HUB5168+應用教學 DAY1

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基礎介紹說明

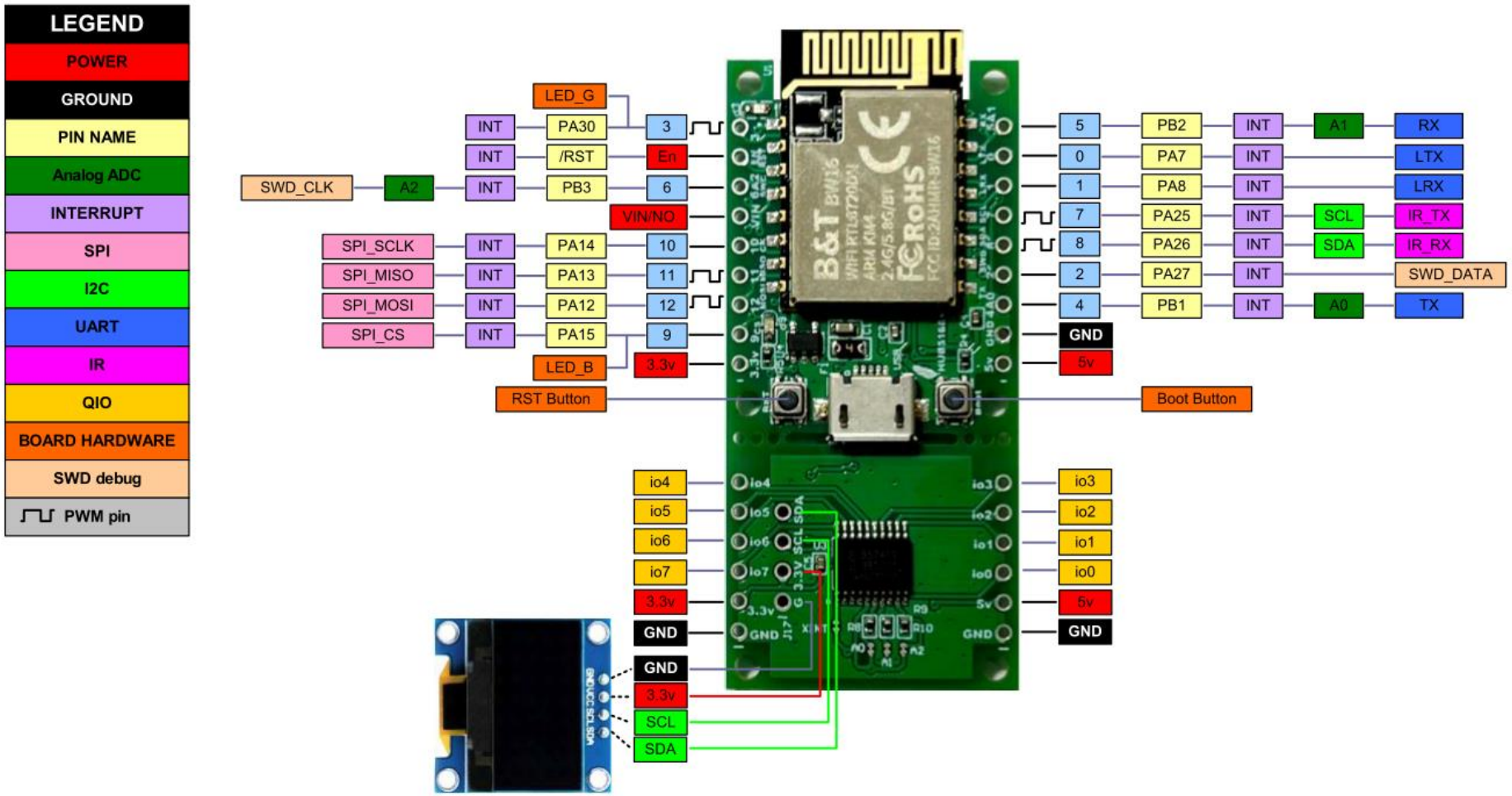
HUB5168+

- 延續了 DSI5168 輕薄短小
- 支援 2.4G, 5G 雙頻 Wi-Fi 和低功耗 BLE5.0 及雙核心處理器
- 擴充模組可直上 OLED
- 為國產晶片於物聯網產品開發的好工具。

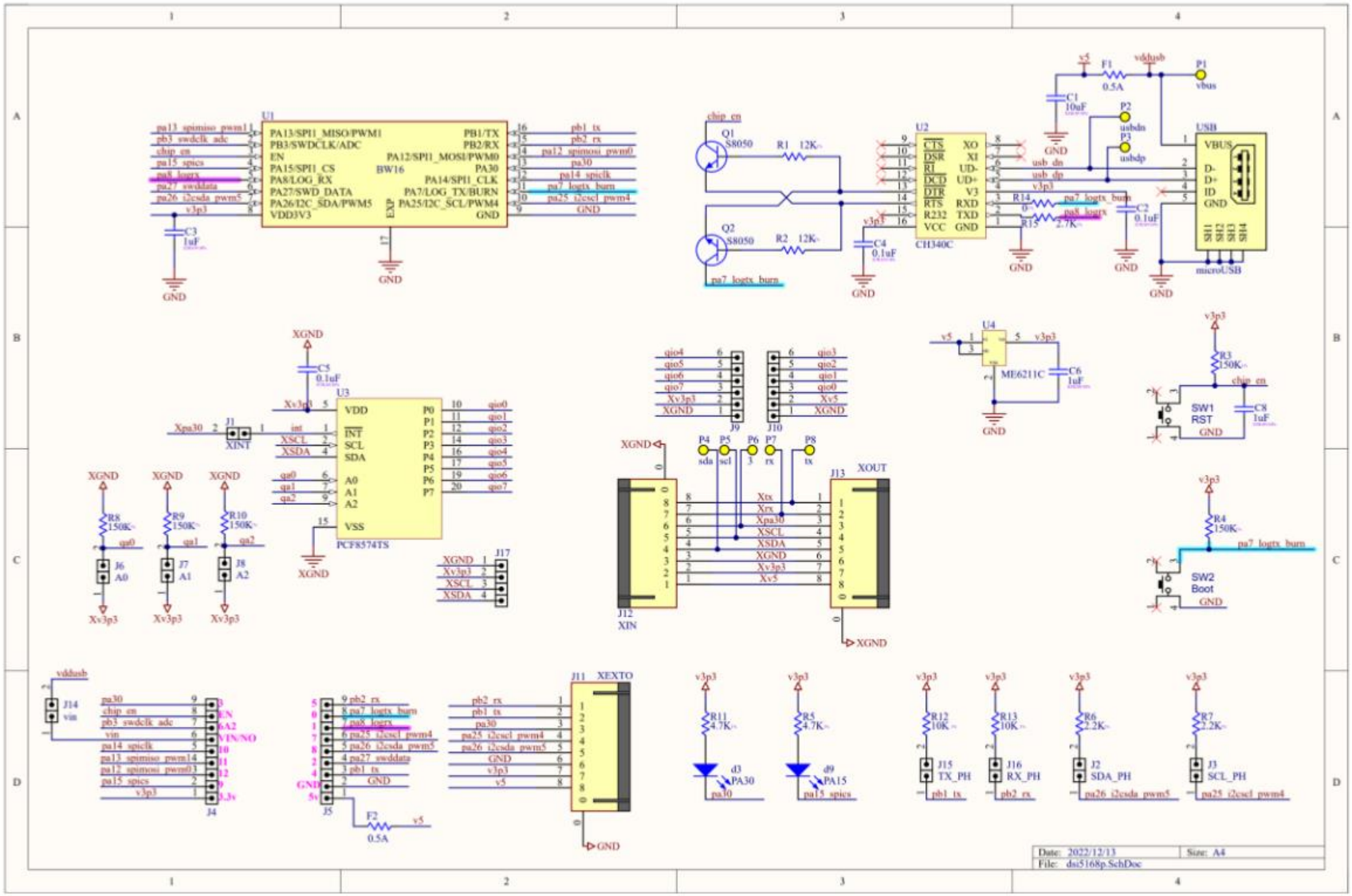
HUB5168+

硬體功能	HUB 5168+
Wireless LAN	2.4G, 5G 雙頻 Wi-Fi
BLE BLE	低功耗 BLE5.0
Chipset	RTL8720DN
MCU	KM4 Arm Cortex-M4 core @ 200 MHz KM0 Arm Cortex-M0 core @ 20 MHz
Length	34.7mm
Width	25.4mm
Flash memory	16Mbit
HS_SRAM	512KB
LP_SRAM	64KB
Clock Speed	200 MHz
I/O	21
ADC	3
SPI	1
UART	2
I2C	1

