MAKEE

Arduino Yún

Daniel Liao

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Arduino 開發板總類

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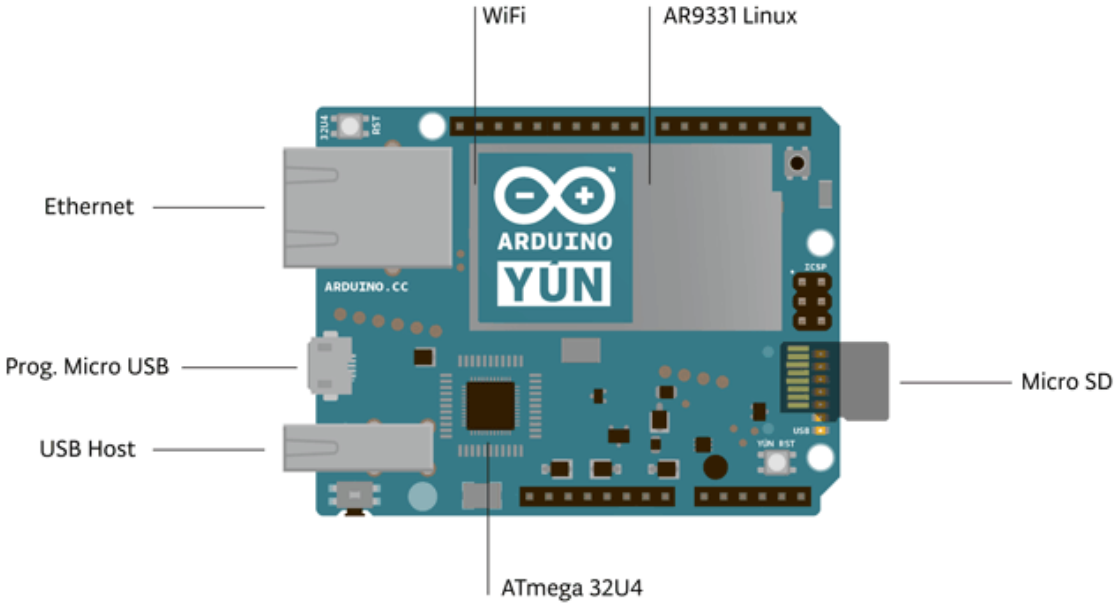
Arduino 開發板比較

名稱	處理器	電壓	Digital I/O	Digital I/O(PWM)	ANALOG I/O	備註
Arduino Due	ATSAM3X8E(84MHz)	3.3V	54	12	12	
Arduino Yún	ATmega32U4(16MHz) Atheros AR9331(400MHz)	5V	14	6	12	
Arduino Leonardo	ATmega32U4(16MHz)	5V	20	7	12	
Arduino Uno	ATmega328P(16MHz)	5V	14	6	6	
Arduino Mega2560	ATmega2560(16MHz)	5V	54	15	16	
Arduino Nano	ATmega328(16MHz)	5V	14	6	8	

Arduino Yún介紹

Yún提供有線與無線通訊的能力(乙太網路接頭與 Wifi)，並且具有雙處理器，Yún除了有一顆微控制器ATmega32U4，還有一顆Atheros AR9331，運行Linux發行套件Linino（以OpenWRT為基礎修改而成），另外也提供USB A埠與micro SD卡插槽。



