Arduino基礎教學

控制LED、使用開關

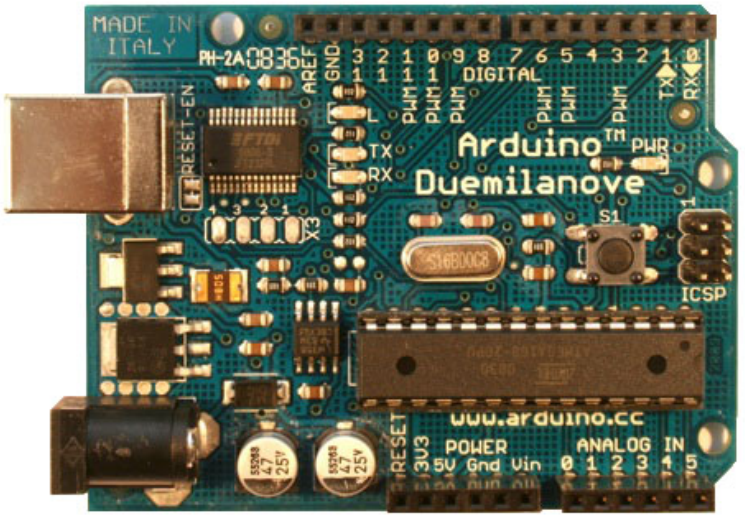
Lession 0

Arduino

Lession 0 - Arduino

- 什麼是Arduino?
- Arduino的種類
- 如何取得Arduino?

什麼是Arduino?



Arduino Duemilanove

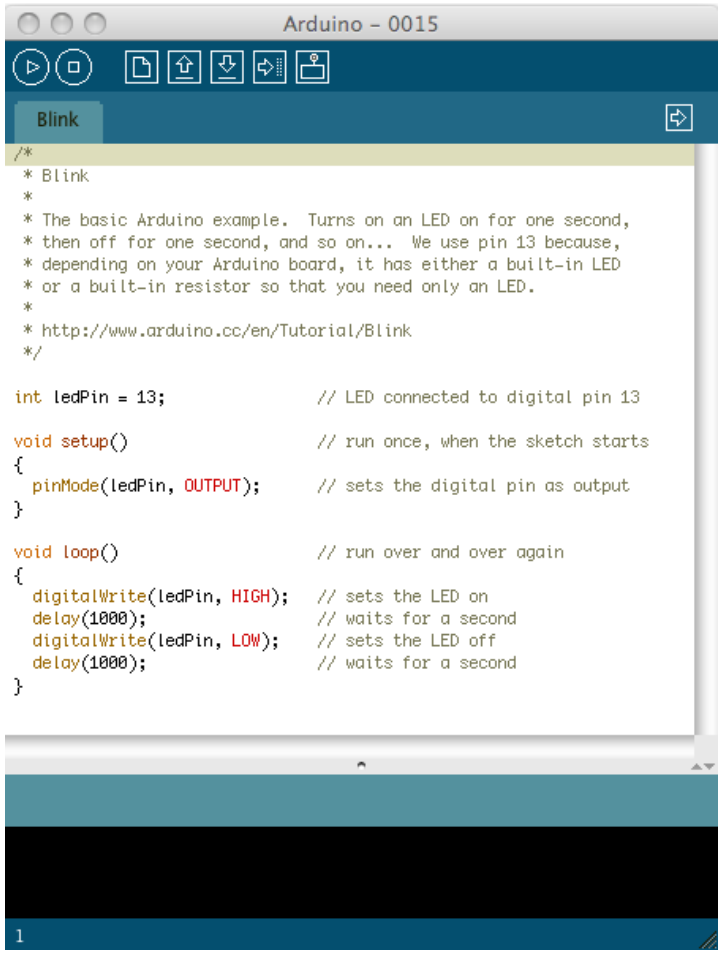
- open source
  - 硬體(Arduino I/O board)
  - 軟體(Arduino IDE)

- 能快速製作電子電路原型 (electronics prototyping)

- 有彈性、易使用

- 目標對象:
藝術家、設計師、任何對互動有興趣的人

什麼是Arduino?



Arduino IDE

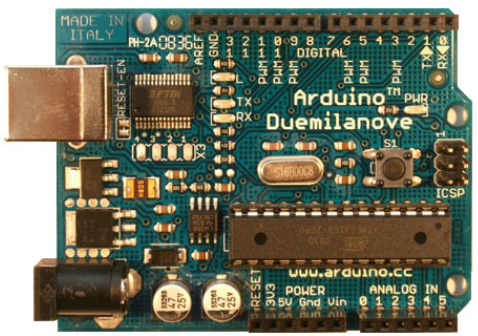
- 藉由感應器(sensor)能感知周遭環境變化 (如 : 紅外線感應器)

- 能控制周遭裝置 (如 : 燈)

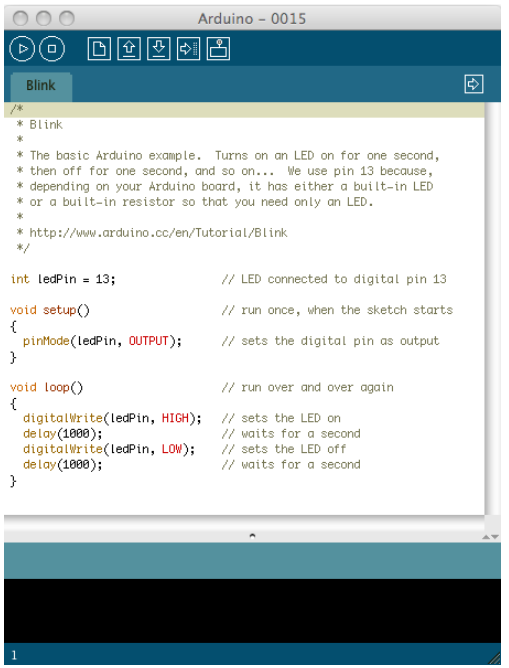
- Arduino電路可獨自運作

- Arduino電路也可以搭配電腦運作, 跟電腦溝通

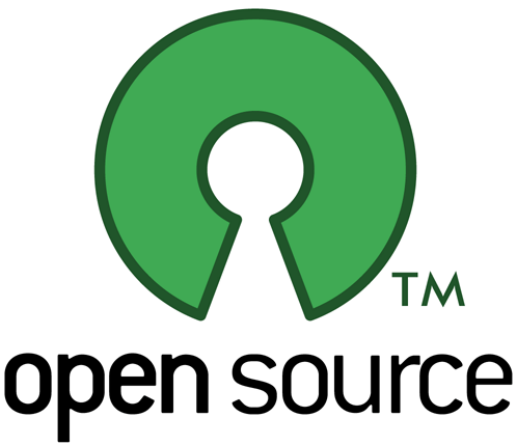
什麼是Arduino?


MADE IN ITALY
Arduino
Duemilanove
DIGITAL
POWER
ANALOG IN
www.arduino.cc

+


Arduino - 0015
Blink
/*
* Blink
*
* The basic Arduino example. Turns on an LED on for one second,
* then off for one second, and so on... We use pin 13 because,
* depending on your Arduino board, it has either a built-in LED
* or a built-in resistor so that you need only an LED.
*
* http://www.arduino.cc/en/Tutorial/Blink
*/
int ledPin = 13; // LED connected to digital pin 13
void setup() // run once, when the sketch starts
{
pinMode(ledPin, OUTPUT); // sets the digital pin as output
}
void loop() // run over and over again
{
digitalWrite(ledPin, HIGH); // sets the LED on
delay(1000); // waits for a second
digitalWrite(ledPin, LOW); // sets the LED off
delay(1000); // waits for a second
}

+

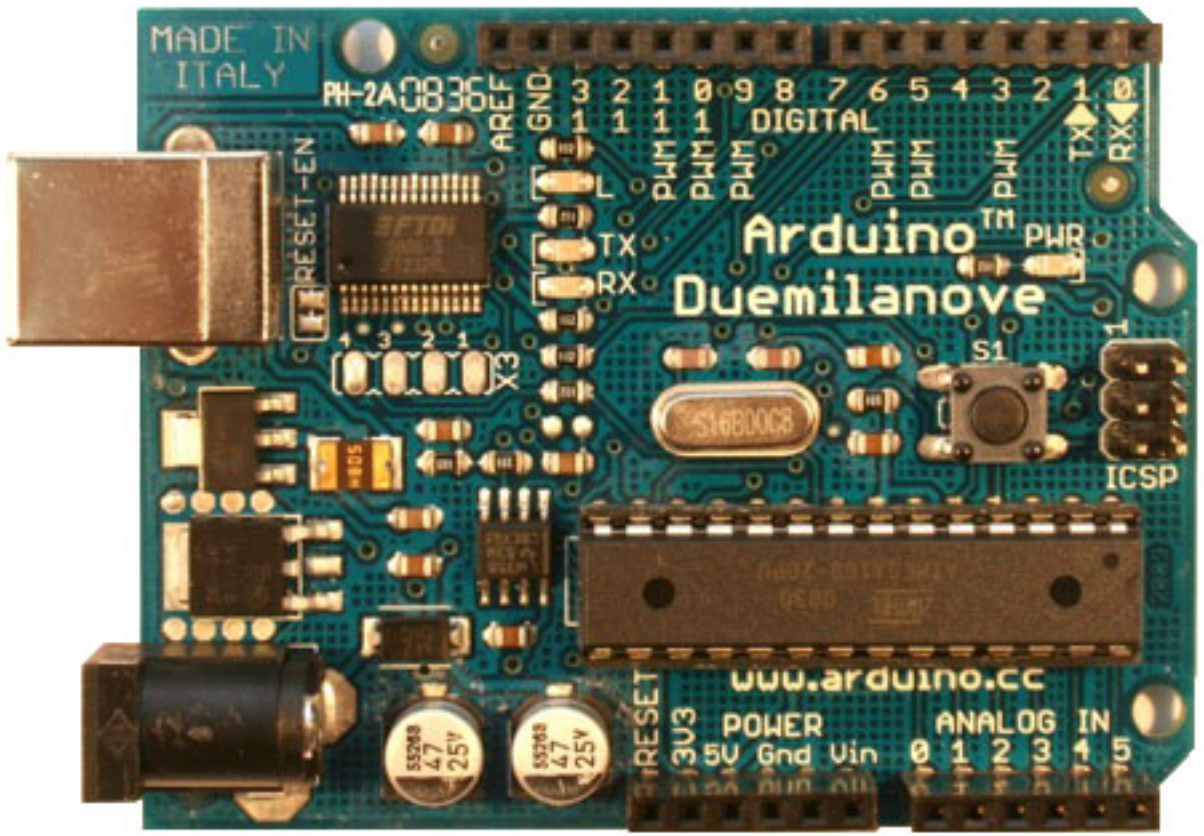

TM
open source

Arduino的種類

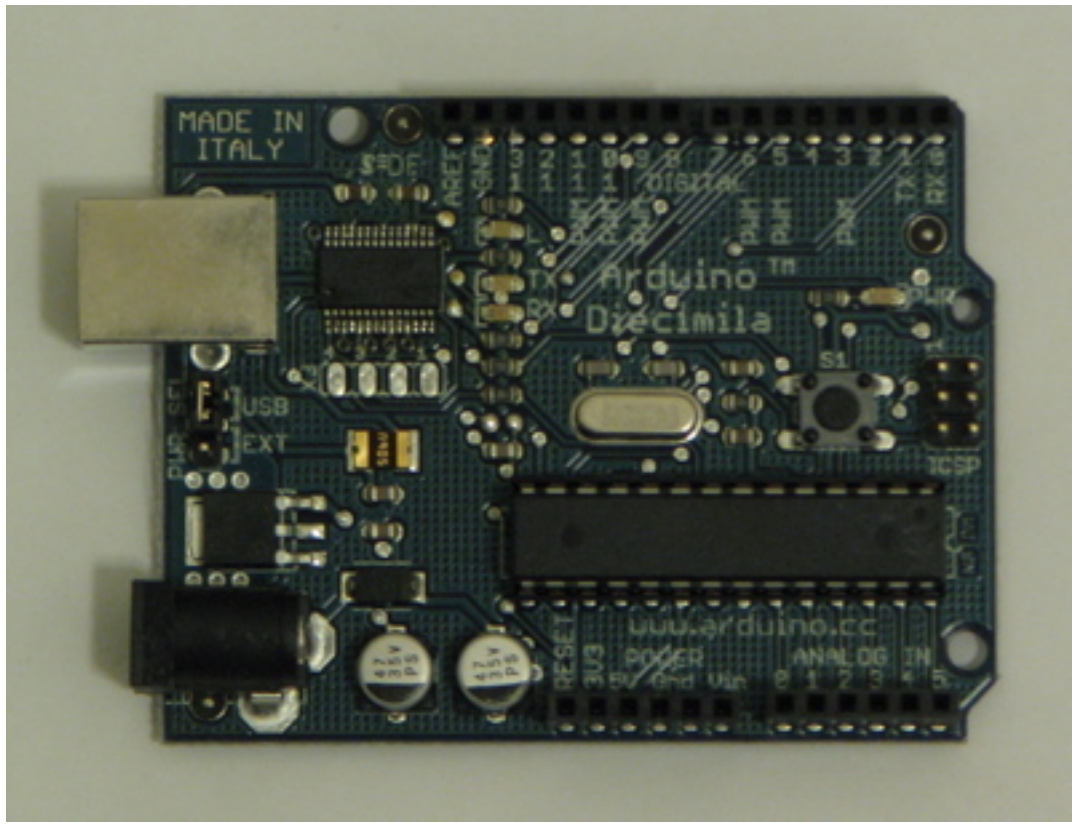
- Arduino Duemilanove (這次工作坊用的)
- Arduino Diecimila
- Arduino Nano
- Arduino Mega
- Arduino Bluetooth
- Arduino LilyPad
- Arduino Mini
- Arduino Mini USB Adapter
- Arduino Pro
- Arduino Pro Mini
- Arduino Serial
- Arduino Serial Single Sided

來源網站：http://arduino.cc/en/Main/Hardware

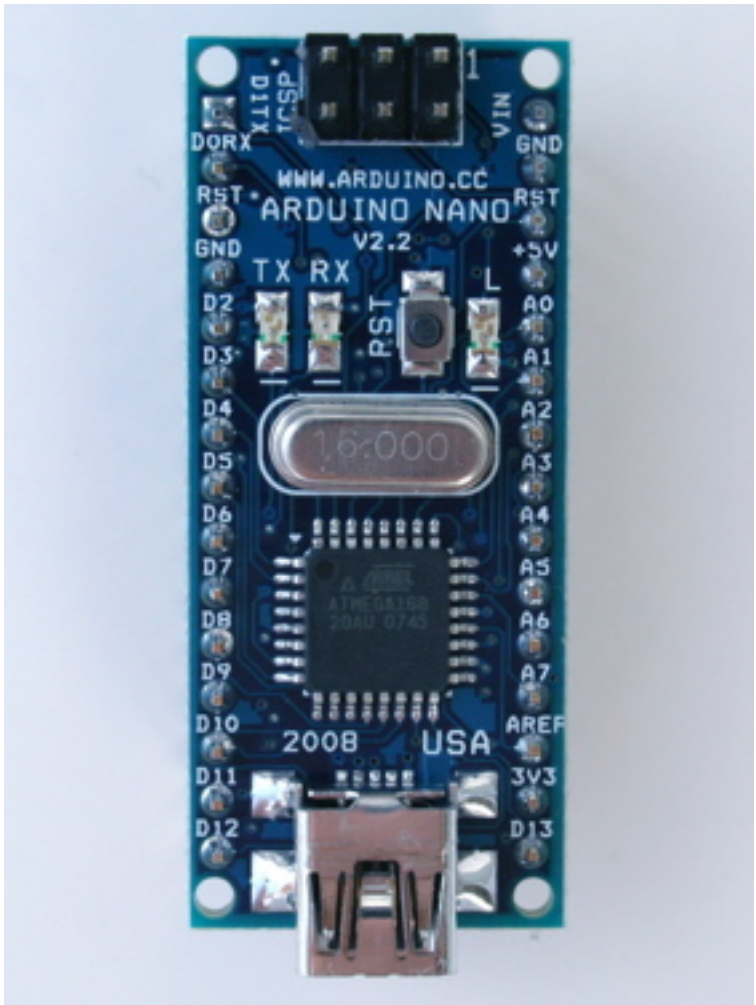
Arduino Duemilanove (這次工作坊用的)

