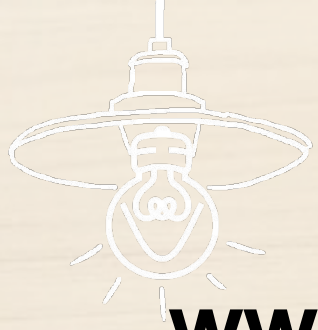


Arduino 實作入門

goo.gl/LcksjY





Install Arduino IDE

www.arduino.cc/en/main/software

2



ARDUINO 1.8.1

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

This software can be used with any Arduino board. Refer to the [Getting Started](#) page for Installation instructions.

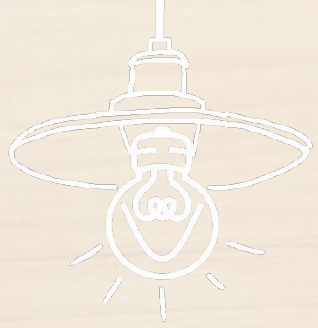
Windows Installer
Windows ZIP file for non admin install

Windows app  **Get**

Mac OS X 10.7 Lion or newer

Linux 32 bits
Linux 64 bits
Linux ARM

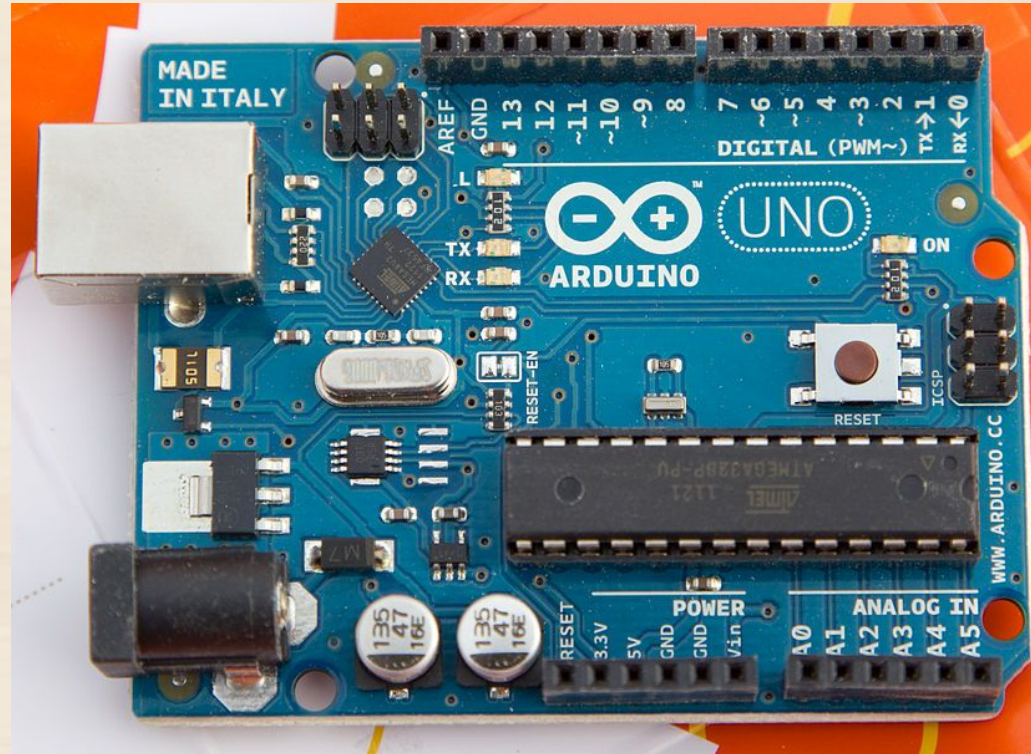
[Release Notes](#)
[Source Code](#)
[Checksums \(sha512\)](#)



Arduino

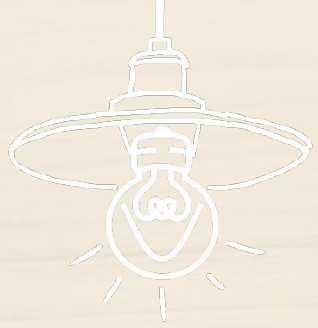
3

- What
 - Microcontroller
- Why
 - Simple I/O
 - C / Java
 - Fast Prototyping
 - Open Source
- How
 - Parts
 - Circuit
 - Program



For beginner never study computer science & electrical science, it's a good solution for getting start.

AE



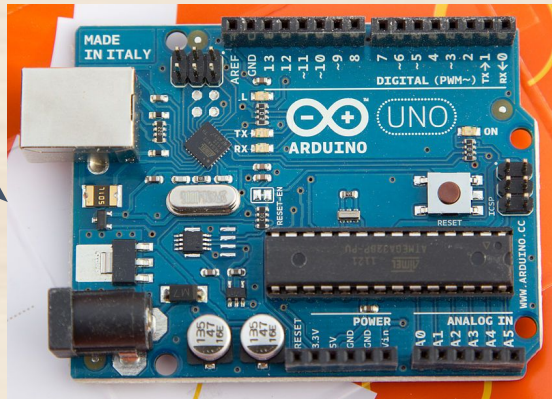
Project Flow

4

Plan

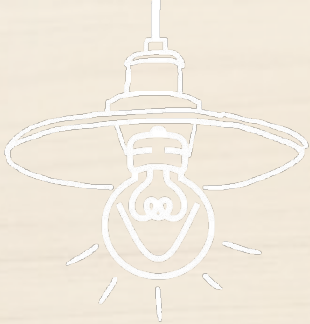
Parts/Circuit

Code



Outcome





5





sketch_feb23c

```
void setup() {  
  // put your setup code here, to run once:  
  
}  
  
void loop() {  
  // put your main code here, to run repeatedly:  
  
}
```

- 新增 Ctrl+N
- 開啟... Ctrl+O
- 開啟最近 >
- 草稿碼簿 >
- 範例 >
- 關閉 Ctrl+W
- 儲存 Ctrl+S
- 另存新檔... Ctrl+Shift+S
- 頁面設定 Ctrl+Shift+P
- 列印 Ctrl+P
- 偏好設定 Ctrl+Comma
- 離開 Ctrl+Q

up code here, to run once:

n code here, to run repeatedly:

9 }



sketch_oct26b

```
1 void setup() {  
2   // put your setup code here.  
3  
4 }  
5  
6 void loop() {  
7   // put your main code here,  
8  
9 }
```

偏好設定

設定 網路

草稿碼簿的位置：

C:\Users\Hao\Documents\Arduino

瀏覽

編輯器語言：

系統預設

(需要重新啟動 Arduino)

編輯器字型大小：

18

介面縮放率：

☒ 自動

100

%

(需要重新啟動 Arduino)

