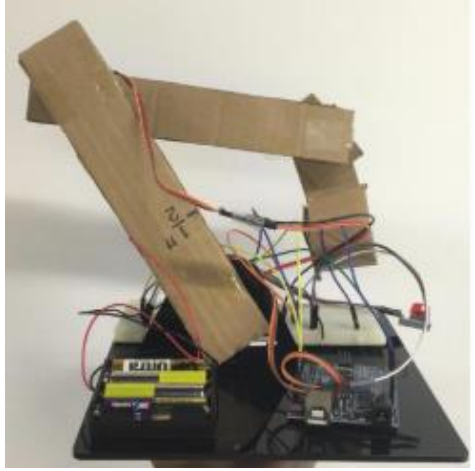
第二屆陳呂重德盃 STEM 三項全能挑戰賽

項目(三): 投擲機械人工作坊

內容

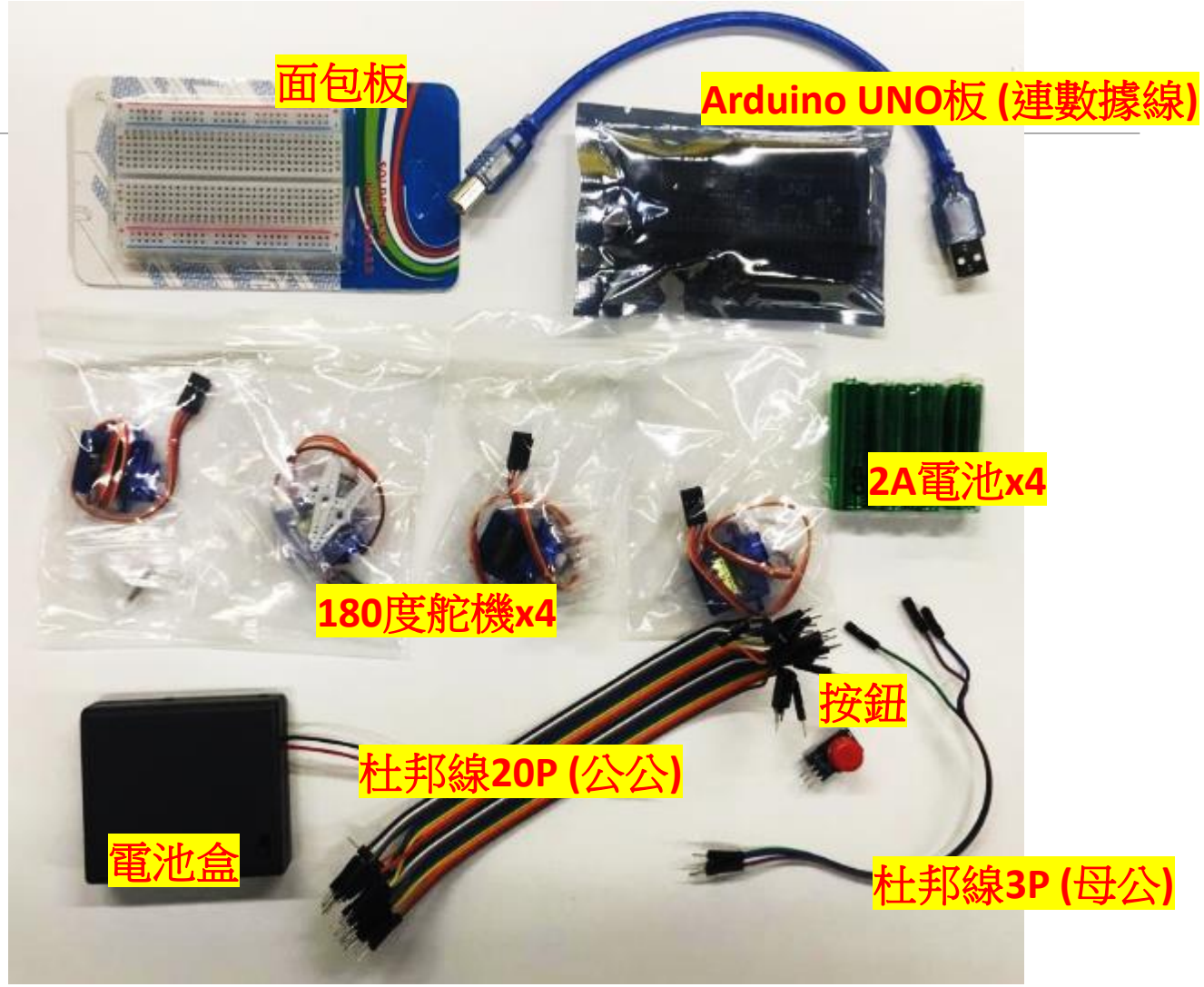
- 介紹材料包
- 部份1: 接駁電子零件 (電源腳)
- 部份2: 接駁電子零件 (訊號腳)
- 部份3: 編程
- 部份4: 製作機械人手臂
- 部份5: 安裝及調試下舵機
- 部份6: 安裝及調試上舵機
- 部份7: 製作射球裝置
- 進行測試及講解細則



