Flush Delete Simulation OFF Import Export

NodeM

A0 A

NodeM

D D0~

D D1~

D D2~

D D5

D D6

D D7

D D8

420fdf

520cff

5409fd 10

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 2c3ae8**5409fd**
則**5409fd**為自己的板子

IoTtalk操作畫面




test

Model

Flush 

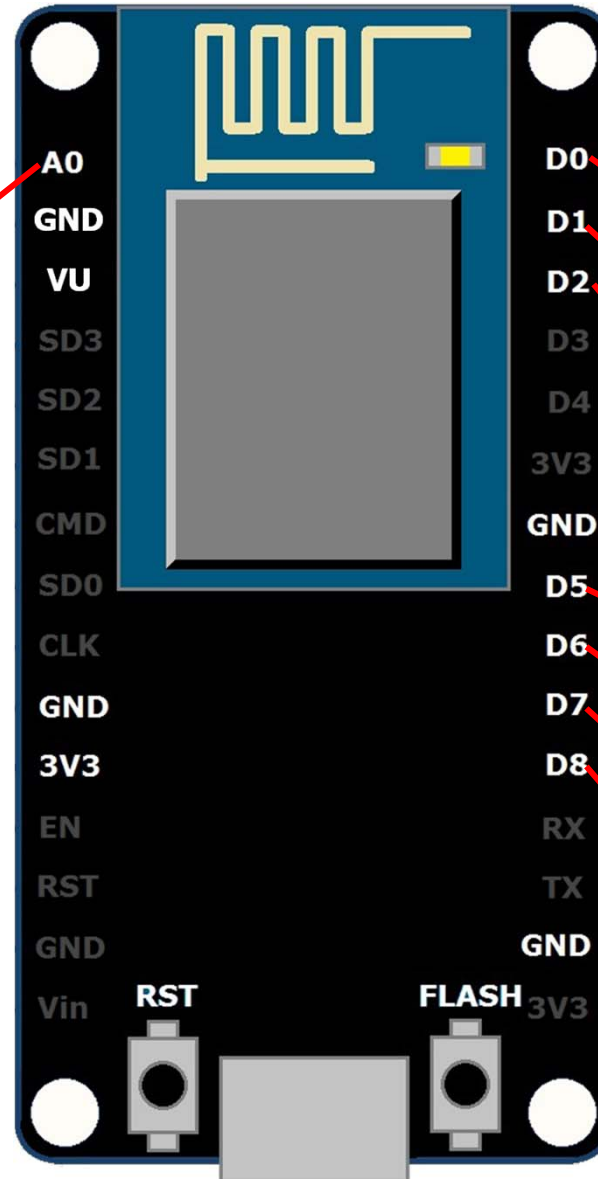
Delete




5409fd

A0

A





5409fd

D

D0~

D

D1~

D

D2~

D

D5

D

D6

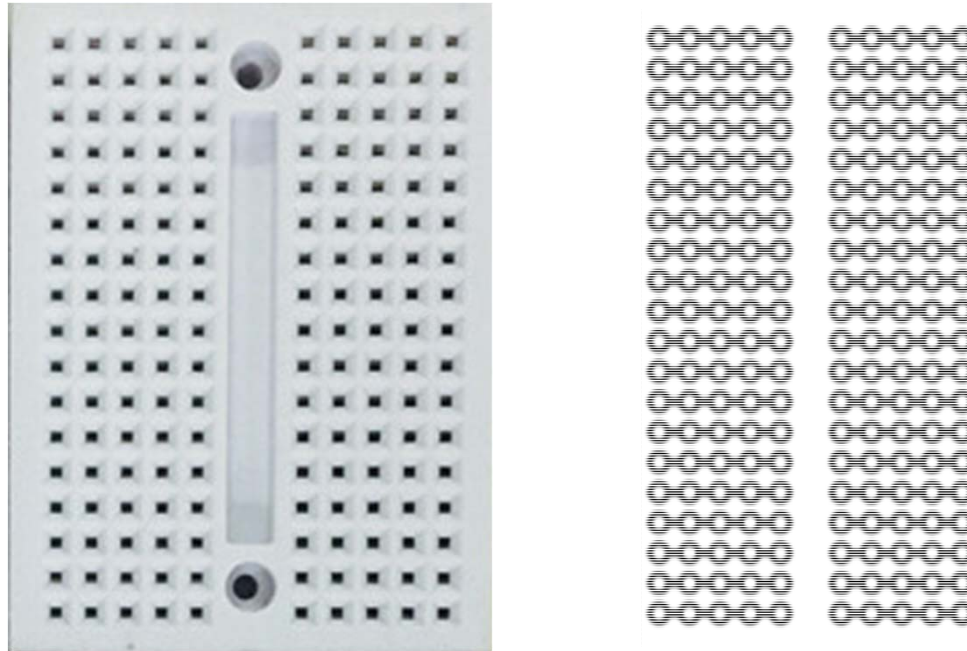
D

D7

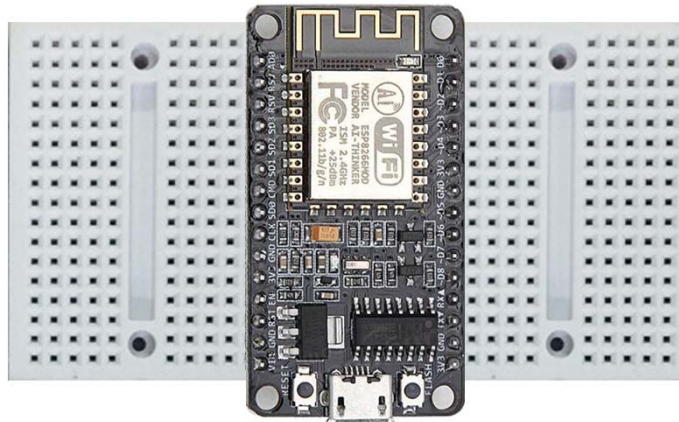
D

D8₁₅

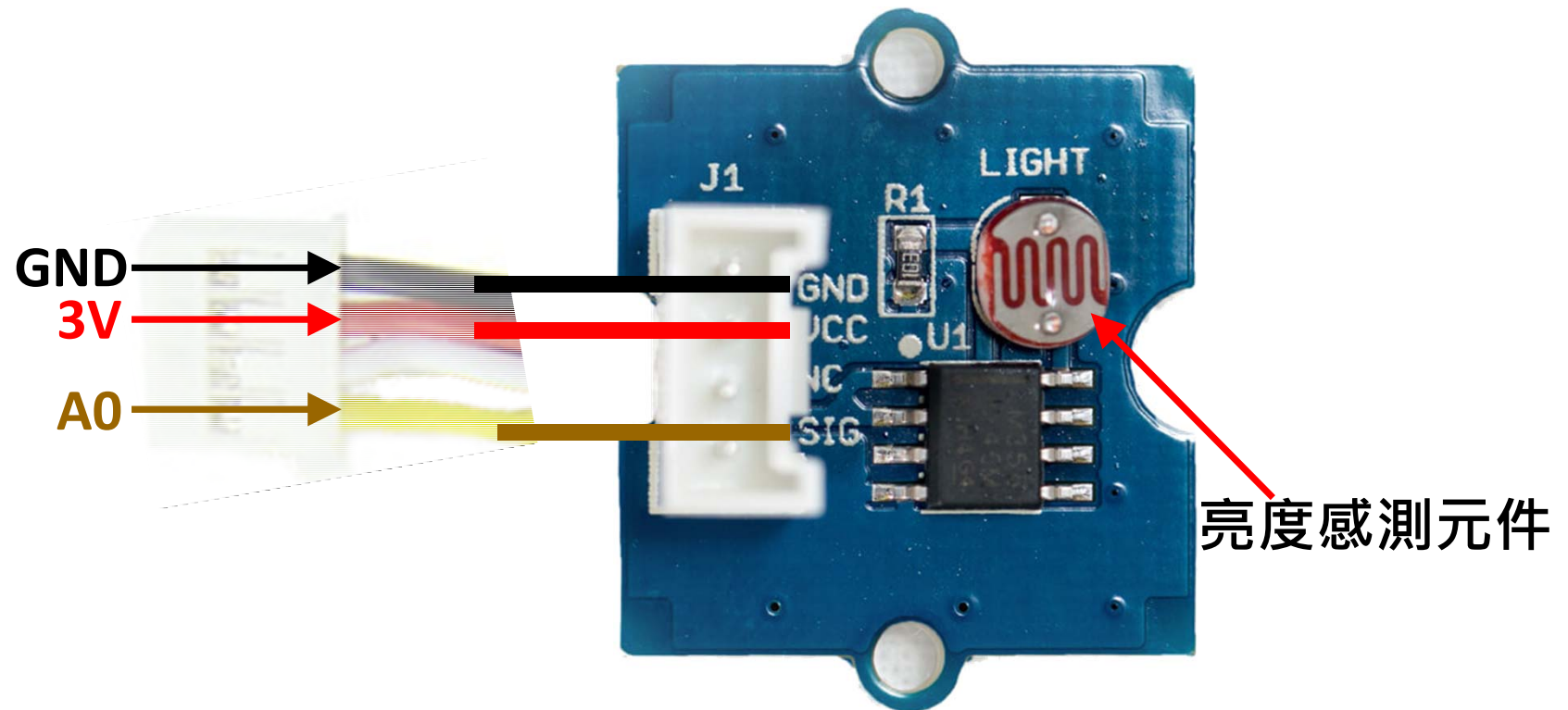
麵包板