顯示詳細輸出：

☐ 編譯☐ 上傳

編譯器警告：

無

☒ 顯示行數☐ 啟用程式碼摺疊功能☒ 上傳後驗證程式碼☐ 使用外部編輯器☒ 積極快取已編譯的核心☒ 啟動時檢查有無更新☒ 儲存時更新草稿碼檔案的副檔名 (.pde -> .ino)☒ 驗證或上傳時先存檔

額外的開發板管理員網址：

http://download.labs.mediatek.com/package_mtk_linkit_7697_index.json

在偏好設定檔裡還有更多設定值可直接編輯

C:\Users\Hao\AppData\Local\Arduino15\preferences.txt

(只能在Arduino未執行之時進行編輯)

確定

取消

MADE
IN ITALY

AREF
GND

13
12
11
10
9
8

~
~
~
~
~
~

7
6
5
4
3
2

~
~
~
~
~
~

1
0

TX
RX

DIGITAL (PWM ~)



TX
RX

ON

RESET-EN

RESET

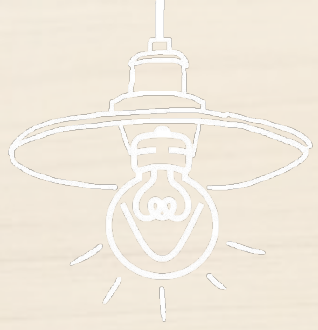
ICSP

WWW.ARDUINO.CC

RESET
3.3V
5V
GND
GND
Vin

A0
A1
A2
A3
A4
A5

ANALOG IN



Pin Wire

10



MADE
IN ITALY

AREF
GND

13
12
11
10
9
8

~
~
~
~
~
~

7
6
5
4
3
2
1
0

DIGITAL (PWM~)

TX
RX



TX
RX

ON

RESET-EN

RESET

ICSP

WWW.ARDUINO.CC

RESET

3.3V

5V

GND

GND

Vin

POWER

ANALOG IN

A0

A1

A2

A3

A4

A5



MADE
IN ITALY

AREF

GND

13

12

11

10

9

8

7

6

5

4

3

2

1

TX

RX

DIGITAL (PWM ~)