PoE – Power Over Ethernet

Ag9050
PoE MODULE
5V 9W

PoE

Ethernet

User button

Reset

Leds

Wi-Fi Module

Atheros
AR9331

Level Translators

SPI

HANDSHAKE

UART

Reset

32U4 Reset

Atmega 32U4

32KB Flash
2.5KB SRAM
512B EEPROM

USB

ICSP

In-Circuit Serial Programming

16MHz

GPIO

Headers

AU6350-MGL

USB

Hub

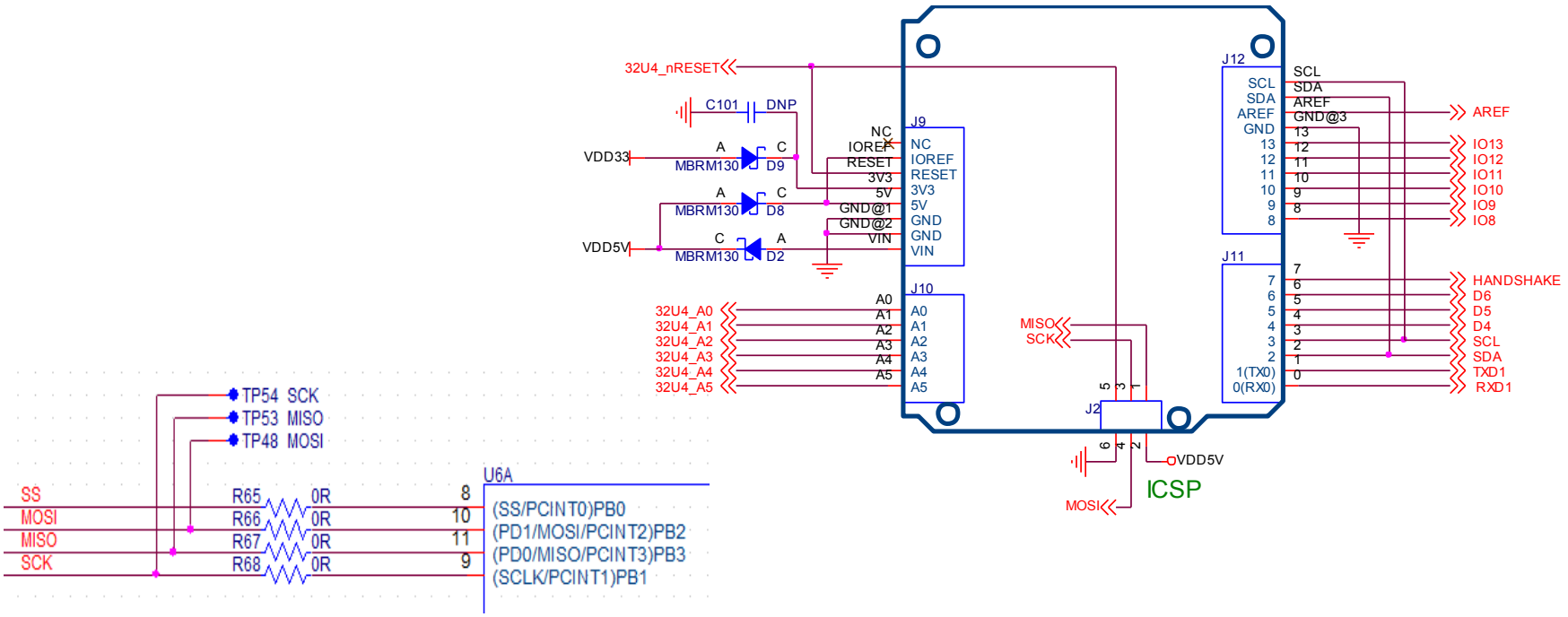
microSD

USB A Host

12MHz

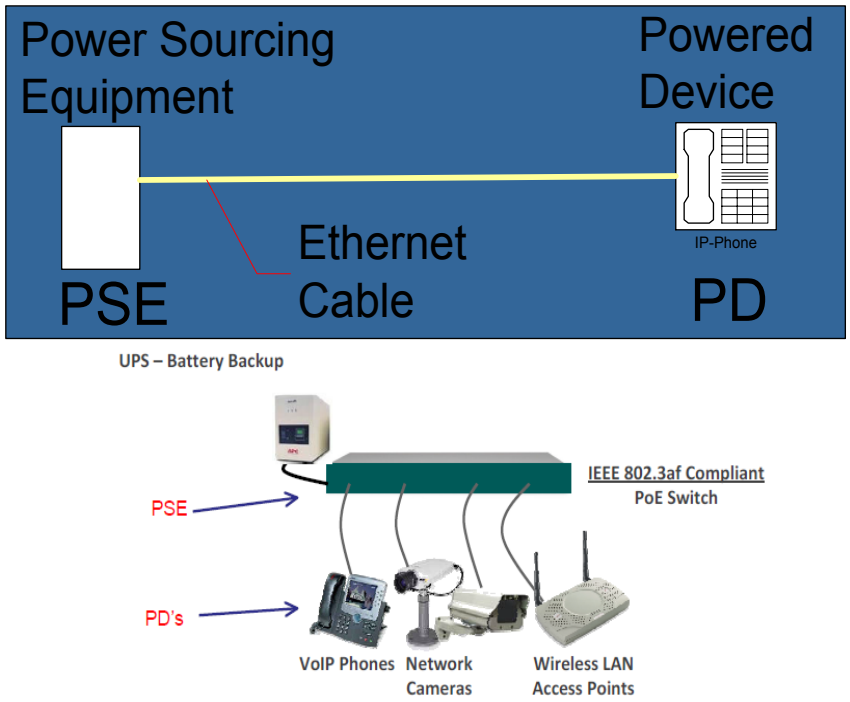
In-Circuit Serial Programming

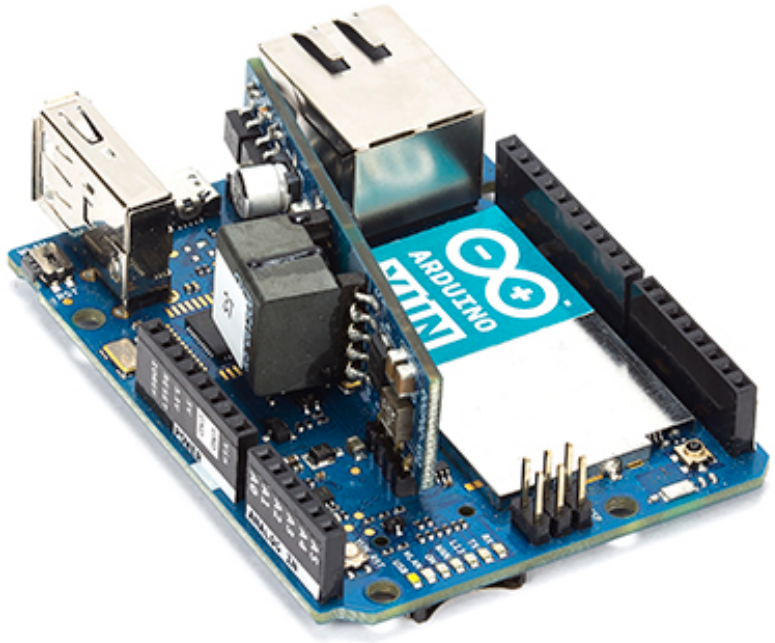
- ICSP燒錄方式，又稱為ISP(In System Programmer)，就是一種線上即時燒錄。



PoE – Power Over Ethernet

- PoE : IEEE 802.3af – Up to 15W of power over ALT A pairs of RJ45
- PoE+ : IEEE 802.3at –Up to 30W of power over ALT A pairs of RJ45





Arduino Yún介紹

- Atheros AR9331（MIPS24k為32位元）採用 Linux (Open-Wrt) 作業系統開機，Arduino Yun 上的 16mb flash 已包含整個 linux 作業系統。

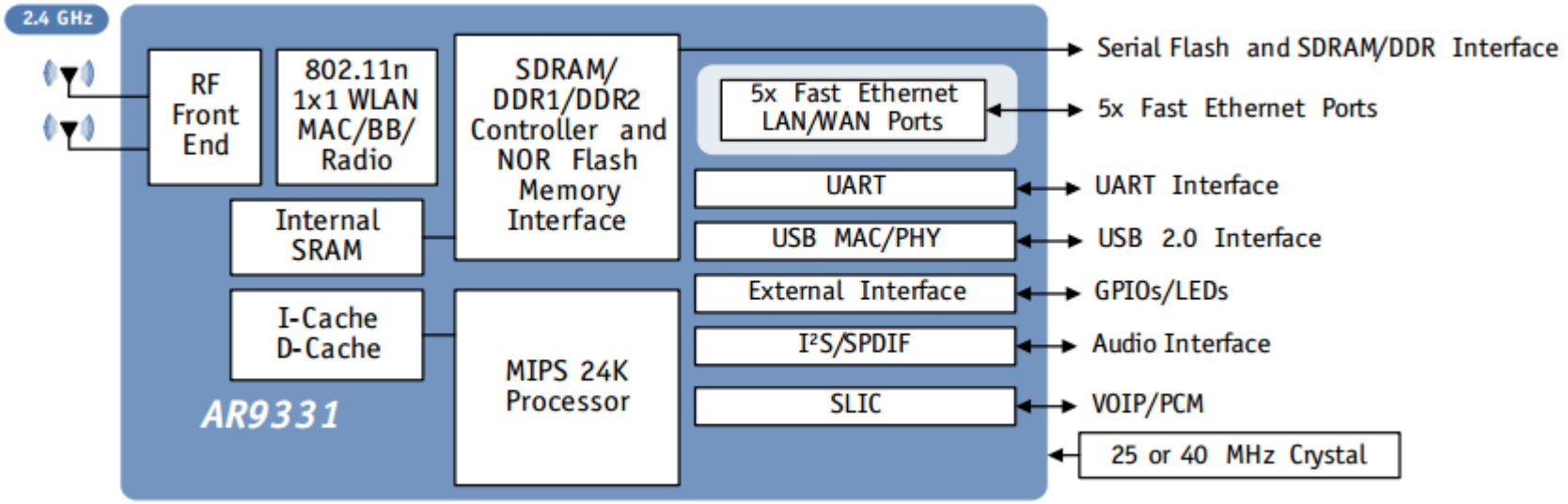
- AR9331包含 64mb 的 DDR2 RAM。並且提供外部的儲存機制，micro SD卡或隨身碟皆可直接使用。