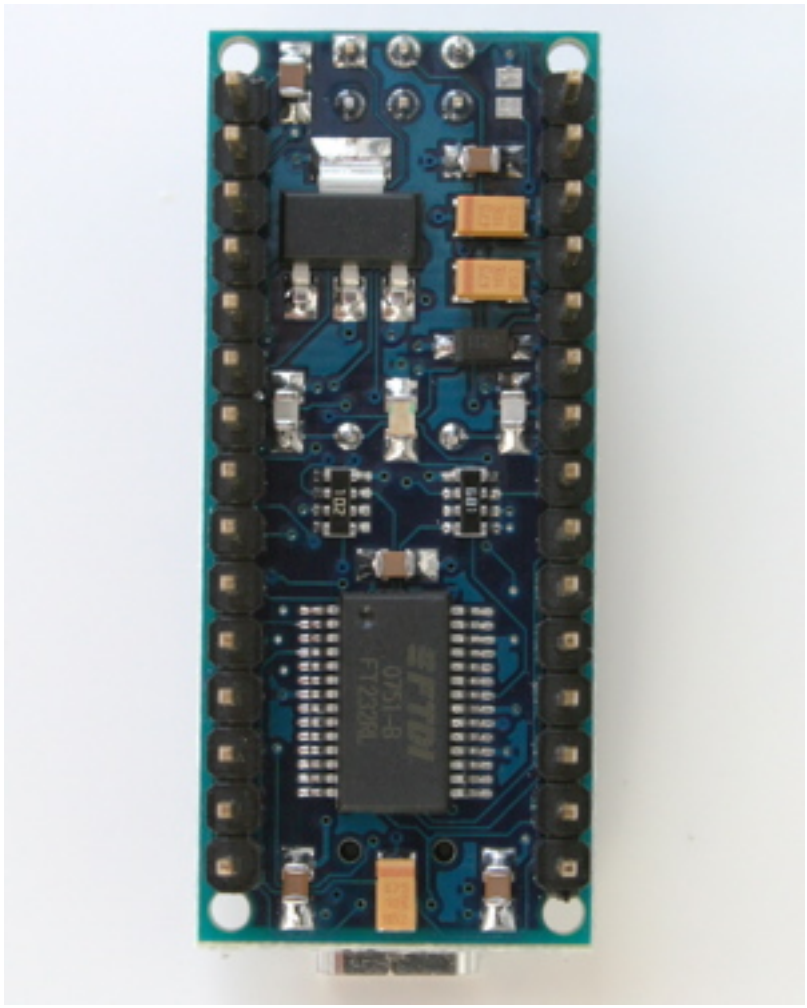


Arduino Diecimila

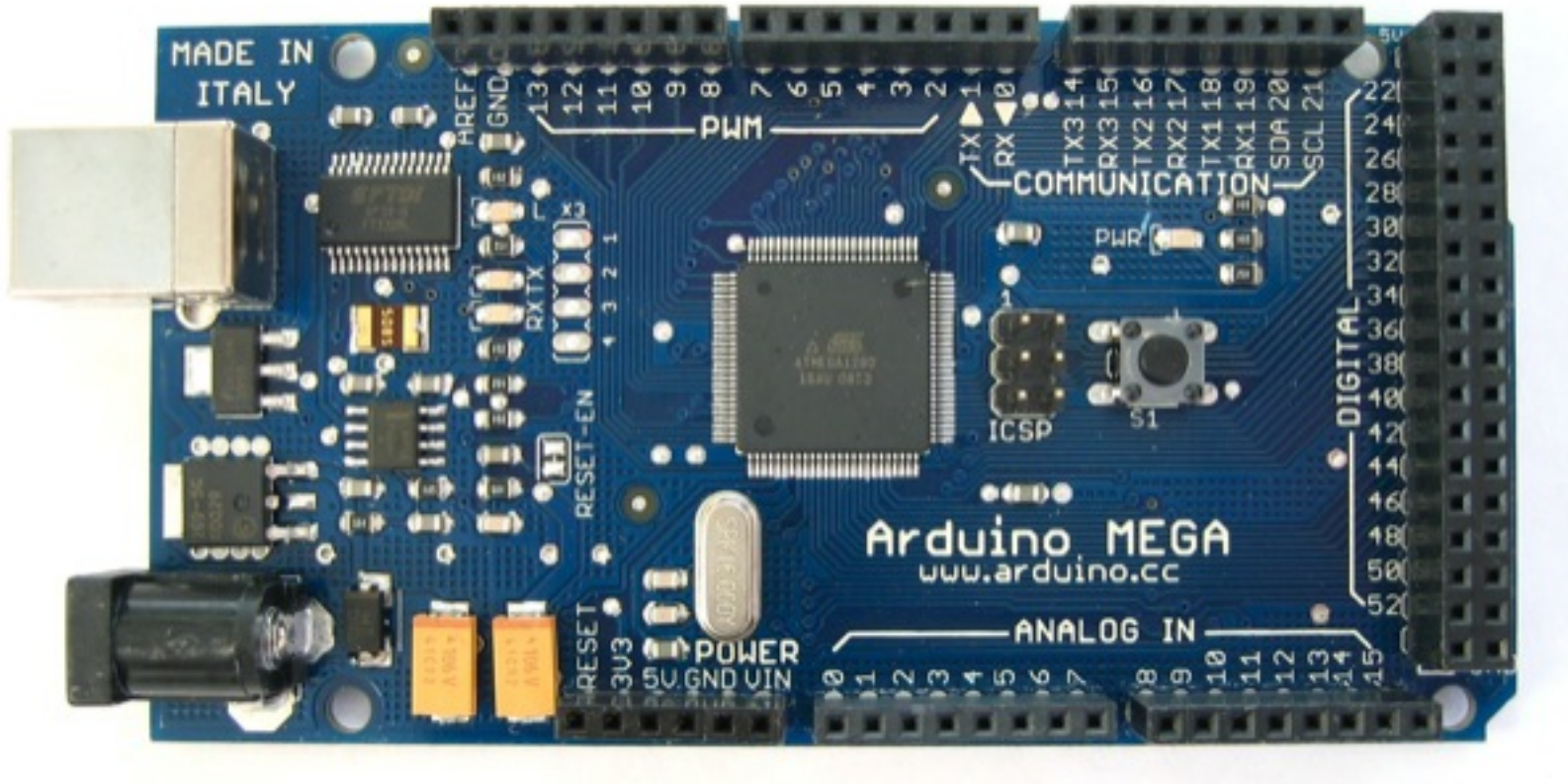


Arduino Nano

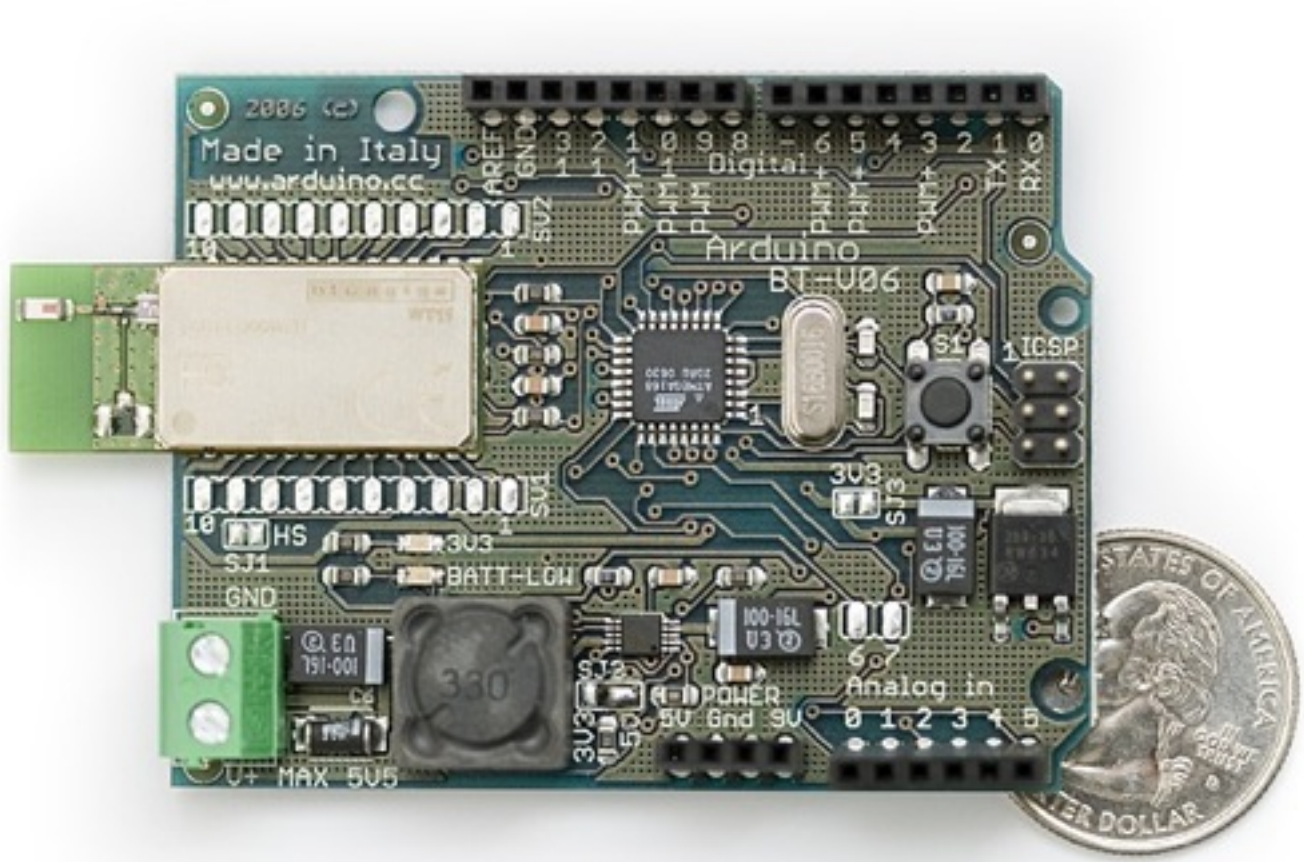




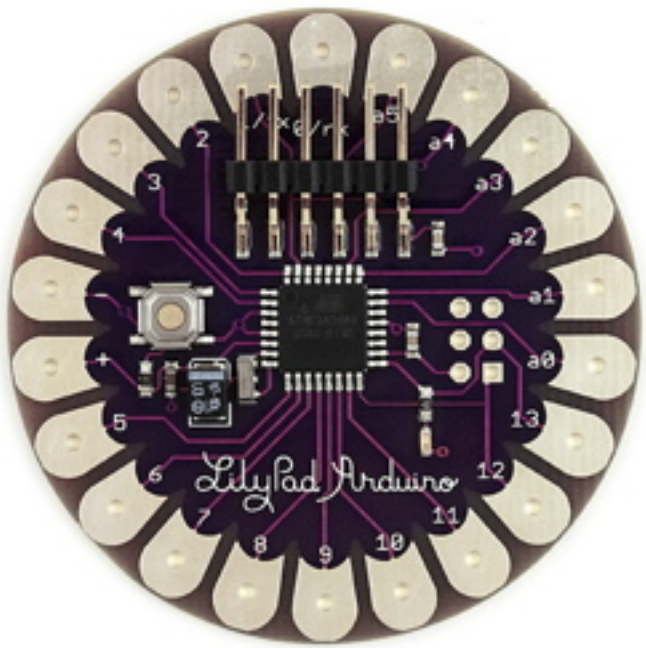
Arduino Mega



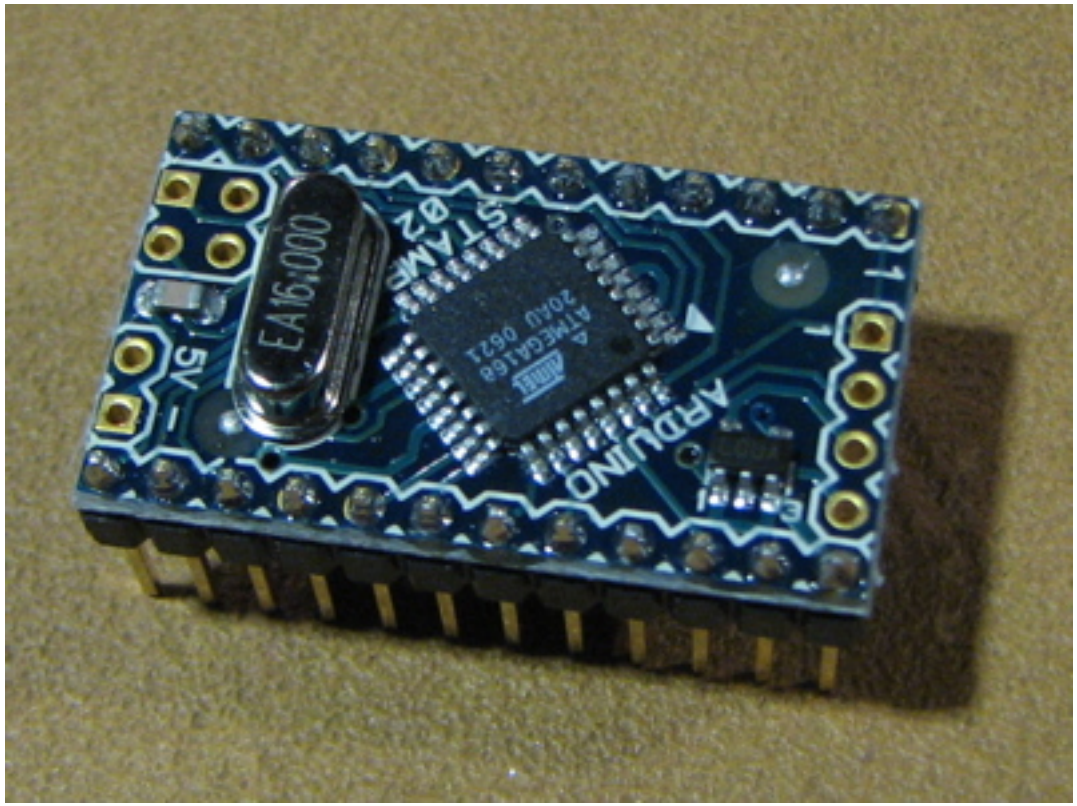
Arduino Bluetooth



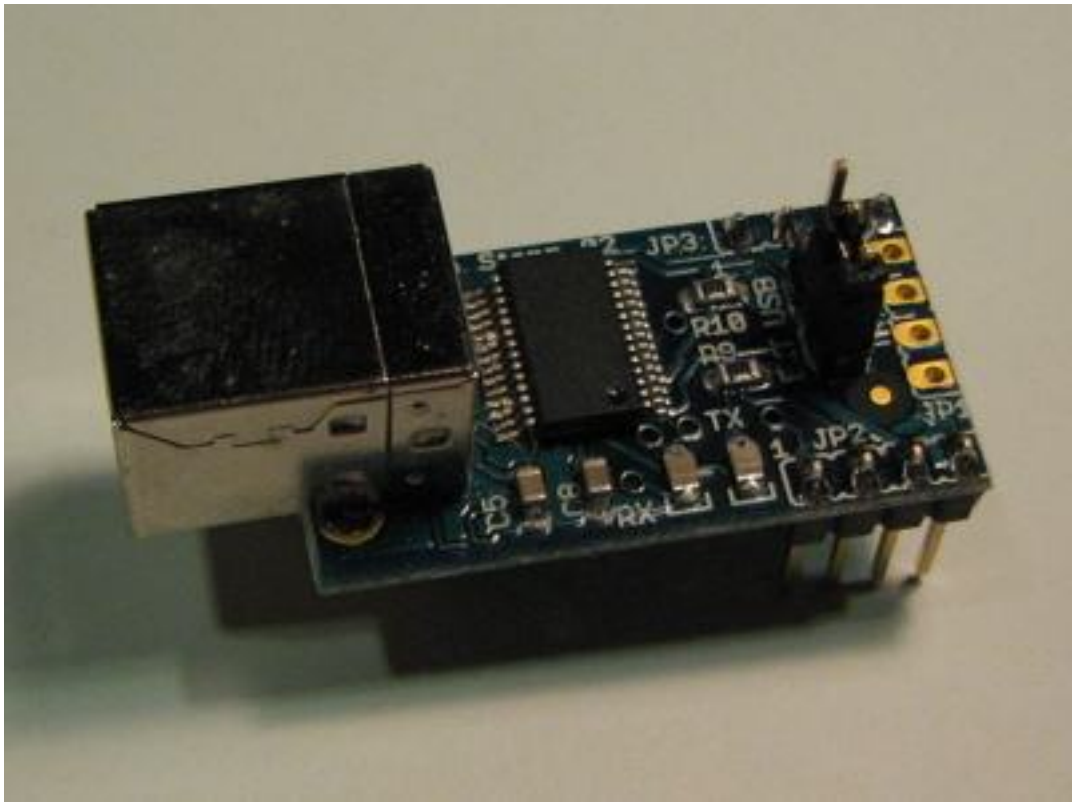
Arduino LilyPad



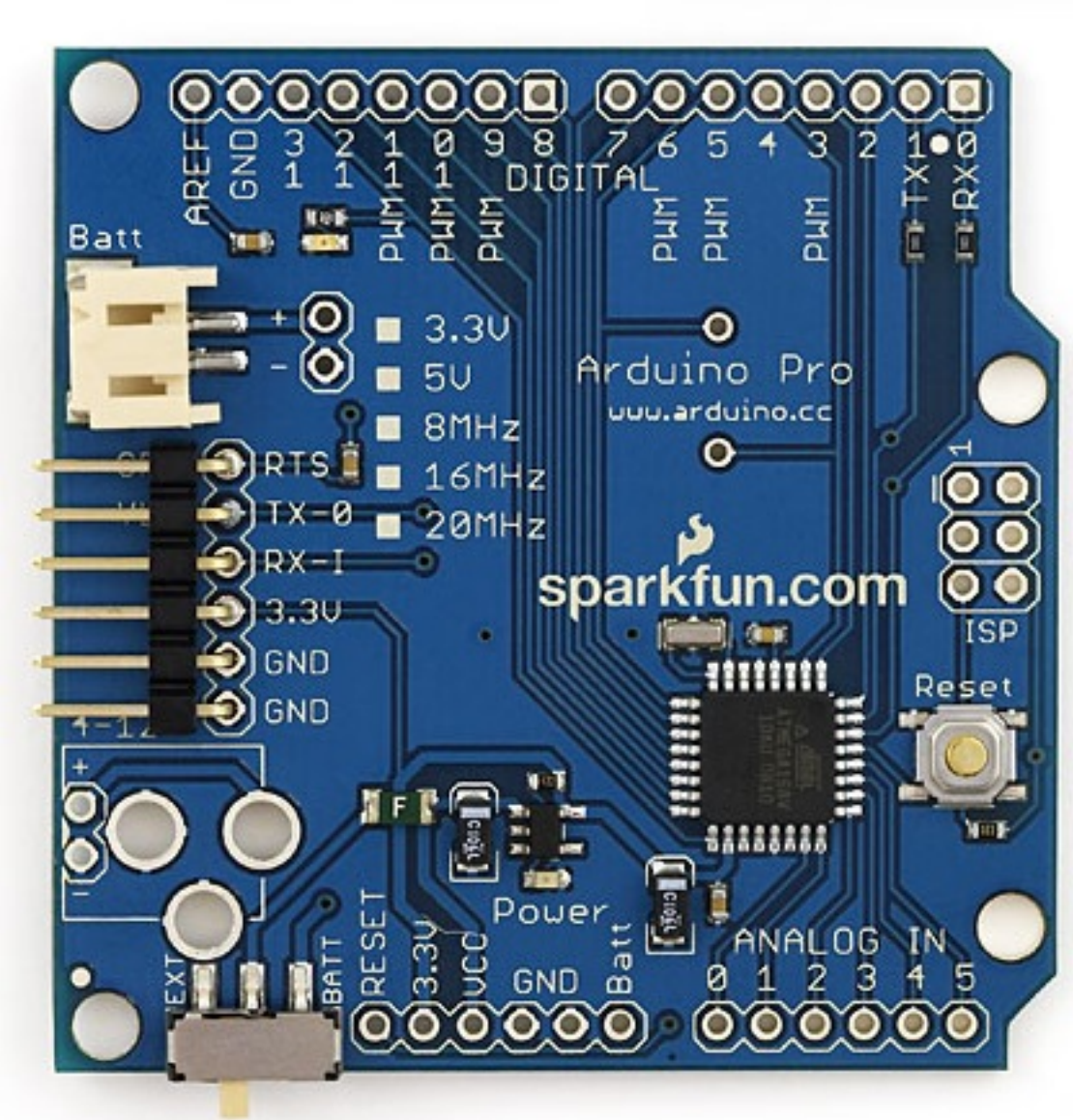
Arduino Mini



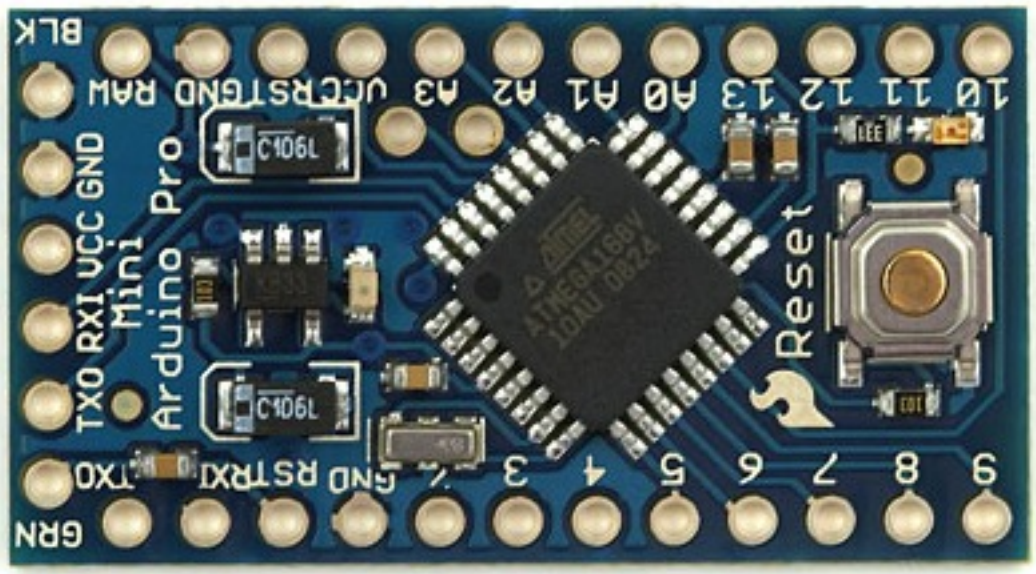
Arduino Mini USB Adapter



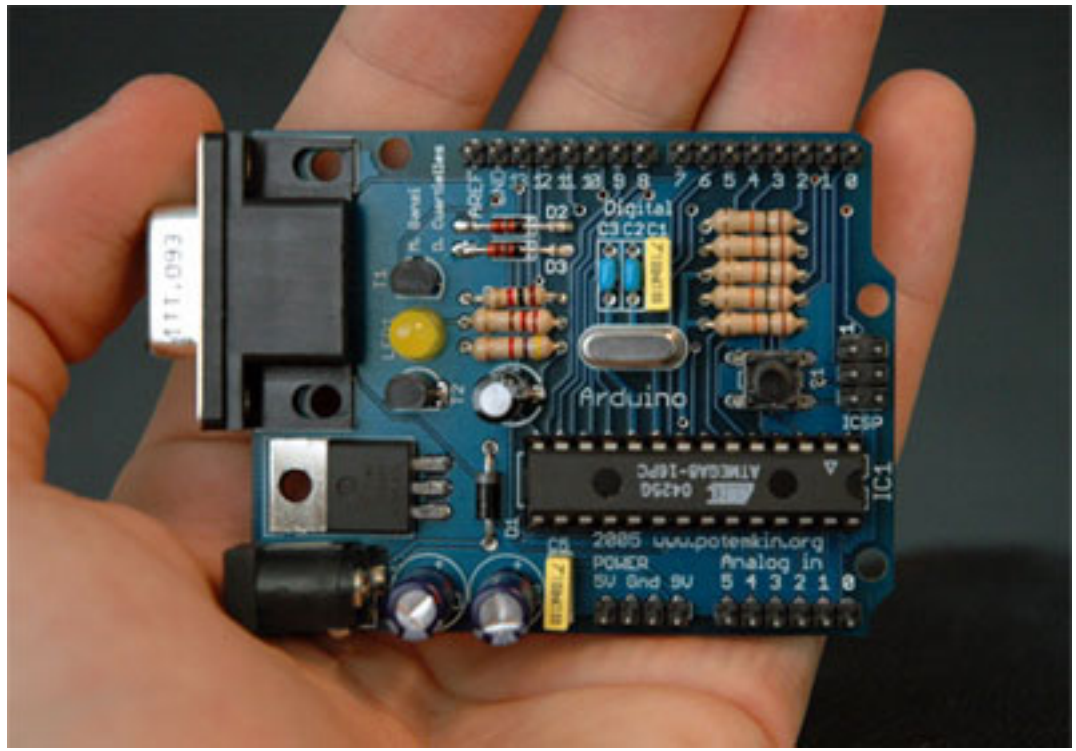