將兩塊麵包板與NodeMCU組合方便後續實作

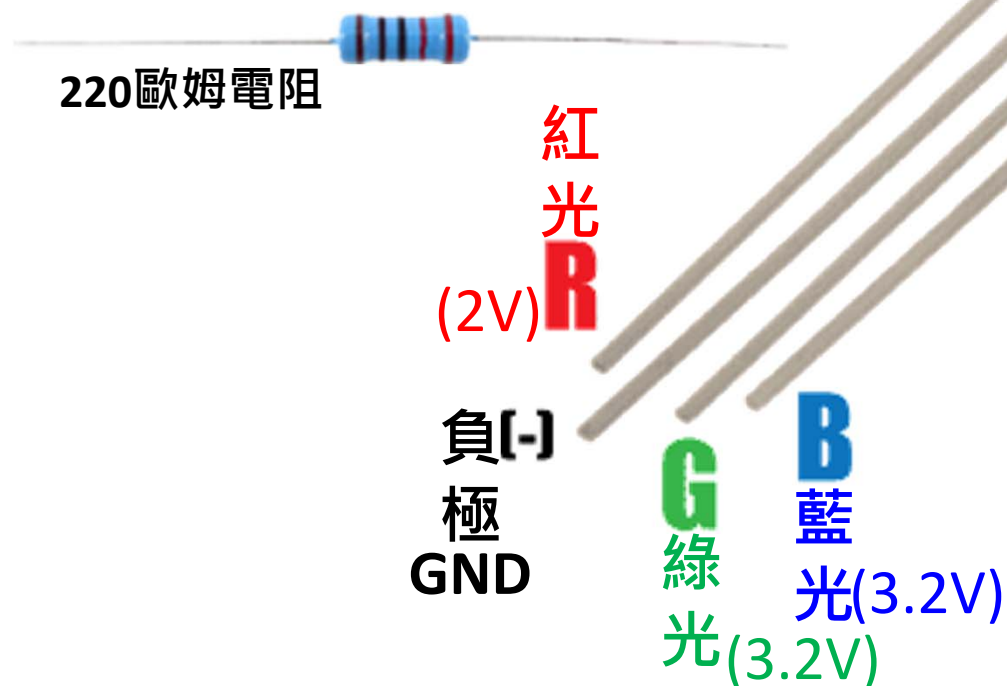


亮度感測器模組 Light sensor

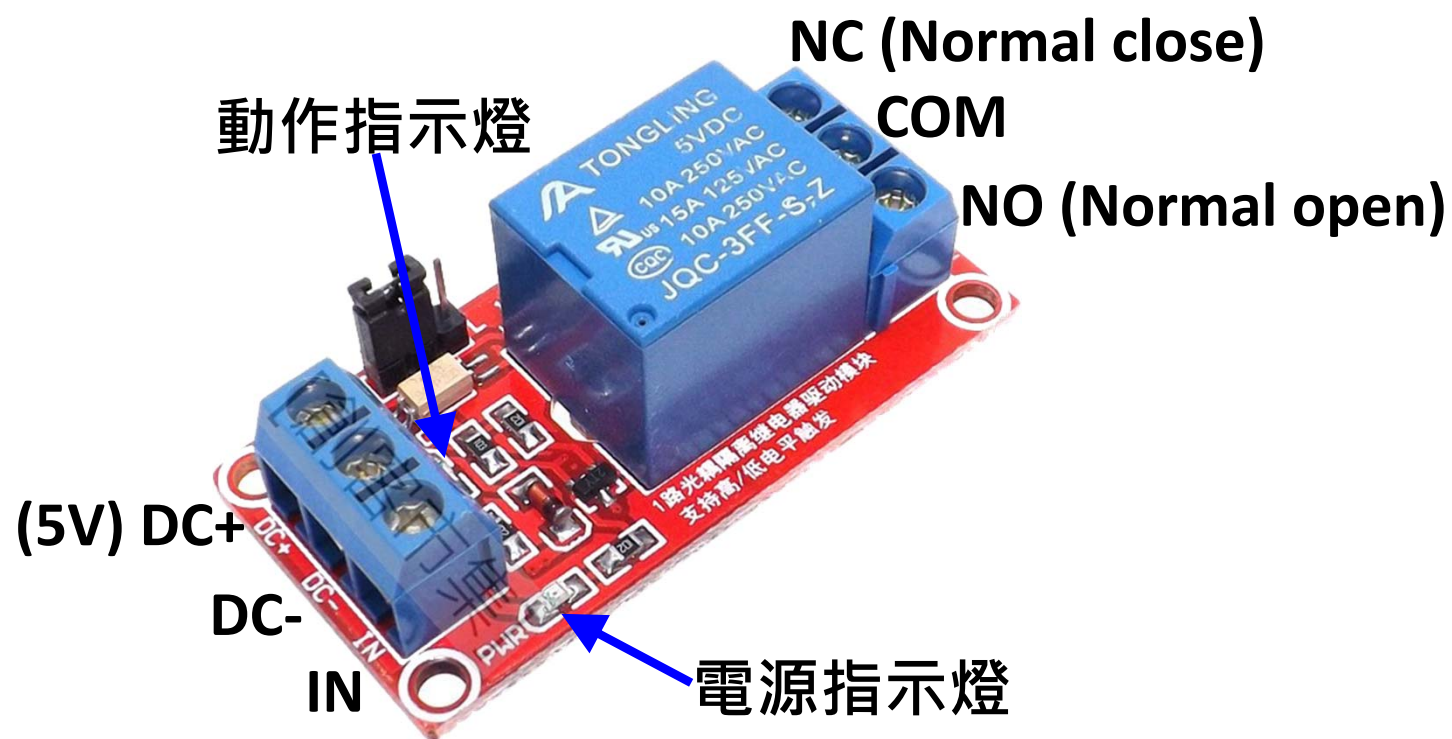


RGB三色發光二極體LED針腳定義

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。



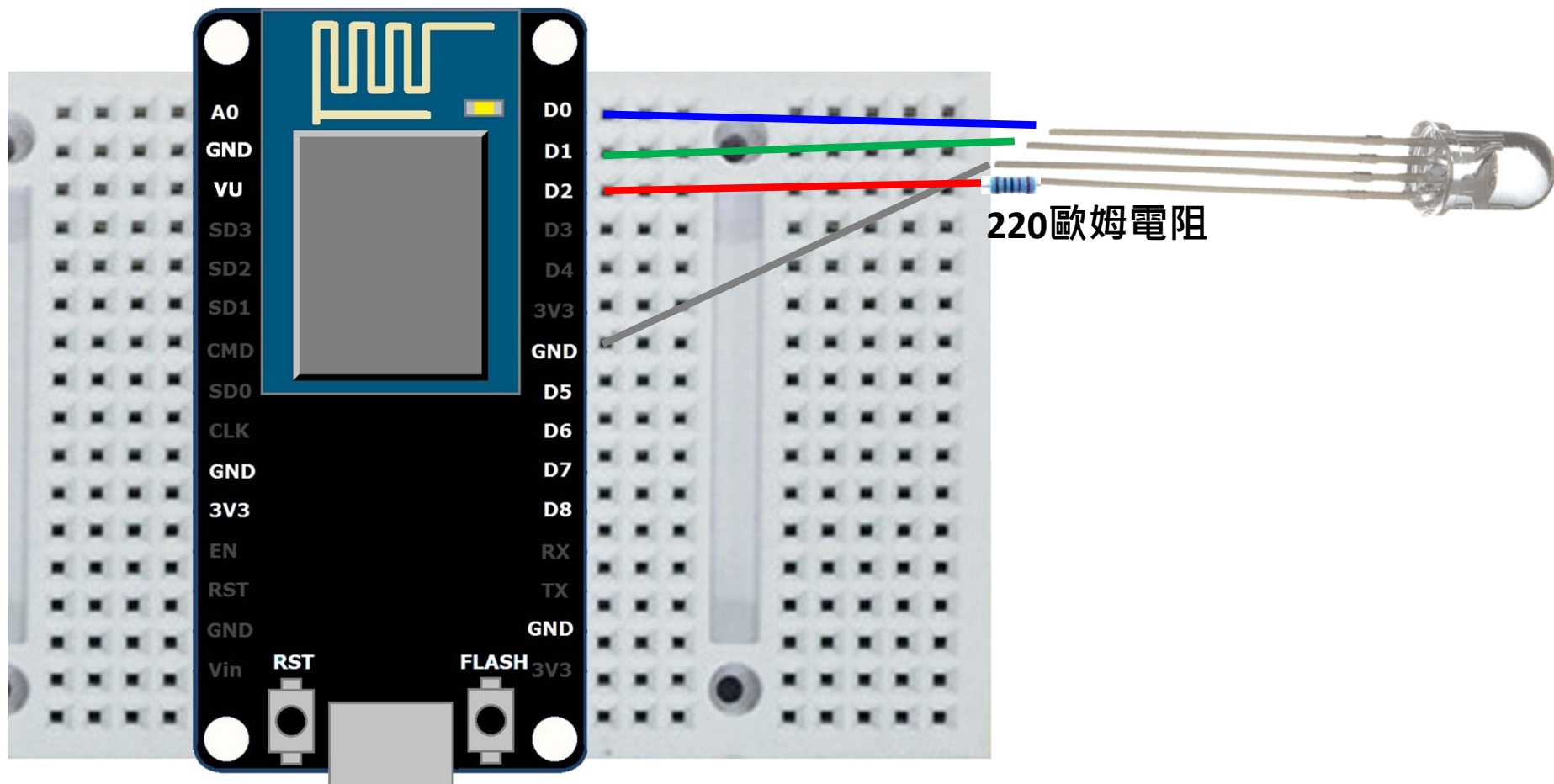
繼電器Relay模組



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](#)

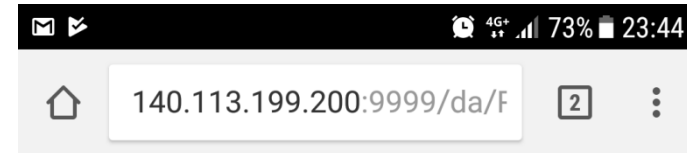
Cyber Device List:

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

VPython List:

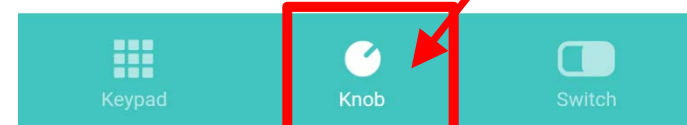
- [3DMotion1](#)
- [3DMotion2](#)