Linux Microprocessor

Processor	Atheros AR9331
Architecture	MIPS @400MHz
Operating Voltage	3.3V
Ethernet	IEEE 802.3 10/100Mbit/s
WiFi	IEEE 802.11b/g/n
USB Type-A	2.0 Host
Card Reader	Micro-SD only
RAM	64 MB DDR2
Flash Memory	16 MB
SRAM	2.5 KB
EEPROM	1 KB
Clock Speed	16 MHz
PoE compatible 802.3af card support	See *Power*

Arduino Yún介紹

- AR9331執行OpenWRT，並控制一個USB埠、一個Ethernet埠、一個Wi-Fi、一個microSD記憶卡槽

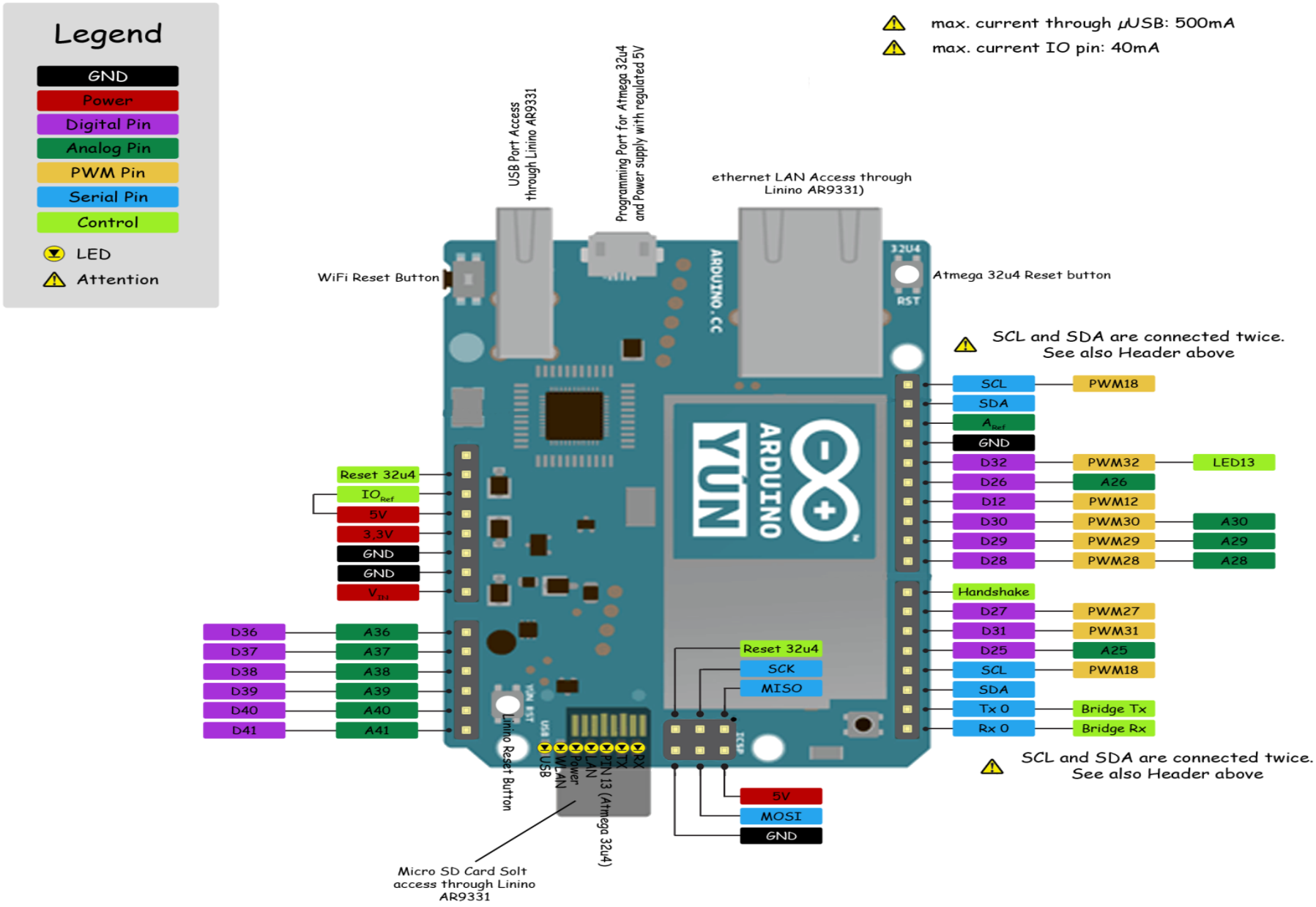


Arduino Yún介紹

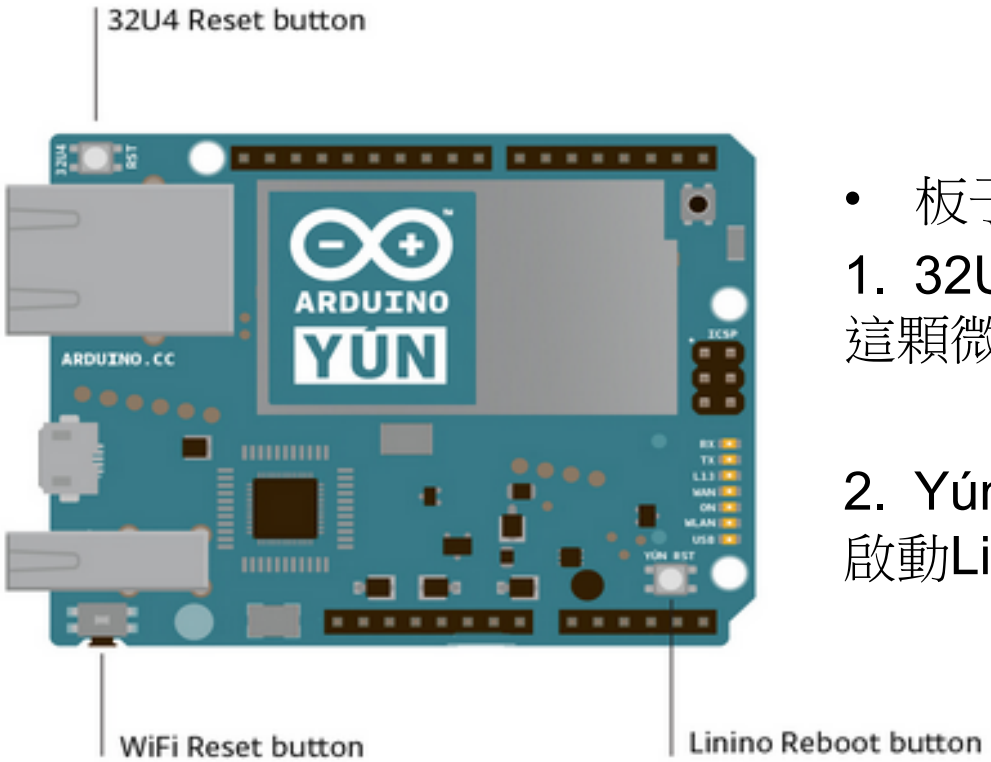
- Atmel AVR系列中的ATmega 32U4 用來處理 Arduino 相關的 I/O 功能。