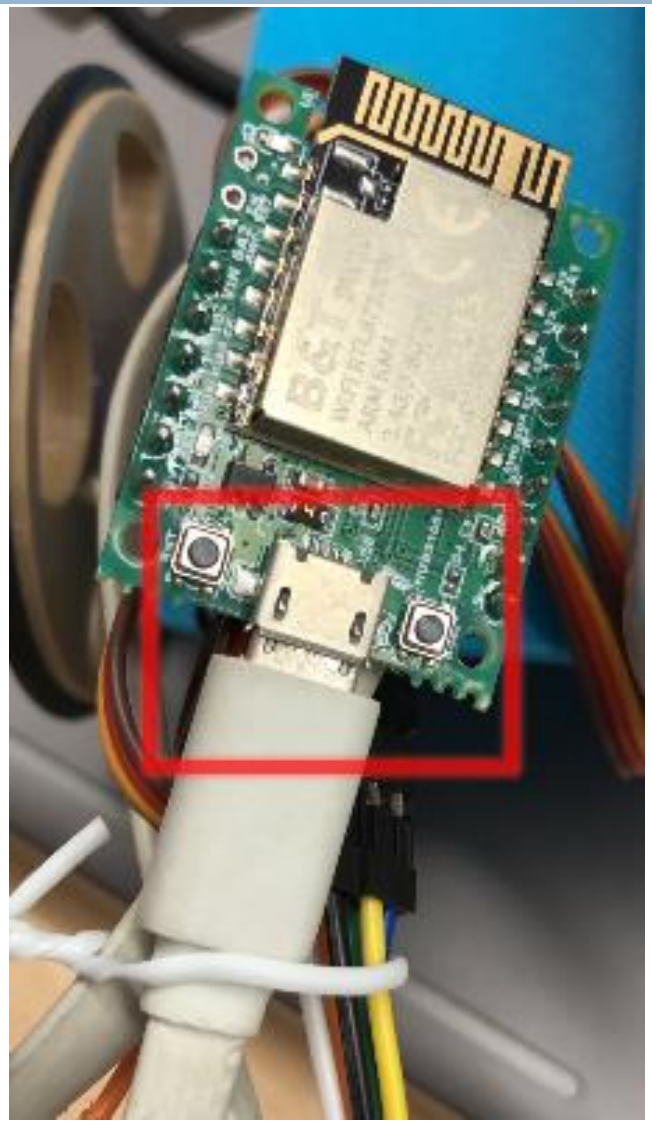
HUB5168+


LEGEND
POWER
GROUND
PIN NAME
Analog ADC
INTERRUPT
SPI
I2C
UART
IR
QIO
BOARD HARDWARE
SWD debug
PWM pin
LED_G
INT
PA30
3
INT
/RST
En
SWD_CLK
A2
INT
PB3
6
VIN/NO
SPI_SCLK
INT
PA14
10
SPI_MISO
INT
PA13
11
SPI_MOSI
INT
PA12
12
SPI_CS
INT
PA15
9
LED_B
3.3v
RST Button
5
PB2
INT
A1
RX
0
PA7
INT
LTX
1
PA8
INT
LRX
7
PA25
INT
SCL
IR_TX
8
PA26
INT
SDA
IR_RX
2
PA27
INT
SWD_DATA
4
PB1
INT
A0
TX
GND
5v
Boot Button
io4
io5
io6
io7
3.3v
GND
io3
io2
io1
io0
5v
GND
GND
3.3v
SCL
SDA

HUB5168+


U1
PA13/SPI1_MISO/PWM1
PB3/SWDCLK/ADC
EN
PA15/SPI1_CS
PA8/LOG_RX
PA27/SWD_DATA
PA26/I2C_SDA/PWM5
VDD3V3
PB1/TX
PB2/RX
PA12/SPI1_MOSI/PWM0
PA30
PA14/SPI1_CLK
PA7/LOG_TX/BURN
PA25/I2C_SCL/PWM4
GND
BW16
EXP
U2
CH340C
U3
PCF8574TS
U4
ME6211C
J11 XEXTO
J12 XIN
J13 XOUT
USB
microUSB
SW1 RST
SW2 Boot
Q1 S8050
Q2 S8050
Date: 2022/12/13
File: dsi5168p.SchDoc
Size: A4

接線圖



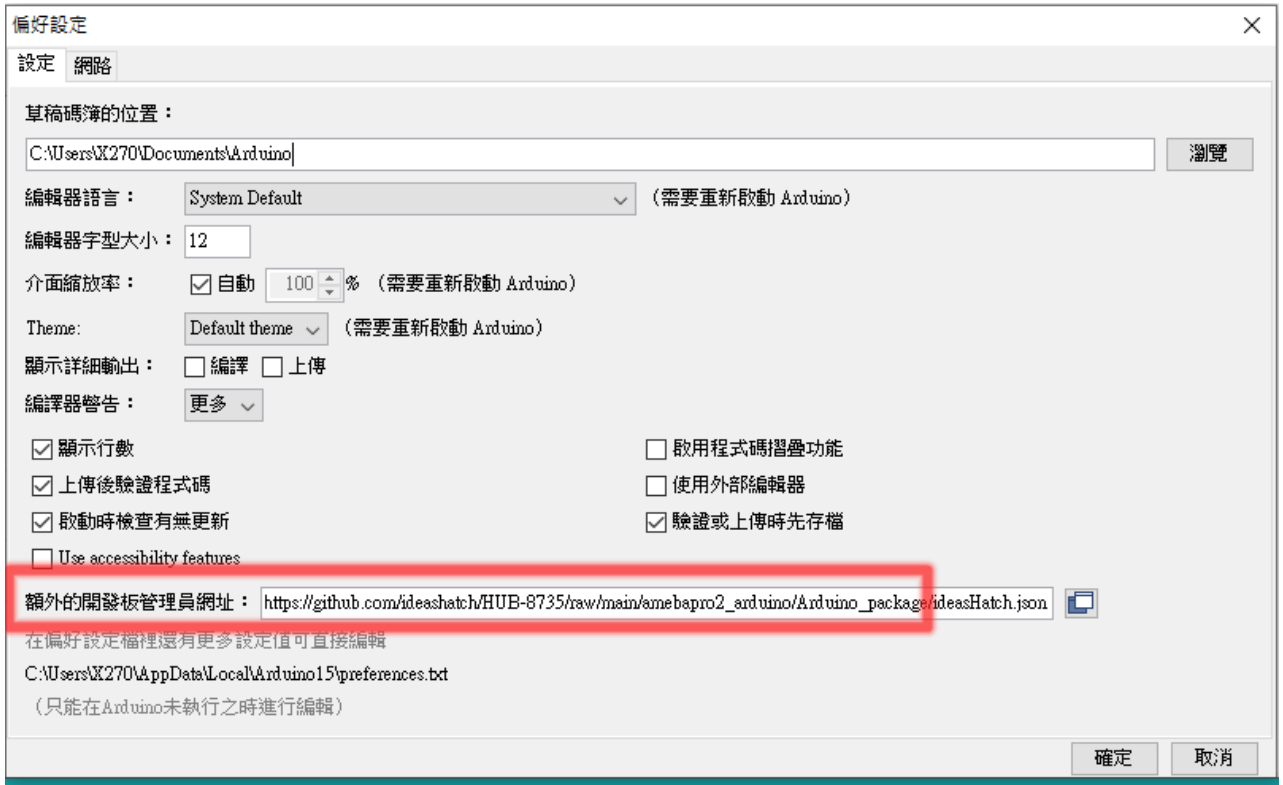
Arduino安裝說明

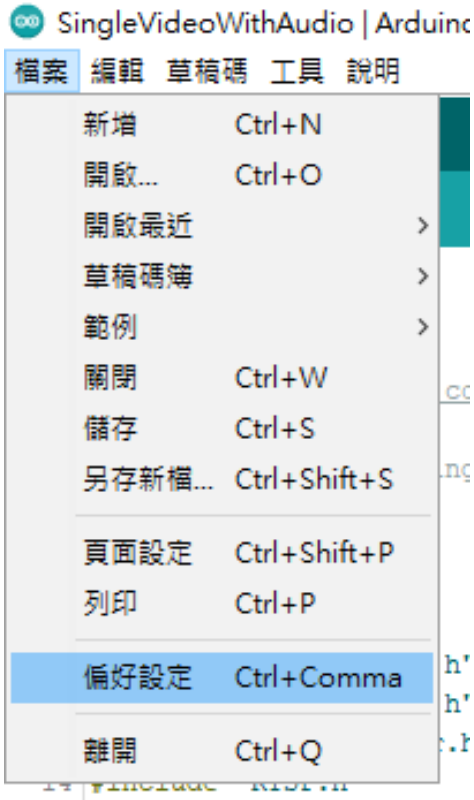
- 盡量使用安裝版
- 使用1.8.19以上版本(講師使用1.8.19)

Legacy IDE (1.8.X)