Arduino Pro


AREF
GND
3 2 1 0 9 8 7 6 5 4 3 2 1 0
DIGITAL
PWM
TX
RX
Batt
3.3V
5V
8MHz
16MHz
20MHz
Arduino Pro
www.arduino.cc
RTS
TX-0
RX-I
3.3V
GND
GND
sparkfun.com
ISP
Reset
Power
RESET
3.3V
VCC
GND
Batt
ANALOG IN
0 1 2 3 4 5
EXT
BATT

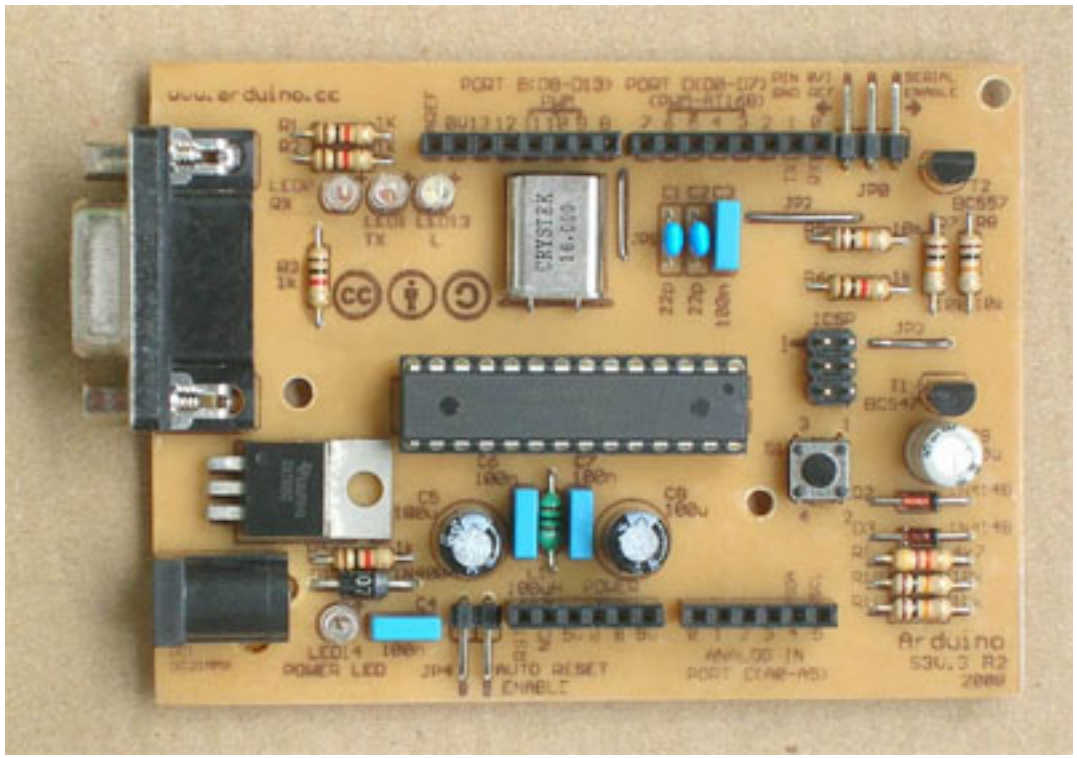
Arduino Pro Mini



Arduino Serial



Arduino Serial Single Sided

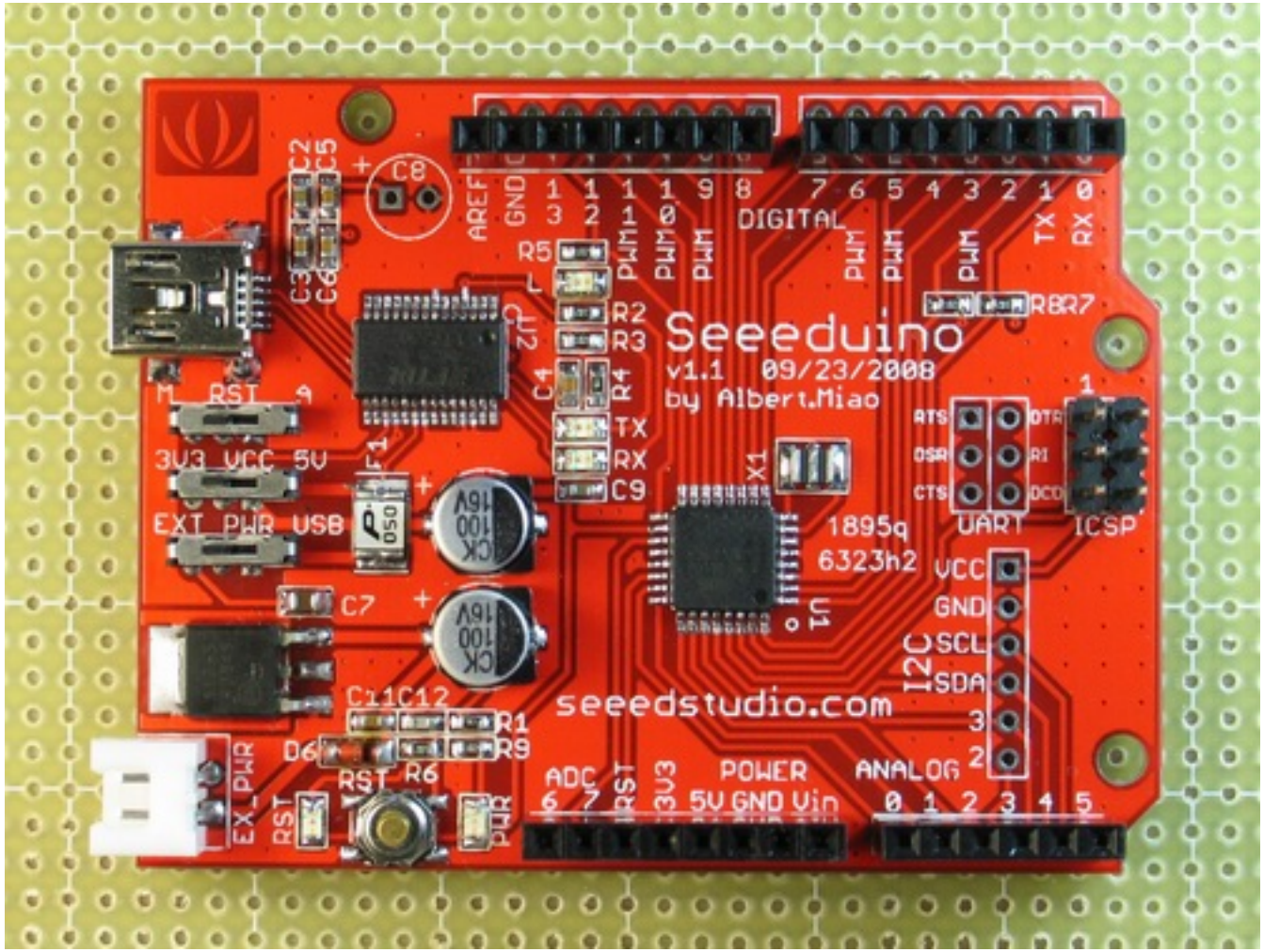


類Arduino或Arduino相容的I/O board

- Seeeduino
- Sanguino
- Pinguino
- funnel IO
- ...族繁不及備載, 請上網尋找! (這就是open source的樂趣啊!)