UNO

ARDUINO

TX

RX

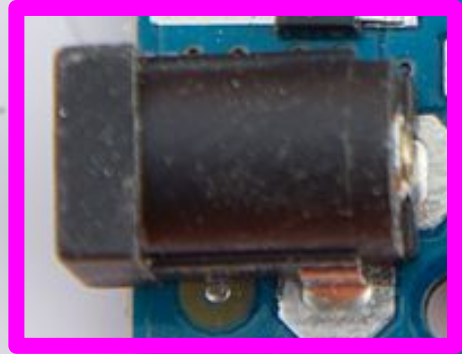
ON

RESET-EN

RESET

ICSP

WWW.ARDUINO.CC



135
47
16E

135
47
16E

RESET

3.3V

5V

GND

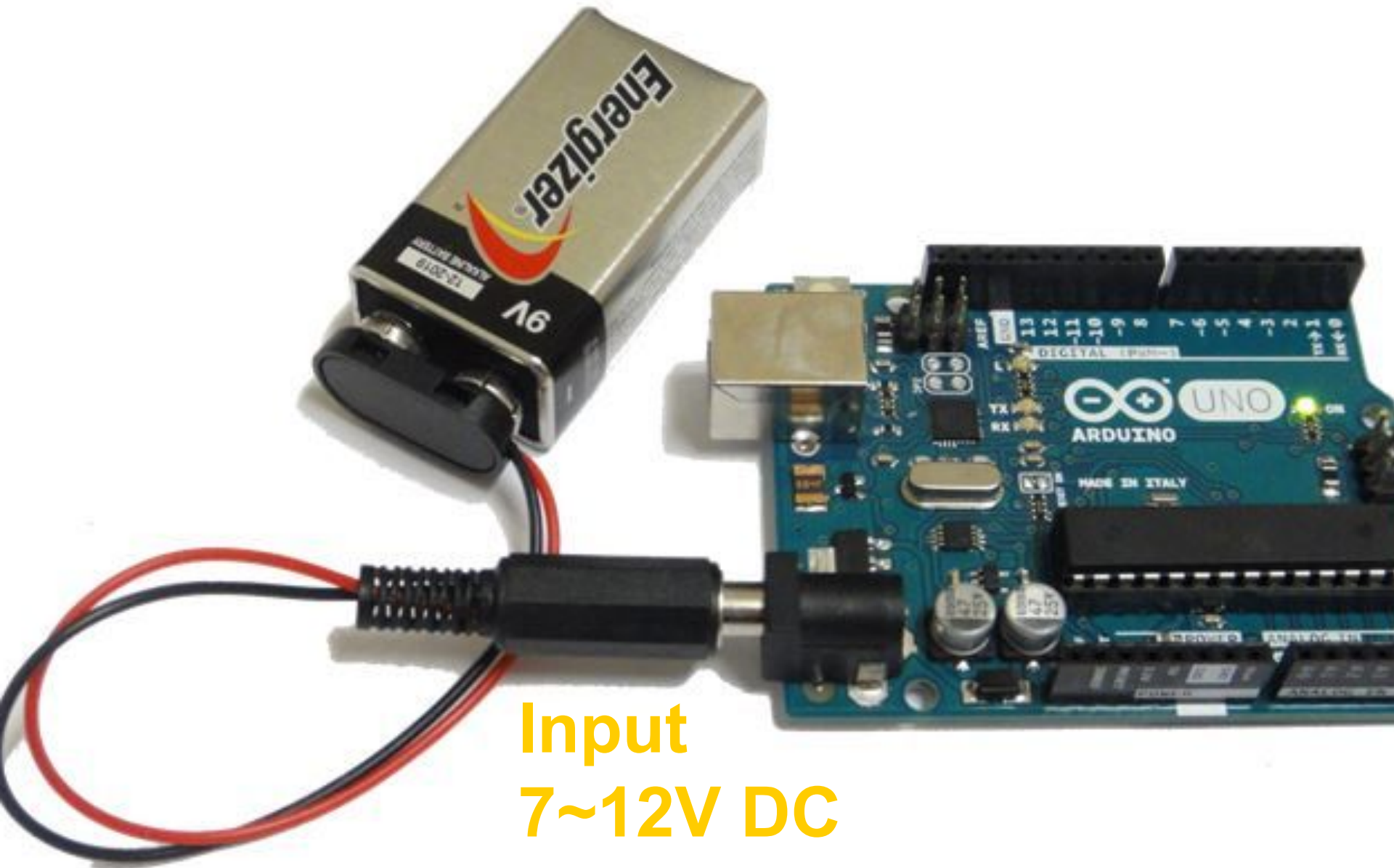