介紹材料包

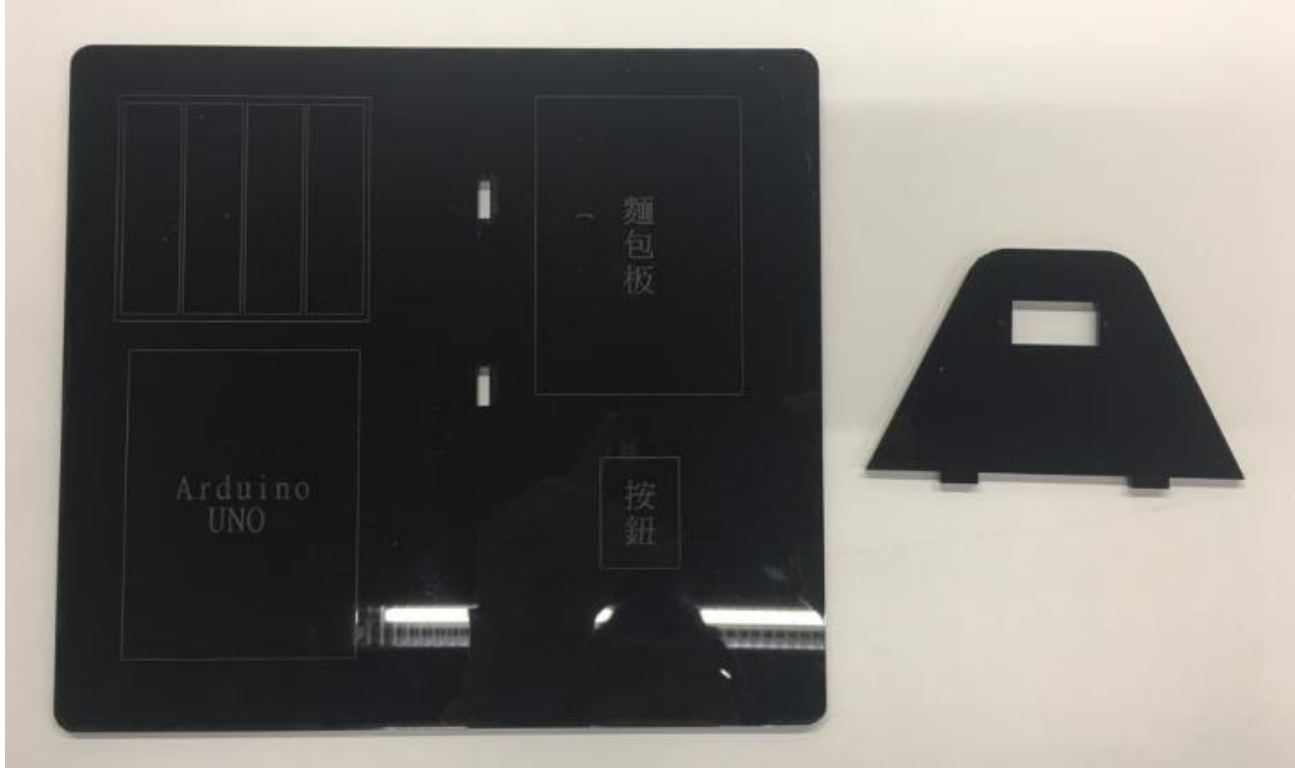
1. 電子零件

- 面包板
- Arduino UNO板 (連數據線)
- 180度舵機X4
- 2A電池X4
- 電池盒
- 杜邦線20P (公公)
- 杜邦線3P (母公)
- 按鈕



2. 材料

- 機械人底座
- 舵機固定



3. 自備材料

- 紙皮

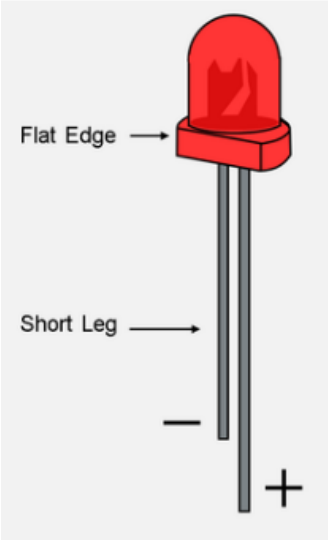
4. 工具

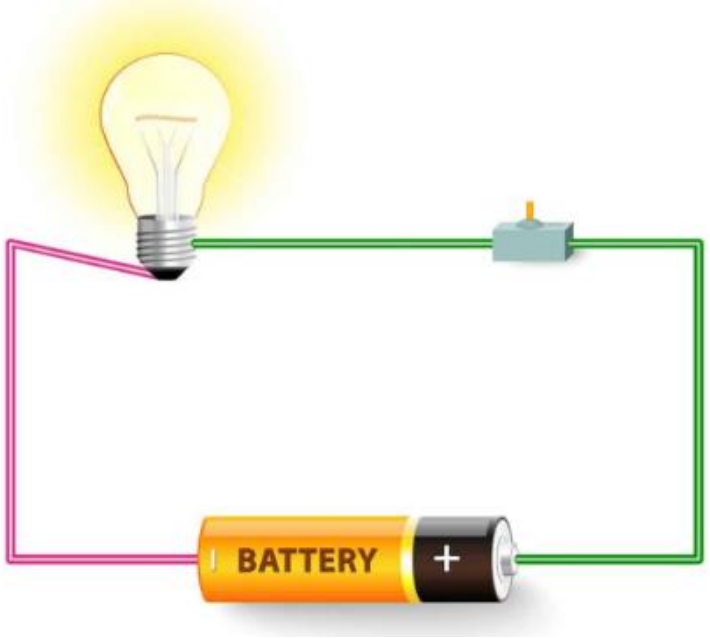
- 介刀
- 剪刀
- AA膠及白膠橡
- 尖咀刀
- 熱熔膠槍
- 枱板
- 膠紙及雙面膠紙
- 間尺
- 鉛筆
- 螺絲批

部份1. 接駁電子零件 (電源腳)