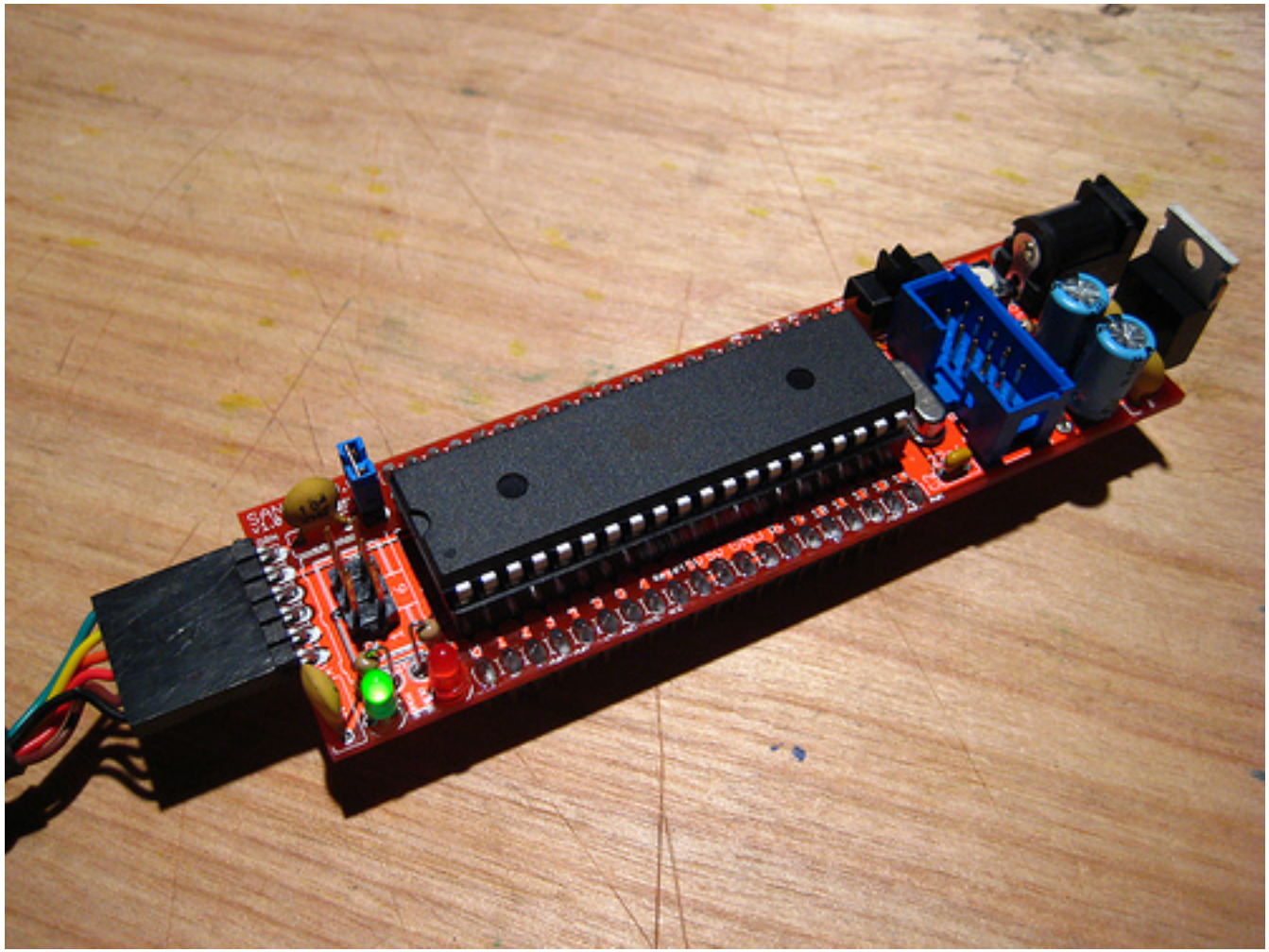
Seeeduino

http://www.seeedstudio.com/blog/?page_id=110



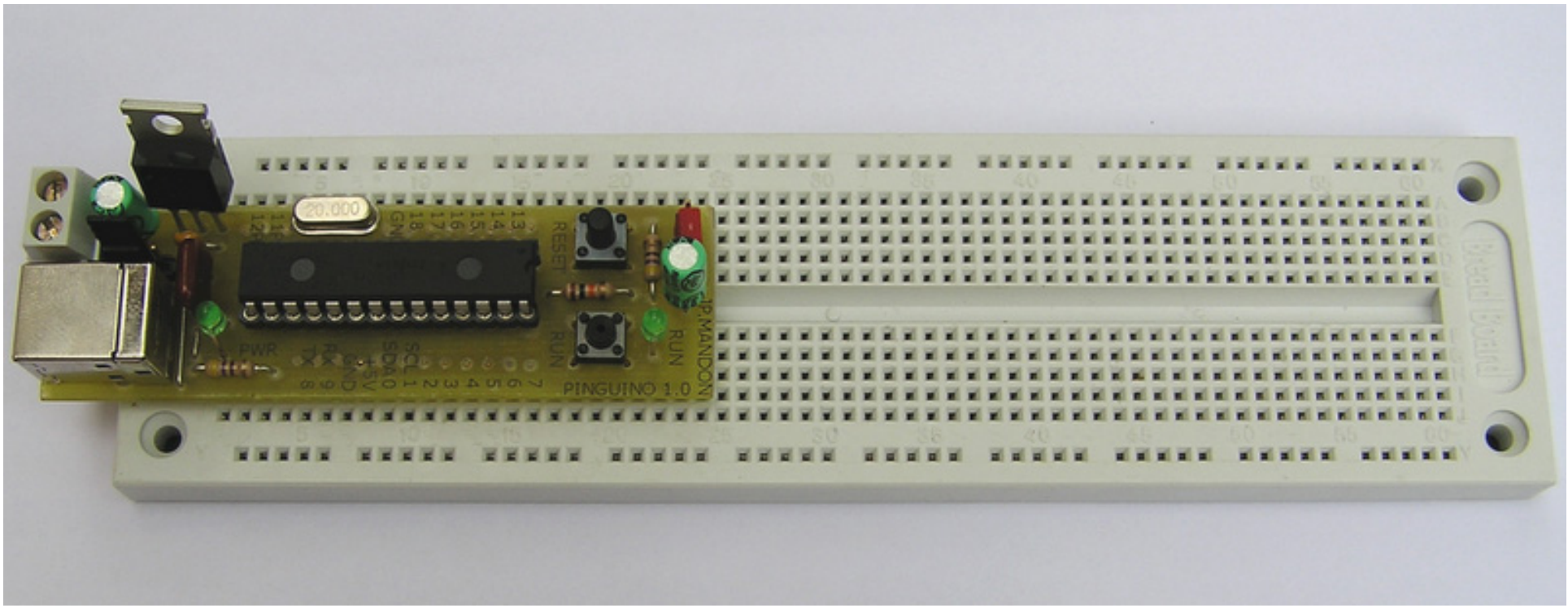
Sanguino

http://sanguino.cc/



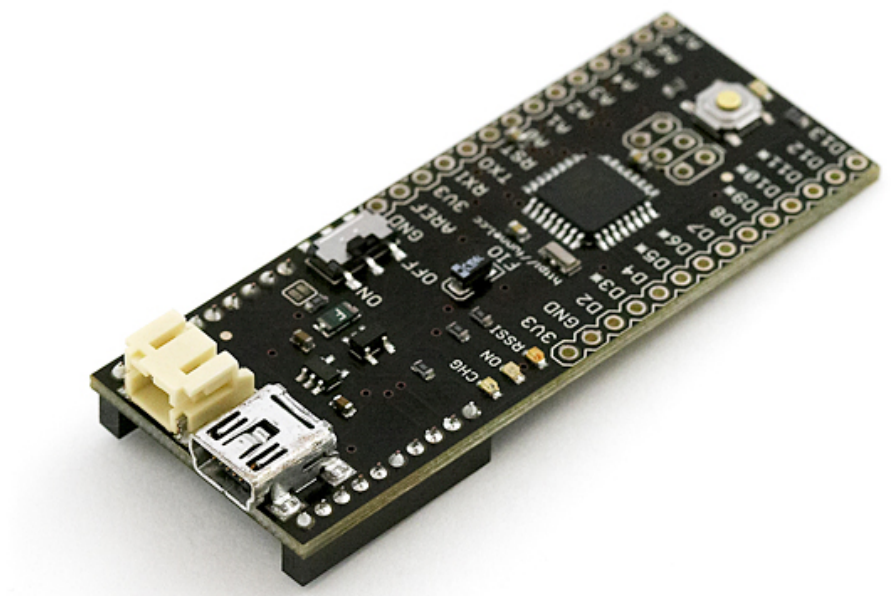
Pinguino

http://www.hackinglab.org/pinguino/index.html



funnel IO

http://funnel.cc/Main/HomePage



如何取得Arduino?

台灣代理商:

http://www.playrobot.com/home_index.htm

http://www.aroboto.com/

國外代理商:

http://www.sparkfun.com/commerce/categories.php

其他:
Arduino官網上列出全世界許多代理商
http://arduino.cc/en/Main/Buy

Lession 1

Let's get start!

Lession 1 - Let's get start!

- 事前準備
- 利用USB線將Arduino連接上電腦
- 了解Arduino I/O board
- 了解Arduino IDE
- 了解麵包板
- 最簡單的電路
- 範例一 Hello Arduino: blink LED!
- 範例二 LED loop
- 第二簡單的電路
- 範例三 Button

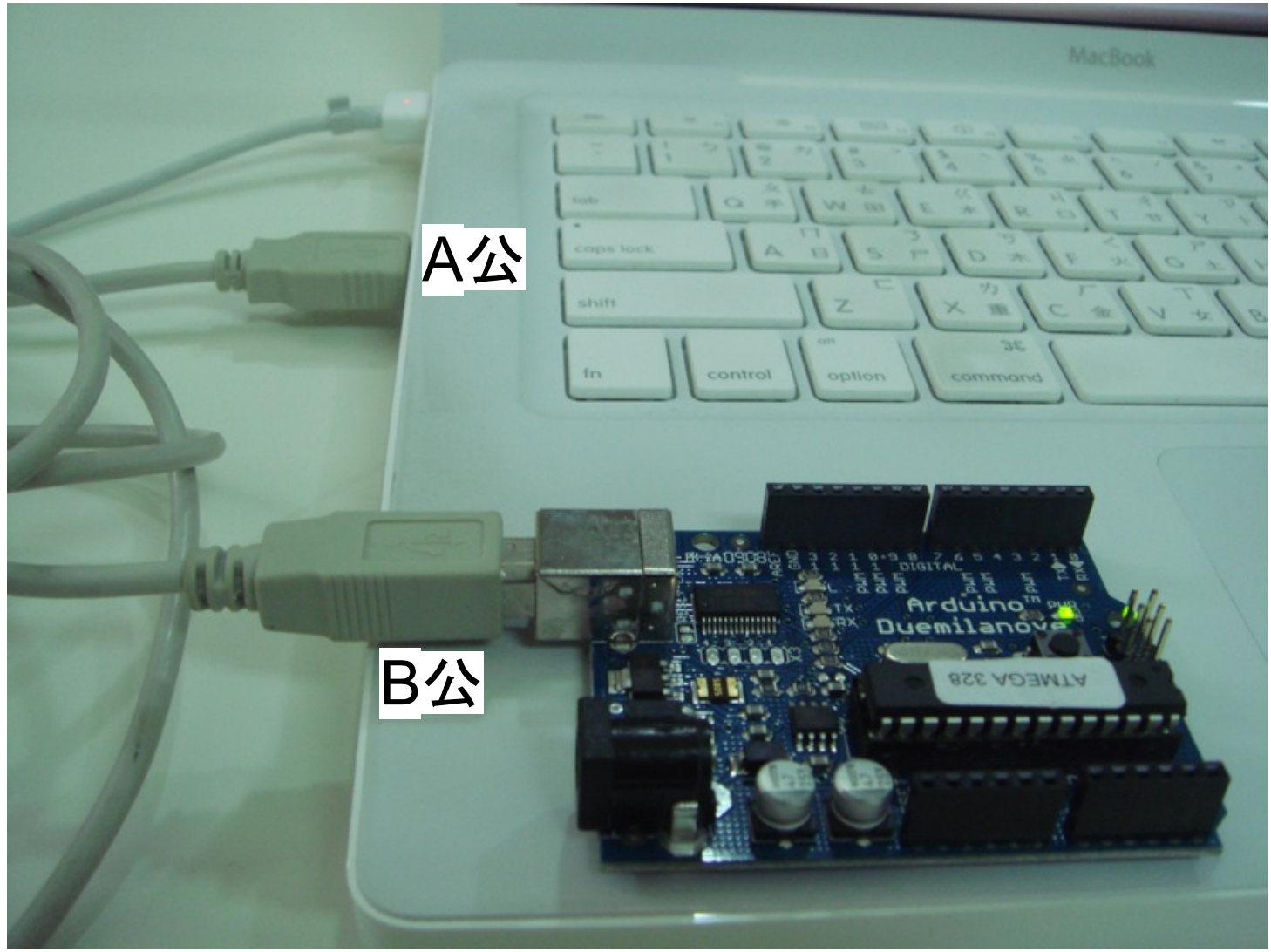
事前準備

1. 取得Arduino I/O board
2. 下載安裝Arduino IDE
   http://arduino.cc/en/Main/Software
3. 安裝USB驅動程式(USB driver)
   [Windows 使用者]
   下載Arduino IDE後, 利用USB將Arduino和PC相連接後, 螢幕上會出現安裝驅動程式畫面。指定驅動程式安裝路徑(在arduino資料夾裡 -> [drivers] -> [FTDI USB Drivers]), 連續安裝兩次即可。