GND

Vin

POWER

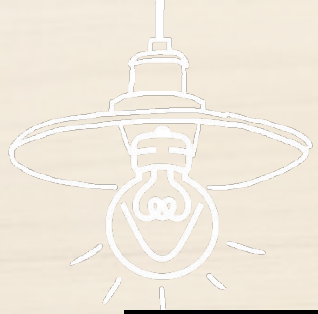
ANALOG IN

A0
A1
A2
A3
A4
A5

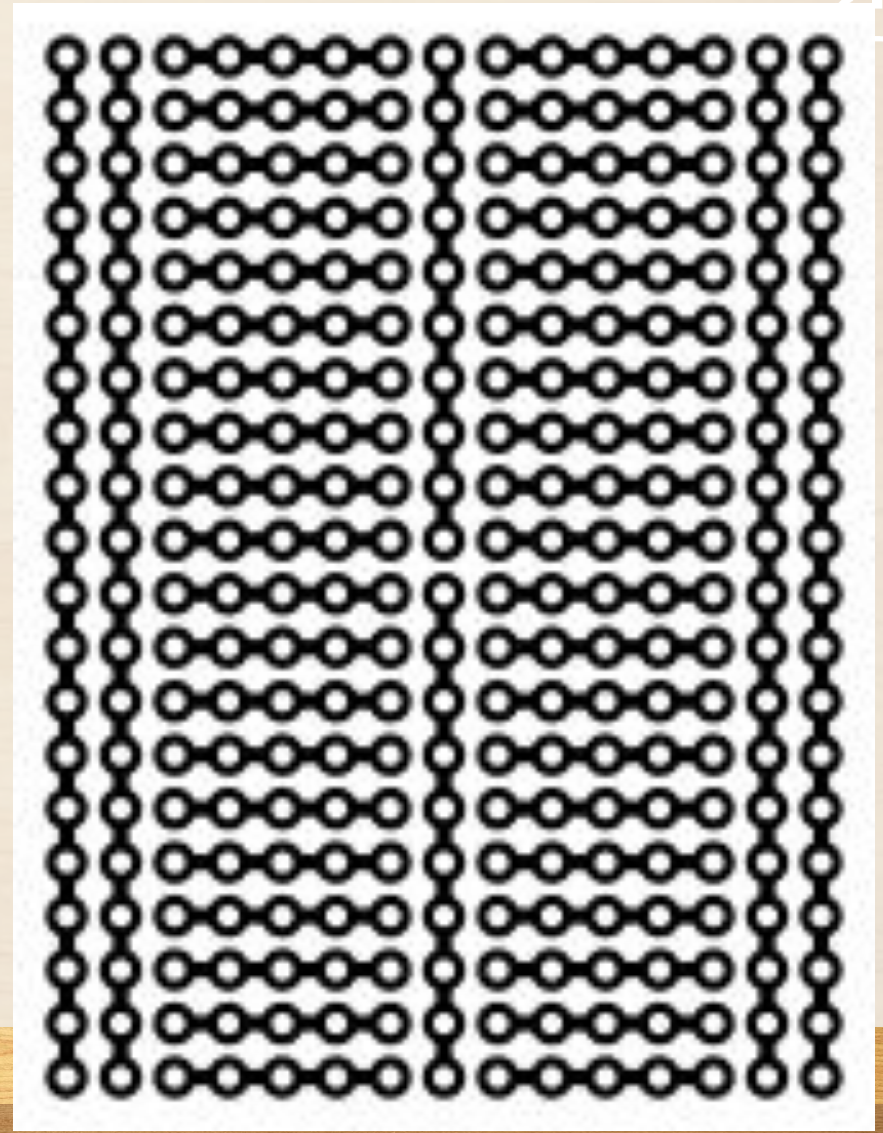
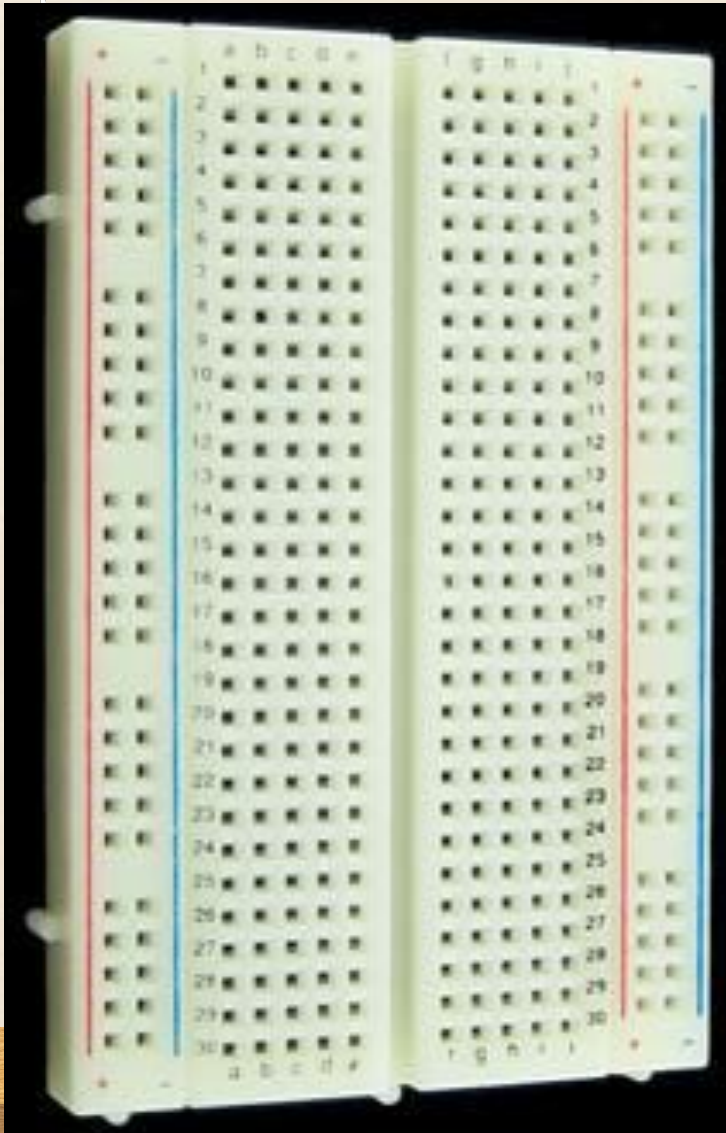