1. 基礎電子知識

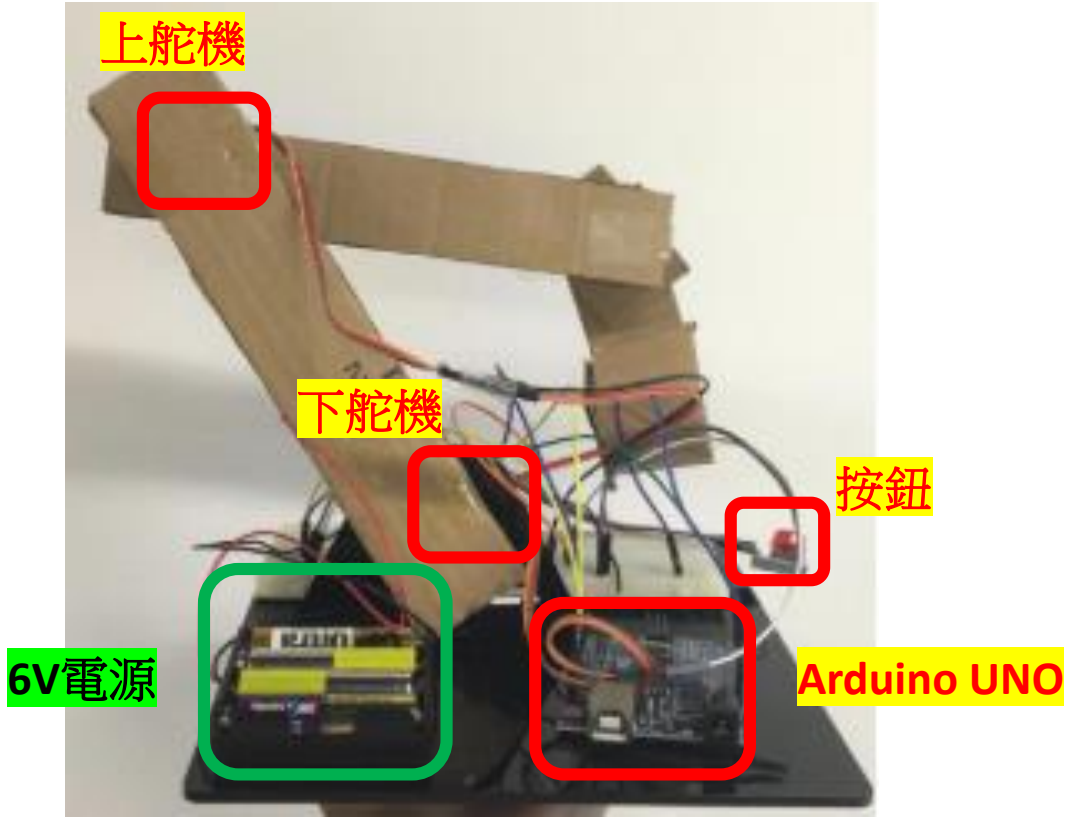
- 所有電子零件也需要電才能開啟!!!!