Arduino安裝說明

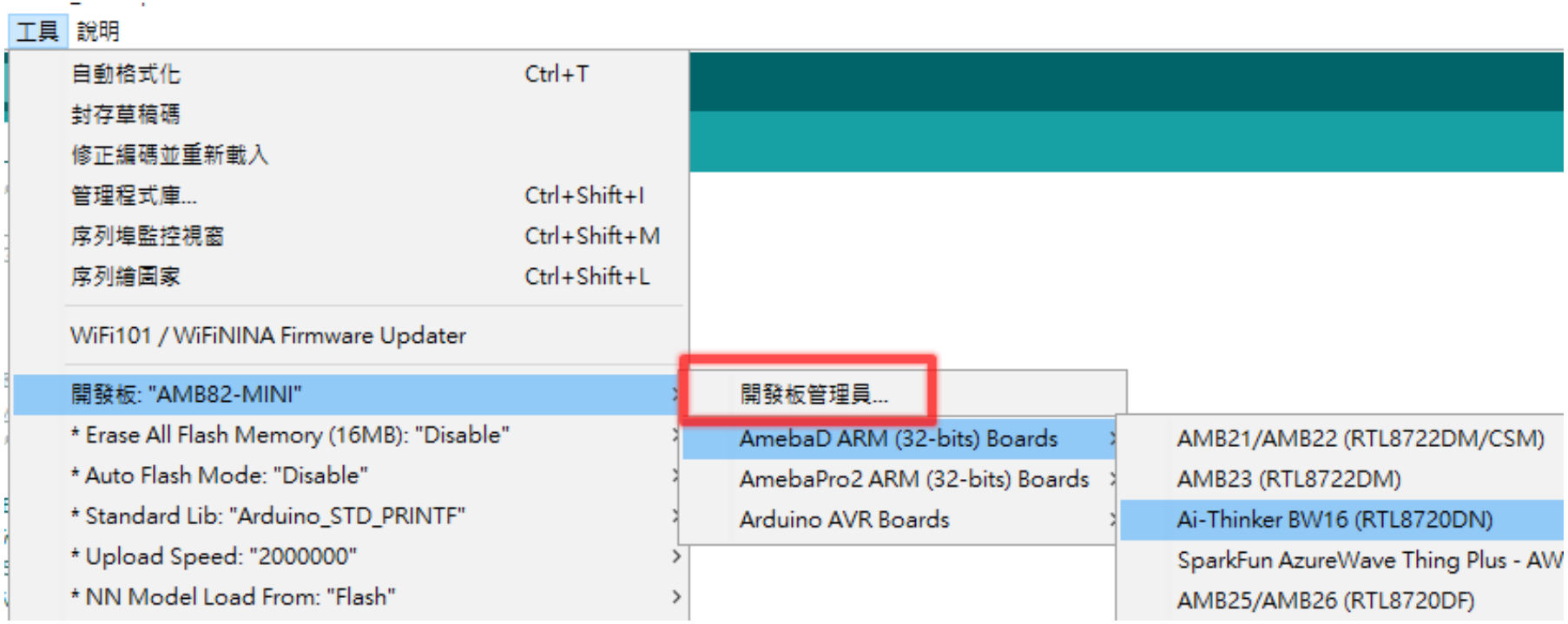
- 開啟Arduino IDE，打開「檔案」/「偏好設定」
- 在「開發板管理員網址」填入網址：
  https://github.com/ambiot/ambd_arduino/raw/master/Arduino_package/package_realtek.com_amebad_index.json





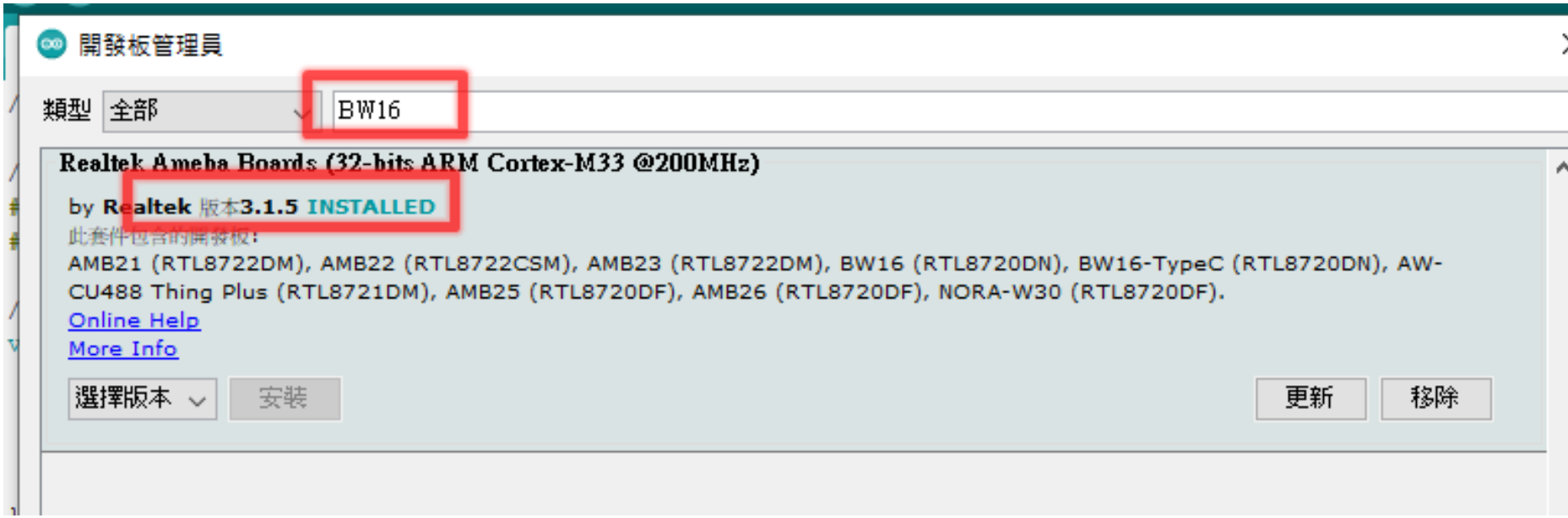
Arduino安裝說明

- 選擇「工具」/「開發板管理員」



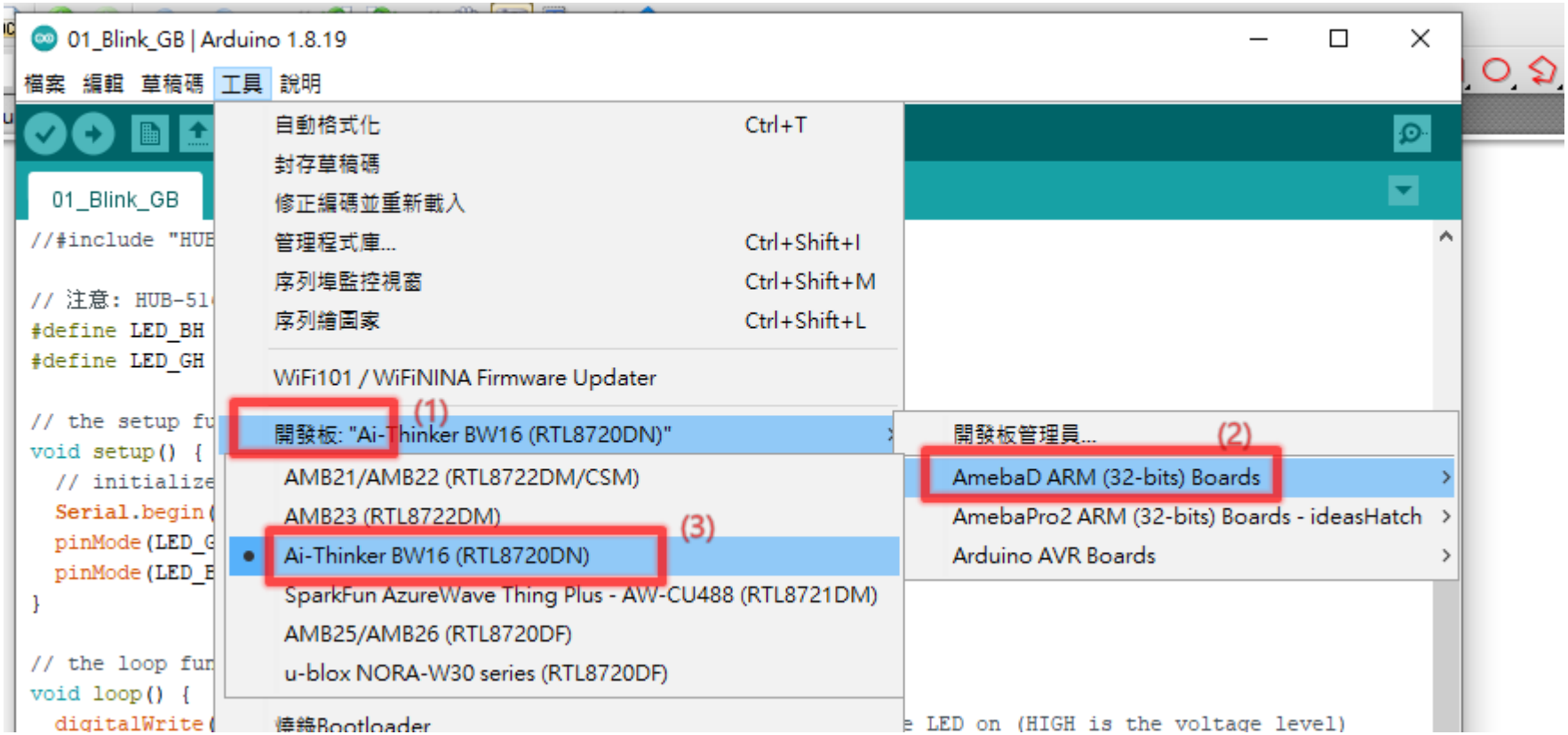
Arduino安裝說明

- 填入BW16，以下為講師安裝的版本



Arduino安裝說明

- 安裝好開發板套件後，再選擇RTL8720DN (此為realtek晶片的名稱)