Input
7~12V DC

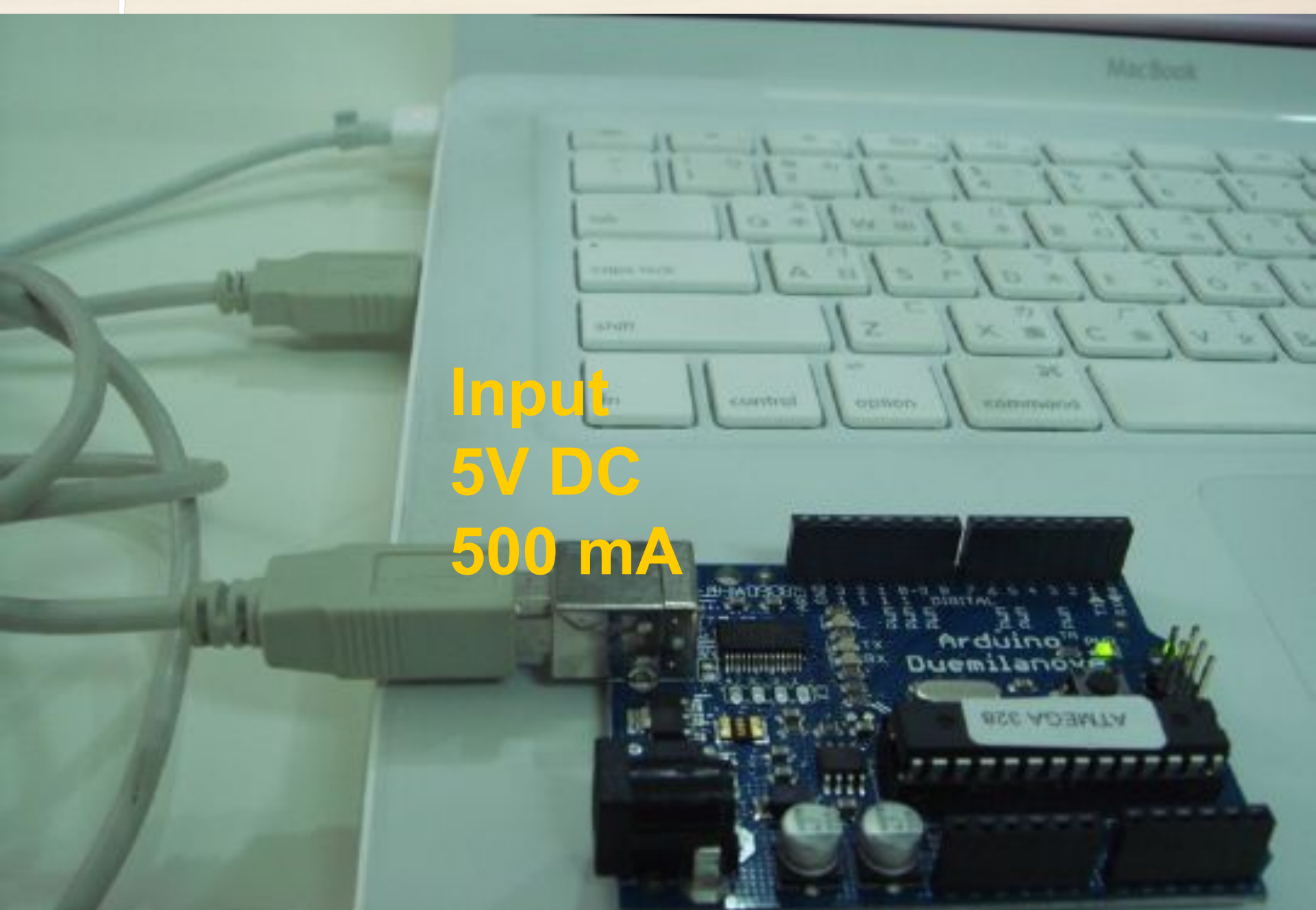


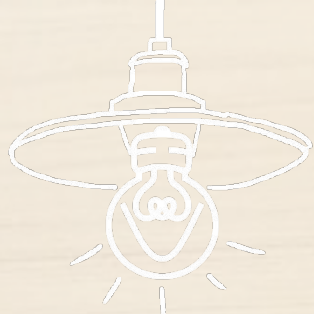


Bread Board



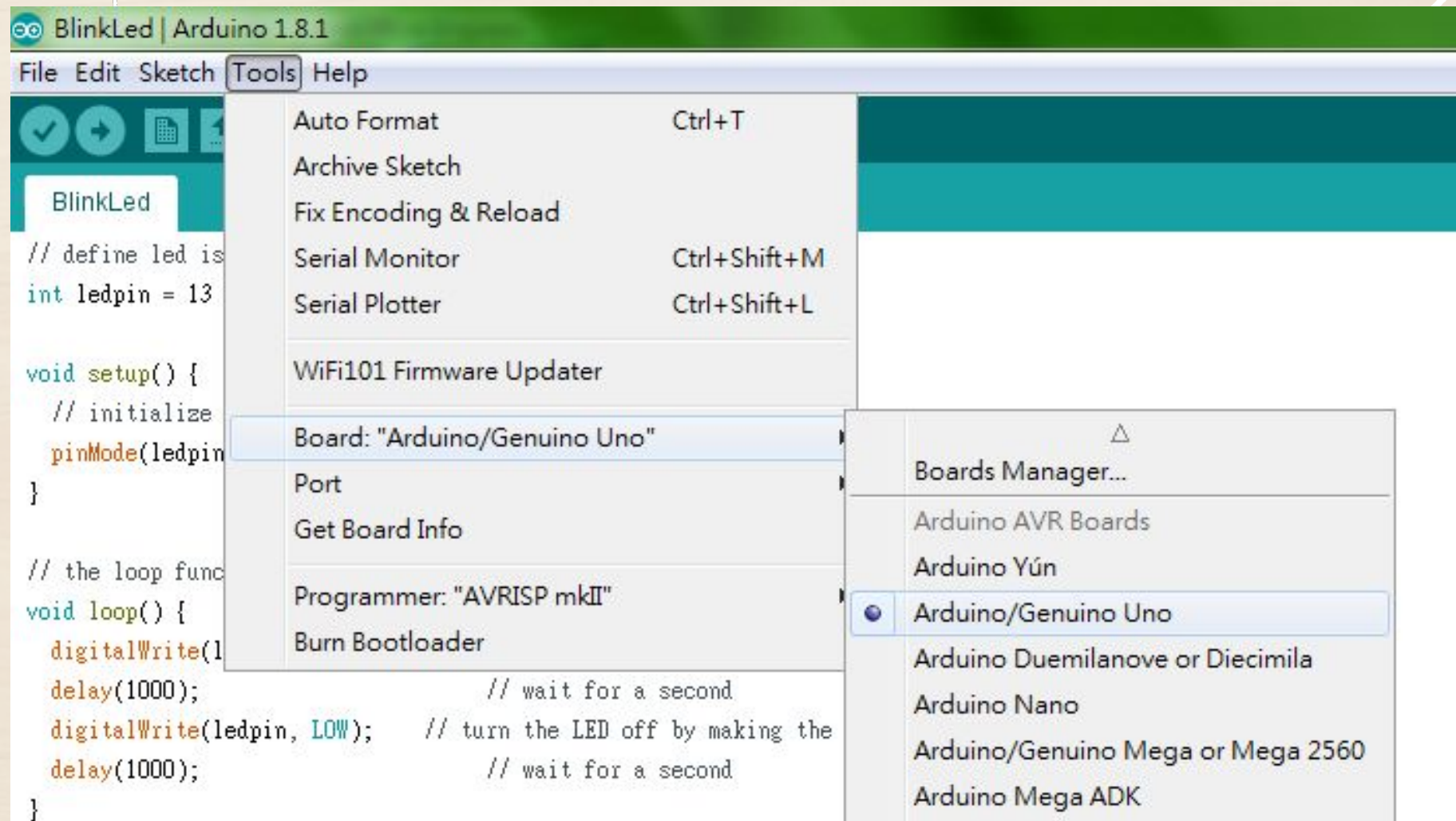
Input
5V DC
500 mA

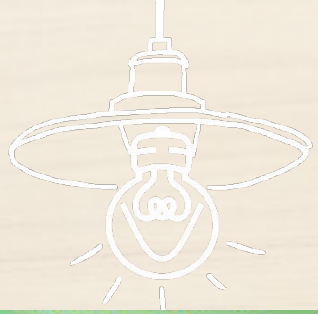




Choose Arduino UNO

16





Choose Your Port

17

BlinkLed | Arduino 1.8.1

File Edit Sketch Tools Help

BlinkLed

```
// define led is
int ledpin = 13

void setup() {
  // initialize
  pinMode(ledpin
}

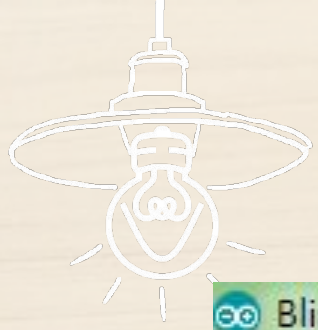
// the loop func
void loop() {
  digitalWrite(1
  delay(1000);           // wait for a second
  digitalWrite(ledpin, LOW); // turn the LED off by making the voltage LOW
  delay(1000);           // wait for a second
}
```

Tools menu:

- Auto Format (Ctrl+T)
- Archive Sketch
- Fix Encoding & Reload
- Serial Monitor (Ctrl+Shift+M)
- Serial Plotter (Ctrl+Shift+L)
- WiFi101 Firmware Updater
- Board: "Arduino/Genuino Uno"
- Port: "COM5 (Arduino/Genuino Uno)"
- Get Board Info
- Programmer: "AVRISP mkII"
- Burn Bootloader

Serial ports submenu:

- Serial ports
- COM5 (Arduino/Genuino Uno) (checked)



Compile