   [PowerPC *Mac* 使用者 (Powerbook, iBook, G4 or G5*)]*
   下載Arduino IDE後, 在arduino資料夾裡 -> [drivers] -> 執行 FTDIUSBSerialDriver_v2_1_9.dmg安裝

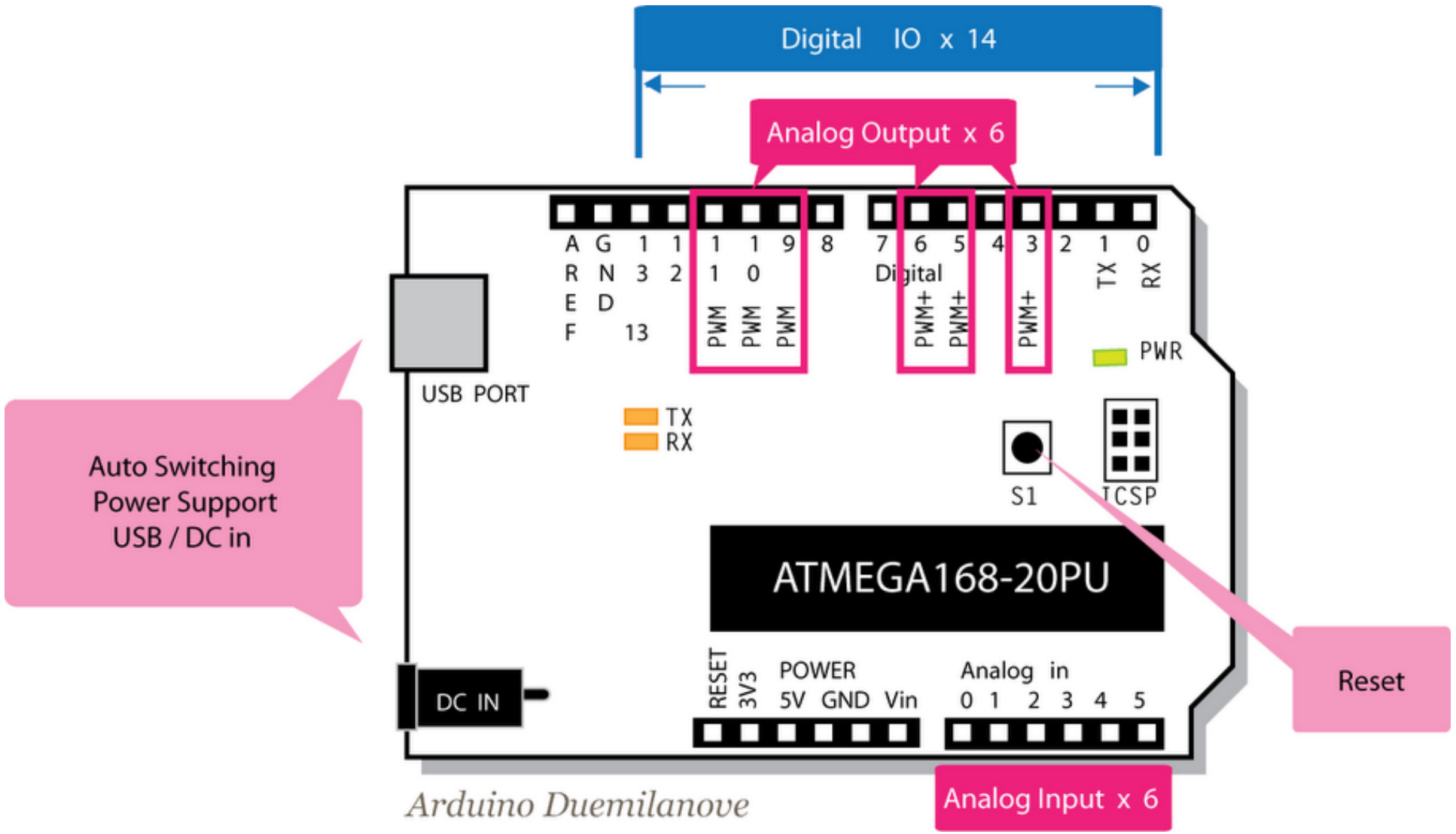
   [Intel Mac 使用者 (MacBook, MacBook Pro, or Mac Pro*)]*
   下載Arduino IDE後, 在arduino資料夾裡 -> [drivers] -> 執行 FTDIUSBSerialDriver_v2_1_9.dmg安裝

利用USB線(A公-B公)將Arduino連接上電腦



PS. Windows使用者此時若出現"發現新硬體"的視窗, 一直點選下一步安裝USB驅動程式即可（請參考 Arduino官網 http://arduino.cc/en/Guide/Windows)

了解Arduino I/O board



資料來源：http://interactive2go.blogspot.com/2009/04/get-to-start.html

了解Arduino I/O board

Digital I/O	共13，數位輸出/輸入端(pin 13作為LED指示用)
Analog Out	共6，在Digital I/O中的pin 3,5,6,9,10,11 可做類比輸出使用
Analog In	共6，類比輸入端pin 0~5
Tx/Rx	支援Tx/Rx訊號輸入輸出（若使用時，Digital I/O pin 0,1不可作為數位輸出入/使用）
USB傳輸與供電	支援USB直接供電，以及USB接頭資料傳輸
輸入電壓	可選擇USB直接供電或外部供電(建議7V~12V)，用JUMP切換 (Duemilanove版本改用自動切換)
輸出電壓	有5V、3.3V與Vin三種電壓輸出
支援線上燒錄功能	免去燒入經片需要重複拔插晶片的痛苦
LED 13	pin 13內建一個LED

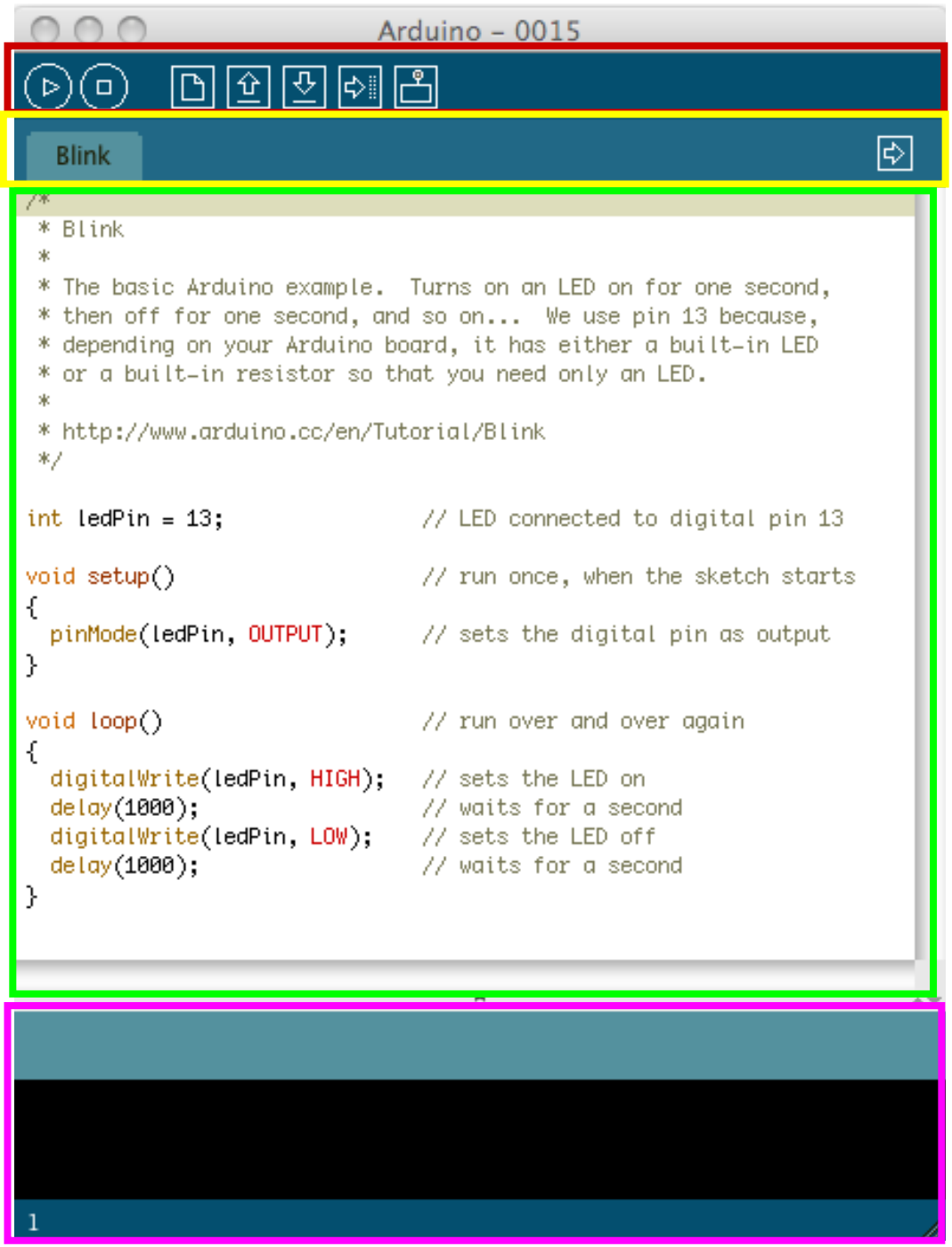
p.s.

(1) 當Digital I/O不敷使用時，可用Analog In pin另外代用，宣告為pin 14~19

(2) 一般不建議使用Digital I/O pin 0,1，因為常作為Serial port傳輸用

資料來源：http://interactive2go.blogspot.com/2009/04/get-to-start.html

了解Arduino IDE



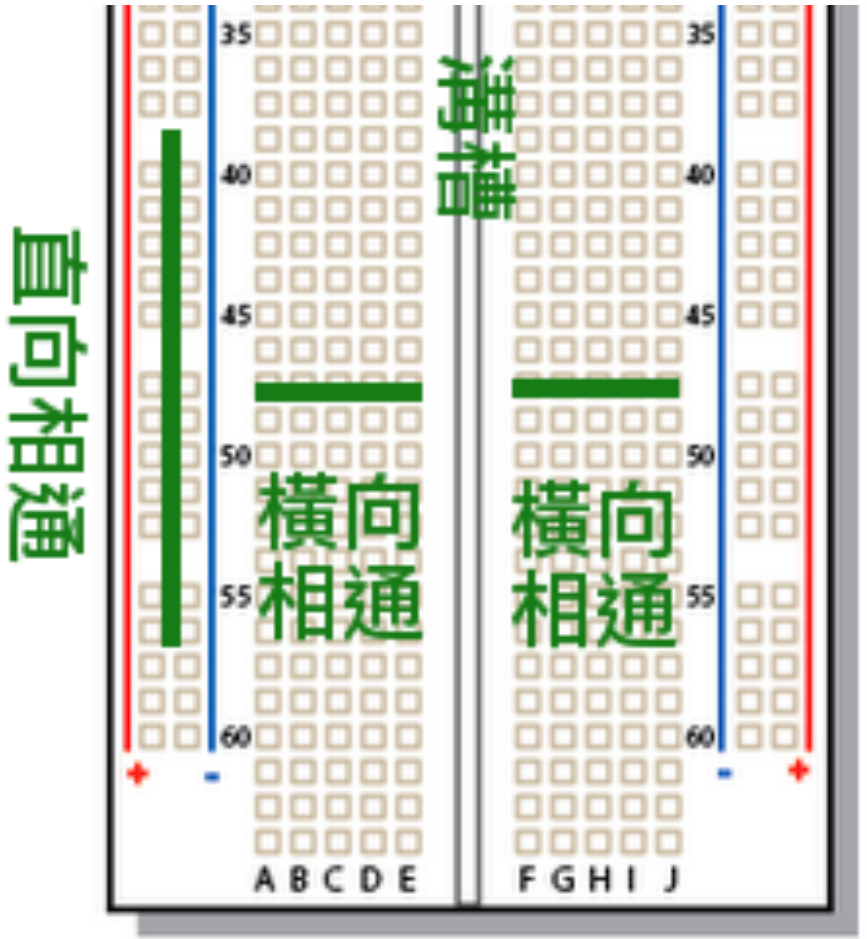
工具列

程式碼分頁

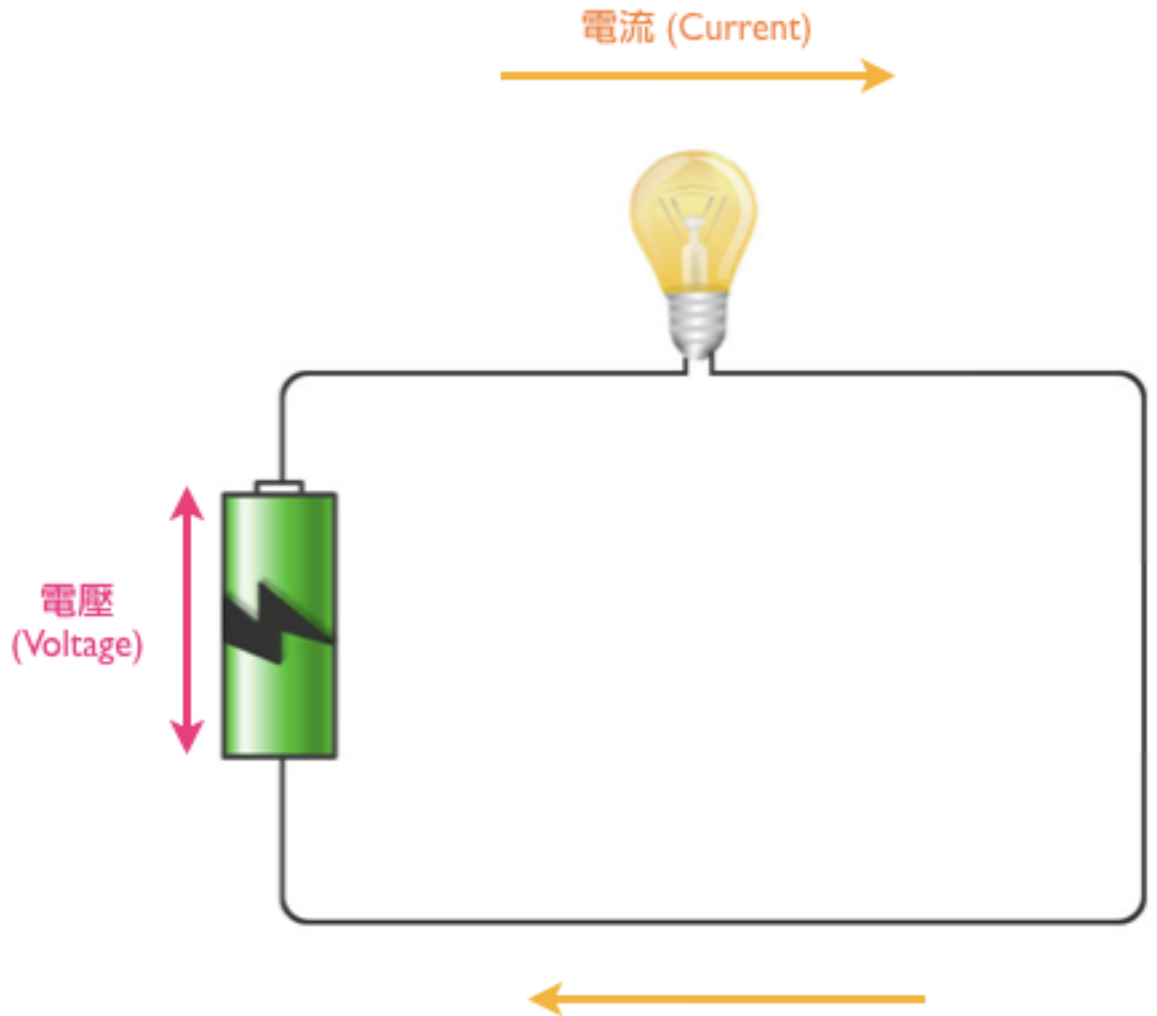
程式內容

訊息顯示區

了解麵包板

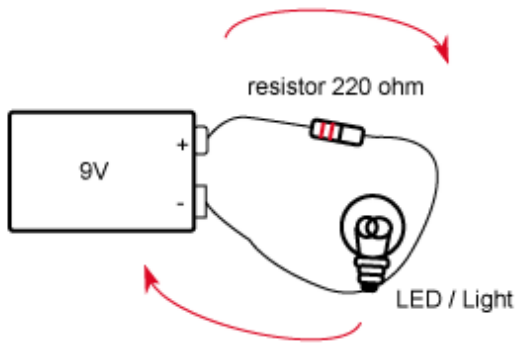


最簡單的電路

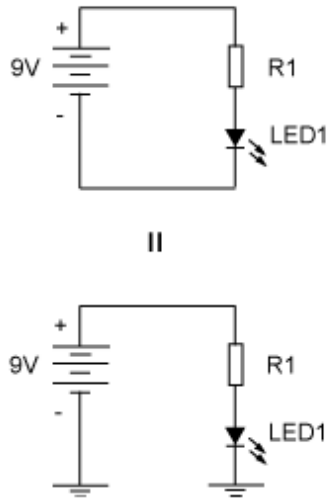


圖片來源：http://interactive2go.blogspot.com/2009/04/digital-out.html

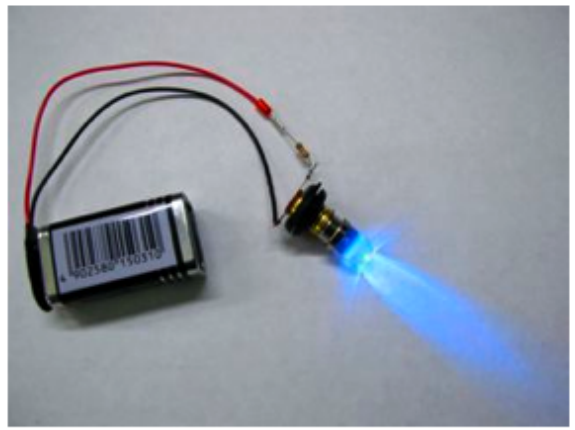
最簡單的電路 (加上電阻)