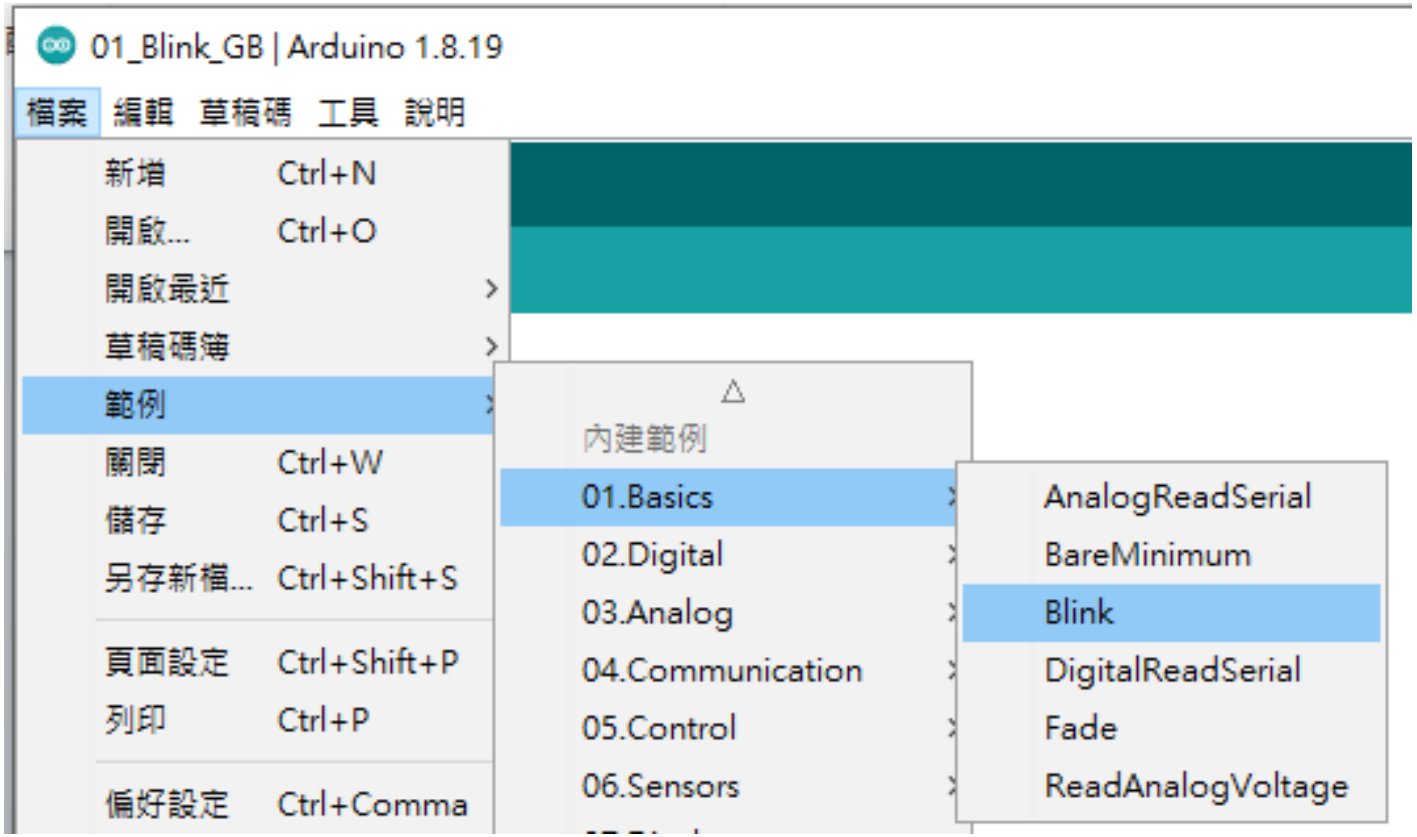


Arduino安裝說明

- 此為講師的設定值
- 這一片模組有支援auto upload模式

Arduino安裝說明

- 環境設定完成後，先載入第一個Arduino的demo程式，用Led說Hello



測試範例: Blink

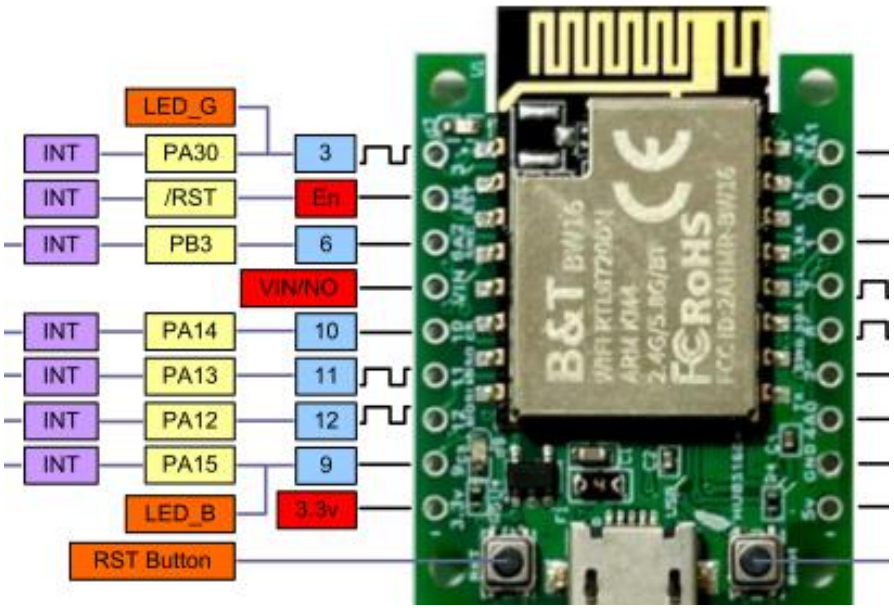
- 燒錄測試最基本的程式!你會發現...

測試範例: Blink

- 失敗...沒有Led在閃爍!!

測試範例: Blink

- 原來!! 要看電路圖



01_Blink | Arduino 1.8.19

檔案 編輯 草稿碼 工具 說明

01_Blink

```
*/

// 注意: HUB-5168的LED要反向控制
#define LED_B 9

// the setup function runs once when you press reset or po
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  Serial.begin(115200);
  pinMode(LED_B, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_B, HIGH);   // turn the LED on (HIGH is
  delay(200);                       // wait for a second
  digitalWrite(LED_B, LOW);    // turn the LED off by maki
  delay(200);                       // wait for a second

  Serial.println("hub5168+");

}
```

測試範例: Blink

- 重新燒錄後可以看到藍色Led快閃

GPIO基本說明-練習題

Blink

測試範例: Blink

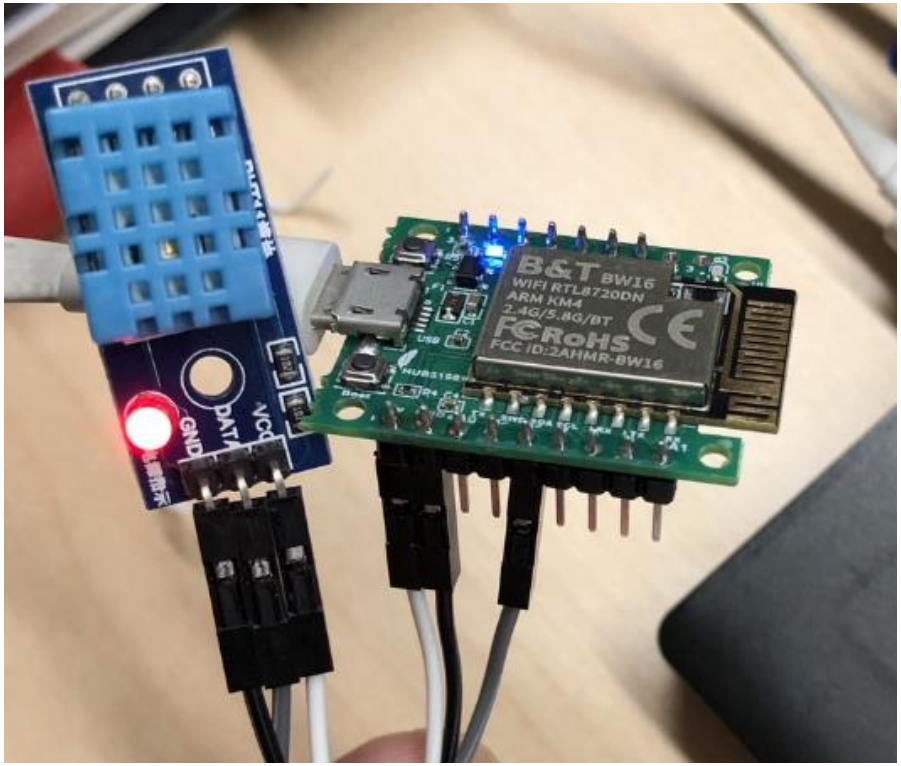
- 請修改剛剛的程式，並研究電路圖上的GPIO腳位，控制綠燈

溫度量測

DHT-11

測試範例: 02_dht11

- 接線如下圖，使用PIN8讀取DHT-11的溫溼度數值



測試範例: 02_dht11

- 打開com port可以看到溫溼度數值

```
#calibration_ok:[2:19:11]
DHTxx test!
Humidity: 40.00%  Temperature: 29.50°C 85.10°F  Heat index: 29.13°C 84.43°F
Humidity: 40.00%  Temperature: 29.40°C 84.92°F  Heat index: 29.02°C 84.24°F
Humidity: 40.00%  Temperature: 29.40°C 84.92°F  Heat index: 29.02°C 84.24°F
Humidity: 39.00%  Temperature: 29.40°C 84.92°F  Heat index: 28.92°C 84.07°F
Humidity: 39.00%  Temperature: 29.40°C 84.92°F  Heat index: 28.92°C 84.07°F
Humidity: 39.00%  Temperature: 29.40°C 84.92°F  Heat index: 28.92°C 84.07°F
Humidity: 39.00%  Temperature: 29.40°C 84.92°F  Heat index: 28.92°C 84.07°F
```

```
#calibration_ok:[2:19:11]
DHTxx test!
Humidity: 44.00%  Temperature: 26.80°C 80.24°F  Heat index: 26.91°C 80.45°F
Humidity: 43.00%  Temperature: 26.90°C 80.42°F  Heat index: 26.94°C 80.49°F
Humidity: 43.00%  Temperature: 26.90°C 80.42°F  Heat index: 26.94°C 80.49°F
Humidity: 43.00%  Temperature: 26.90°C 80.42°F  Heat index: 26.94°C 80.49°F
Humidity: 43.00%  Temperature: 26.90°C 80.42°F  Heat index: 26.94°C 80.49°F
Humidity: 43.00%  Temperature: 26.80°C 80.24°F  Heat index: 26.86°C 80.36°F
Failed to read from DHT sensor!
Failed to read from DHT sensor!
```