AVR Arduino microcontroller

Microcontroller	ATmega32U4
Operating Voltage	5V
Input Voltage	5
Digital I/O Pins	20
PWM Channels	7
Analog Input Pins	12
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (of which 4 KB used by bootloader)
SRAM	2.5 KB
EEPROM	1 KB
Clock Speed	16 MHz


Legend
GND
Power
Digital Pin
Analog Pin
PWM Pin
Serial Pin
Control
LED
Attention
max. current through µUSB: 500mA
max. current IO pin: 40mA
USB Port Access through Linino AR9331
Programming Port for Atmega 32u4 and Power supply with regulated 5V
ethernet LAN Access through Linino AR9331)
WiFi Reset Button
Atmega 32u4 Reset button
SCL and SDA are connected twice. See also Header above
SCL
SDA
AREF
GND
D32
D26
D12
D30
D29
D28
PWM18
PWM32
PWM26
PWM12
PWM30
PWM29
PWM28
LED13
A26
A30
A29
A28
Handshake
D27
D31
D25
SCL
SDA
Tx 0
Rx 0
PWM27
PWM31
A25
PWM18
Bridge Tx
Bridge Rx
SCL and SDA are connected twice. See also Header above
Reset 32u4
IOREF
5V
3.3V
GND
GND
VIN
D36
D37
D38
D39
D40
D41
A36
A37
A38
A39
A40
A41
Reset 32u4
SCK
MISO
5V
MOSI
GND
Linino Reset Button
USB
WLAN
Power
LAN
PIN 13 (Atmega 32u4)
TX
RX
Micro SD Card Solt access through Linino AR9331

Arduino Yún介紹



- 板子上有3個重置鍵：

1. 32U4 RST ➔ 重置ATmega32U4這顆微控制器。

2. Yún RST ➔ 重置AR9331，重新啟動Linux系統。

Arduino Yún介紹

3. WLAN RST ➔ 兩個用途

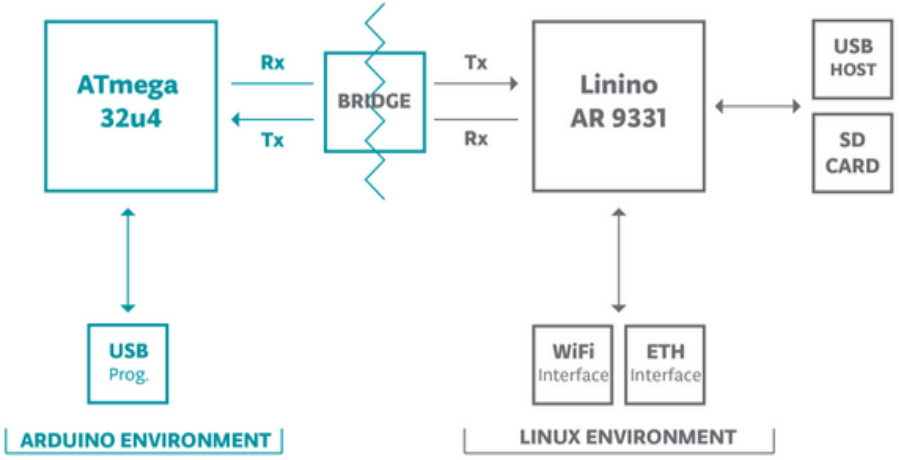
(1) 將WiFi組態重置回工廠設定值，會讓WiFi晶片進入AP（access point）模式，IP是192.168.240.1，分享出來的網路名稱是「Arduino Yun-XXXXXXXXXXXX」，其中X是WiFi無線網路卡的MAC位址，按著此重置鍵不放、持續5秒，即可進入WiFi組態重置模式。

(2) 將Linux映像檔重置回工廠預設的映像檔內容， 必須按著重置鍵不放持續30秒，這麼一來，儲存在板子裡的快閃記憶體（與AR9331連接）的檔案，通通都會消失。

Arduino Yún介紹

Arduino YUN 藉由板載的 Linux OS 就能兼顧 Arduino 的易用性，同時又有強大的網路功能，除了一般的 Linux 指令外，可以自行寫 shell 或是 python 腳本來達到更多的效果。

Bridge 是讓 Arduino YUN 上的兩個處理器彼此溝通，能讓 Arduino code 就能直接執行 shell 腳本，與網路介面溝通或是接收從 AR9331處理器來的指令。

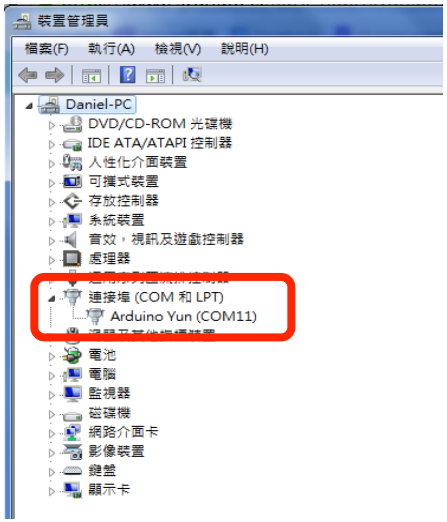


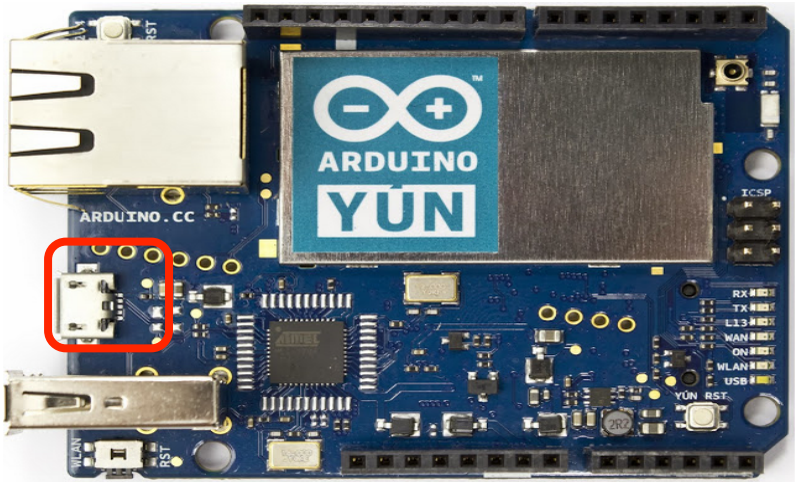
開發環境建立

- Arduino軟體從1.5.4版開始才支援Yún
  (ARDUINO 1.5.4 BETA - 2013.09.10)
- Open-source Arduino Software (IDE)
  ARDUINO 1.6.5-r5 - 2015.08.28

開發環境建立(Windows)