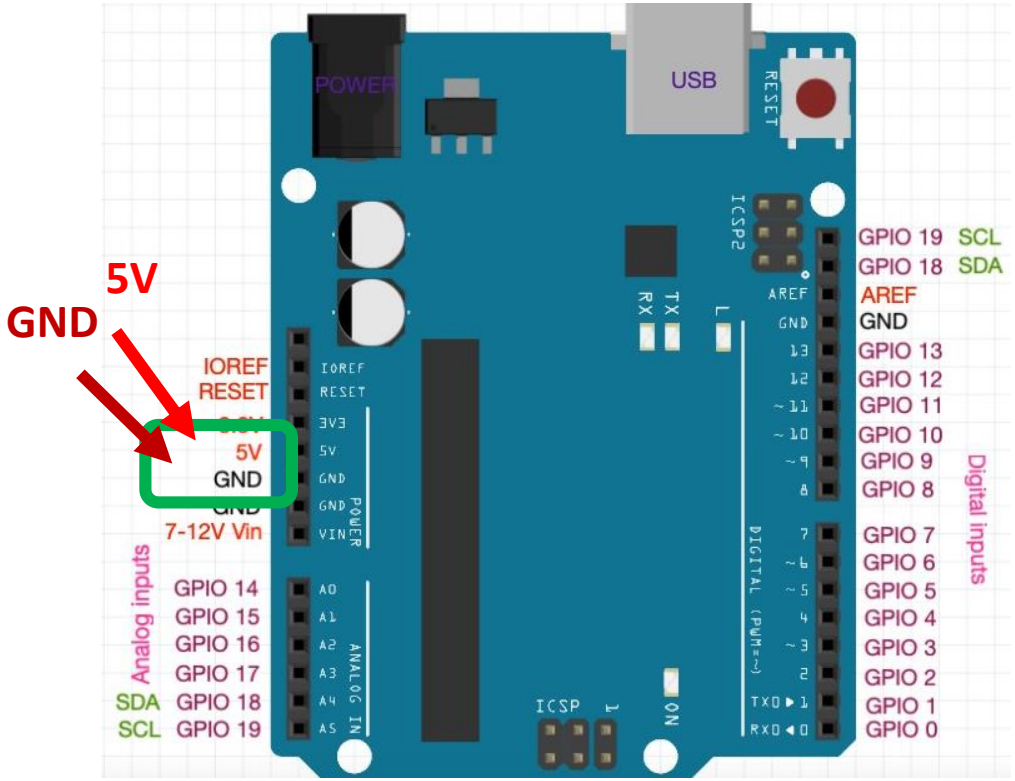


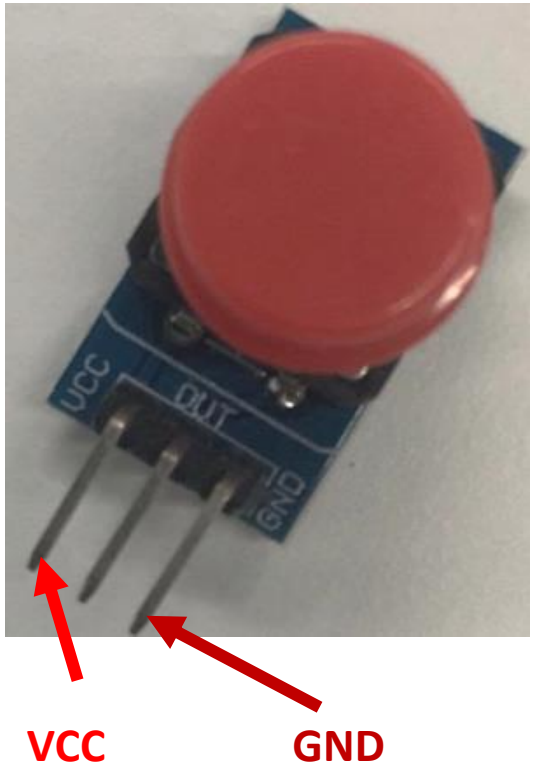
2. 以下零件需要電才可以使用

- 我們主要的電源是6V電池, 供給所有電子零件使用
- 舵機x2 (上/下舵機)
- 按鈕
- Arduino UNO 處理器



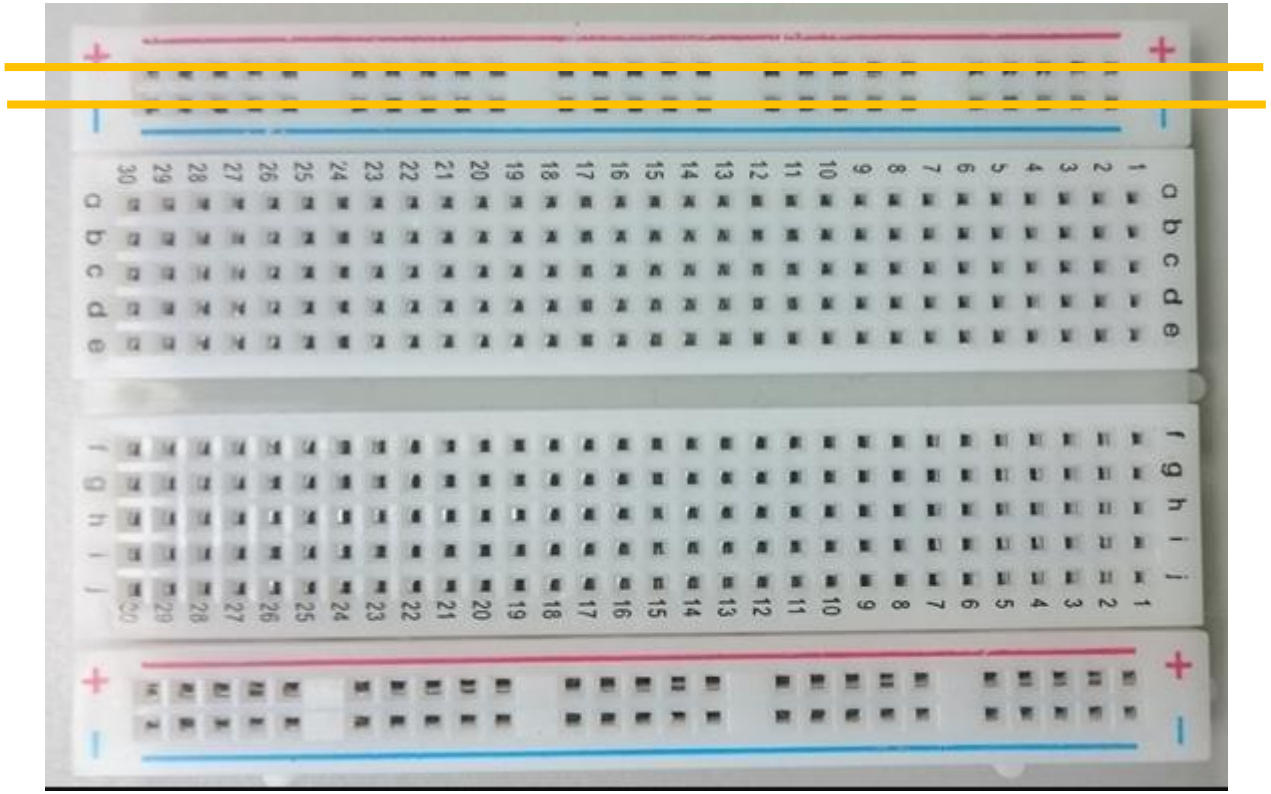
3. 認識電子零件的電源腳



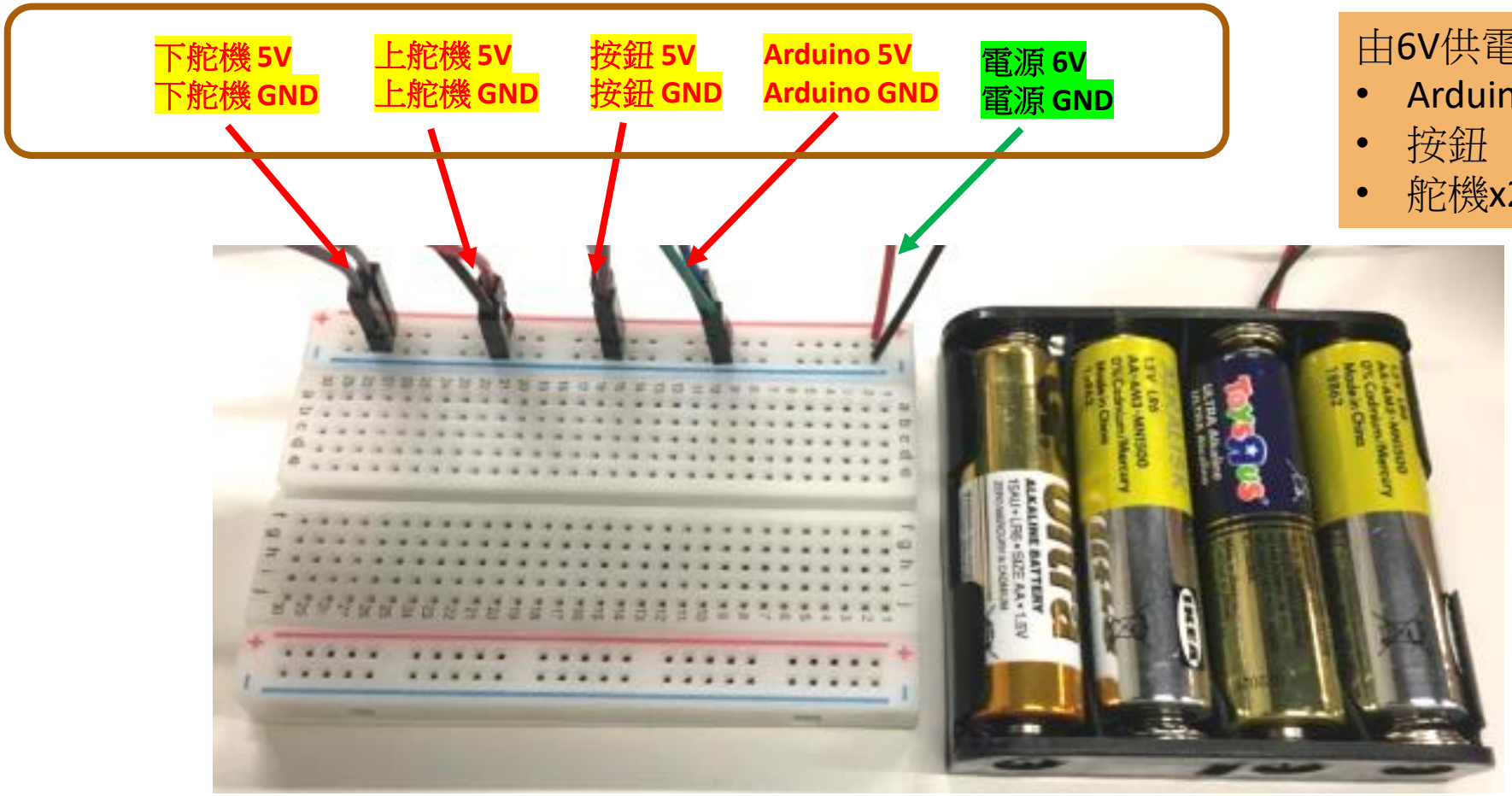


4. 認識面包板上排