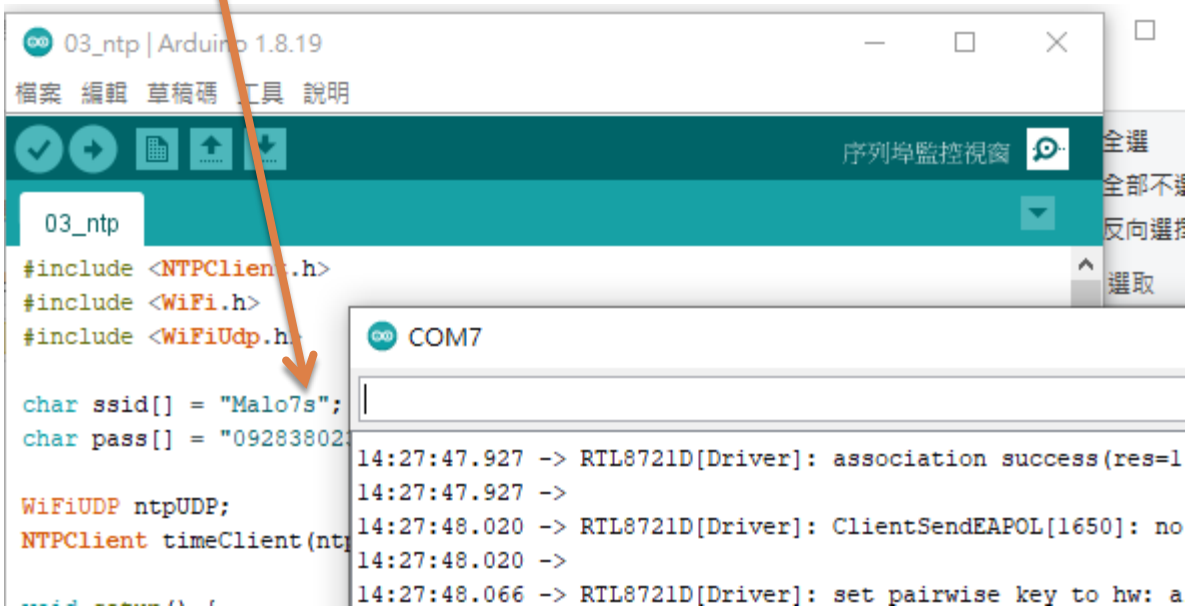
沒有插對的pin腳時

WiFi使用

NTP

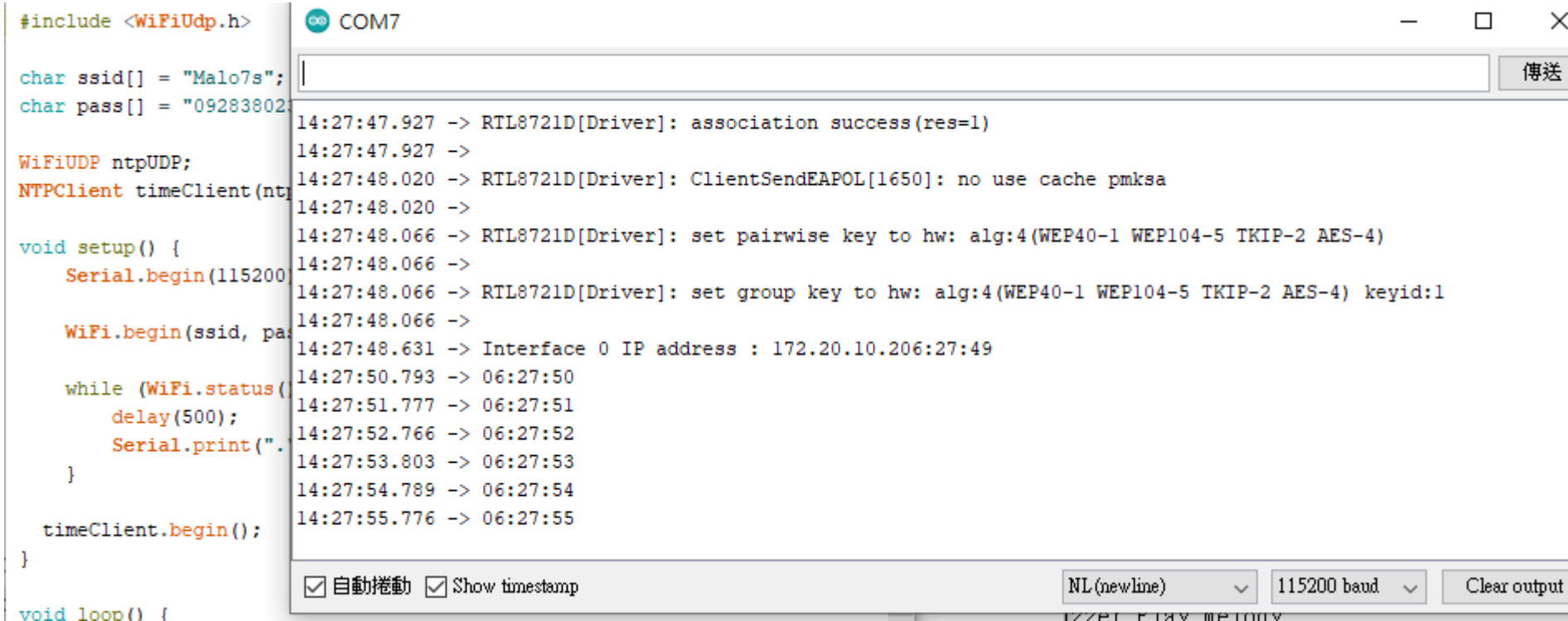
測試範例: 03_ntp

- 修改ssid, pass，再燒錄



測試範例: 03_ntp

- 輸出如下，我們可以得到校時後的時間

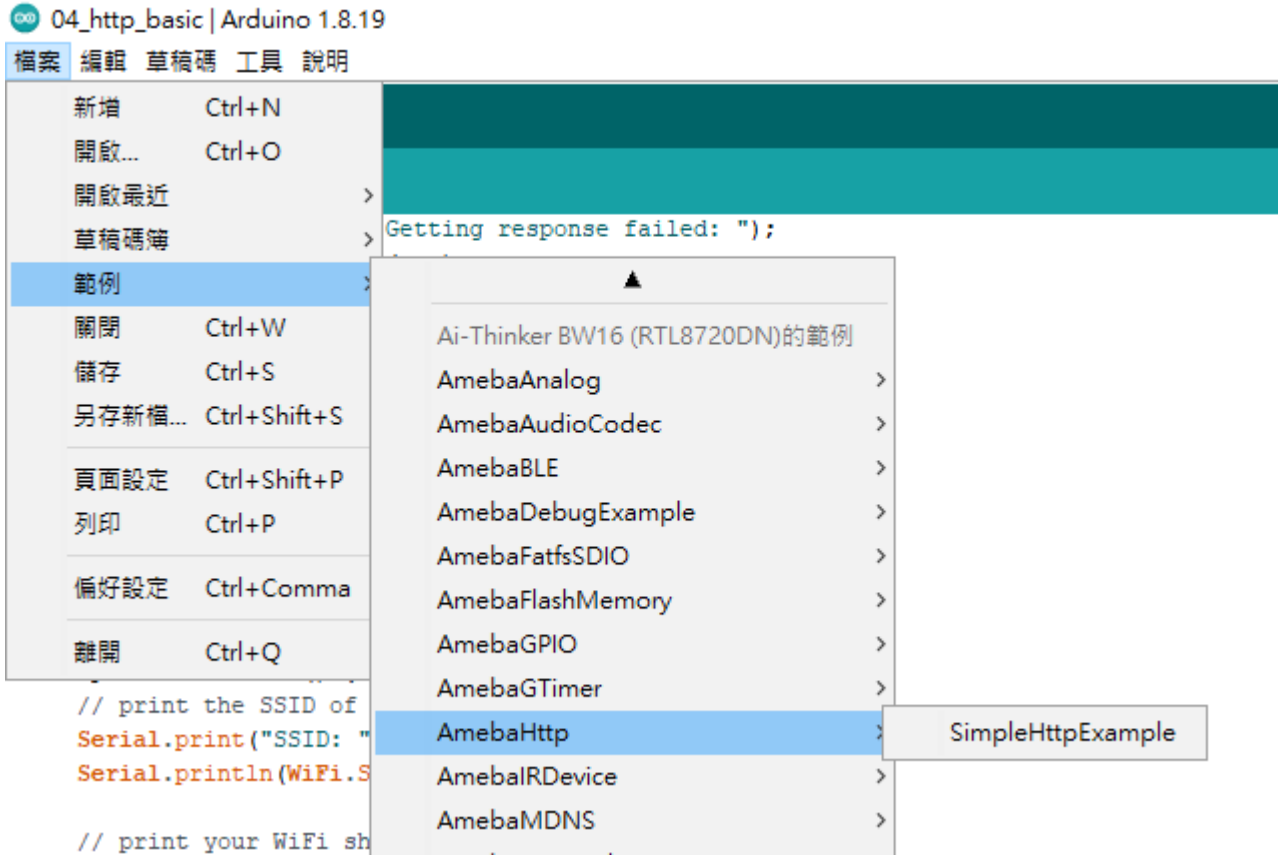


http範例

04_http

http應用

- 打開http的範例程式



http應用

- 修改ssid, pass

```
// This example downloads the URL "http://www.amebaiot.com"

char ssid[] = "your ssid"; //  your network SSID (name)
char pass[] = "your password";    // your network password (use
int keyIndex = 0;                 // your network key Index number (r

// Name of the server we want to connect to
const char kHostname[] = "www.amebaiot.com";

const char kPath[] = "/";
// Number of milliseconds to wait without receiving any data bef
const int kNetworkTimeout = 30 * 1000;
// Number of milliseconds to wait if no data is available before
const int kNetworkDelay = 1000;
int status = WL_IDLE_STATUS;
```