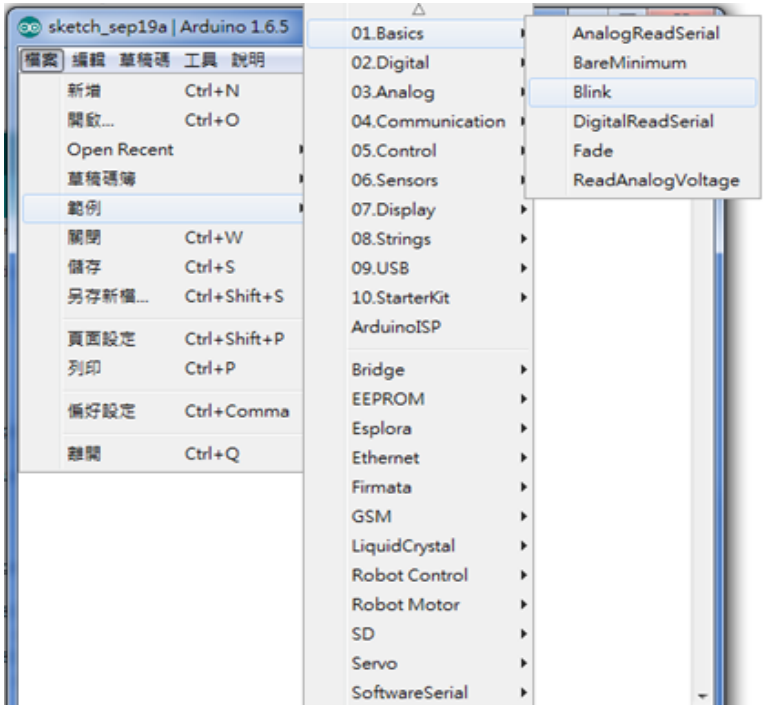
- 安裝後使用micro-USB與電腦連線，利用我的電腦確認目前連線serial port。

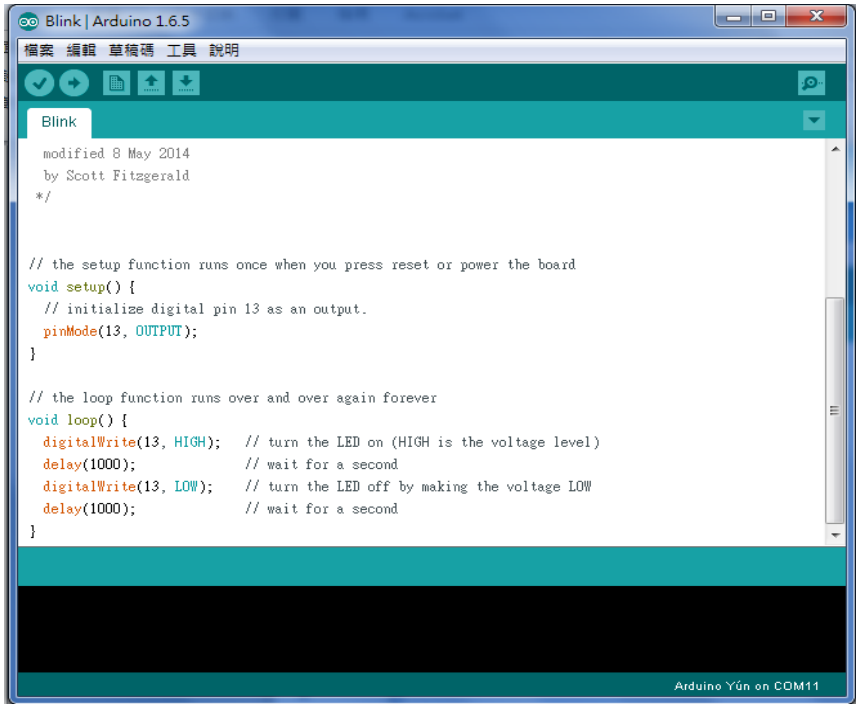




測試程式

- 執行Arduino軟體並開啟測試程式
  (LED blink example sketch: File > Examples >01.Basics > Blink)





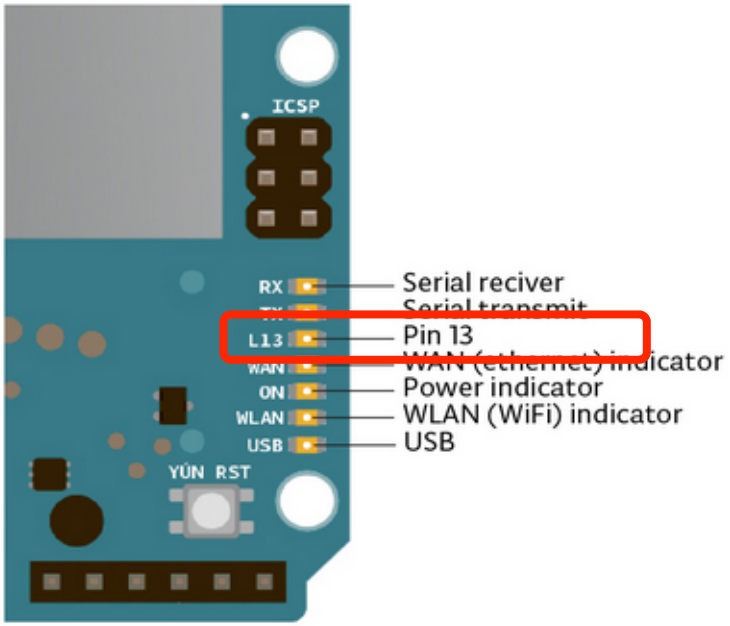
LED範例程式說明

- **L13對應腳位初始化參數設定**

```
// the setup function runs once when you press reset or power the board
void setup() { // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}
```

- **LED閃爍重複執行迴圈設定**

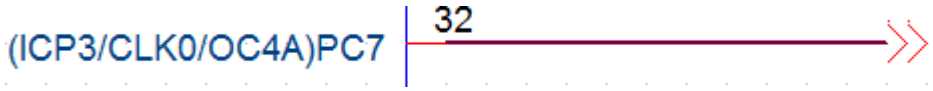
```
// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);
// turn the LED on (HIGH is the voltage level)
  delay(1000);               // wait for a second
  digitalWrite(13, LOW);
// turn the LED off by making the voltage LOW
  delay(1000);
}
```