- 上方的2排分別連接一起
- 方便一起供電



5. 接駁電源: 主要提供電源6V



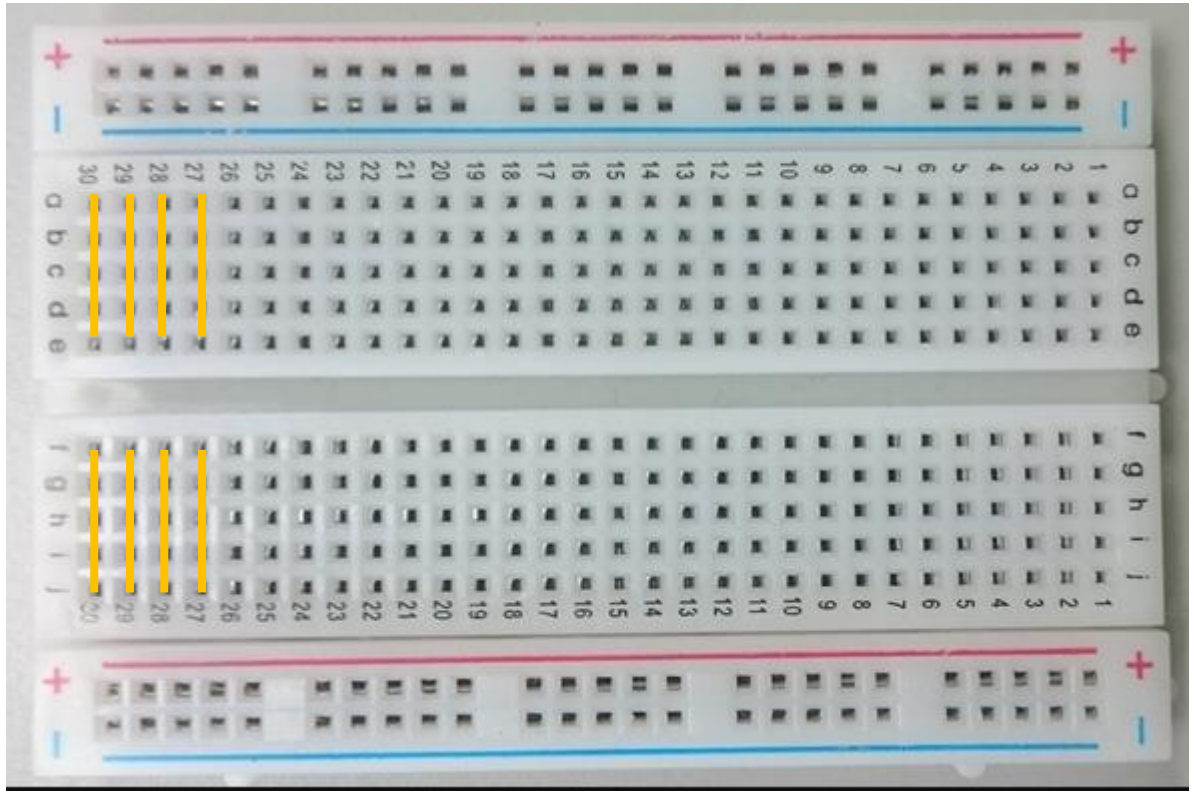
由6V供電給所有電子零件, 包括

- Arduino
- 按鈕
- 舵機x2

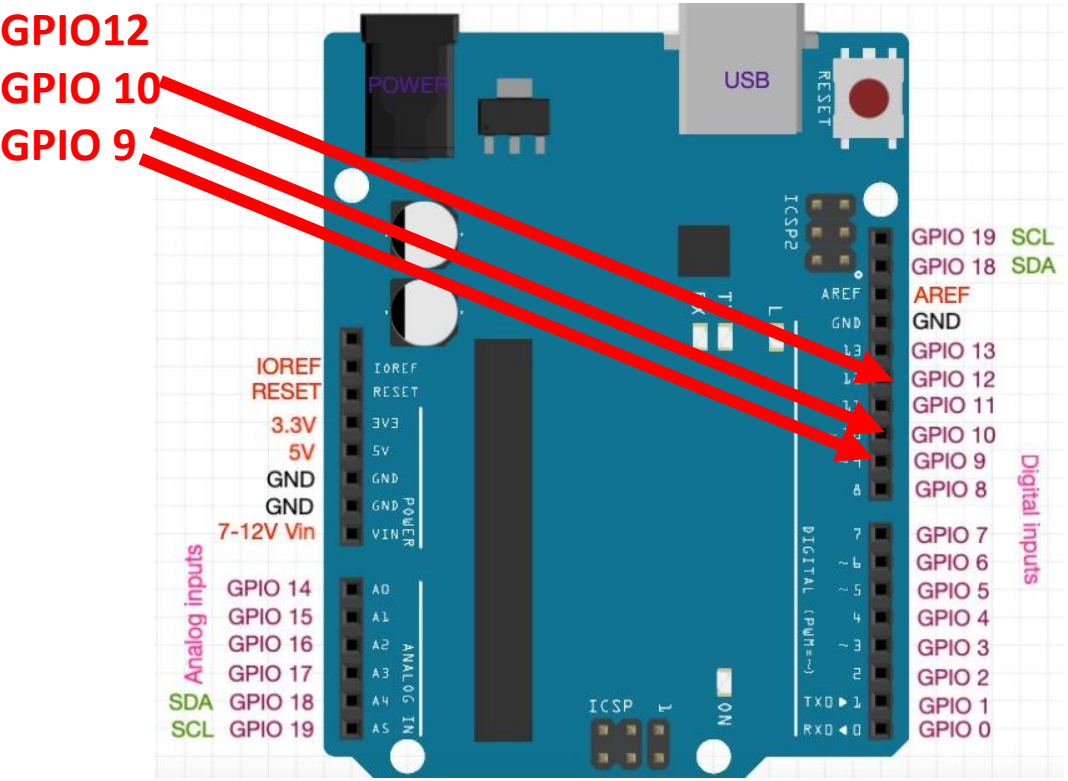
部份2: 接駁電子零件 (訊號腳)

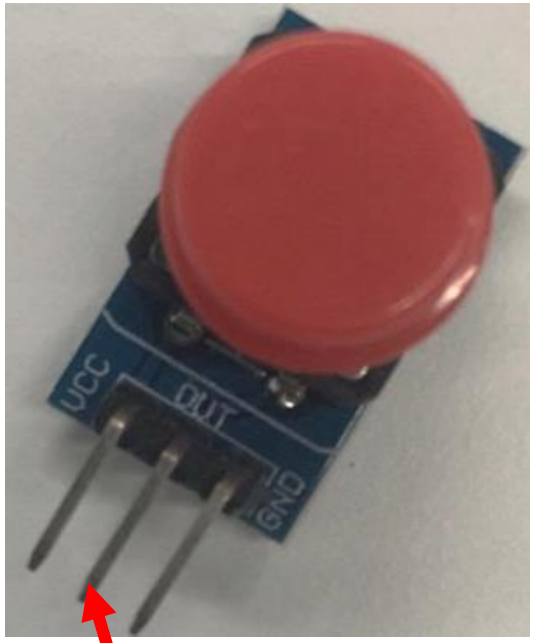
1. 認識面包板中間

- 中間5個點是連接在一起的
- 方便提供訊號腳
- 例子:
- 30a, 30b, 30c, 30d, 30e連接一起
- 27a, 27b, 27c, 27d, 27e連接一起
- 2f, 2g, 2h, 2i, 2j連接一起



2. 認識電子零件的訊號腳



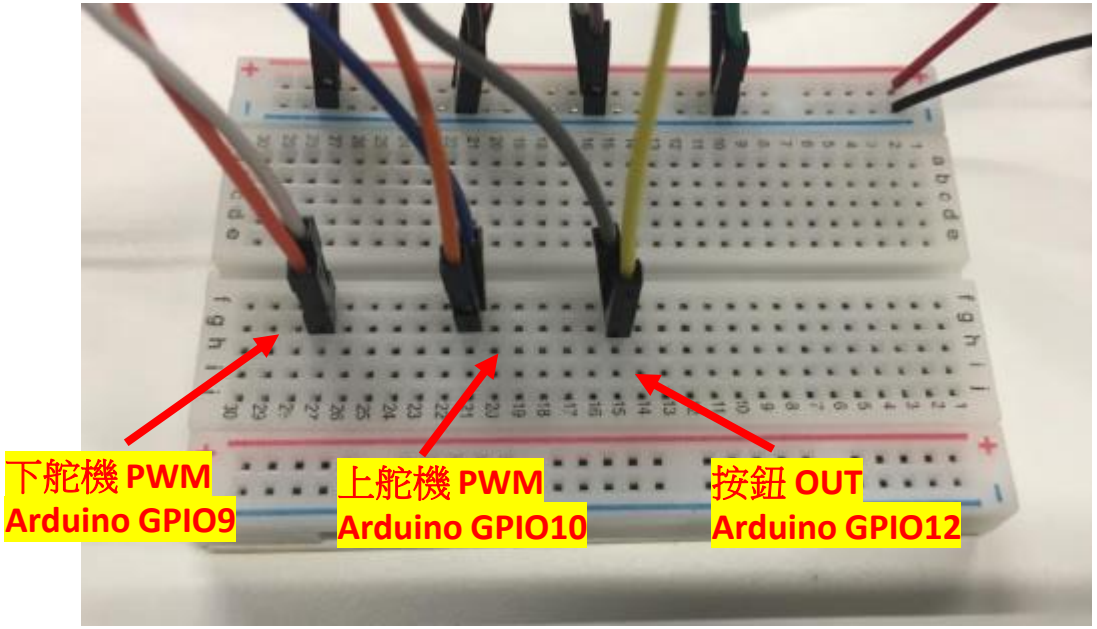


OUT

3. 接駁管腳: 連接訊號腳

- 由於Arduino要獲取按鈕數值, 繼而控制2個舵機。
- 因此，**Arduino 的訊號腳**要連接至**按鈕的訊號腳**
- 同時，**Arduino 的訊號腳**要連接至**2個舵機的訊號腳**