http應用

- 可以看到這樣的輸出

```
RTL8721D[Driver]: set group key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2 AES-4) keyid:1

Interface 0 IP address : 172.20.10.2
Connected to wifi
SSID: Malo7s
IP Address: 172.20.10.2
signal strength (RSSI):-51 dBm

[INFO]server_drv.cpp:  start_client
[INFO] Create socket successfully

[INFO] Connect to Server successfully!
startedRequest ok
Got status code: 301
Content length is: 315

Body returned follows:
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>301 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://www.amebaiot.com/">here</a>.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at www.amebaiot.com Port 80</address>
</body></html>
```

http應用

- 讓我們來解析一下輸出

```
RTL8721D[Driver]: set group key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2 AES-4) keyid:1

Interface 0 IP address : 172.20.10.2
Connected to wifi
SSID: Malo7s
IP Address: 172.20.10.2
signal strength (RSSI):-51 dBm

[INFO]server_drv.cpp:  start_client
[INFO] Create socket successfully

[INFO] Connect to Server successfully!
startedRequest ok
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Content length is: 315

Body returned follows:
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<html><head>
<title>301 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://www.amebaiot.com/">here</a>.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at www.amebaiot.com Port 80</address>
</body></html>
```

要怎麼上傳資料到Server?

- 讓我們來解析一下輸出

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RTL8721D[Driver]: set group key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2 AES-4) keyid:1

Interface 0 IP address : 172.20.10.2
Connected to wifi
SSID: Malo7s
IP Address: 172.20.10.2
signal strength (RSSI):-51 dBm

[INFO]server_drv.cpp:  start_client
[INFO] Create socket successfully

[INFO] Connect to Server successfully!
startedRequest ok
Got status code: 301
Content length is: 315

Body returned follows:
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
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</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://www.amebaiot.com/">here</a>.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at www.amebaiot.com Port 80</address>
</body></html>
```

要怎麼上傳資料到Server?

- 利用http get操作

```
int keyIndex = 0;            // your network key

// Name of the server we want to connect to
const char kHostname[] = "api.thingspeak.com";

char kPath[128];
float t=30.5;
float h=80;
```

```
WiFiClient c;
HttpClient http(c);


sprintf(kPath, "/update?api_key=5IRM6UNIDXLCAPM1&field1=%.2f&field2=%.2f", t, h);
sprintf(str1, "%s%s", kHostname, kPath);
Serial.println(str1);

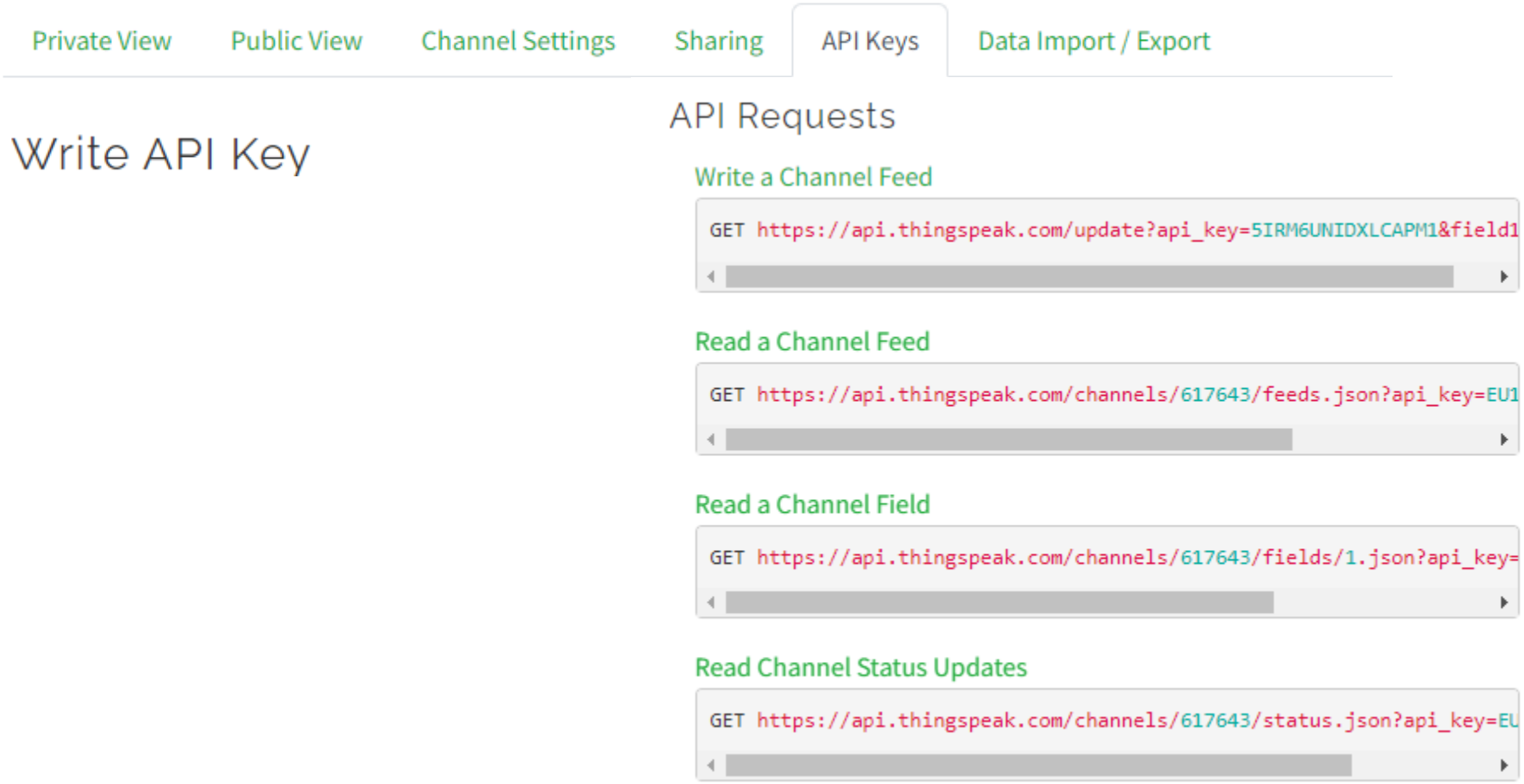
err = http.get(kHostname, kPath);
if (err == 0) {
```

申請ThingSpeaker平台帳號

- 先申請ThingSpeaker帳號

申請ThingSpeaker平台帳號

- 進入此分頁，右下角有許多API格式的範例



申請ThingSpeaker平台帳號

- 依照格式可以測試一下讀取功能

api.thingspeak.com/channels/617643/feeds.json?api_key=EU1JSB28NB8MMM2M&results=2