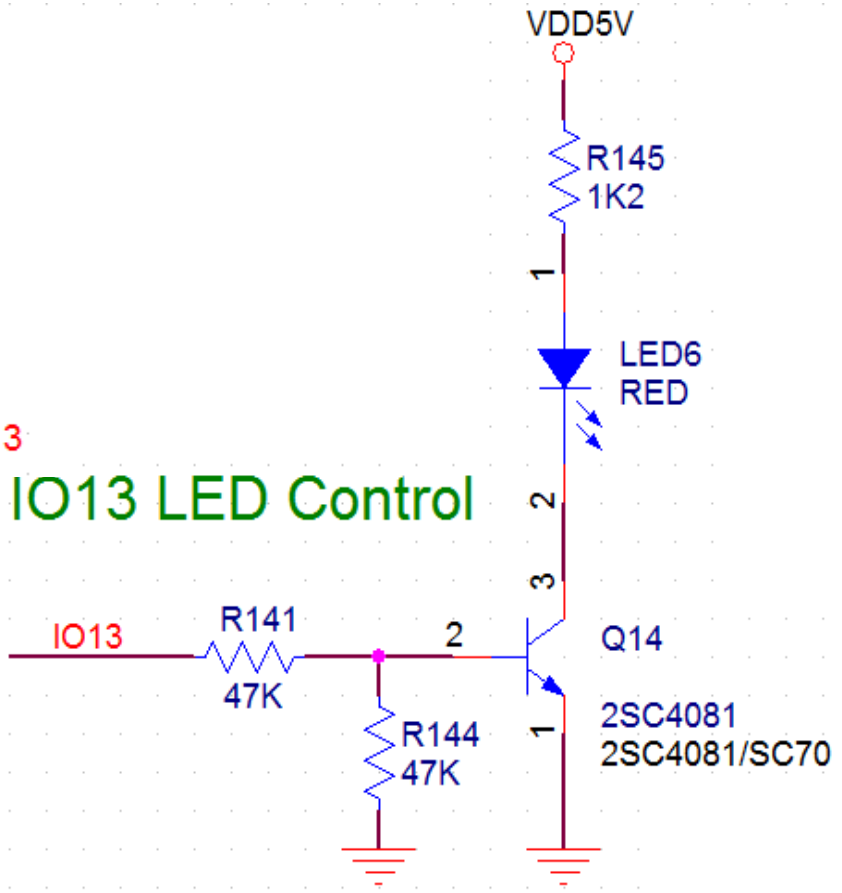


LED範例程式說明

- **LED控制方式**

```
digitalWrite(13, HIGH);
// turn the LED on (HIGH is the voltage level)
digitalWrite(13, LOW);
// turn the LED off by making the voltage LOW
```



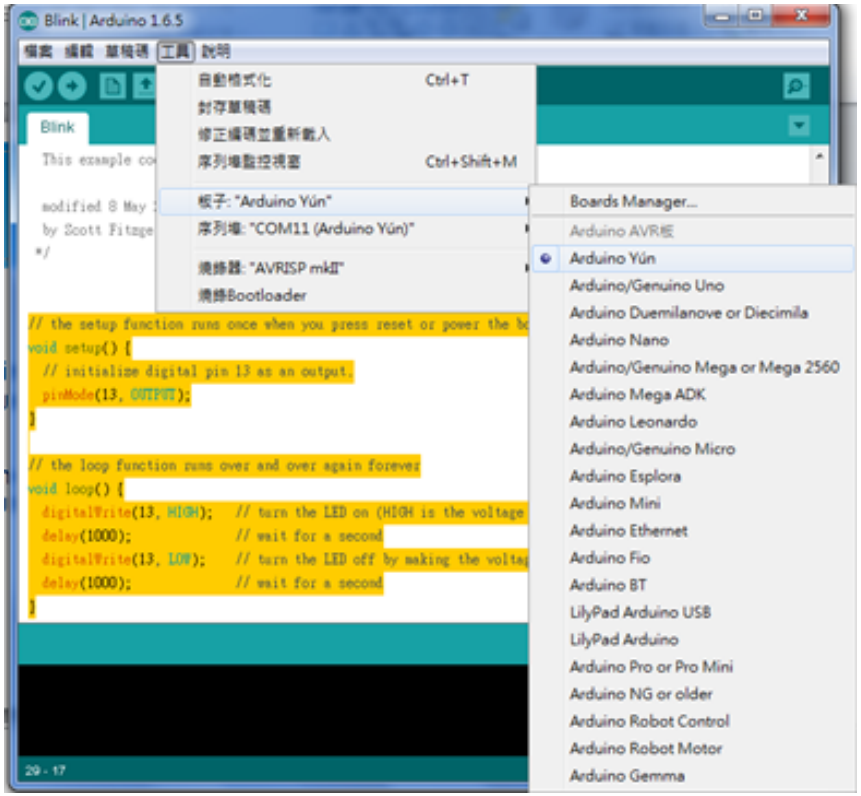


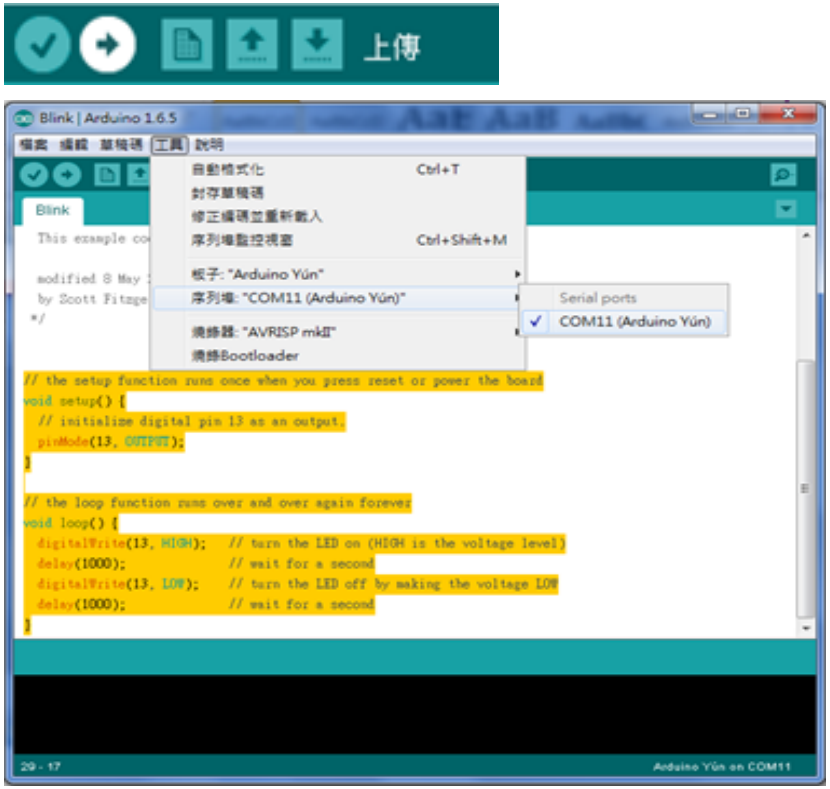
ATmega 32U4

* Port C (PC7,PC6) is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C pins are tri-stated (high impedance (Hi-Z), logical 1, logical 0).