2. 叫出一個 Remote_control備用



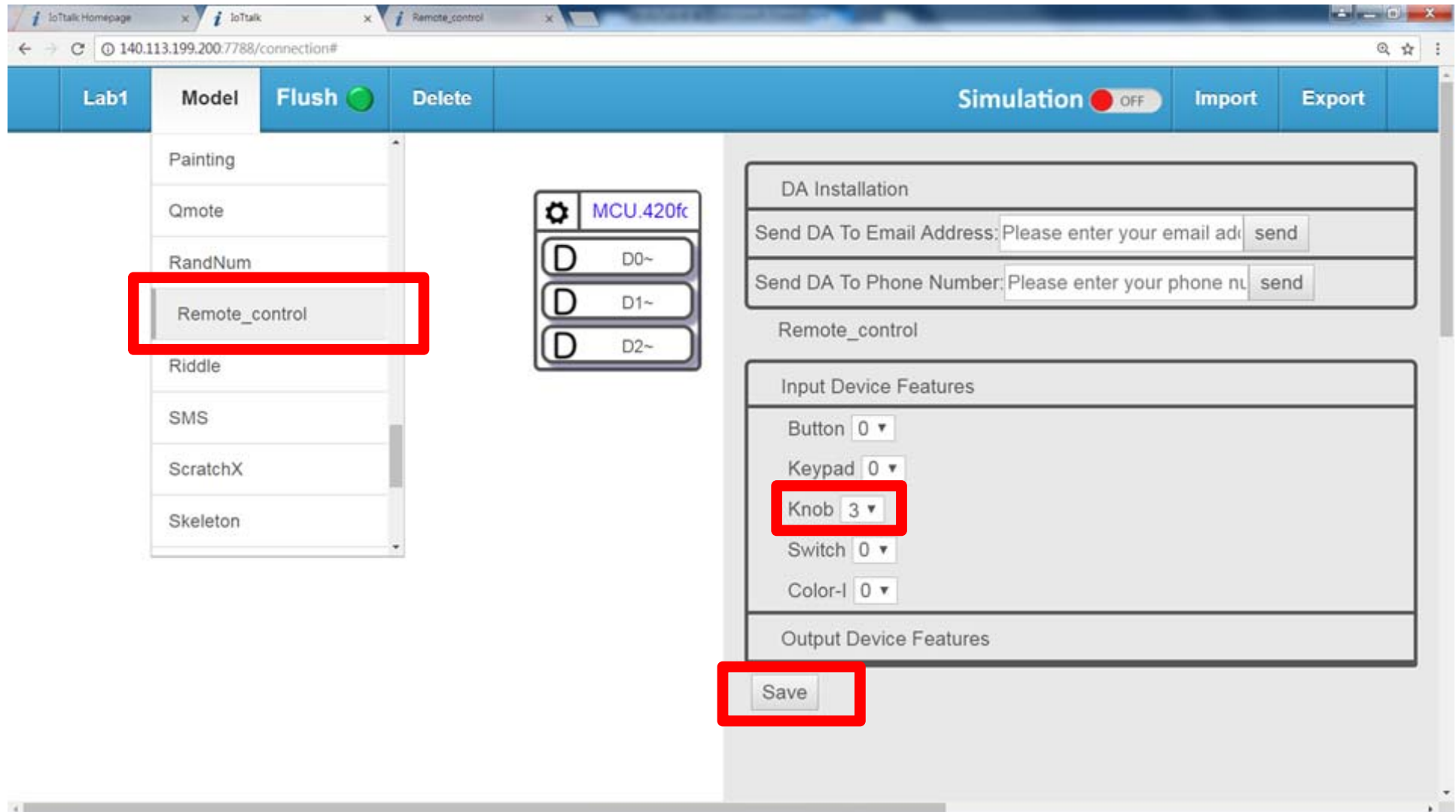
4. 記住這設備名稱

3. 選取類型



LAB1.1 – 以Knob控制LED

在IoTtalk介面操點選Remote_control，選3個Knob



LAB1.1 – 以Knob控制LED

將叫出來的Model連接上Remote_control

The screenshot displays the IoTalk web interface. At the top, there is a navigation bar with buttons: Lab1, Model, Flush (with a green indicator), Delete, Simulation (with a red OFF indicator), Import, and Export. Below this, the main workspace is divided into several sections. On the left, there are two panels: '00.Rem' and 'MCU.4'. The '00.Rem' panel contains three knobs labeled 'Knob1 S', 'Knob2 S', and 'Knob3 S'. A red arrow points from the 'Knob1 S' label to a text box. The 'MCU.4' panel contains three digital outputs labeled 'D D0~', 'D D1~', and 'D D2~'. In the center, there is a 'Controller' section with a red box around the text '00.Remote_control'. A red arrow points from this box to another text box. At the bottom right, there is a 'Knob' section with a red box around the text '00.Remote_control'. A red arrow points from this box to a third text box. At the very bottom, there is a large, detailed image of a silver knob with a green indicator.

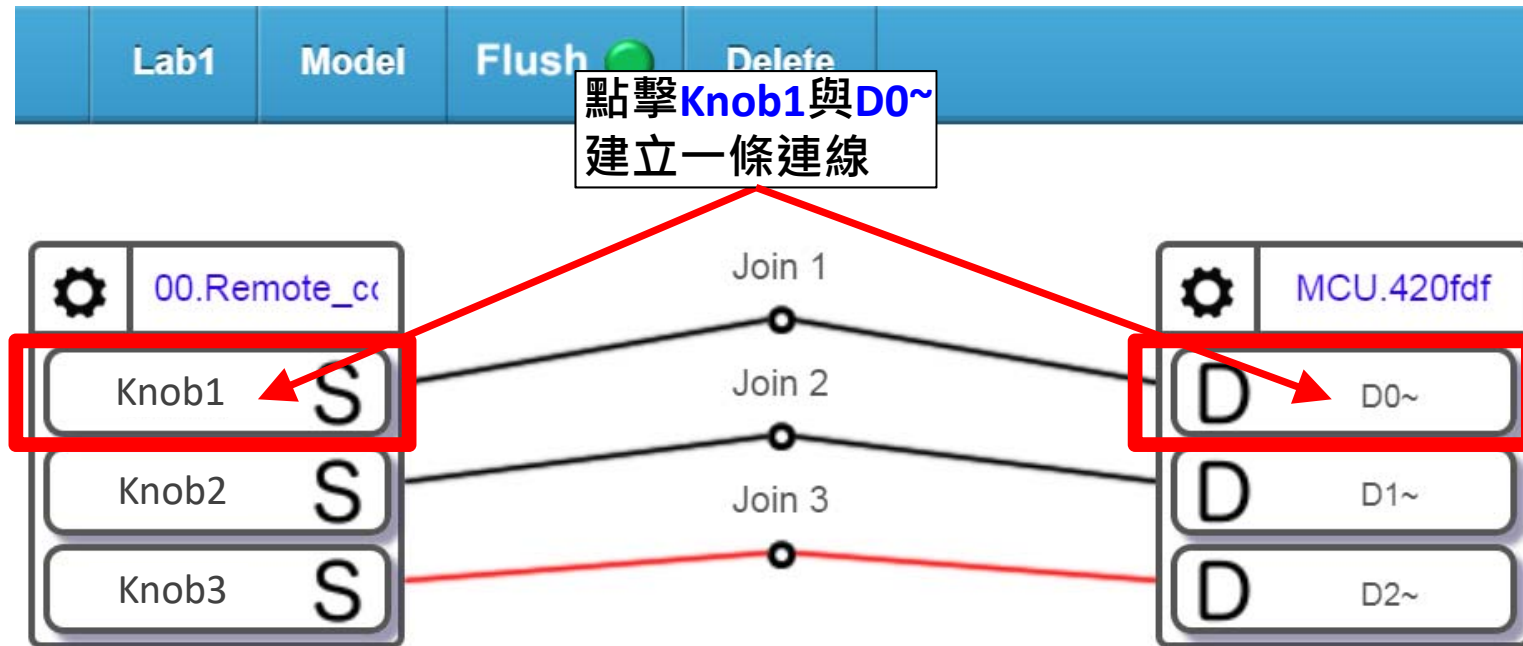
選完設備後變成藍色才是正確連接 (設備名字要選對)

要選擇一模一樣名字的設備

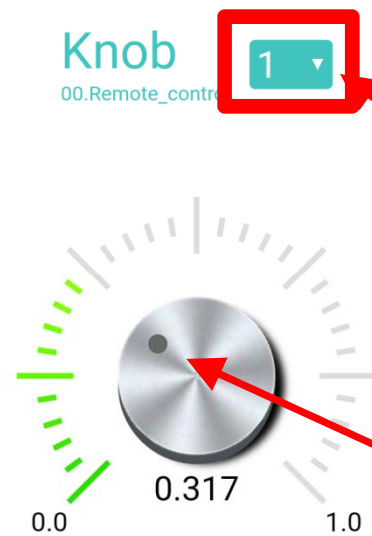
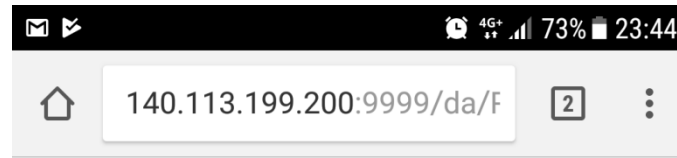
Knob 1

00.Remote_control

LAB1.1 – 以Knob控制LED



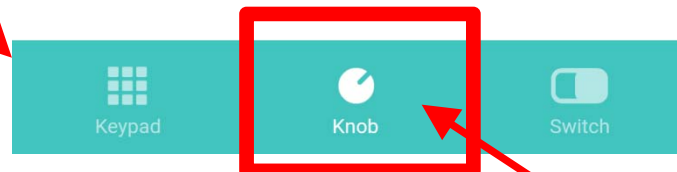
LAB1.1 – 以Knob控制LED



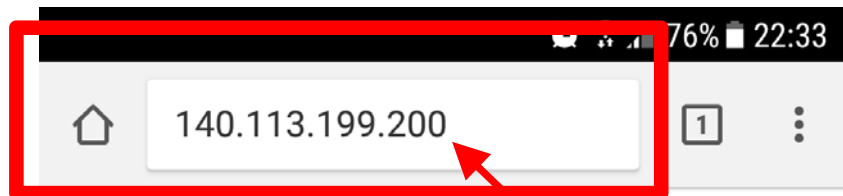
切換Knob1~Knob3
試著調整三個Knob1~Knob3
控制RGB三個LED, 可以調出
很多種顏色喔!

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



使用手機Chrome瀏覽器
輸入此網址

IoTalk:

- [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](#)

點擊Smartphone

VPython List:

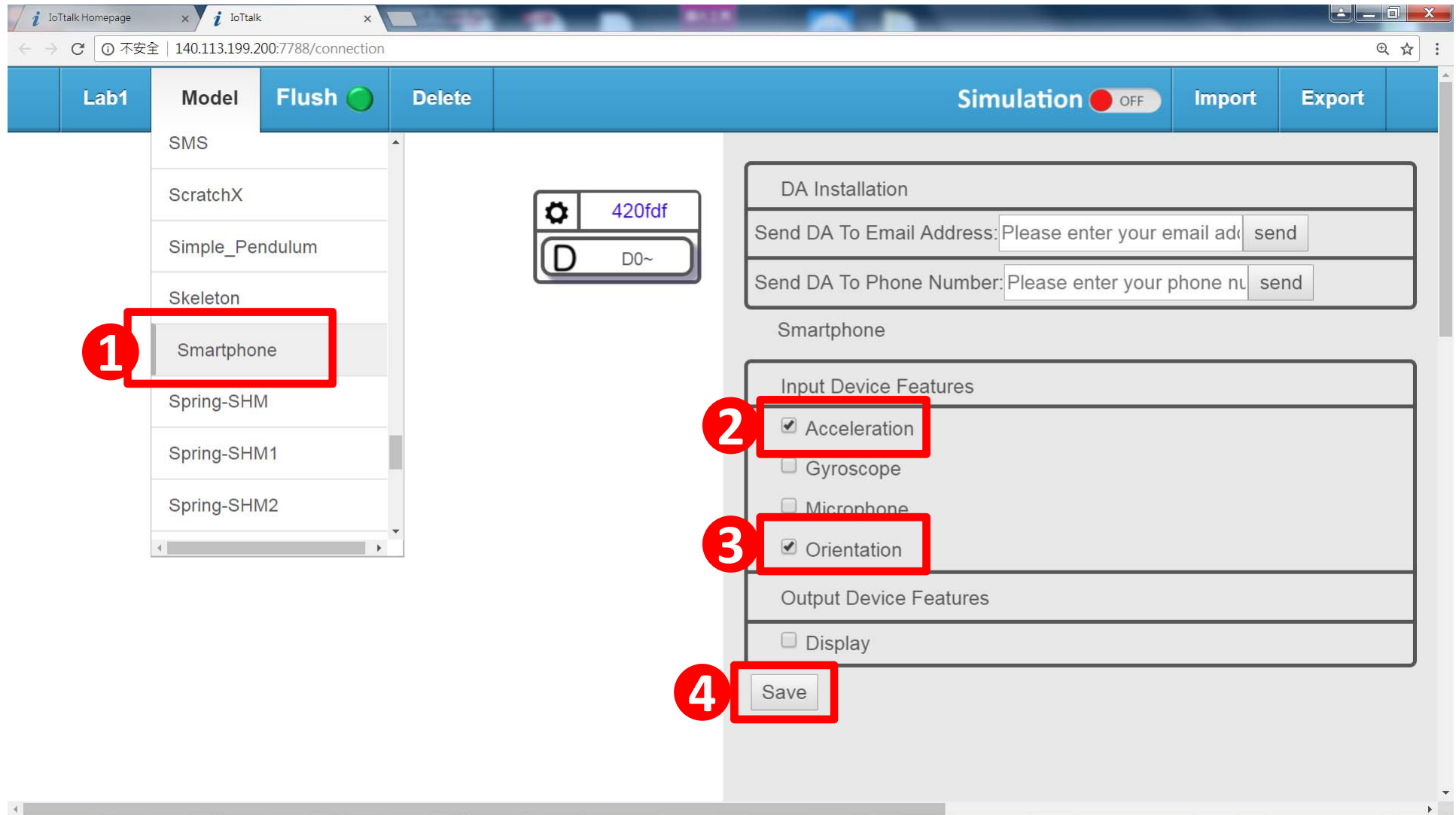
- [3DMotion1](#)
- [3DMotion2](#)

LAB1.2 – 以Smartphone控制LED



記住這名稱

LAB1.2 – 以Smartphone控制LED



LAB1.2 – 以Smartphone控制LED

IoTalk Homepage x 140.113.199.200:9999/list_al x IoTalk x Remote_control x

140.113.199.200:7788/connection#

Lab1 Model Flush Delete Simulation OFF Import Export

Smartphon Accelerator A Orientation O

420fdf D D0~

43.Smartphone

92.Smartphone

要選擇一模一樣名字的設備

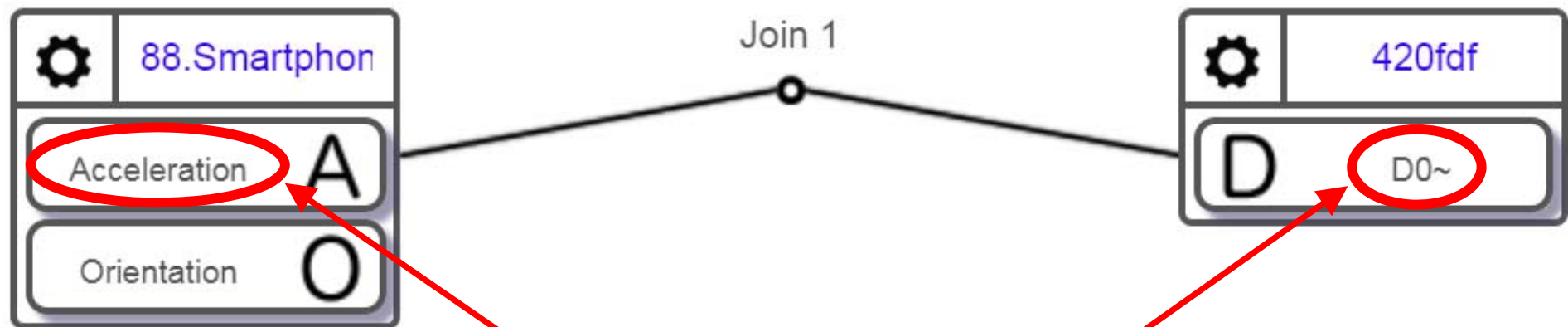
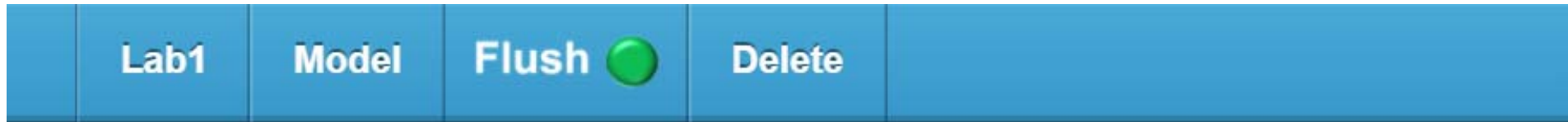
140.113.199.200:9999/da/9

92.Smartphone

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

IoTalk Homepage x IoTalk x Remote_control x

140.113.199.200:7788/connection#

Lab1 Model Flush Delete Simulation OFF Import Export

Connection Name: Join 1 Delete Save

92.Smartphone (IDF) Delete

Acceleration	Type	Function
x1	variant	
x2	variant	flip
x3	sample	

MCU.420fdf (ODF) Delete

D2~	Function
y1	disabled

左鍵點擊Join1小圓圈

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 web interface with three browser tabs: 'IoTalk Homepage', 'IoTalk', and 'Remote_control'. The address bar shows '140.113.199.200:7788/connection#'. The top navigation bar includes 'Lab1', 'Model', 'Flush' (with a green indicator), 'Delete', 'Simulation' (with a red 'OFF' toggle), 'Import', and 'Export'.

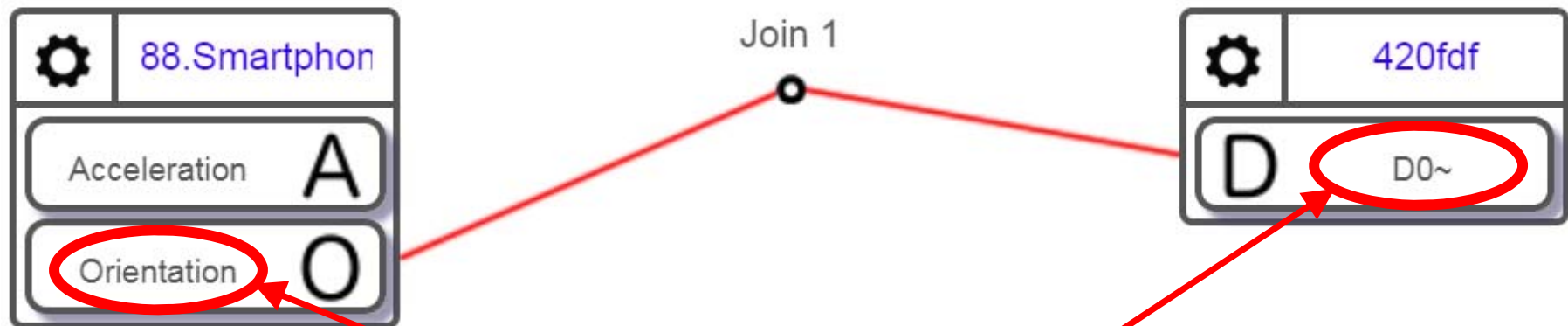
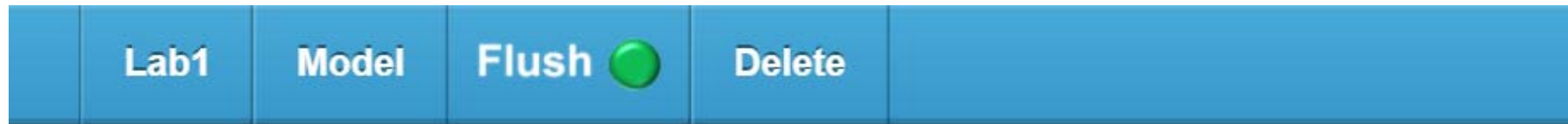
In the main workspace, a diagram shows a 'Join 1' node (a small circle) connected to two blocks: '88.Smartphon' (containing 'Acceleration A' and 'Orientation O') and '420fdf' (containing 'D D0~'). A red circle highlights the 'Join 1' node, with a red arrow pointing to it and a text box that says '右鍵點擊Join1小圓圈' (Right-click the Join 1 small circle).

On the right side, there are two data monitors:

- IDF Monitor**: A table showing data for 'Sub-stage: Input'. The table has columns for time, 'Continue', 'Next', and 'Table'. The data shows a constant value of 0.00 for 'Continue' and -0.10 for 'Next' across several time intervals, with a 'Table' value of 9.80.
- ODF Monitor**: A table showing data for 'Sub-stage: Function'. The table has columns for time and 'Table'. The data shows a value of 0.10 for 'Table' at 23:19:38, and 0.00 at 23:19:39 and 23:19:40.

A red box highlights the 'IDF Monitor' table. A text box with the text '可觀察到手機加速度計的即時偵測狀態' (Can observe the real-time detection status of the smartphone accelerometer) points to the 'IDF Monitor' table.