```
{
  "channel": {
    "id": 617643,
    "name": "test",
    "latitude": "0.0",
    "longitude": "0.0",
    "field1": "溫度",
    "field2": "濕度",
    "created_at": "2018-11-03T04:09:10Z",
    "updated_at": "2023-10-20T03:47:27Z",
    "last_entry_id": 281
  },
  "feeds": [
    {
      "created_at": "2023-10-20T03:51:49Z",
      "entry_id": 280,
      "field1": "25",
      "field2": "50"
    },
    {
      "created_at": "2023-10-20T03:52:14Z",
      "entry_id": 281,
      "field1": "28",
      "field2": "81"
    }
  ]
}
```

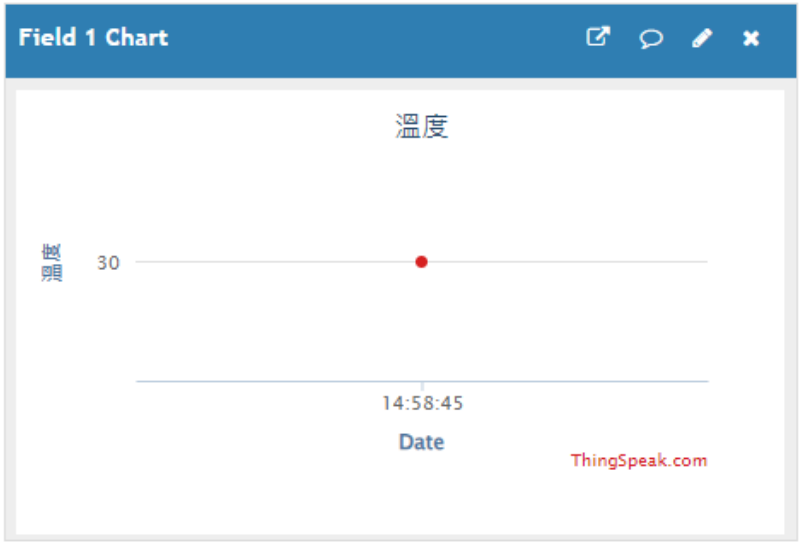
申請ThingSpeaker平台帳號

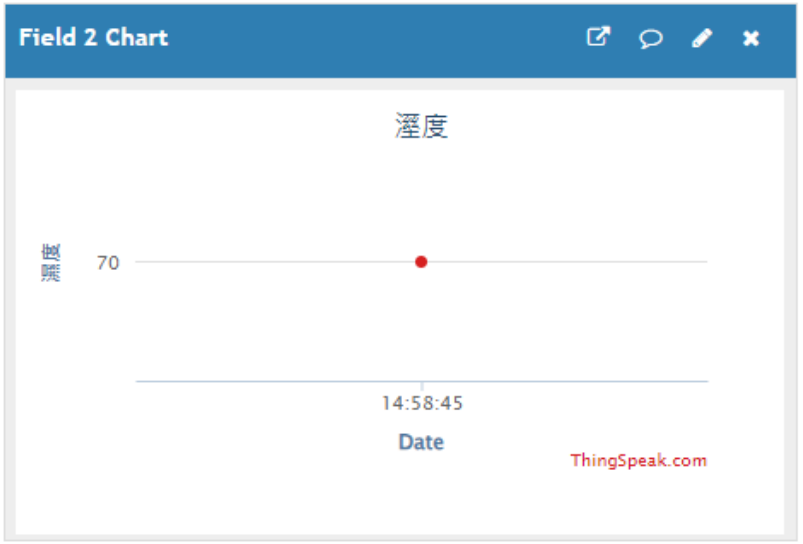
- 接著測試一下上傳資料的功能
- 以我的API來說，長這個樣子
- https://api.thingspeak.com/update?api_key=5IRM6UNIDXLCAPM1&field1=30&field2=70

申請ThingSpeaker平台帳號

- 我們可以得到這樣的視覺化效果

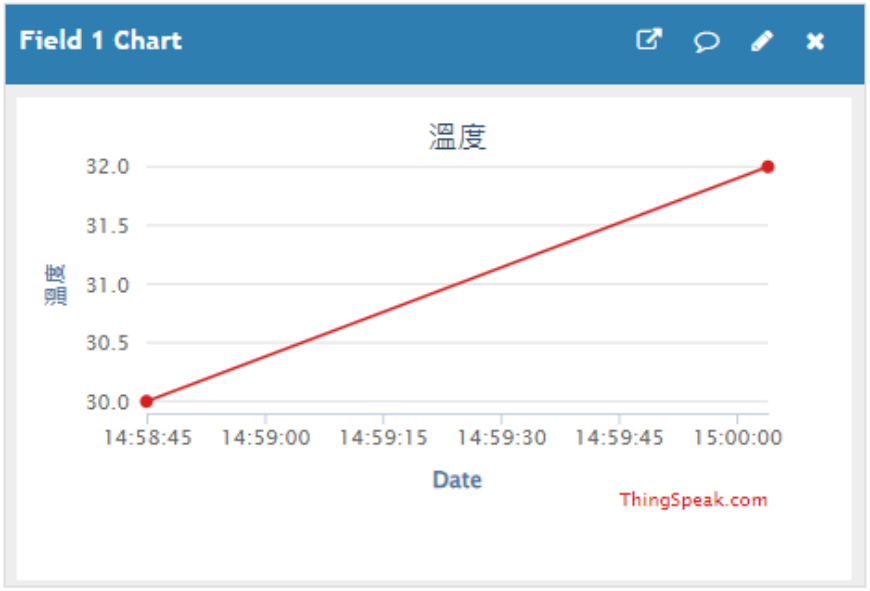
Created: 5 years ago
Last entry: less than a minute ago
Entries: 282

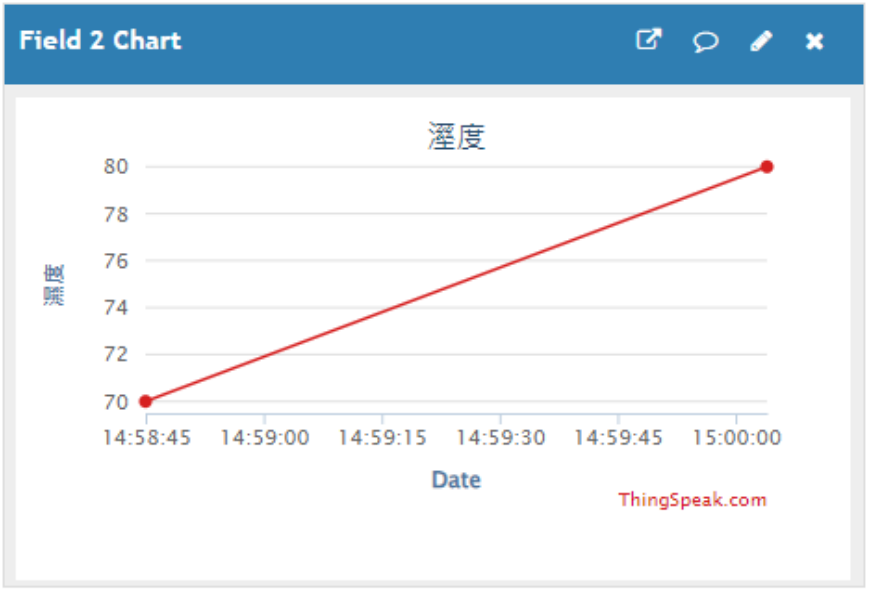




申請ThingSpeaker平台帳號