寫入開發板 micro-USB

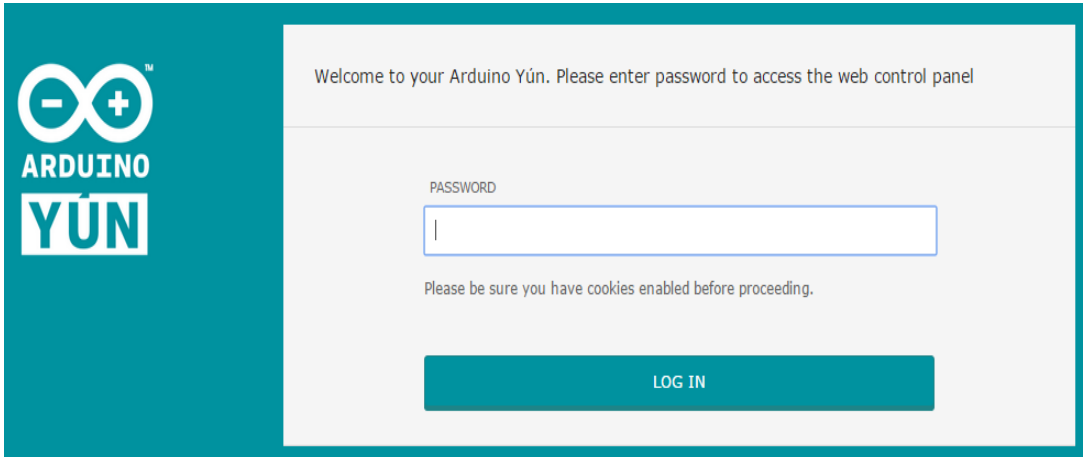
- 上傳之前要先確認目前板子與serial port是否正確





AP模式

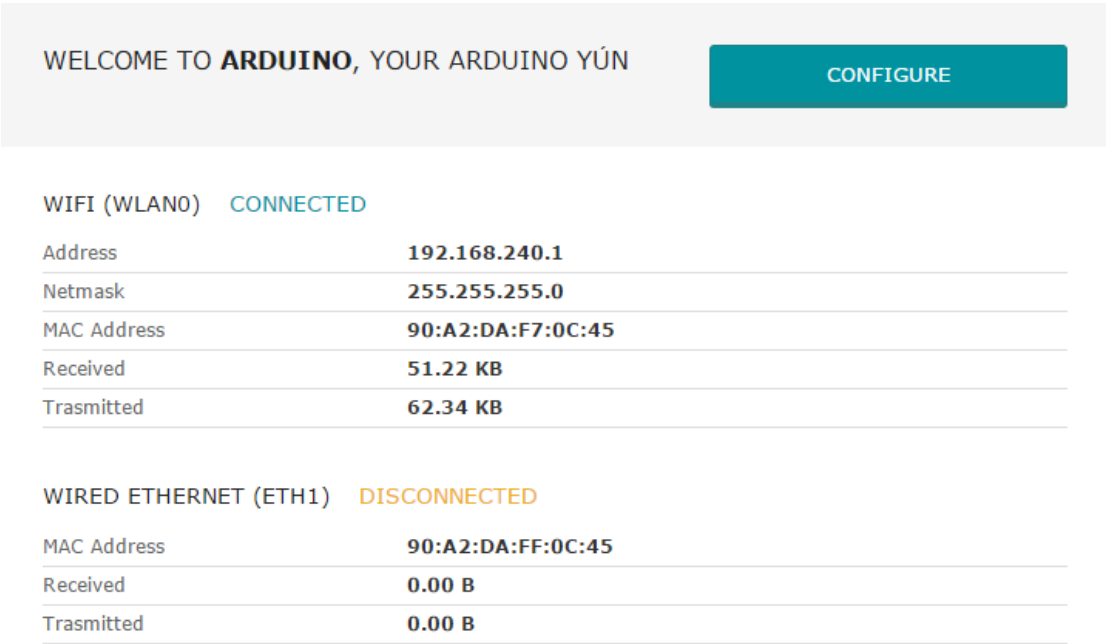
- 開啟無線網路,搜尋Arduino Yun-XXXXXXXXXXXX
- (XXXXXXXXXXXX是WiFi無線網路卡的MAC位址)