18

BlinkLed | Arduino 1.8.1
File Edit Sketch Tools Help



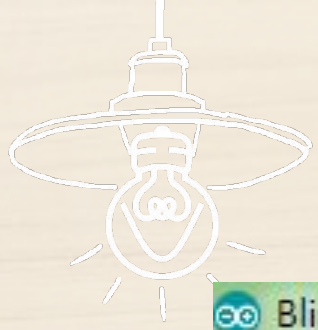
Compile

```
// define led is connected to digital pin13
int ledpin = 13

void setup() {
  // initialize digital pin 13 as an output.
  pinMode(ledpin, OUTPUT);
}

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

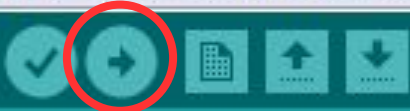




Upload

19

BlinkLed | Arduino 1.8.1
File Edit Sketch Tools Help



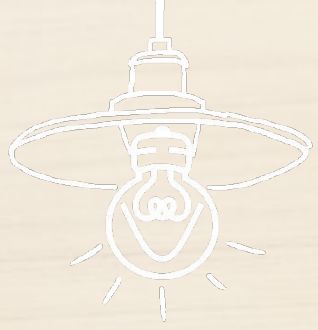
Upload

```
// define led is connected to digital pin13
int ledpin = 13

void setup() {
    // initialize digital pin 13 as an output.
    pinMode(ledpin, OUTPUT);
}

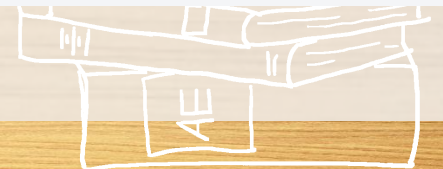
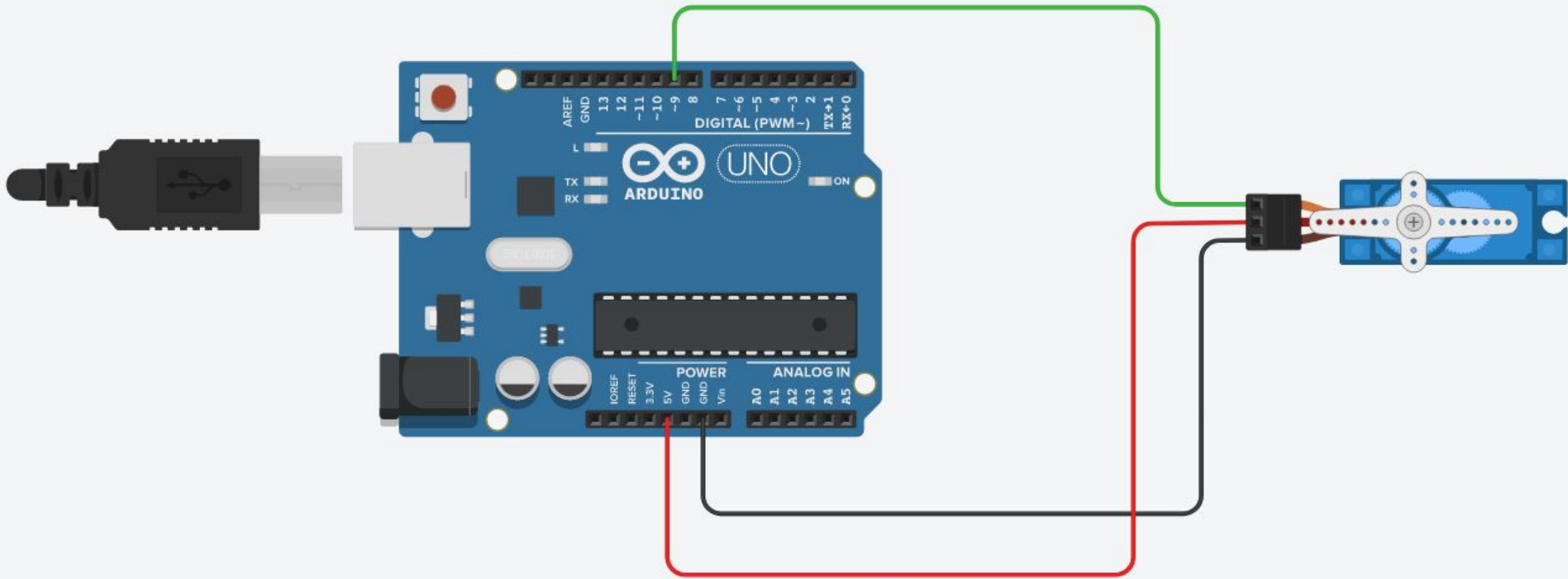
// the loop function runs over and over again forever
void loop() {
    digitalWrite(ledpin, HIGH); // turn the LED on (HIGH is the voltage level)
    delay(1000);                // wait for a second
    digitalWrite(ledpin, LOW);  // turn the LED off by making the voltage LOW
    delay(1000);      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