Arduino的訊號腳	舵機及按鈕的訊號腳
GPIO 9	下舵機 PWM
GPIO 10	上舵機 PWM
GPIO 12	按鈕 OUT



部份3: 編程

1. 下載mBlock3

https://www.mblock.cc/en-us/download

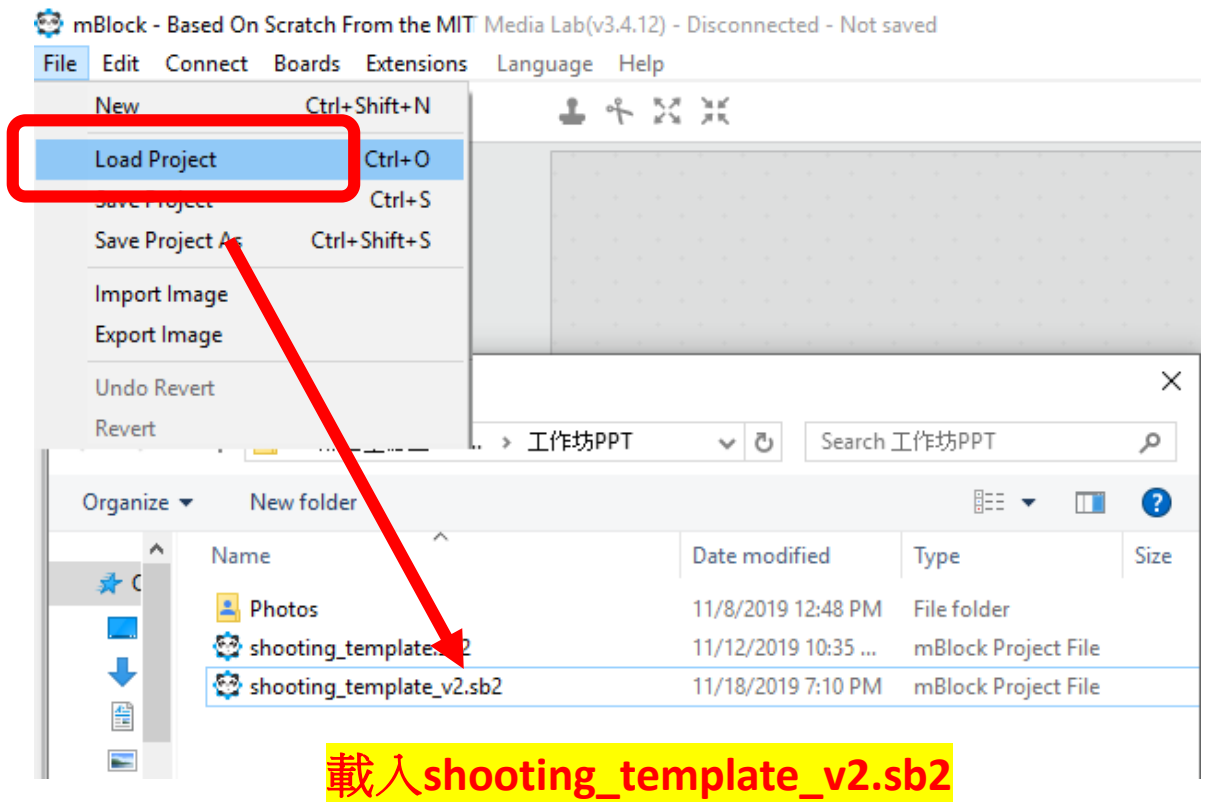
2. 下載程式碼範例

https://www.smarthon.cc/clctmc-stem-competition

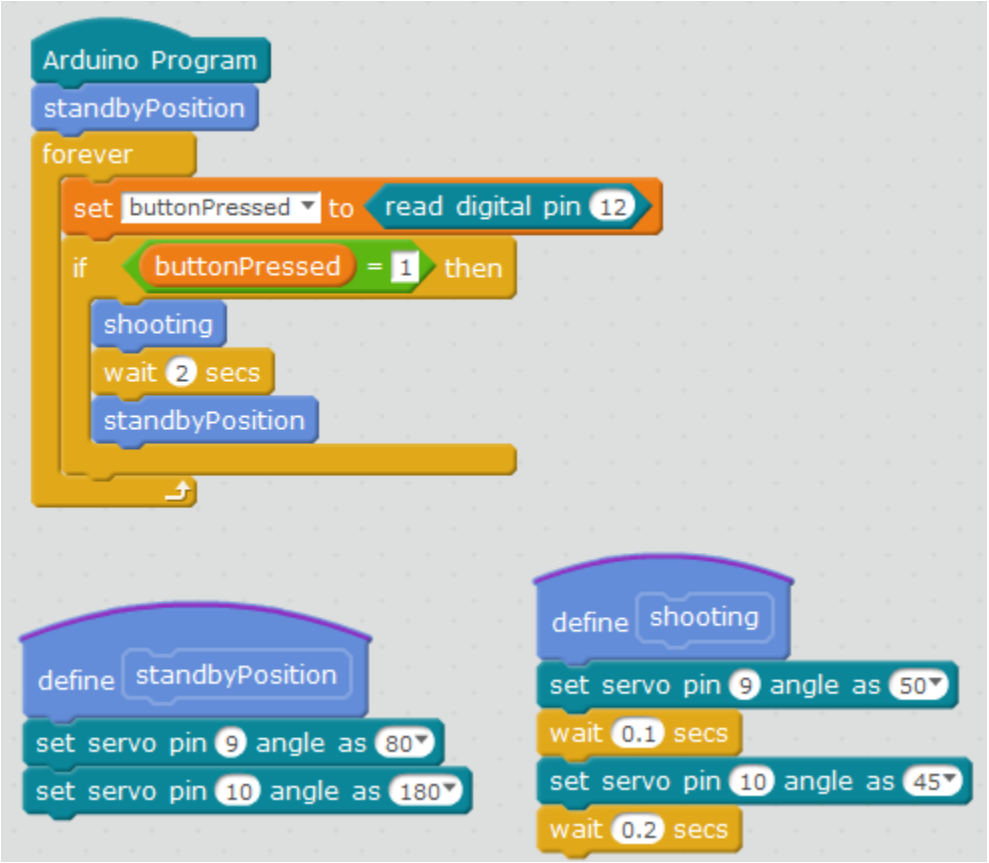
項目(三): 投擲機器人程式碼範例

- Mbot version程式碼 (按此下載)
- Arduino IDE version程式碼 (按此下載)