線路示意圖



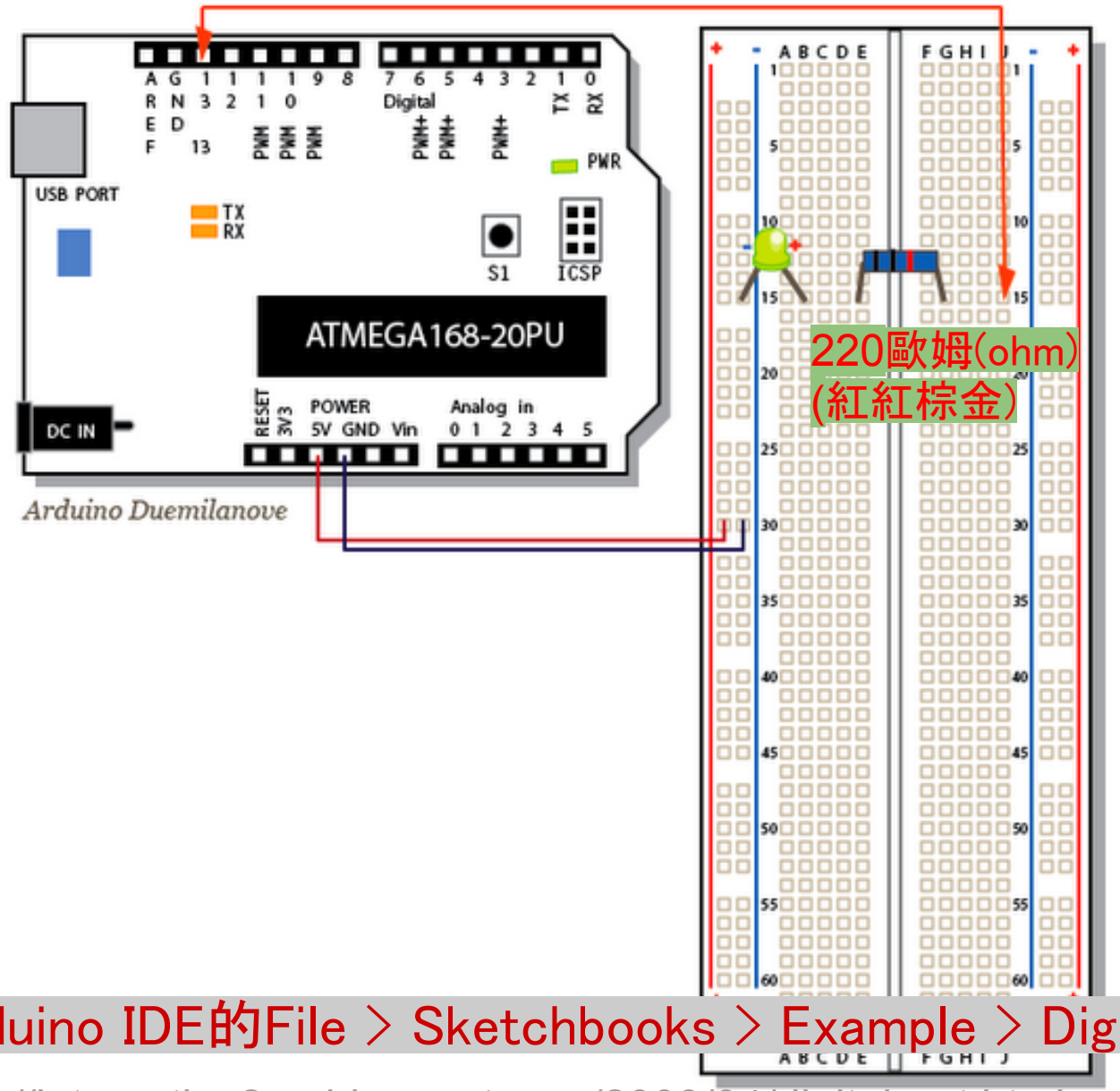
電路圖



實作此電路

圖片來源：http://interactive2go.blogspot.com/2009/04/digital-out.html

範例一 Hello Arduino: blink LED!



程式檔：Arduino IDE的File > Sketchbooks > Example > Digital > Blink

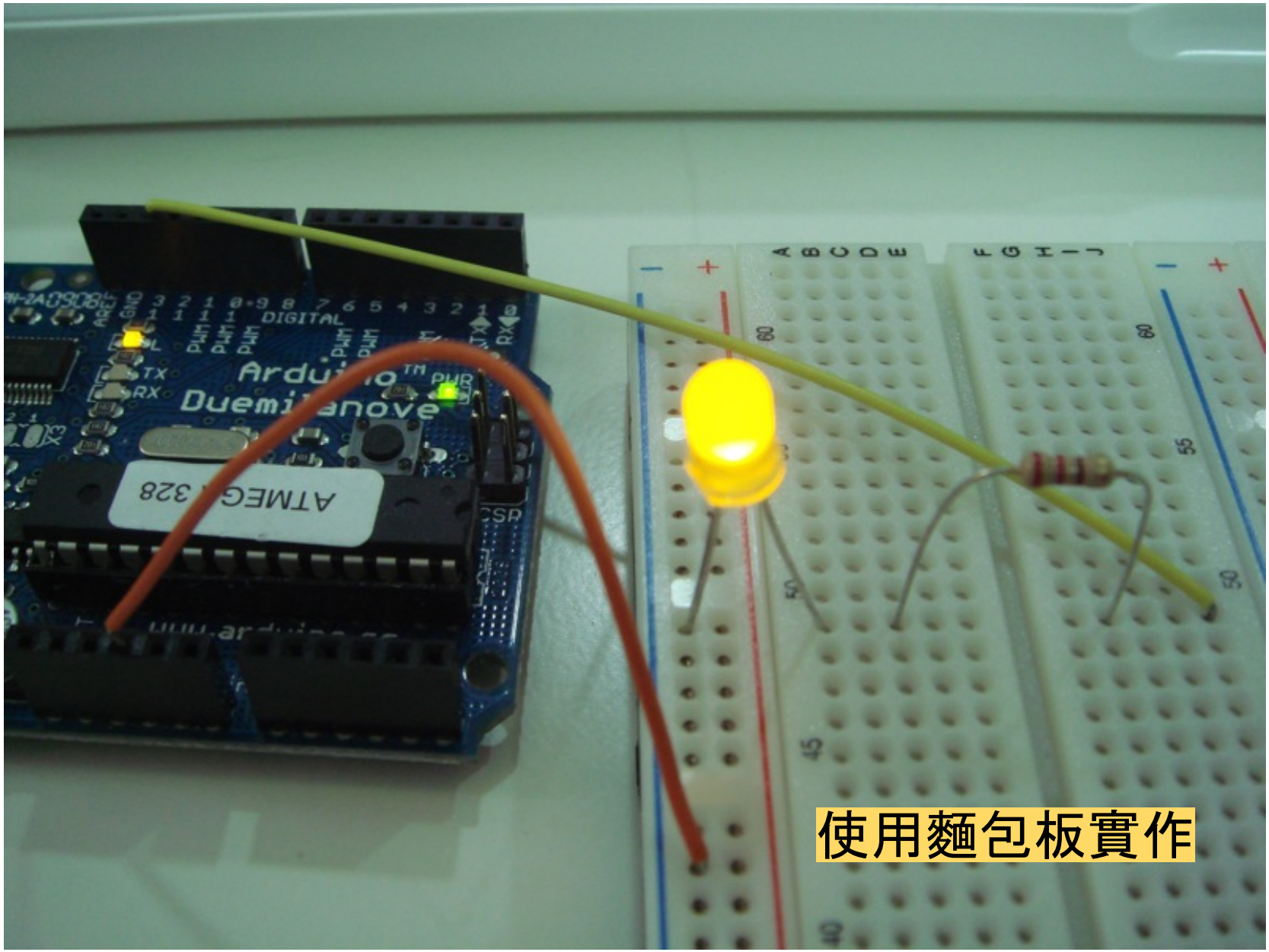
圖片來源：http://interactive2go.blogspot.com/2009/04/digital-out.html

上傳程式至Arduino板子

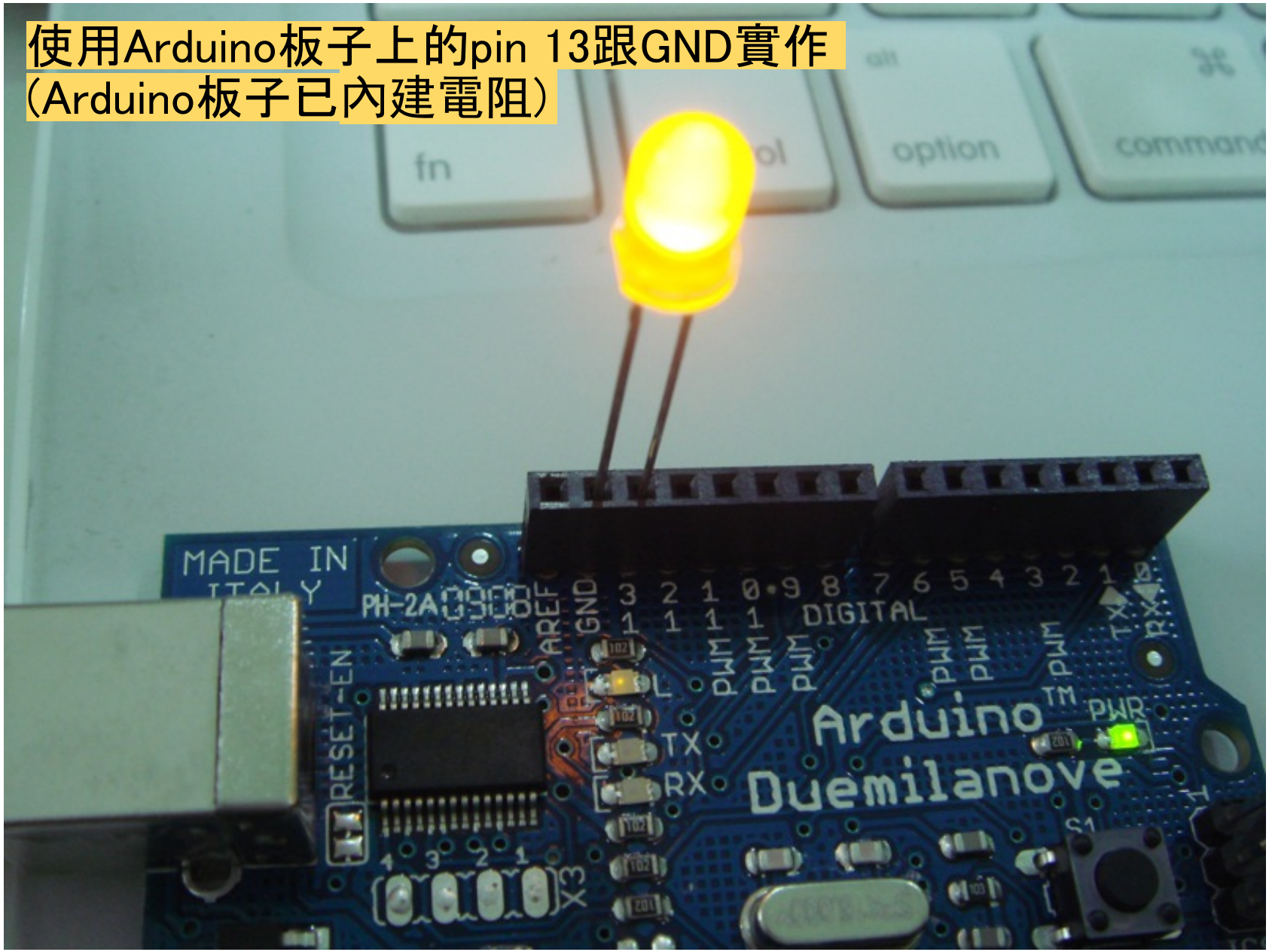
1. 撰寫Arduino程式
2. 檢查程式是否有誤

3. 設定Arduino板子型號：
   Tools > Board > Arduino Duemilanove w/ ATmega328
4. 設定USB serial port：
   Tools > Serial Port > (windows跟mac不同)
   Windows用戶請參考：http://arduino.cc/en/Guide/Windows
   Mac用戶請參考：http://arduino.cc/en/Guide/MacOSX
5. 上傳程式至Arduino板子