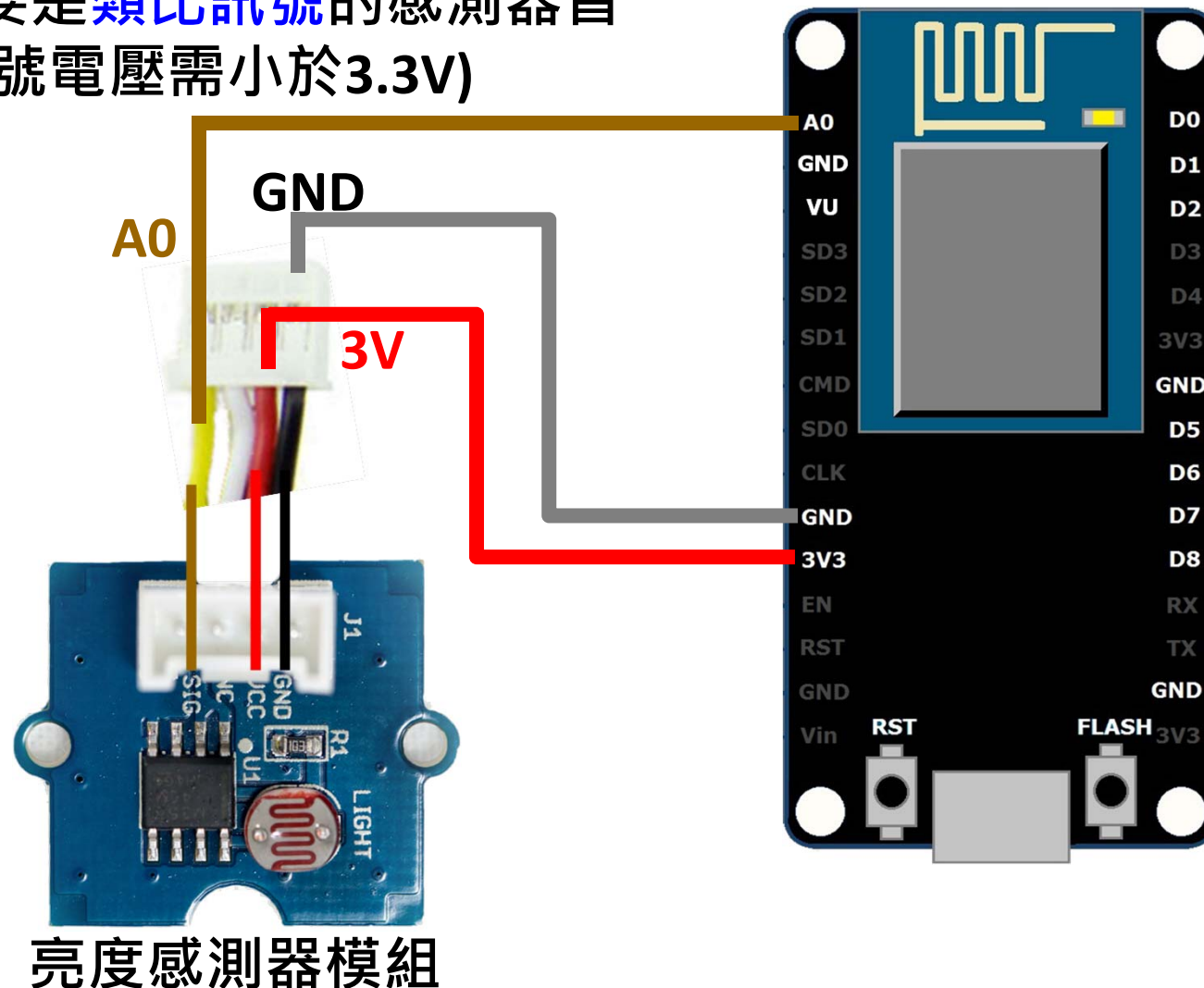
LAB1.2 – 以Smartphone控制LED



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)



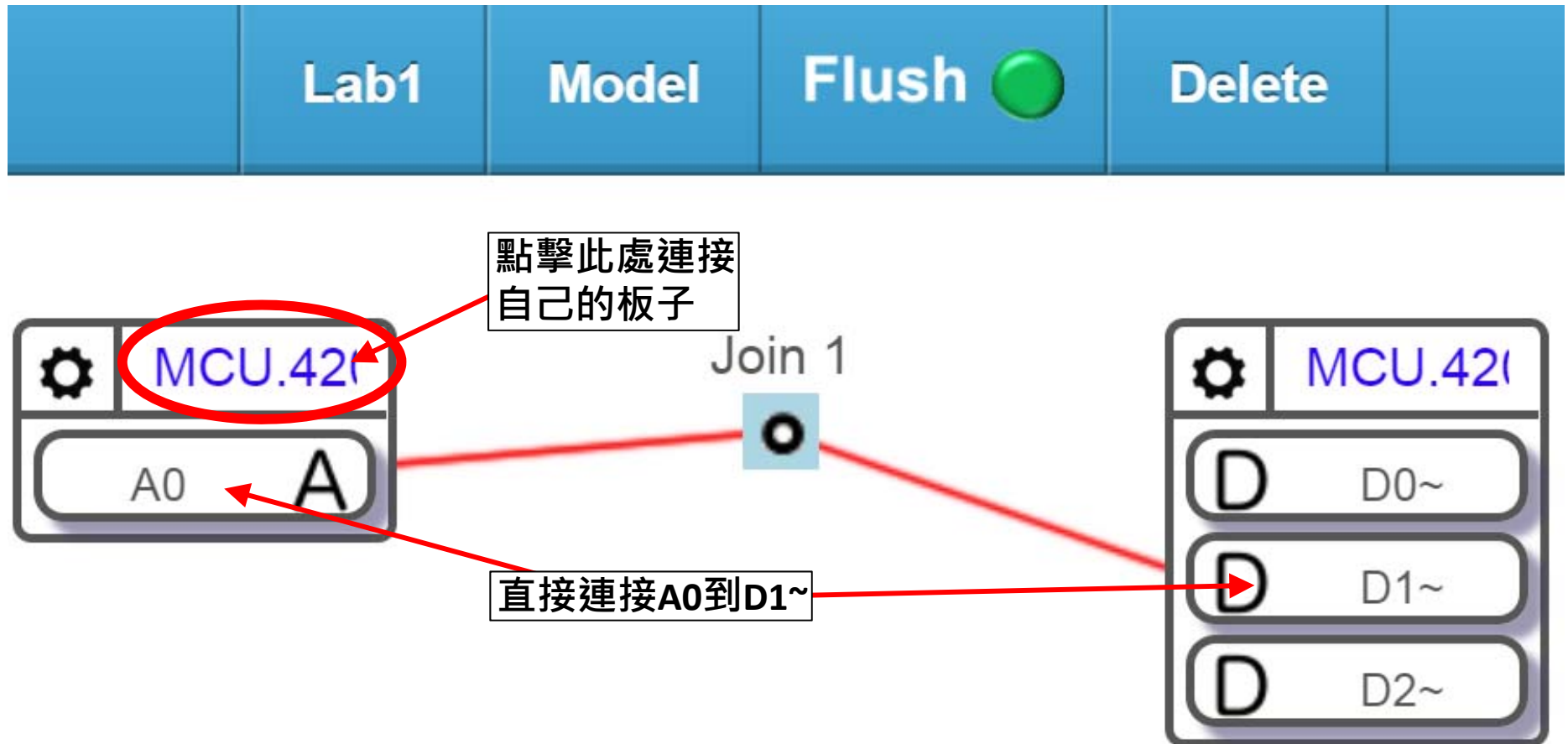
LAB2 – 亮度感測模組連接

The screenshot shows the IoTalk web interface with the following components:

- Top Bar:** Includes tabs for 'Lab1', 'Model', 'Flush' (with a green status indicator), 'Delete', 'Simulation' (with a red 'OFF' indicator), 'Import', and 'Export'.
- Left Panel:** A list of models including MusicBox, NodeMCU (highlighted with a red circle), Painting, Qmote, RandNum, Remote_control, Riddle, and SMS.
- Center Panel:** Displays the selected model 'MCU.420fc' with three digital input buttons labeled 'D D0~', 'D D1~', and 'D D2~'.
- Right Panel:** Contains configuration sections:
 - DA Installation:** Fields for 'Send DA To Email Address' and 'Send DA To Phone Number', each with a 'send' button.
 - NodeMCU:** A section for configuring the module's features.
 - Input Device Features:** A list of input devices where 'A0' is checked (highlighted with a red circle).
 - Output Device Features:** A list of output devices (D0~ through D8) that are currently unchecked.

A text annotation '把NodeMCU的A0叫出來' (Bring out NodeMCU's A0) is placed next to the checked 'A0' checkbox in the Input Device Features section.

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

Connection Name: Join 1

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

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

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

The screenshot shows the IoTalk web interface with the following components:

- Navigation Bar:** Lab1, Model, Flush (green circle), Delete, Simulation (red circle OFF), Import, Export.
- Diagram:** Two MCU.420 modules are connected via a 'Join 1' node. The left module has an output A0 connected to the 'Join 1' node, which is then connected to the input D0 of the right module.
- Configuration Panel (Right):**
 - Connection Name: Join 1 (with Delete and Save buttons)
 - MCU.420fdf (IDF) table:

A0	Type	Function
x1	sample	reverse
		disabled
		reverse
		smooth
		add new function

The 'add new function' button is highlighted with a red circle.

LAB2 – 亮度感測模組連接

IoTalk允許使用者利用Python語言撰寫自己DF 功能

The screenshot displays the IoTalk web interface. At the top, there's a navigation bar with buttons: Lab1, Model, Flush (with a green indicator), Delete, Simulation (OFF), Import, and Export. Below this, a circuit diagram shows two MCU.420fc blocks connected by a 'Join 1' component. The left MCU has an 'A0' input with a value of 'A'. The right MCU has three digital outputs labeled 'D0~', 'D1~', and 'D2~'. A 'Function Management' window is open on the right. It contains a 'Global Function List' with 'average', 'fft', 'flip', and 'flip_light'. The 'A0 Function List' on the right includes 'add new function' (circled in red), 'reverse' (circled in red), and 'smooth'. Below these lists, the 'Selected Function' is 'reverse', and the 'Version' is '20180107'. At the bottom of the window, a Python code block is shown, with a red box highlighting the function definition:

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

 A red arrow points from the text '寫了一行很簡單的Python程式' to this code block.