- 開啟瀏覽器輸入網址http://arduino.local或192.168.240.1，便可看到如上畫面，要求輸入密碼，預設密碼是「arduino」。

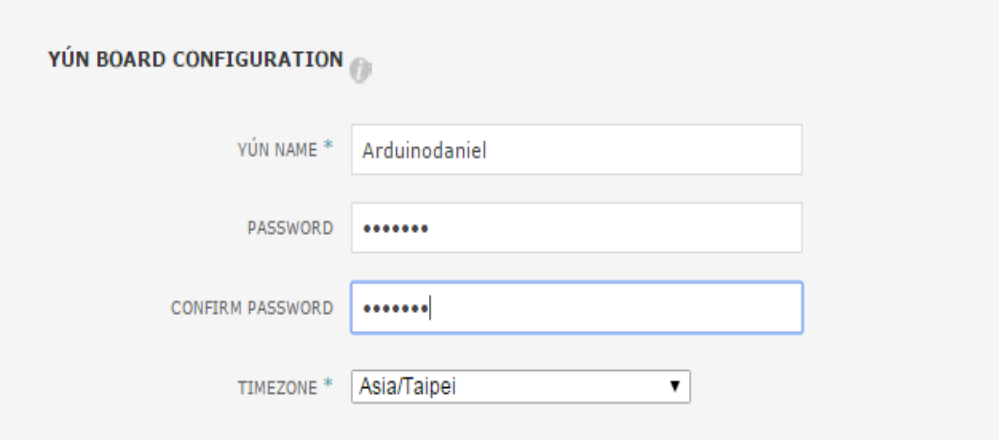
AP模式

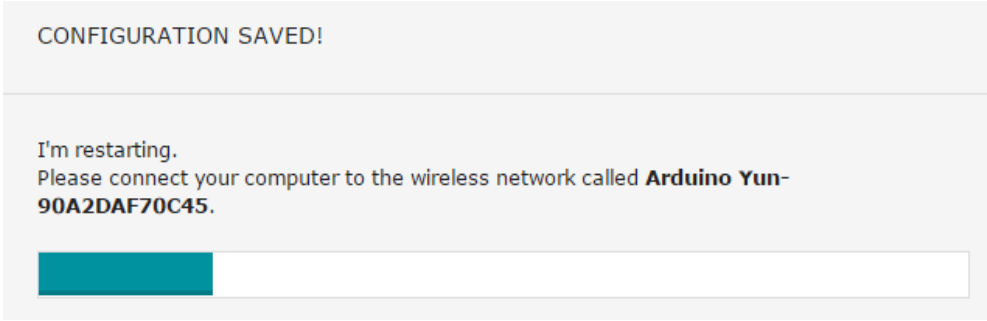
- CONFIGURE ➔進行組態設定



AP模式

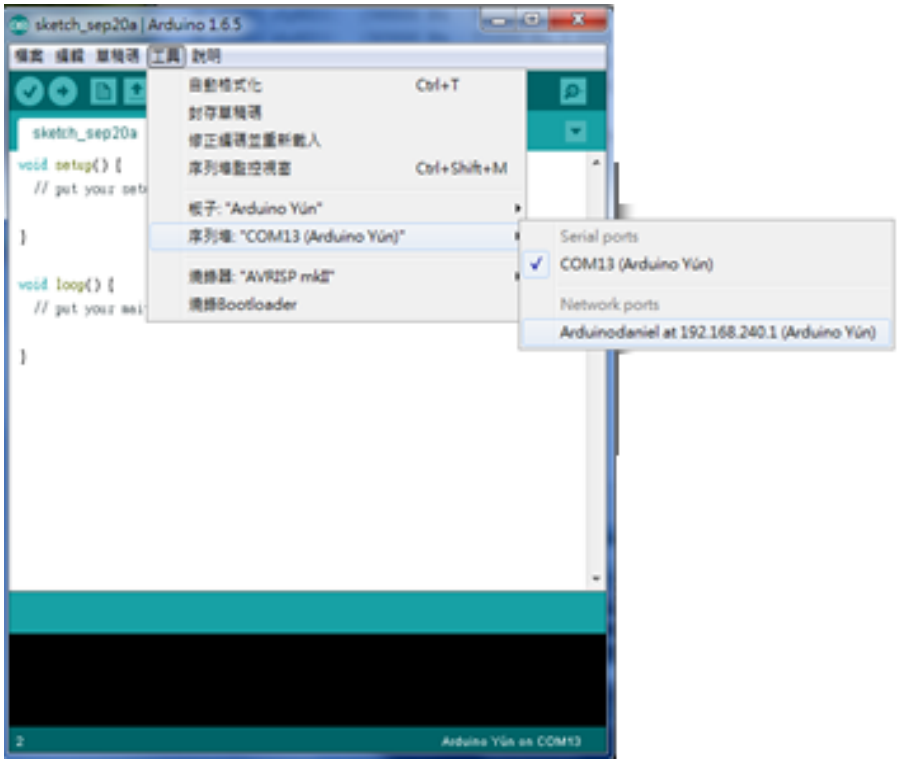
- YÚN NAME：主機名稱，請自由設定，但要記住，將來存取時需要這個名稱。
- PASSWORD ： 在此輸入新密碼，若不輸入則沿用預設密碼。(八位數)
- TIMEZONE ： 可選擇所在時區。





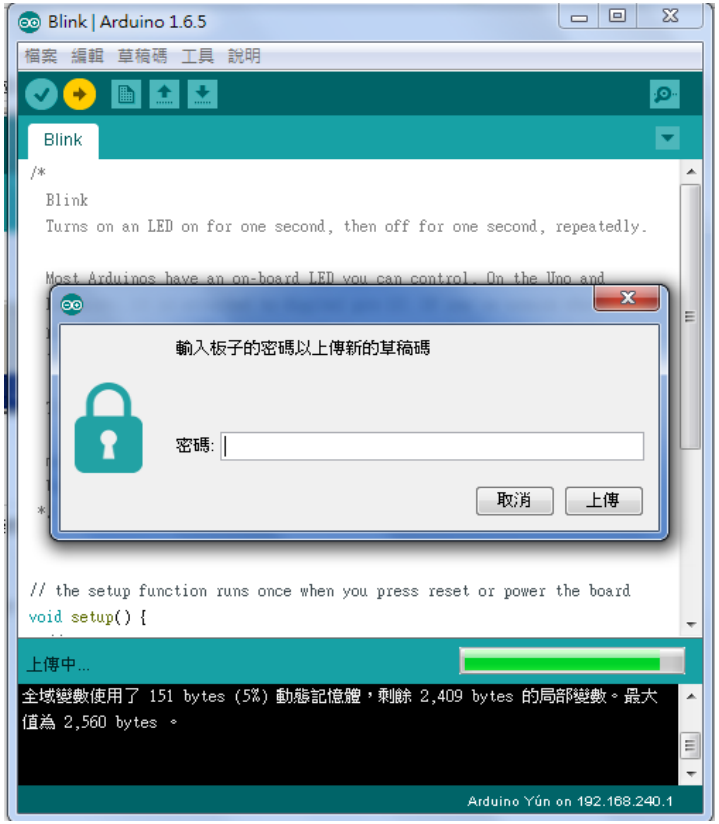
寫入開發板 AP模式

- 開啟電腦上的ARDUINO IDE，可從選單(工具 ➔序列埠)看到含有IP位址的YÚN，勾選後，記得從選單「工具-板子」勾選ARDUINO YÚN。



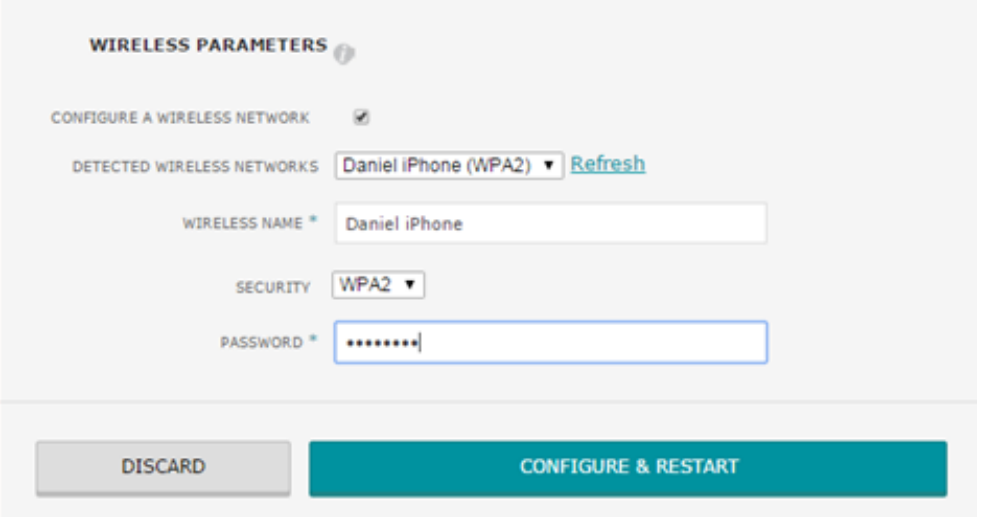
寫入開發板 AP模式

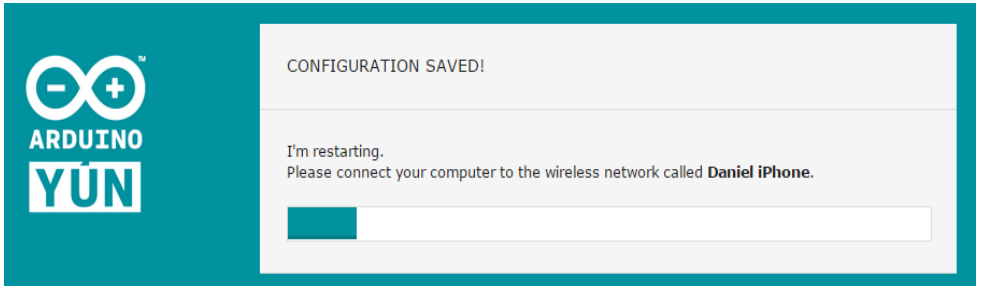
- 執行上傳動作，會要求輸入密碼(預設密碼是「arduino」但若有修改過AP組態設定中的PASSWORD 的話，請使用新的密碼)，輸入後就會進行燒錄動作。



Yún WiFi 一般模式

- DETECTED WIRELESS NETWORKS：輸入你可存取的WiFi網路名稱。
- SECURITY：安全協定，請根據路由器組態設定。
- PASSWORD：存取該WiFi網路時的密碼。





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參考資訊

- www.doghunter.org
- https://www.arduino.cc/en/Main/ArduinoBoardYun?from=Products.ArduinoYUN
- https://www.arduino.cc/en/Tutorial/HomePage