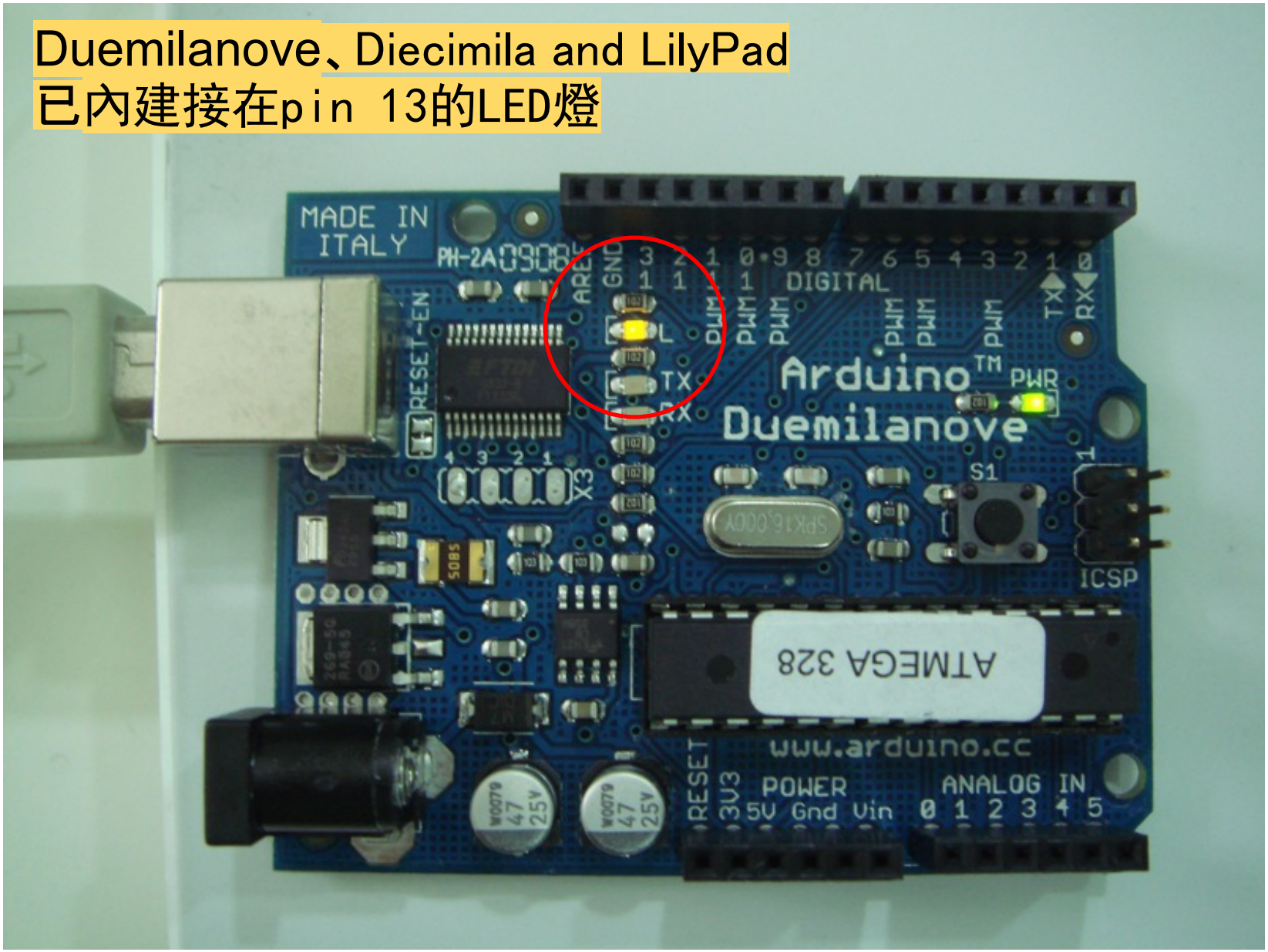
範例一 Hello Arduino: blink LED!



範例一 Hello Arduino: blink LED!



範例一 Hello Arduino: blink LED!



Blink程式碼解說

```
void setup()                    //初始設定區塊 (只執行一次)
{

}

void loop()                     //重複執行區塊 (不斷地重複執行)
{




}
```

Blink程式碼解說

```
int ledPin = 13;                    //設定第13pin為接LED燈的pin腳

void setup()
{

}

void loop()
{




}
```

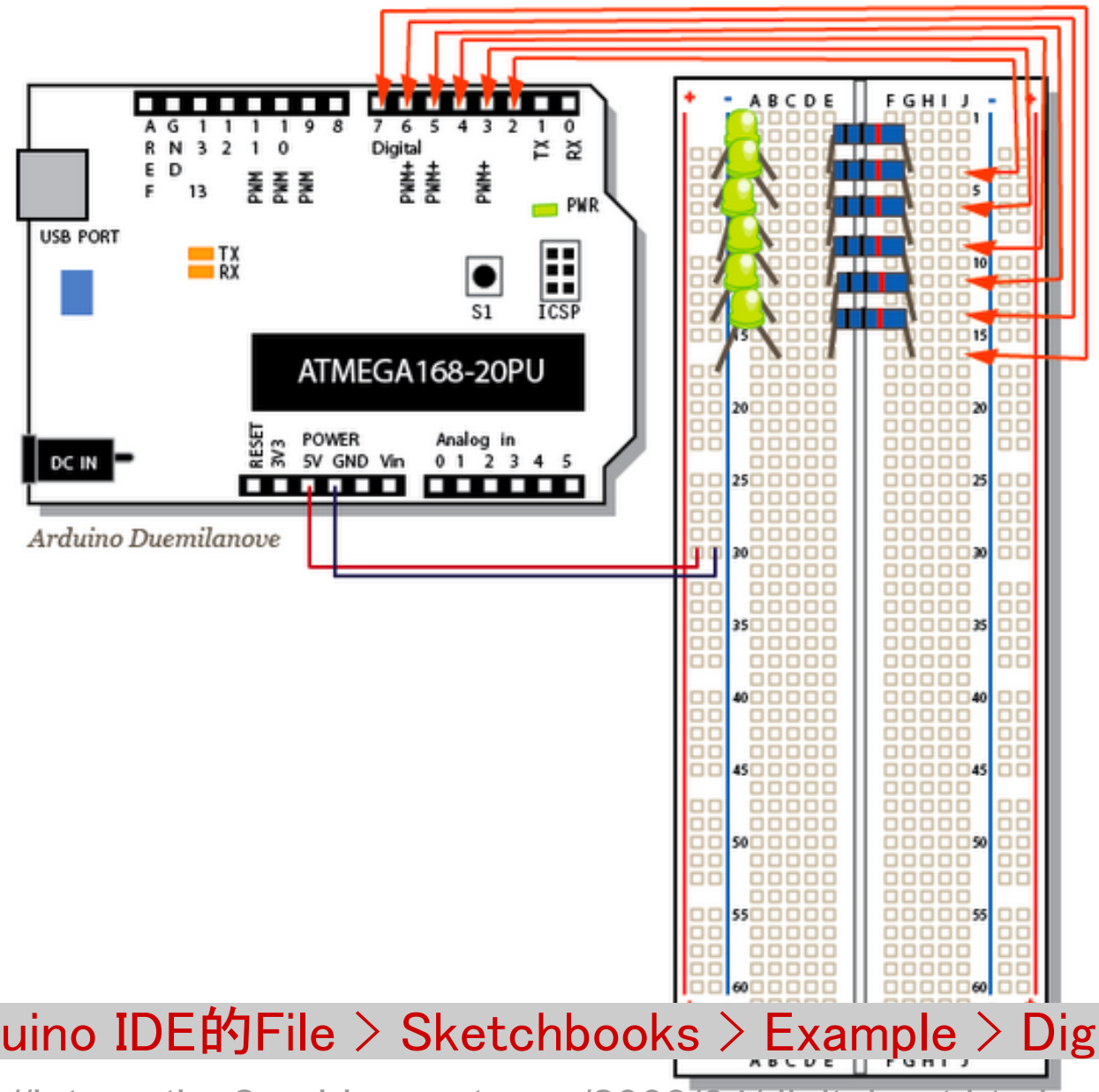
Blink程式碼解說

```
int ledPin = 13;                        //設定第13pin為接LED燈的pin腳

void setup()
{
  pinMode(ledPin, OUTPUT);    //設定pin腳模式為輸出
}

void loop()
{
  digitalWrite(ledPin, HIGH);    //給pin腳高電壓（LED通電就亮）
  delay(1000);                   //延遲1秒鐘(1000毫秒)
  digitalWrite(ledPin, LOW);     //給pin腳低電壓（LED不通電就暗）
  delay(1000);                   //延遲1秒鐘(1000毫秒)
}
```

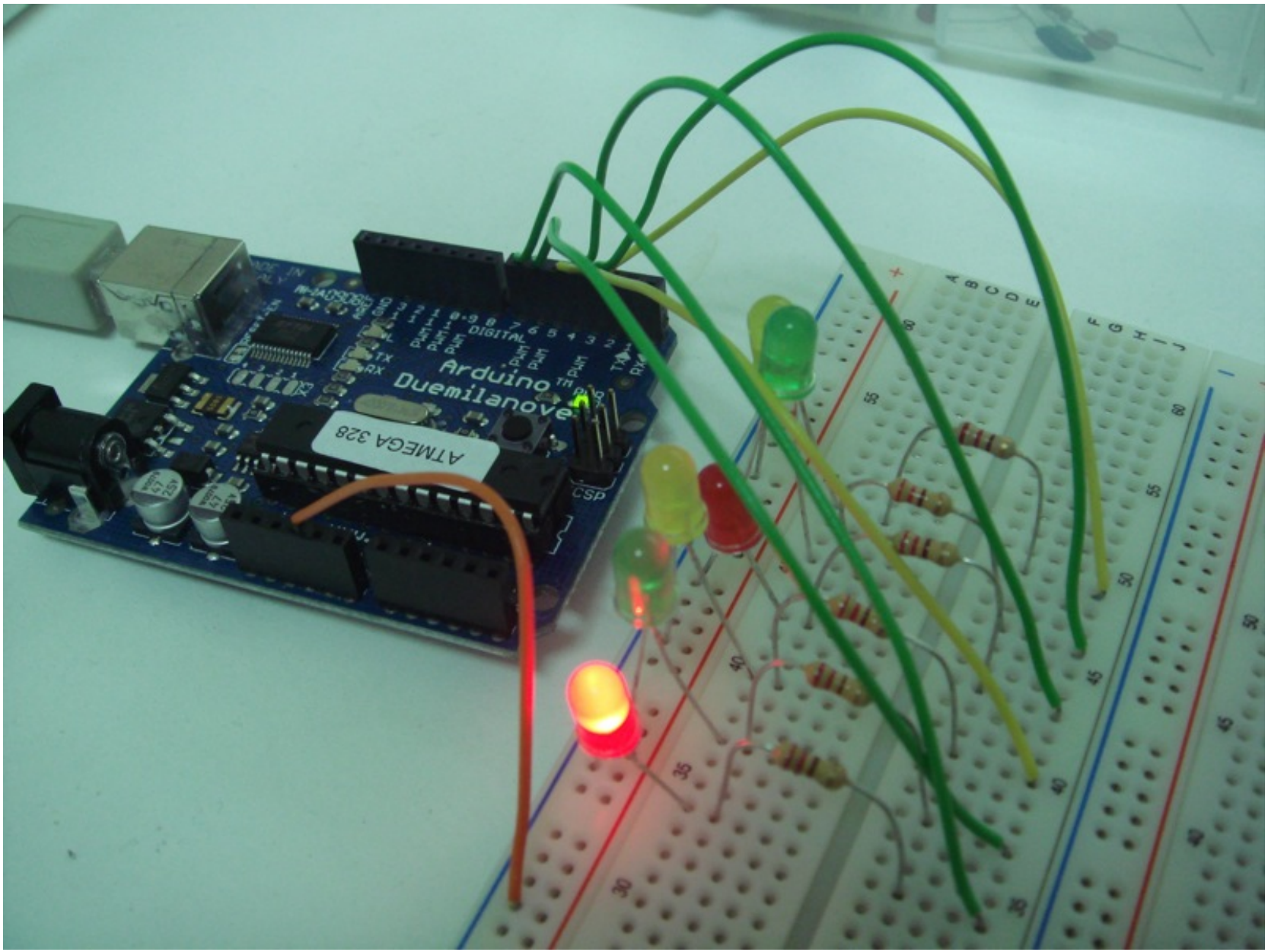
範例二 LED loop



程式檔：Arduino IDE的File > Sketchbooks > Example > Digital > Loop

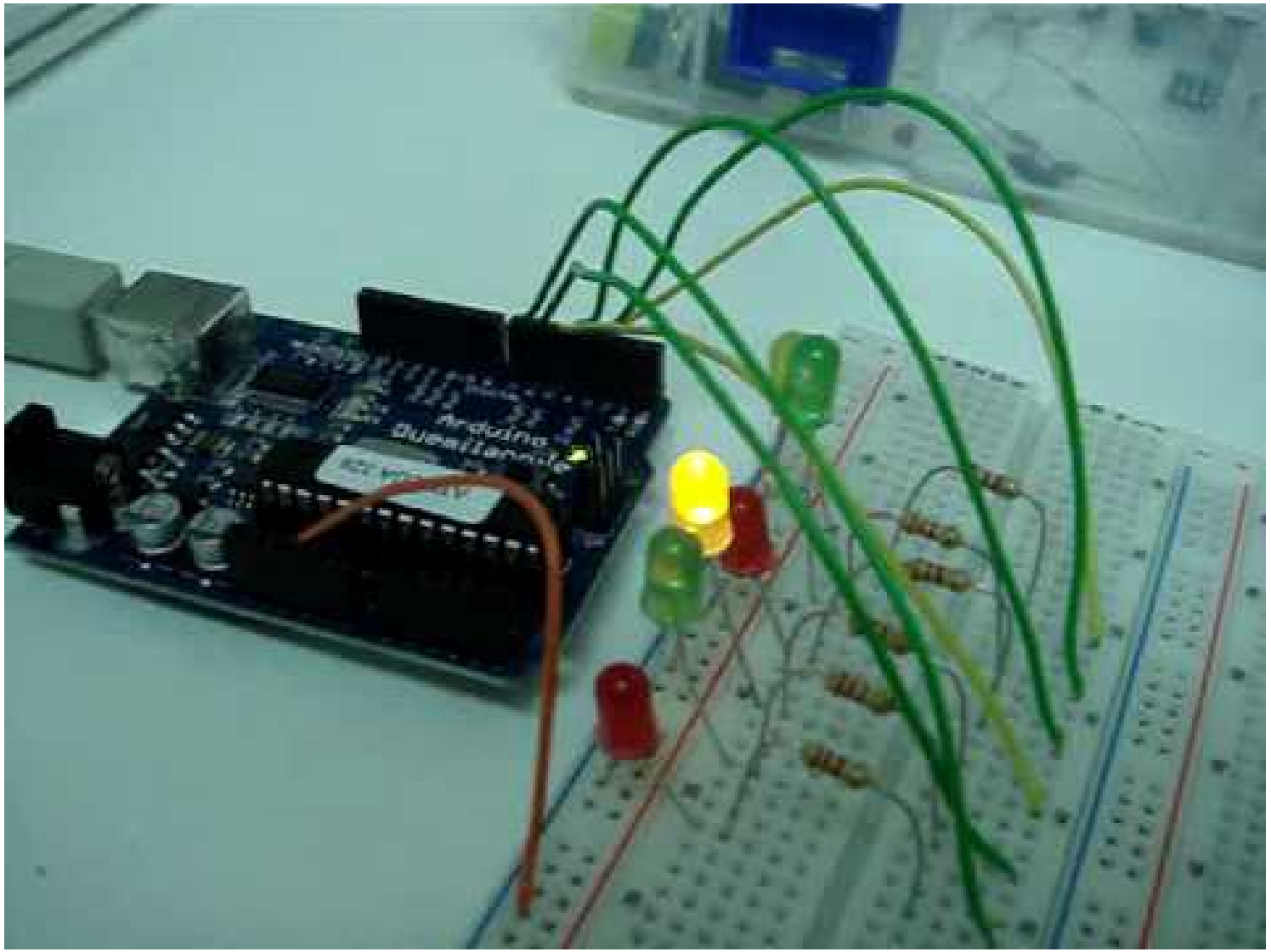
圖片來源：http://interactive2go.blogspot.com/2009/04/digital-out.html