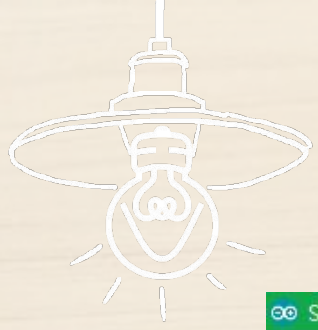




Example Servo Motor

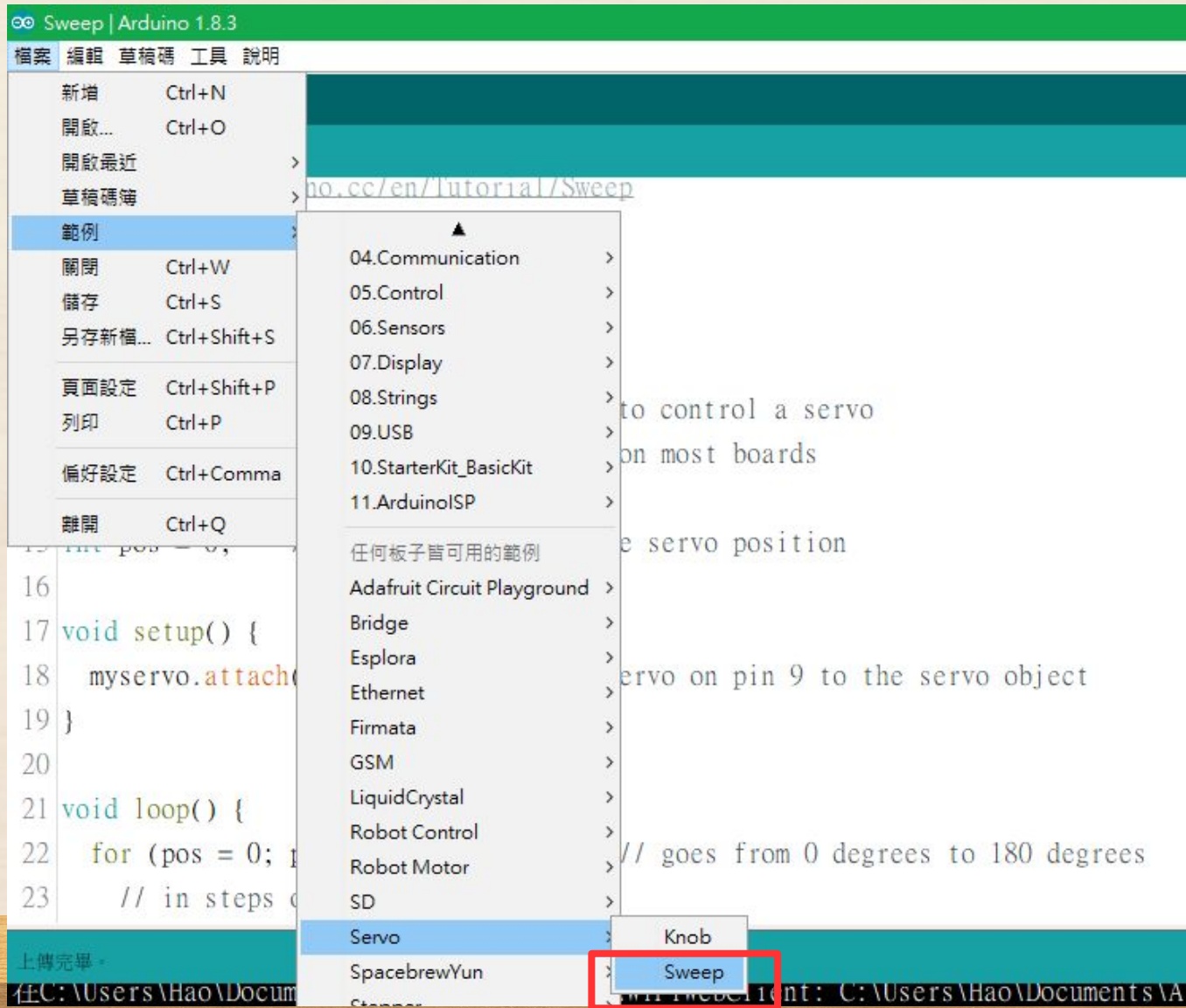
20

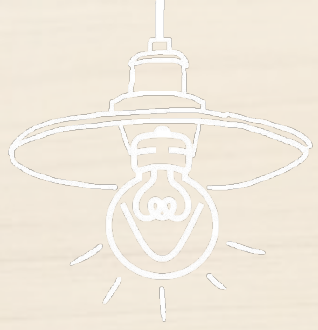




Servo.ino

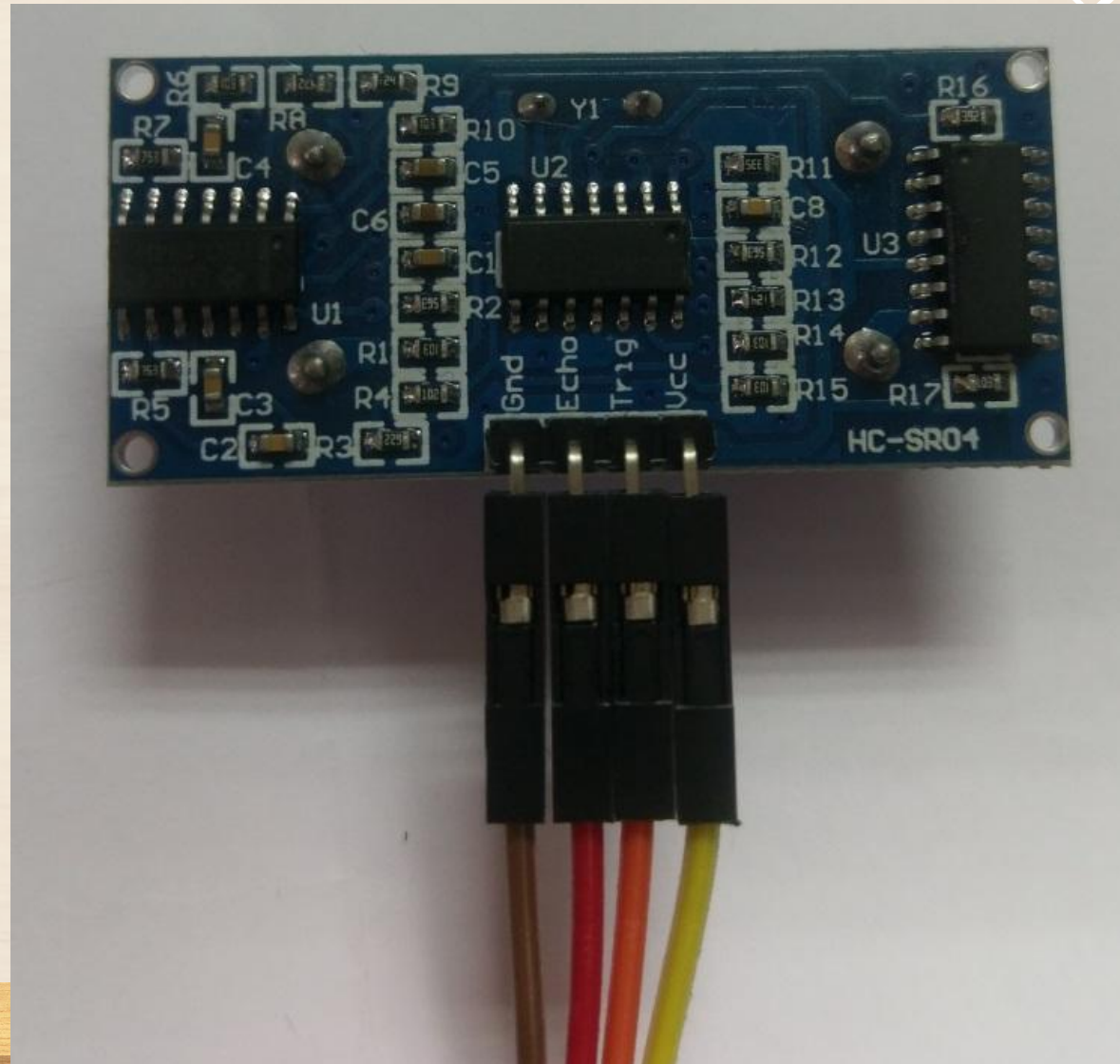
21

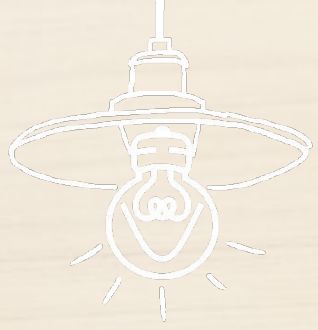




Example Ultrasonic

- **VCC** → **5V**
- **Trigger** → **12**
- **Echo** → **13**
- **GND** → **GND**