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)

Connection Name: Join 1

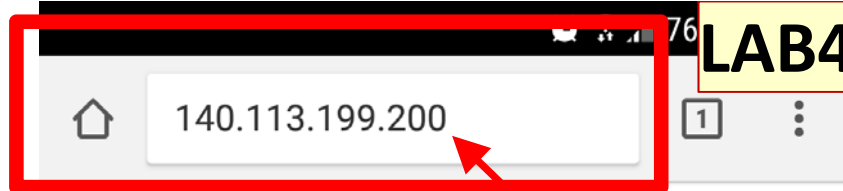
MCU.420fdf (IDF)

A0	Type	Function
x1	sample	reverse

MCU.420fdf (ODF)

D1~	Function
y1	x1

LAB4 – 虛實整合



IoTtalk:

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

使用手機Chrome瀏覽器
輸入此網址

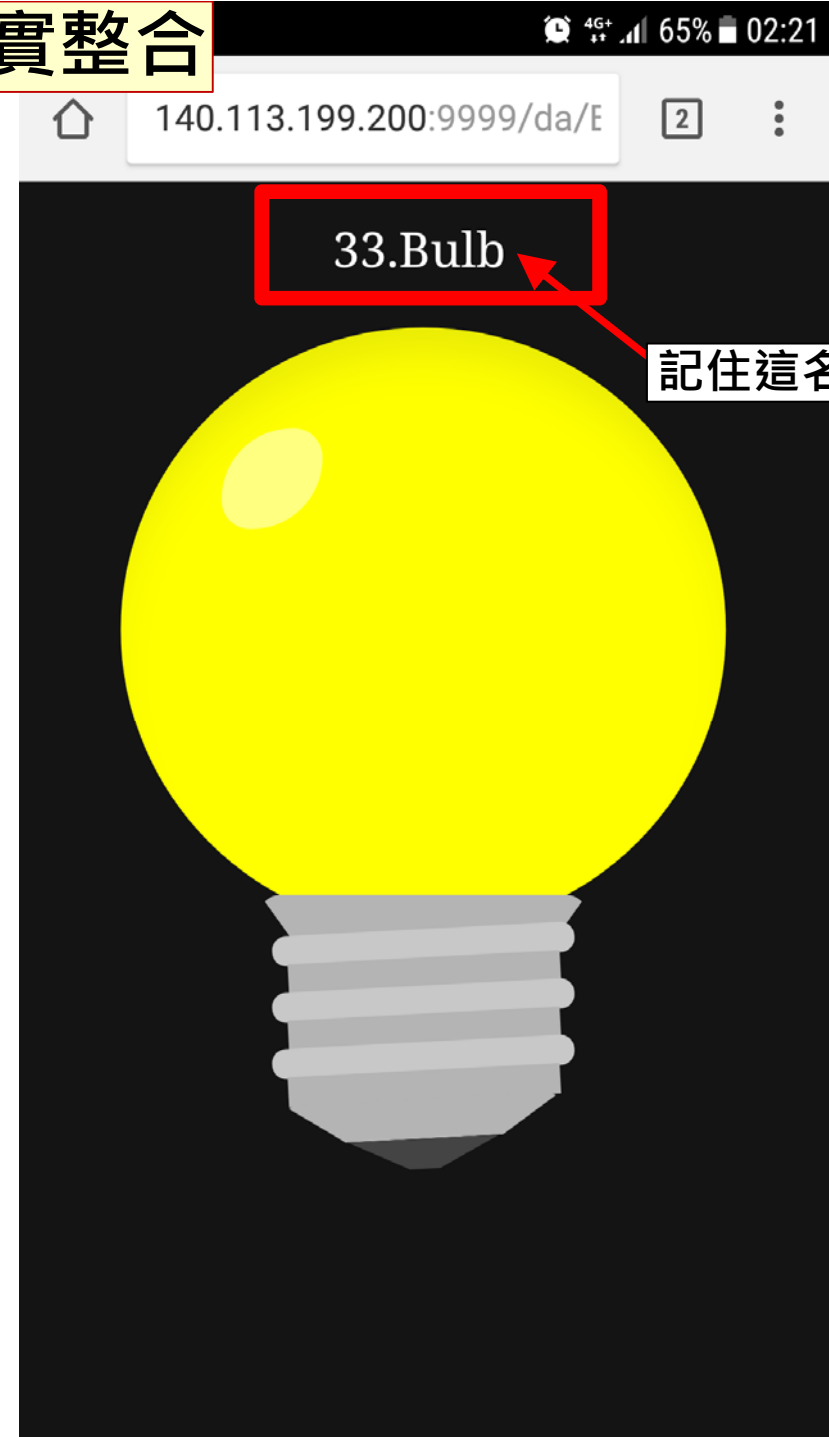
Cyber Device List:

- [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

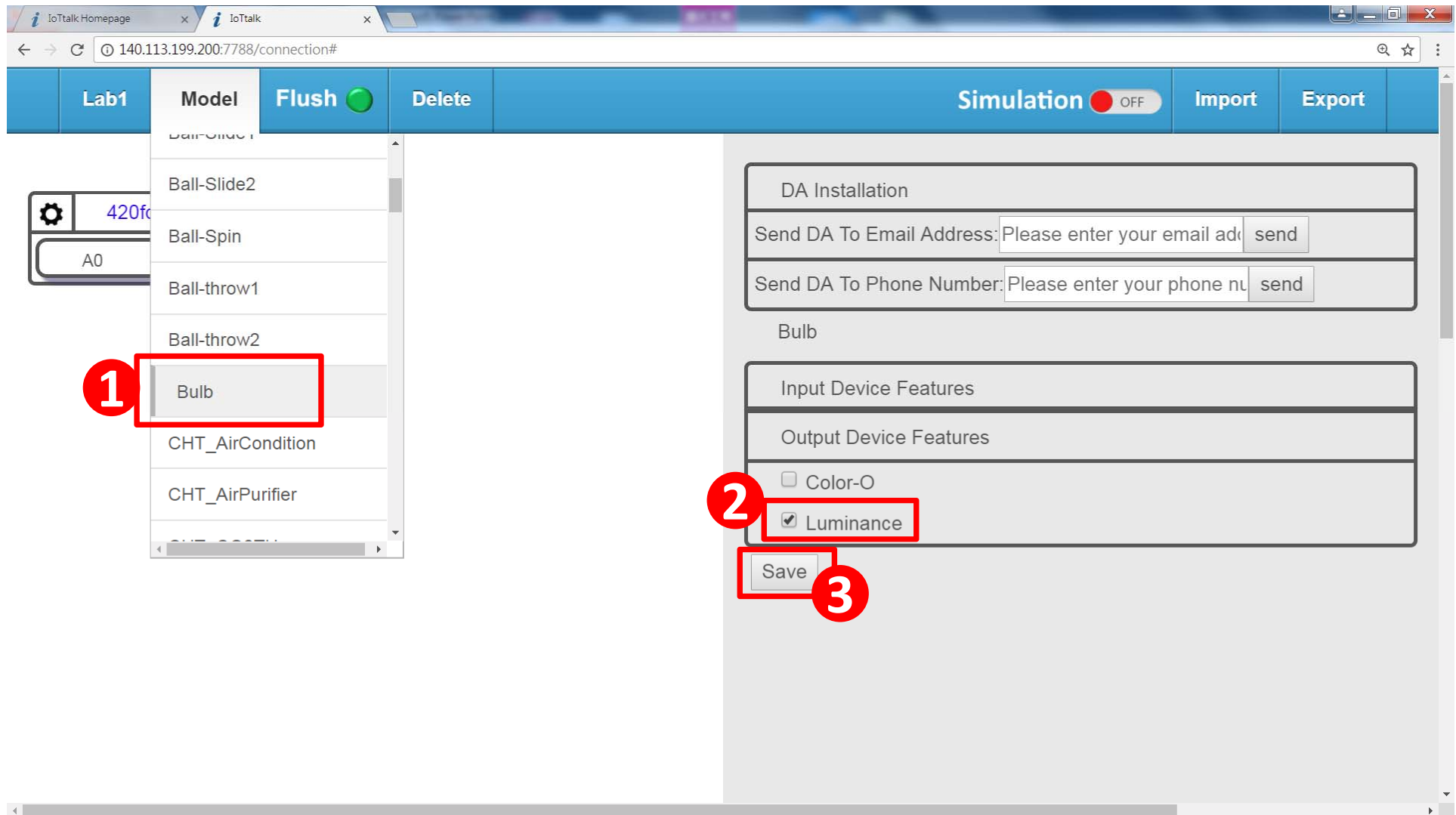
VPython List:

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



記住這名稱

在IoTalk介面操點選Bulb，並勾選Luminance



選擇正確的裝置並掛載上Model

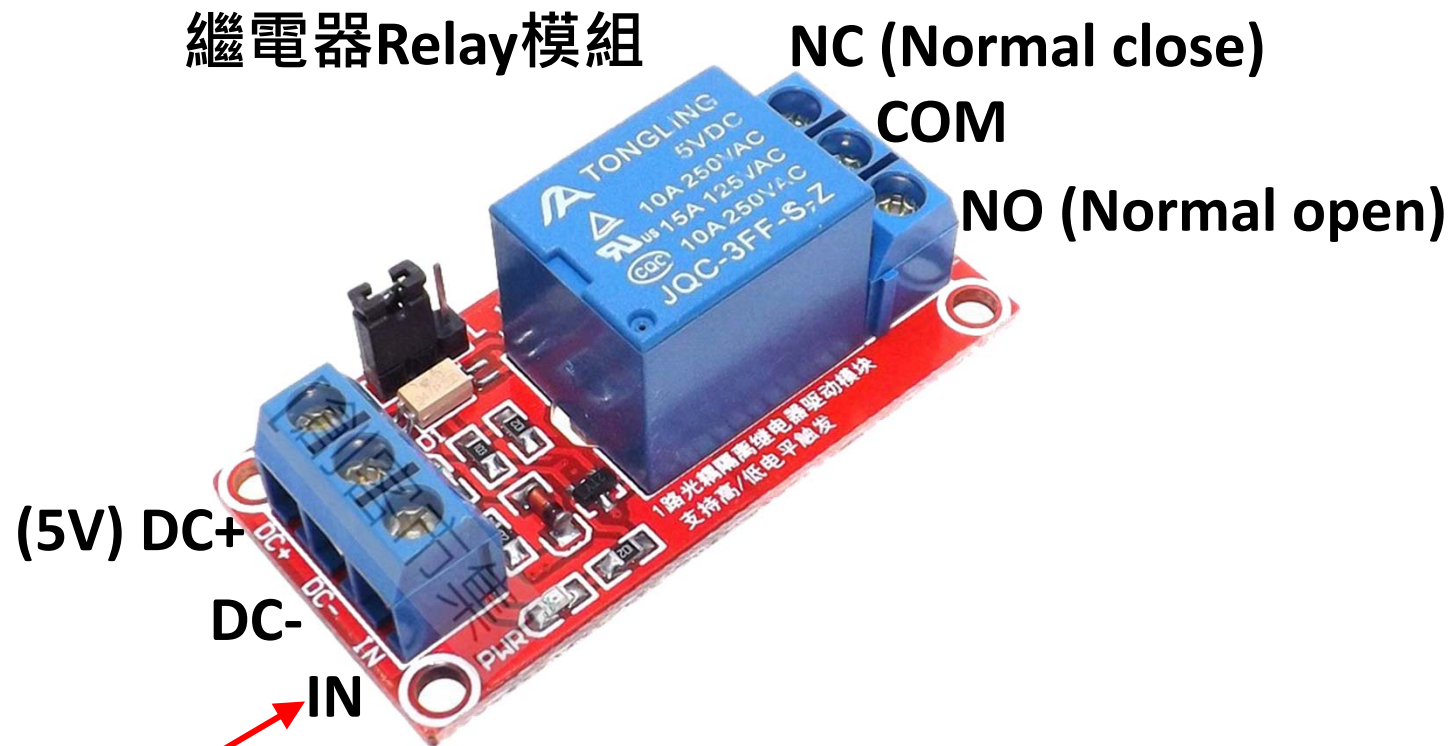


連接A0到Luminance

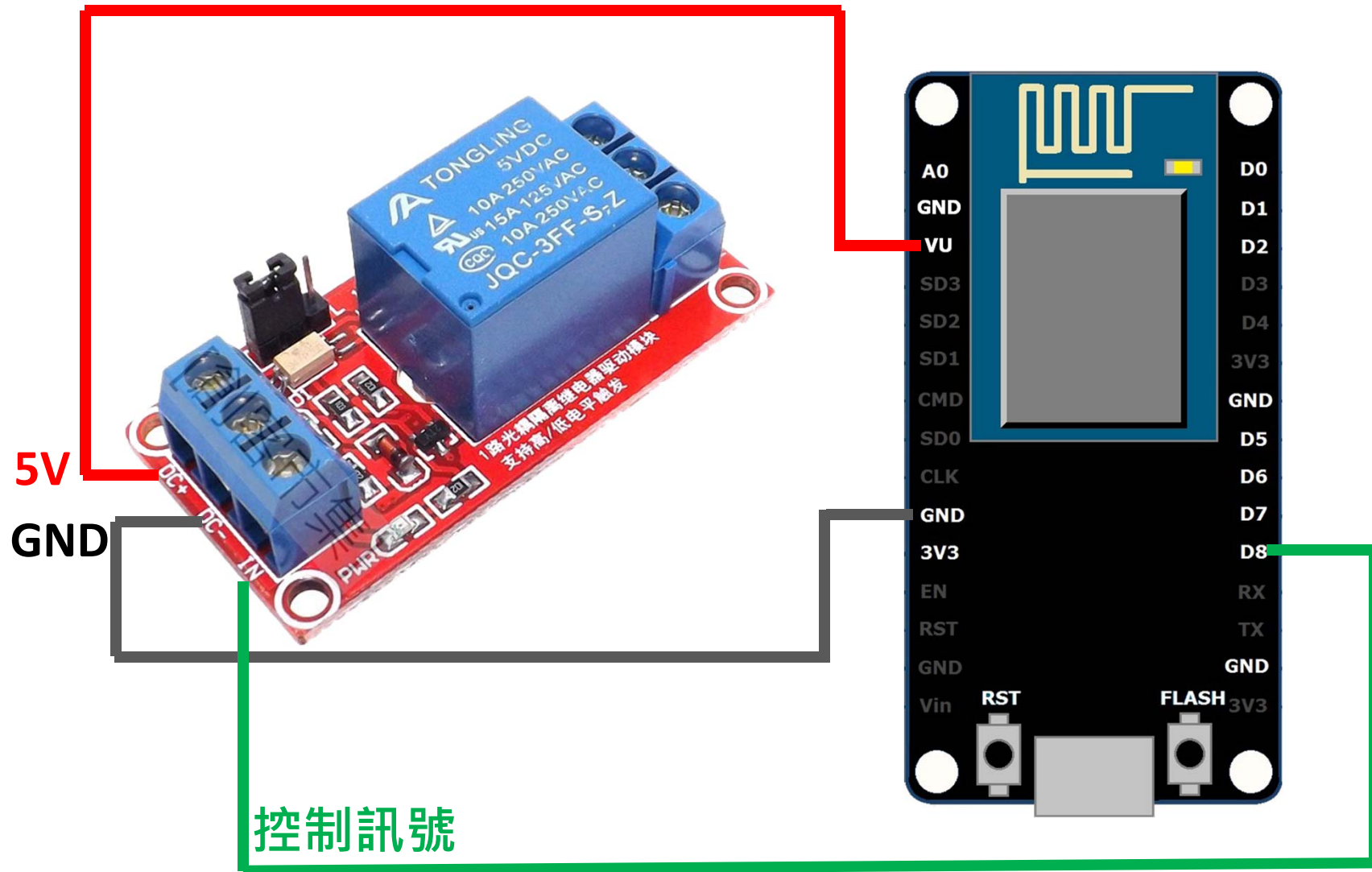


觀察虛擬燈泡的明暗變化是否符合真實LED的模式
可搭配使用reverse、gradual_change兩個功能 (參見page 39)

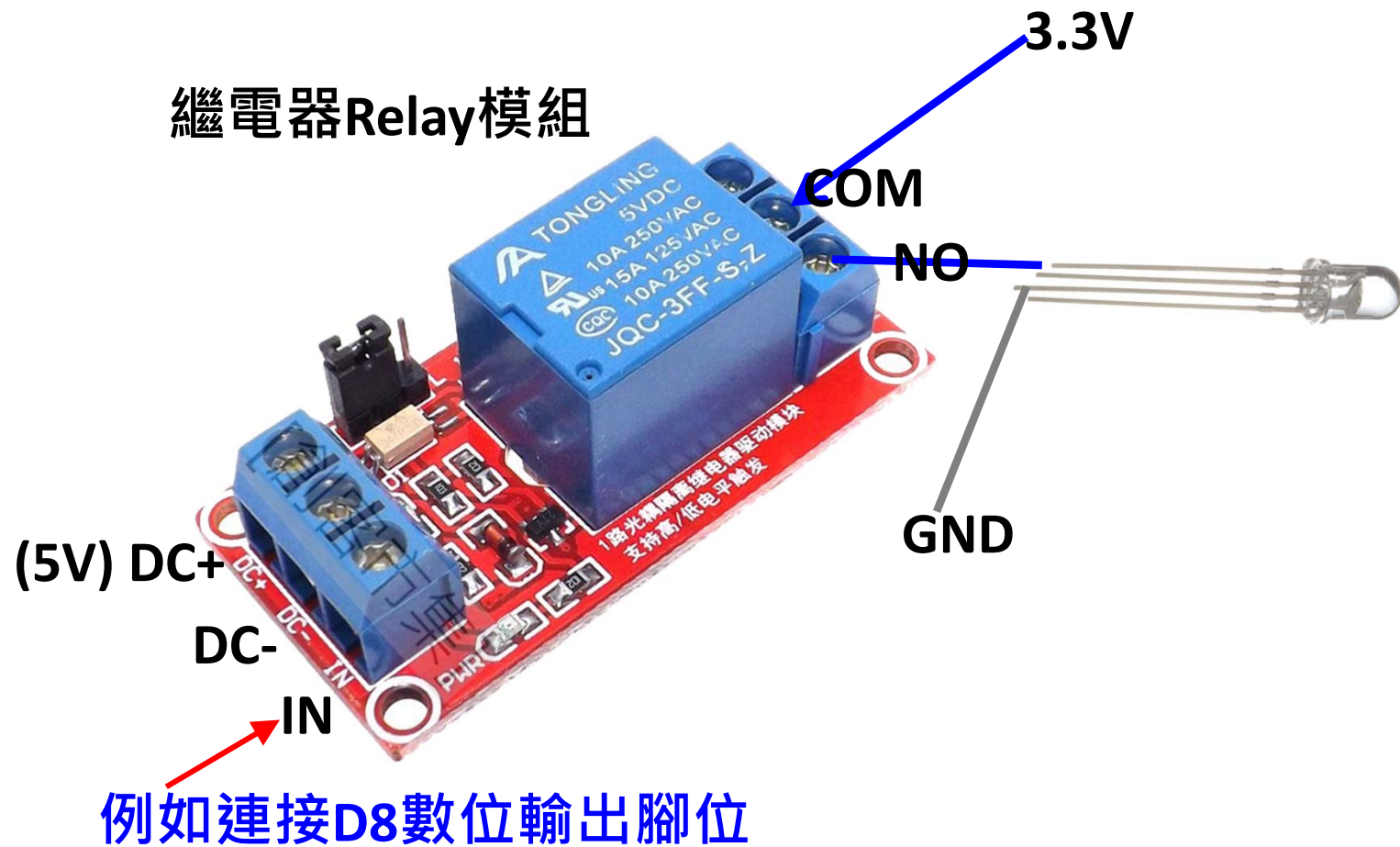
LAB5 – 智慧開關

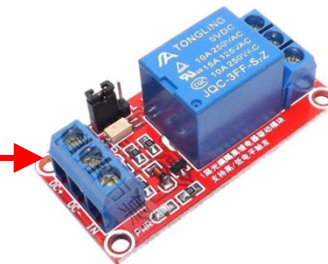
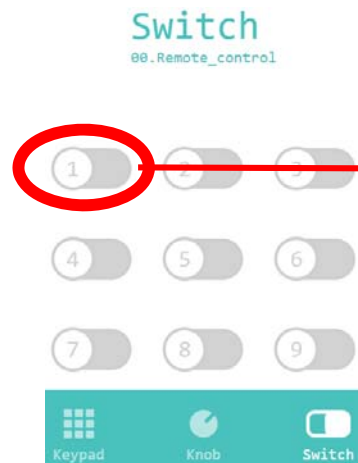
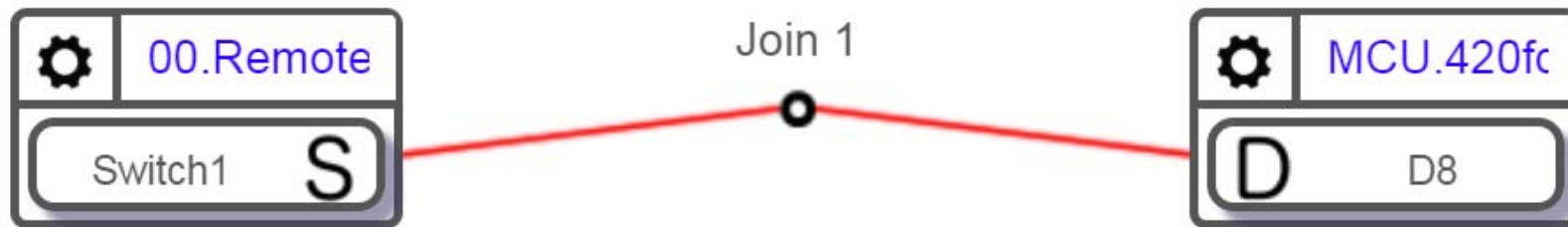


LAB5 – 智慧開關



LAB5 – 智慧開關

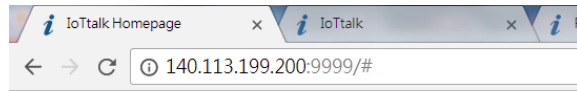




連接後即可用Switch1控制繼電器模組，繼電器啟動時可以聽到答一聲，COM跟NO兩個腳位就會接通。

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

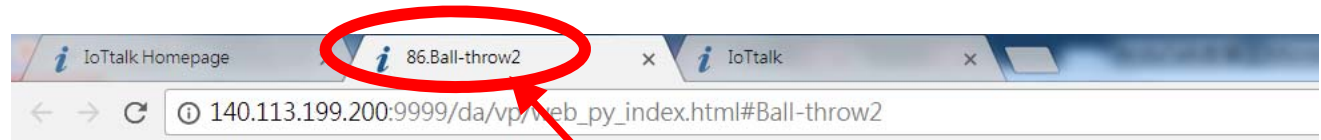


- [Voice Control](#)
- [vibration](#)
- [MusicBox](#)
- [MusicBoxController](#)