範例二 LED loop

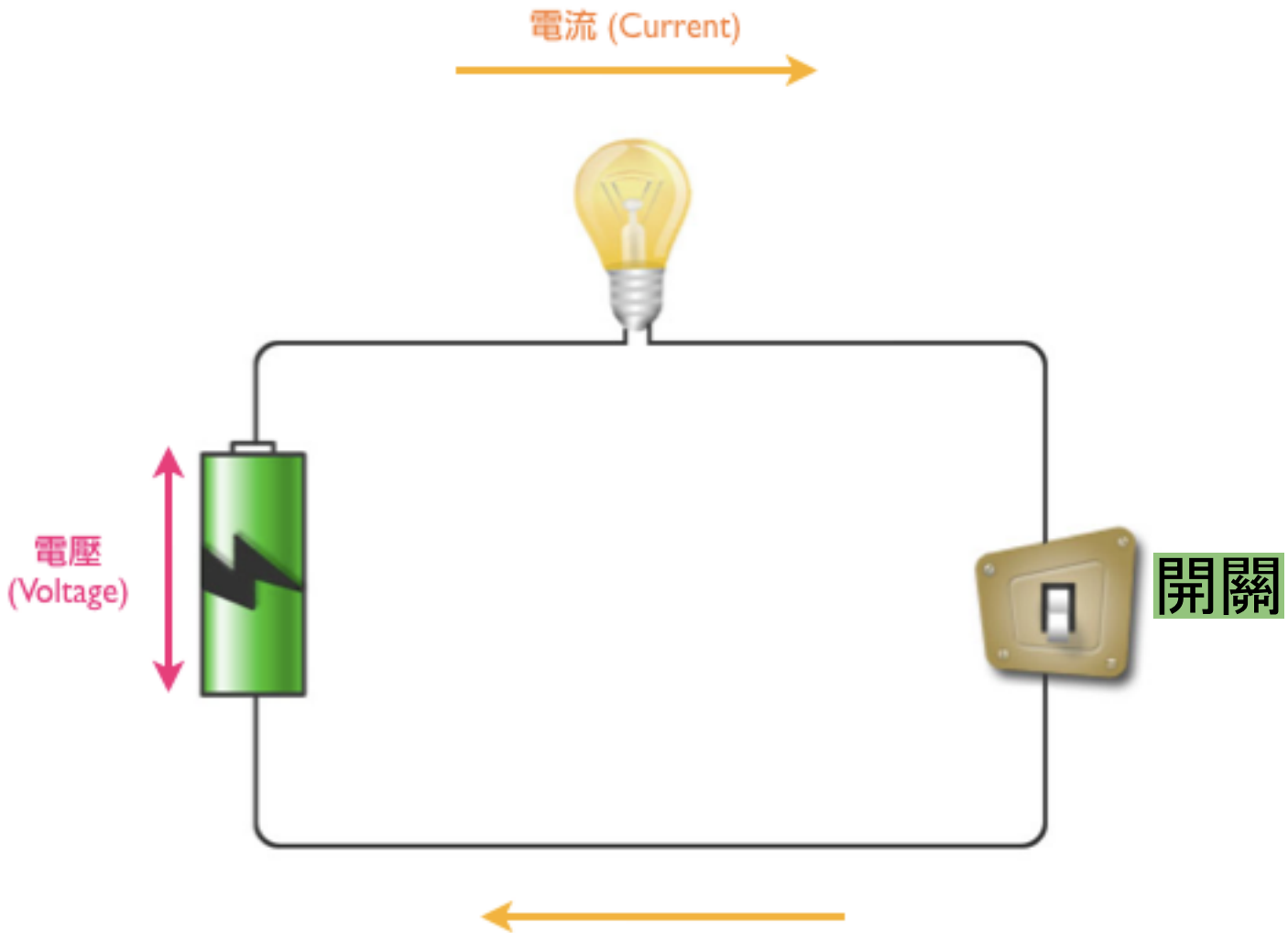


範例二 LED loop

影片來源：http://www.youtube.com/watch?v=2q2jiePq6Ww

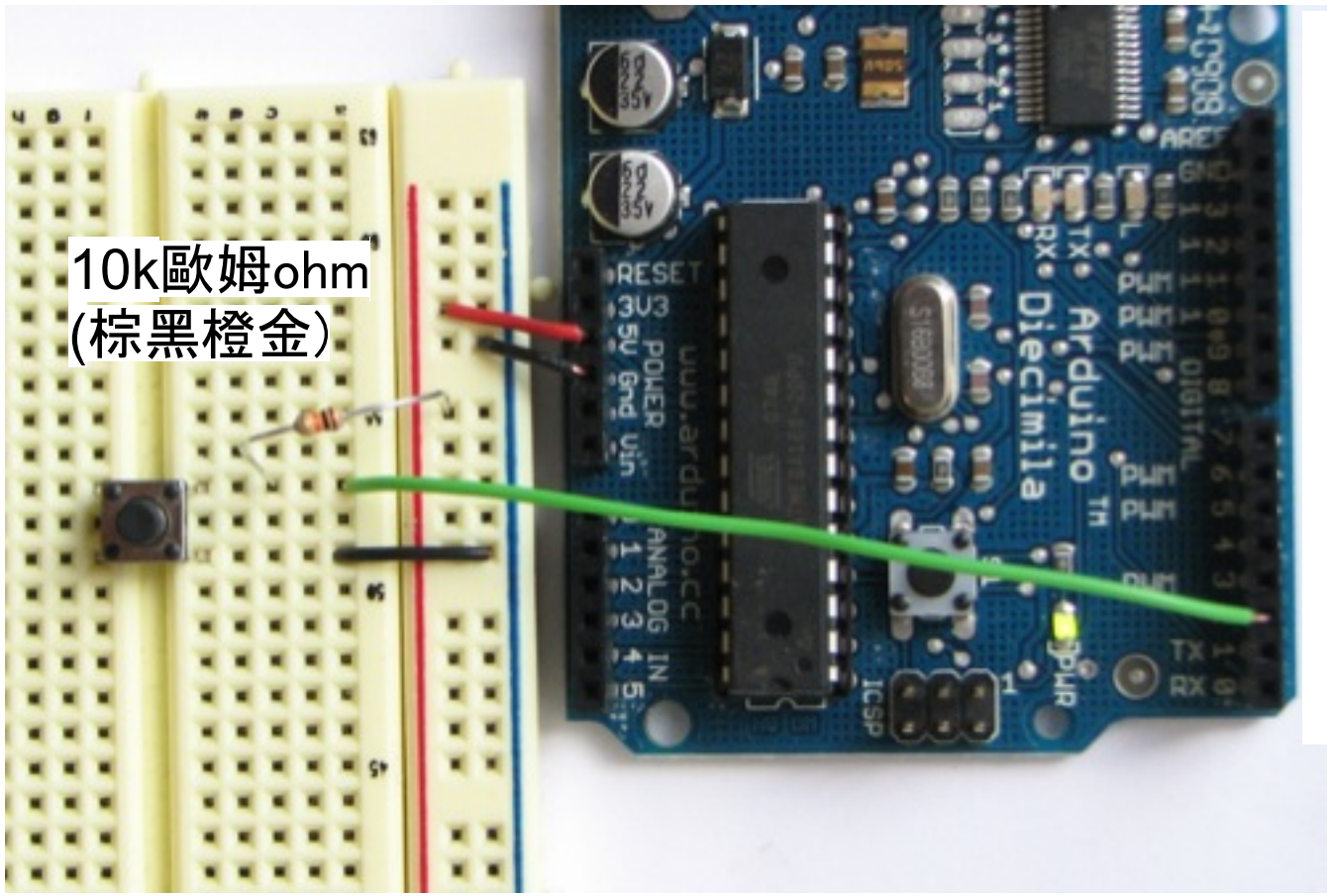


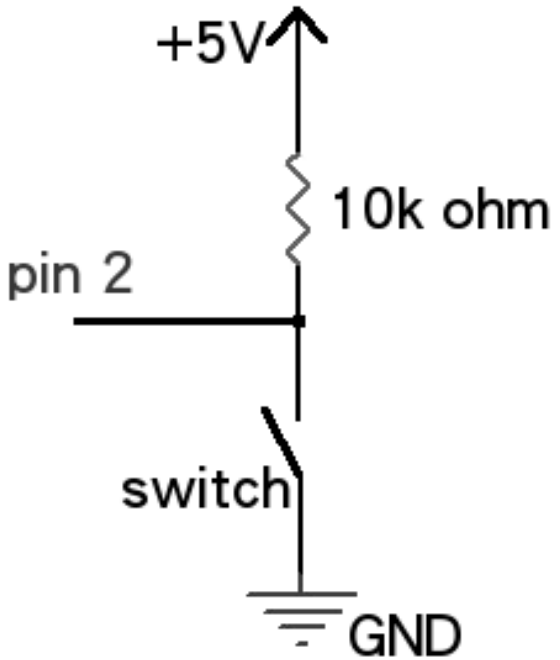
第二簡單的電路 (加上開關)



圖片來源：http://interactive2go.blogspot.com/2009/04/digital-out.html

範例三 Button (接法一)





程式檔:Arduino IDE的File > Sketchbooks > Example > Digital > Button

圖片來源:http://arduino.cc/en/Tutorial/Button

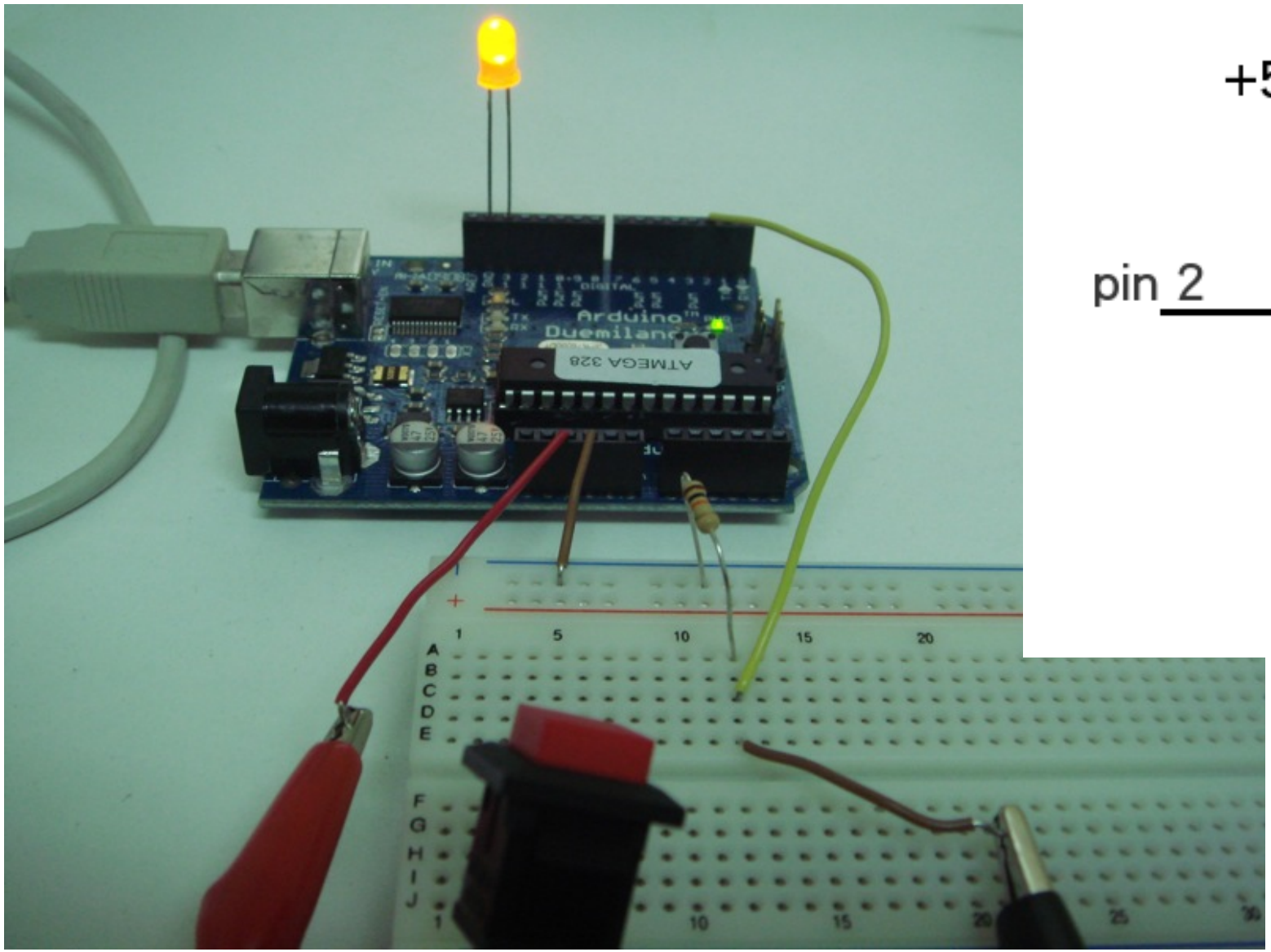
Button (接法一) 程式碼解說

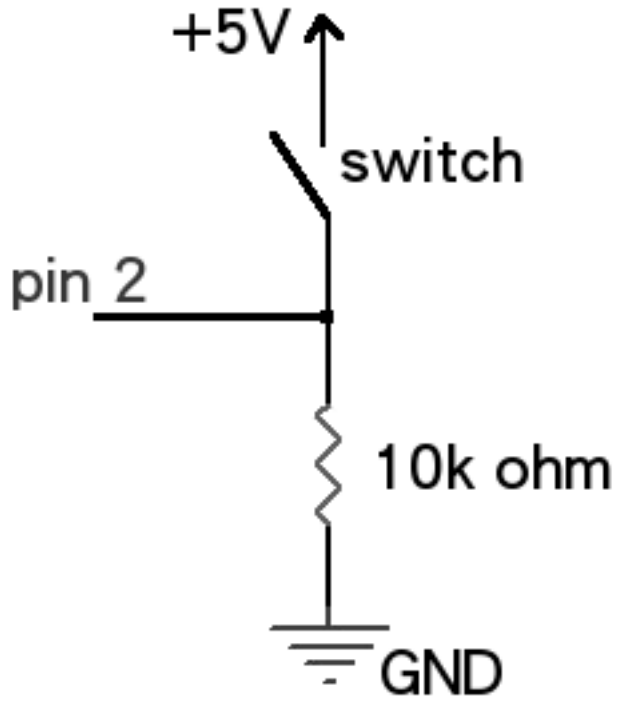
```
int ledPin = 13;      //設定第13 pin給LED燈
int inPin = 2;        //設定第2 pin為輸入pin (為了讀取按鈕狀態)
int val = 0;          //讀取按鈕狀態

void setup() {
  pinMode(ledPin, OUTPUT);  //設定LED pin腳狀態為輸出
  pinMode(inPin, INPUT);    //設定第2 pin狀態為輸入
}

void loop(){
  val = digitalRead(inPin);       //讀取輸入pin腳的值
  if (val == HIGH) {              //確認是否輸入為高電壓 (按鈕壓下)
    digitalWrite(ledPin, LOW);    //給pin腳低電壓 (關掉LED燈)
  } else {
    digitalWrite(ledPin, HIGH);   //給pin腳高電壓 (開啟LED燈)
  }
}
```

範例三 Button (接法二)





參考資料

- Arduino官網 http://arduino.cc
- Arduino樂園 http://arduino.tw/
- 小毛的Interactive2Go http://interactive2go.blogspot.com
- ladyada的Arduino Tutorail http://www.ladyada.net/learn/arduino/index.html
- 基本電學常識 http://tw.group.knowledge.yahoo.com/primary-school/listitem/view?iid=190
- 電阻色碼計算 http://samengstrom.com/nxl/3660/4_band_resistor_color_code_page.en.html
- 線上相關電學計算網站 http://bbs.audiohall.net/viewtopic.php?t=1337&sid=999ddd2b9f932f45c95e192388a5dfa3
- 電阻概論 http://sun.cis.scu.edu.tw/~lab/knowledge/r.htm
- 歐姆定律 http://en.wikipedia.org/wiki/Ohm%27s_law