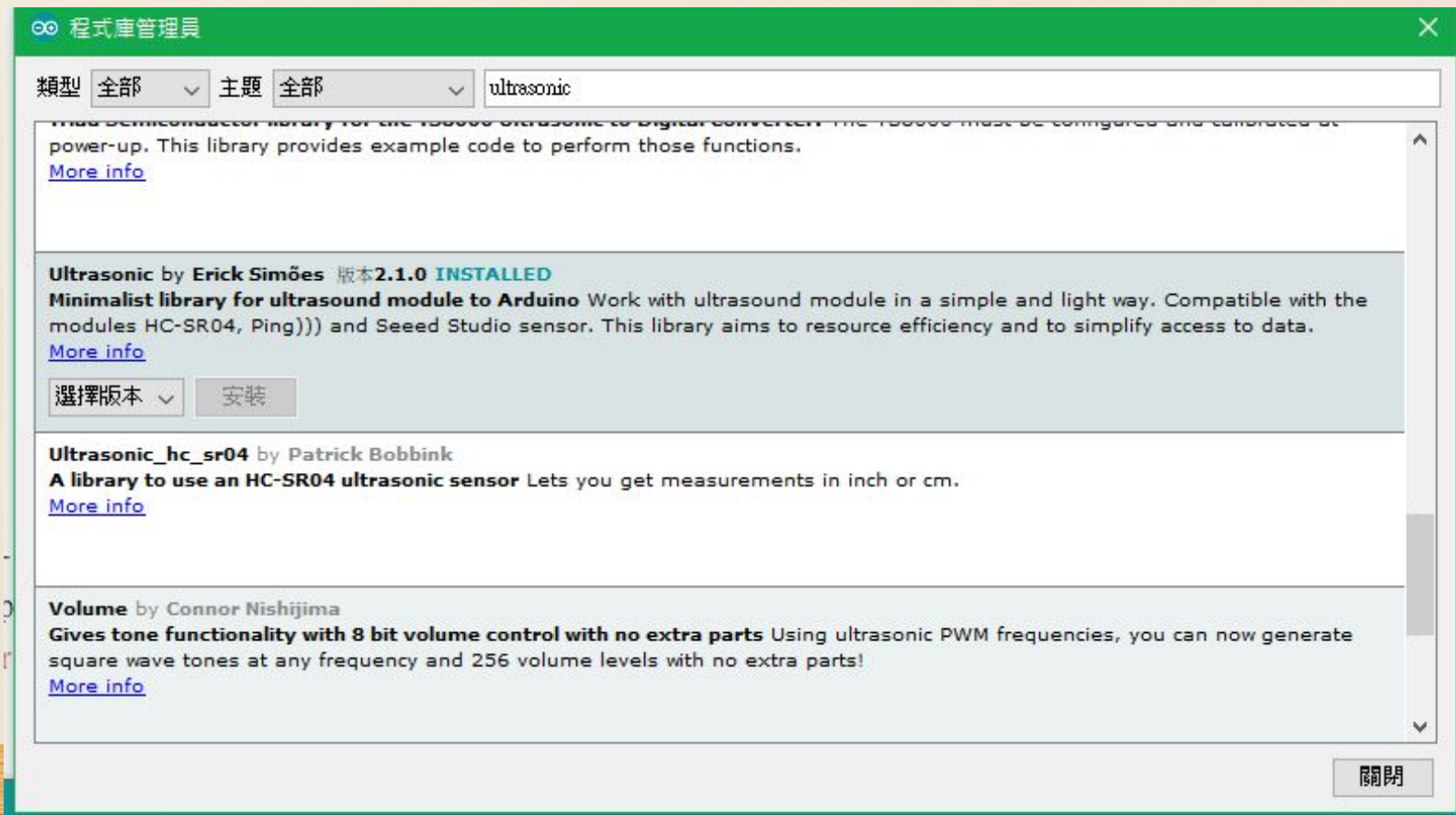


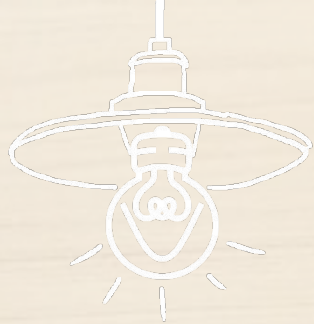


Install Library

23

- 草稿碼→匯入程式庫→管理程式庫→搜尋 "Ultrasonic" 並執行安裝





Example

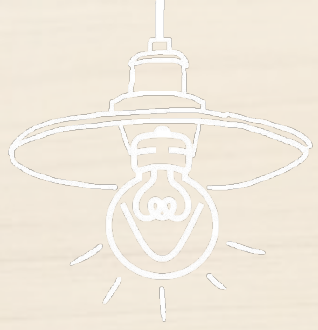
24

- 開啟檔案→範例→Ultrasonic→ Ultrasonic Simple
- 設定 Trigger Pin 12, Echo Pin 13
- Line #43 Ultrasonic ultrasonic(12, 13);

The screenshot displays the Arduino IDE interface. The left pane shows the 'UltrasonicSimple' sketch with the following code:

```
25 *
26 * created 3 Apr 2014
27 * by Erick Simões (github: @ErickSimoes | twitter: @AloErickSimoes)
28 * modified 23 Jan 2017
29 * by Erick Simões (github: @ErickSimoes | twitter: @AloErickSimoes)
30 * modified 03 Mar 2017
31 * by Erick Simões (github: @ErickSimoes | twitter: @AloErickSimoes)
32 *
33 * This example code is released into the MIT License.
34 */
35
36 #include <Ultrasonic.h>
37
38 /*
39  * Pass as a parameter the trigger and echo pin, respectively,
40  * or only the signal pin (for sensors 3 pins), like:
41  * Ultrasonic ultrasonic(13);
42  */
43 Ultrasonic ultrasonic(8, 9);
44
45 void setup() {
46   Serial.begin(9600);
47 }
48
49 void loop() {
50   Serial.print("Distance in CM: ");
51   // Pass INC as a parameter to get the distance in inches
52   Serial.println(ultrasonic.distanceRead());
53   delay(1000);
54 }
```

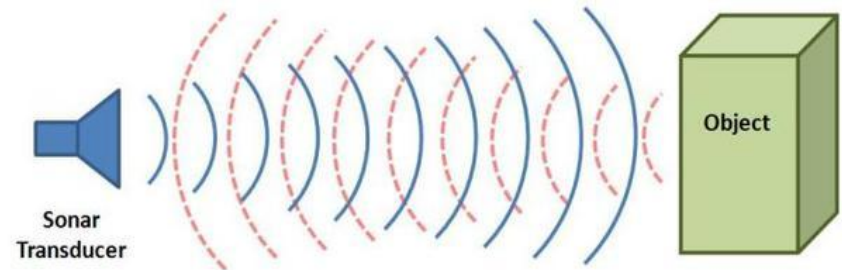
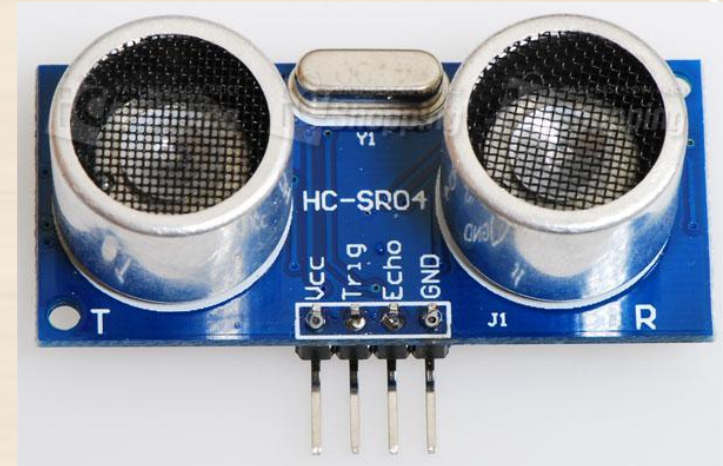
The right pane shows the serial monitor output, which consists of a continuous stream of the text "Distance in CM: 215". At the bottom of the IDE, a status bar indicates "43" lines of code, "LinkIt 7697" board, and "COM12" port. A message at the bottom left states "Wi-Fi Firmware version check ok."



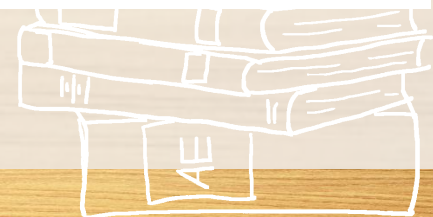
Ultrasonic Sensor

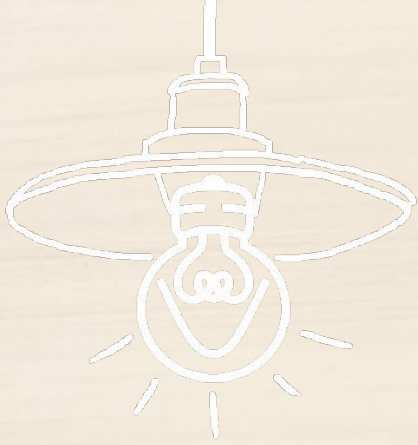
25

- HC-SR04
- 發送40kHz訊號,
藉由量測反射訊號判斷距離
- 可探測距離 2~450cm
- Pin definition
 - Vcc: Voltage (5V)
 - Trig: Trigger 觸發
 - Echo: 回聲
 - G: Ground
- 多個模組同時工作可能造成互相干擾



Basic sonar illustration – a transducer generates a sound pulse and then listens for the echo.

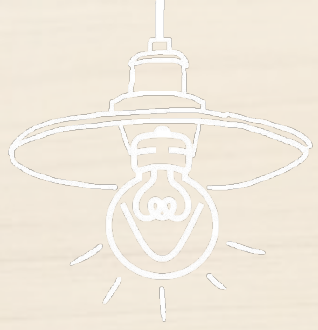




Exercise.

Servo Motor & Ultrasonic Seneor





Ultrasonic Sensor

27

$$\begin{aligned}v &= 340\text{m/s} \\&= 34000\text{cm}/1000000\mu\text{s} \\&\div 1/29 \text{ cm}/\mu\text{s}\end{aligned}$$

$$\Delta d = v * \Delta t$$