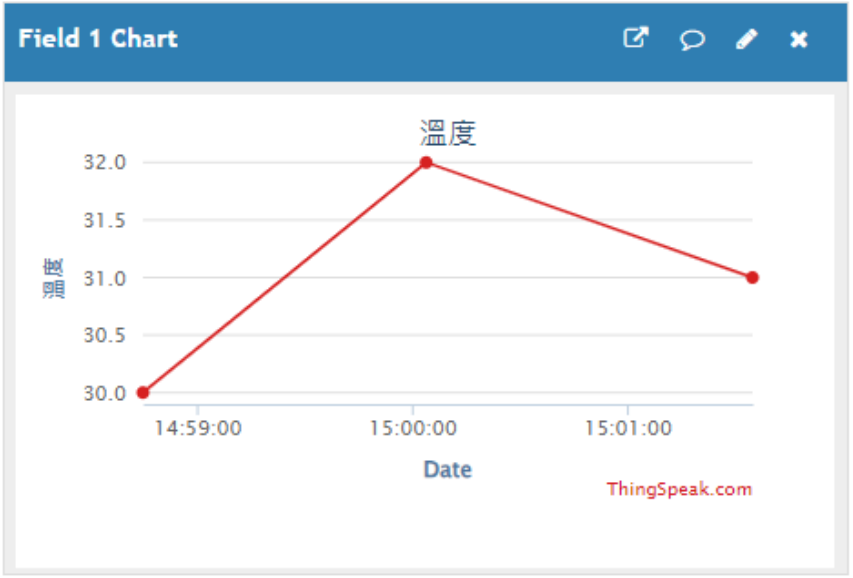
- 但是https對我們來說不好使用，所以調整成:(http://api.thingspeak.com/update?api_key=5IRM6UNIDXLCAPM1&field1=30&field2=70)

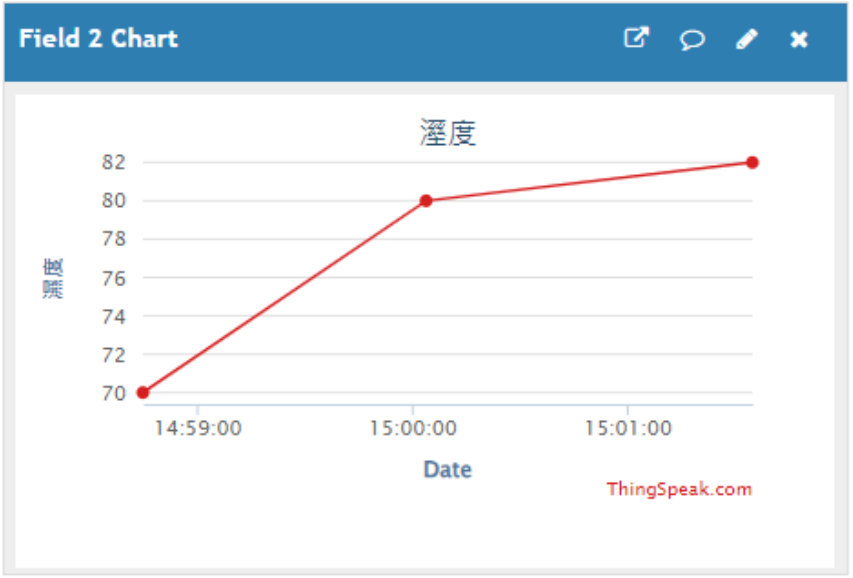




申請ThingSpeaker平台帳號

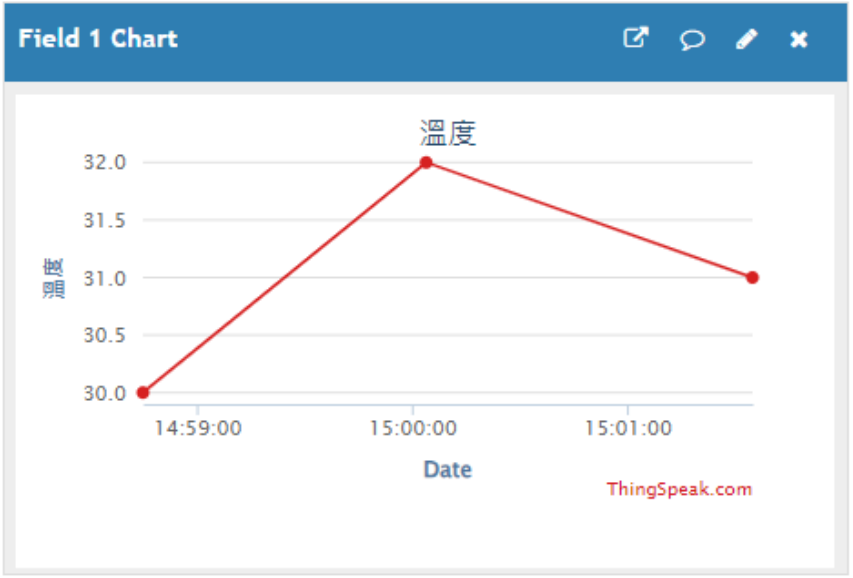
- 再接著試試看:(http://api.thingspeak.com/update?api_key=5IRM6UNIDXLCAPM1&field1=31&field2=82)

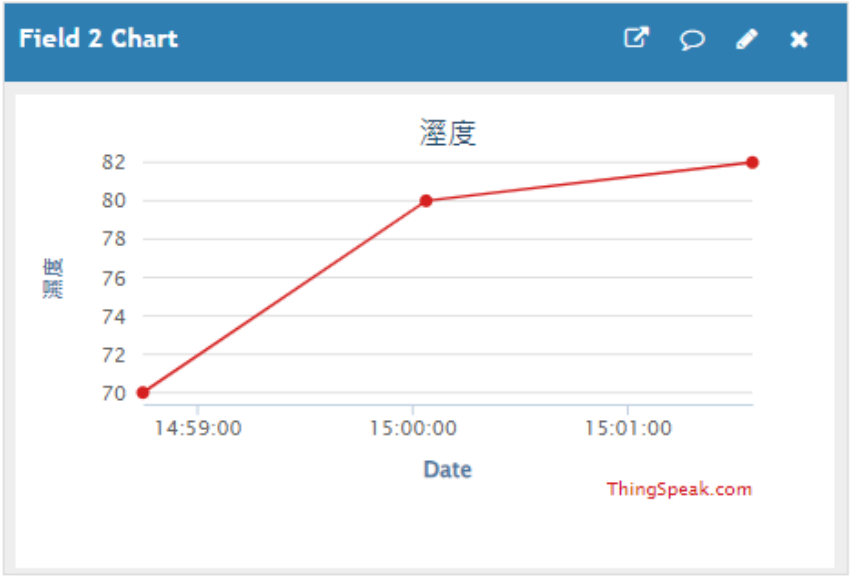




整合ThingSpeaker和DHT11

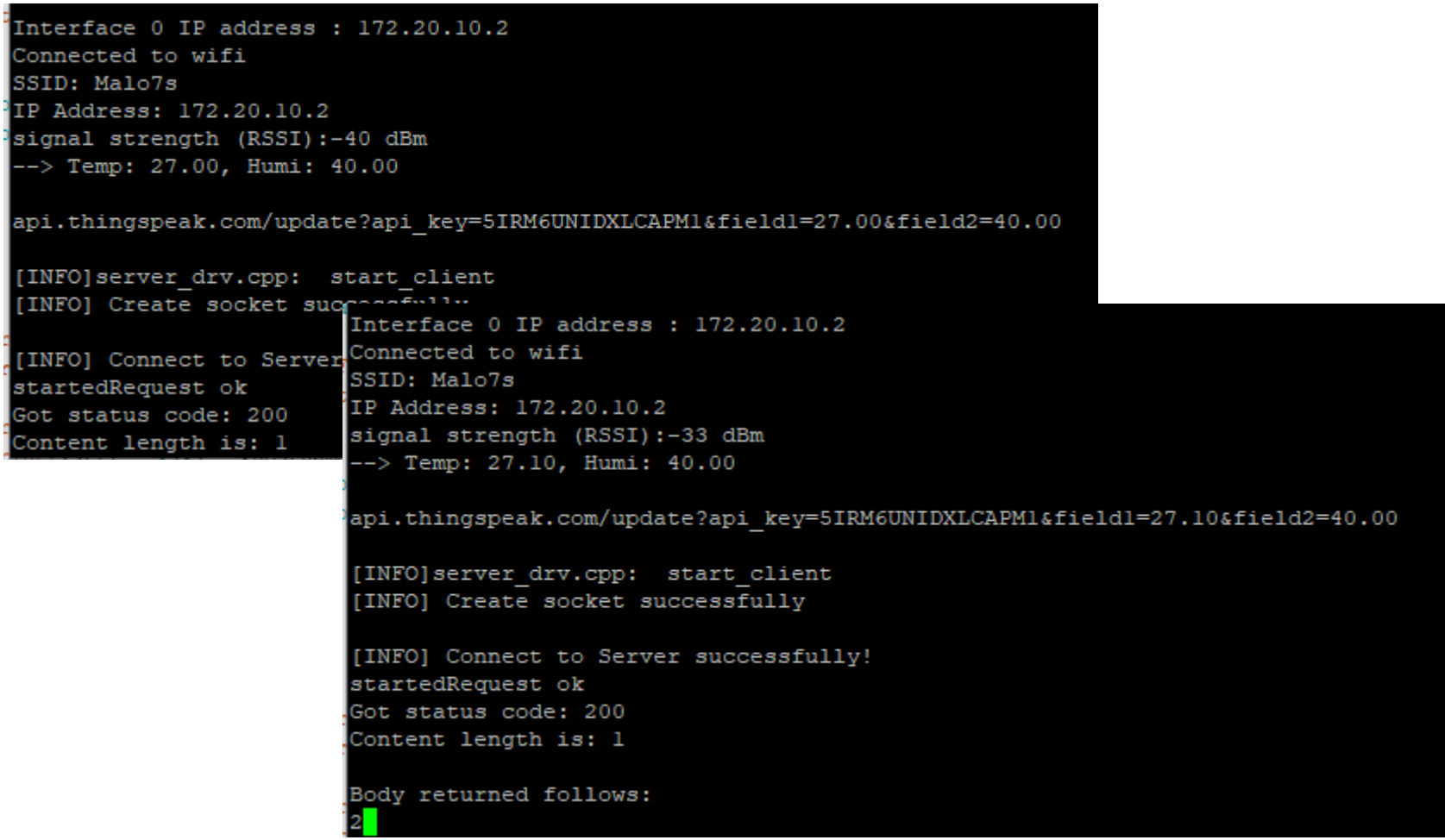
- 以此類推，我們先把http的程式改成可以上傳溫溼度資訊





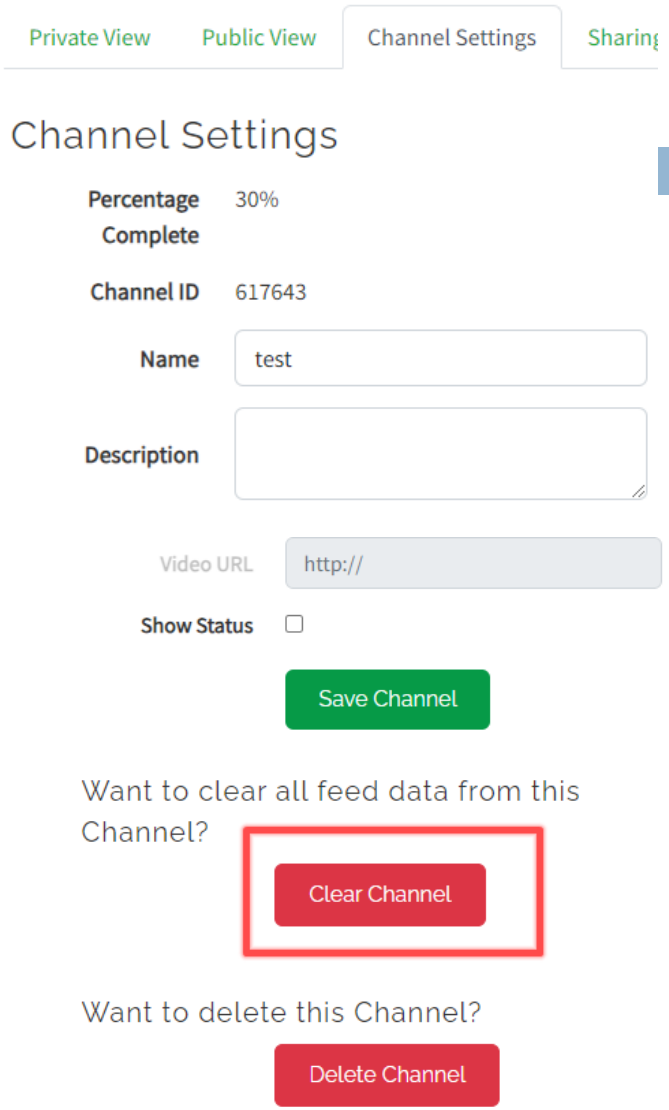
整合ThingSpeaker和DHT11

- 上傳DHT11的資料到ThingSpeaker!



整合ThingSpeaker和I

- 測試前可以先清空原先的測試資料
- 清空的頁面如右圖，在Chanel Settings中



NeoPixel / WS2812B

ws2812B

NeoPixel (WS2812B)

- API手冊參考(link)

NeoPixel (WS2812B)

- WS2812B class
- fill(index, r, g, b)
- setPixelColor(r, g, b, index, num)
- show()

測試範例05:

- 05_NP_01.ino: RGB顏色切換

測試範例05:

- 05_NP_02.ino : 呼吸燈

測試範例05:

- 請試著改寫程式，切換不同的顏色閃動呼吸燈
- 請利用目前學到的應用，配合燈罩設計專屬於你的氣氛燈

原廠範例

- 05_WS2812B_Basics
- 05_WS2812B_Patterns