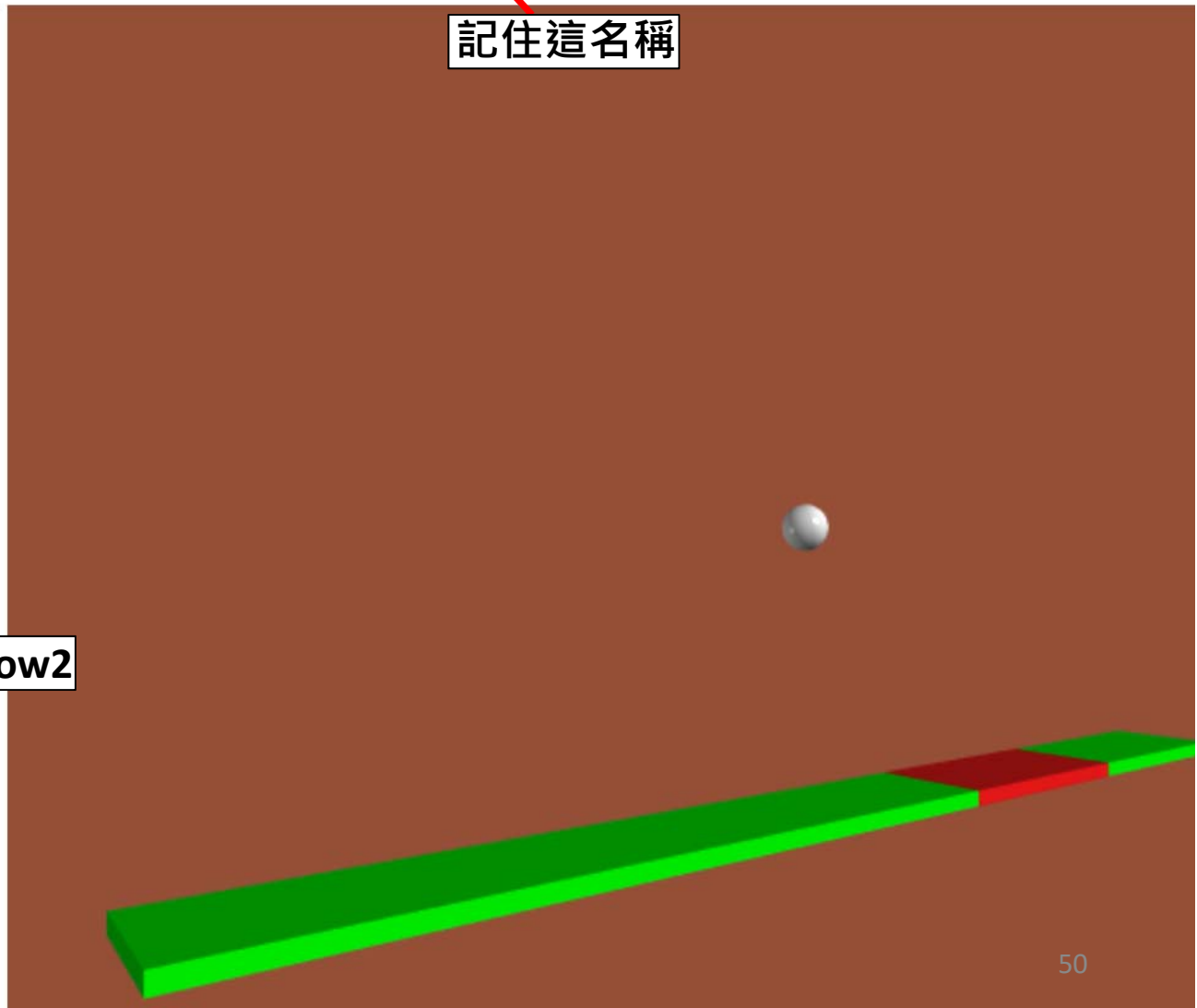
VPython List:

- [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_Fall2](#)

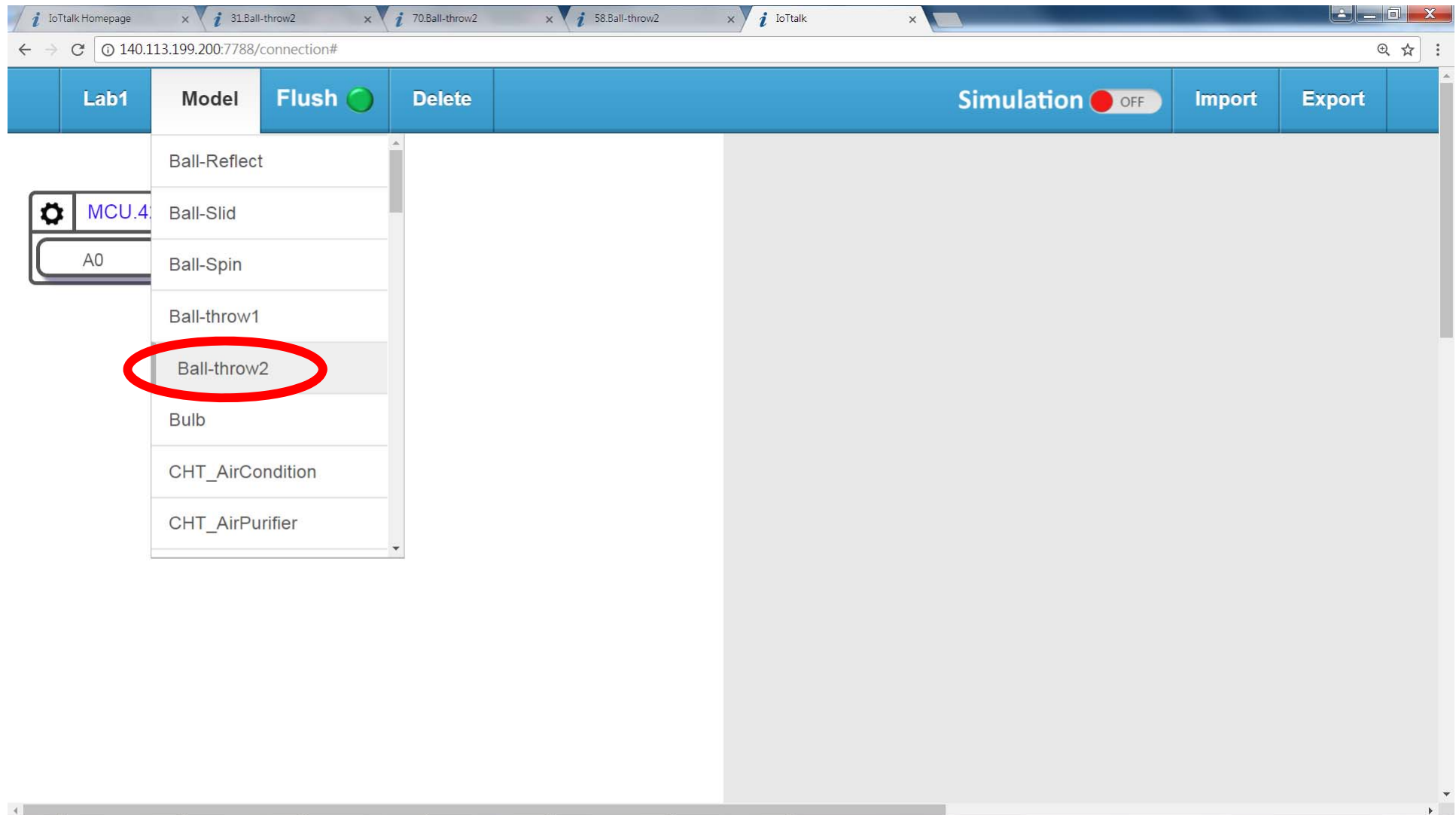
點擊Ball-throw2



記住這名稱

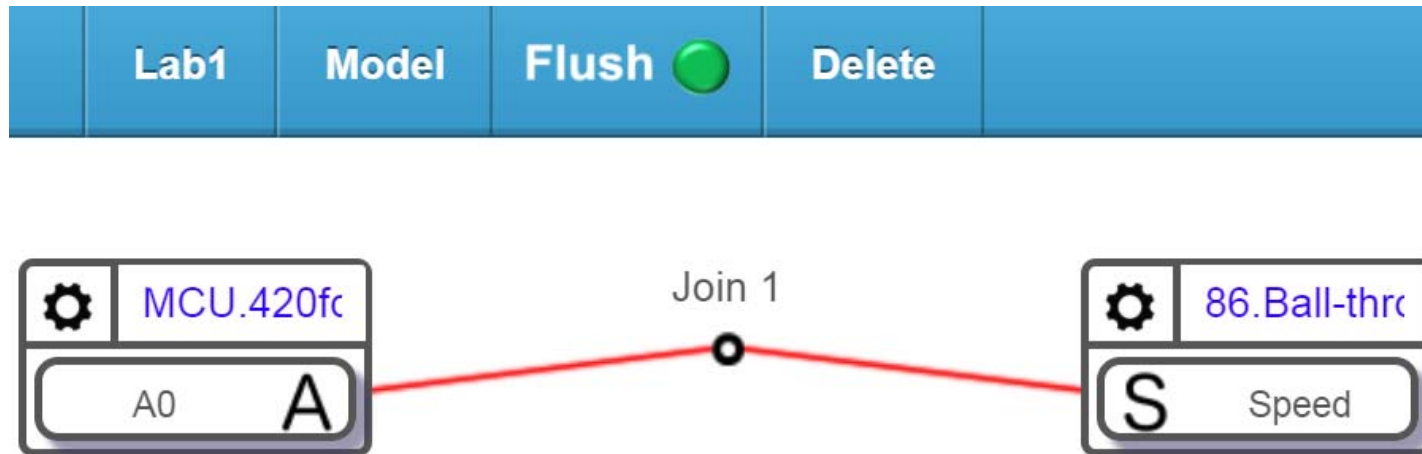


HW1 – 光感丢球



HW1 – 光感丟球

The screenshot displays the IoTalk web interface for a simulation. The top navigation bar includes buttons for **Lab1**, **Model**, **Flush** (with a green indicator), **Delete**, **Simulation** (with a red indicator and 'OFF' status), **Import**, and **Export**. The main workspace shows two device panels: **MCU.420fc** (with a gear icon and 'A0' label) and **Ball-throw2** (with a gear icon and 'Speed' label). A red circle highlights the **86.Ball-throw2** device in the simulation area, with a red arrow pointing to it from a text box that says "要選擇一模一樣名字的設備" (Choose a device with the same name). Below this, another browser window shows the **86.Ball-throw2** device selected in the simulation.



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

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