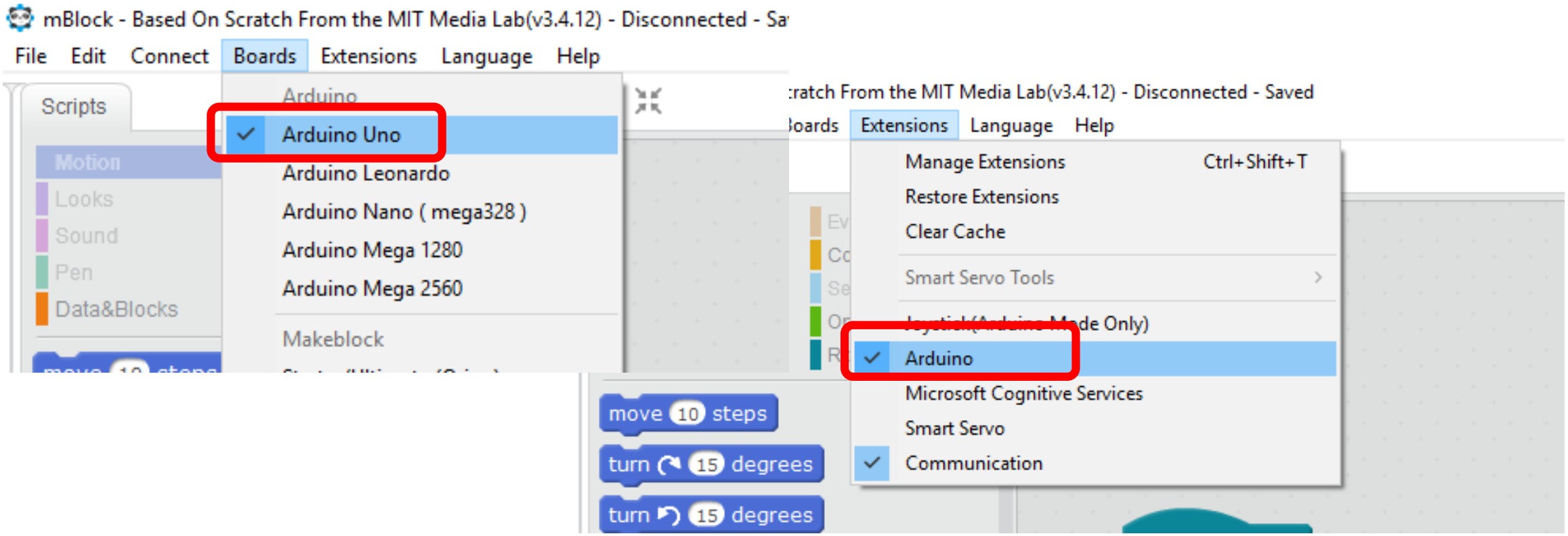
3. 打開mblock3並載入檔案



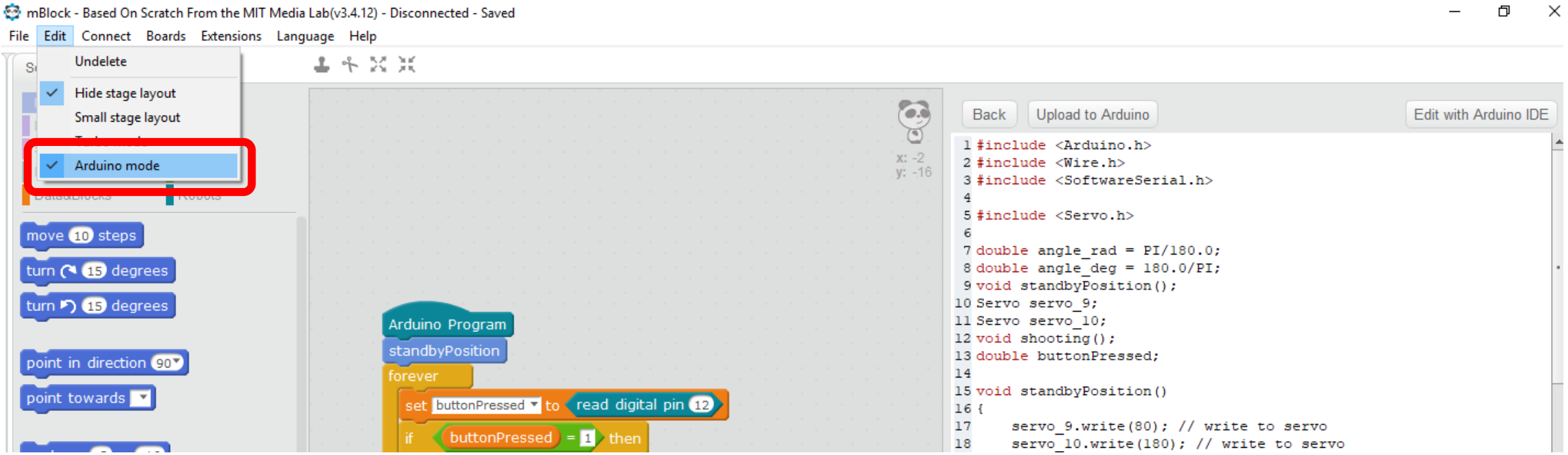
載入shooting_template_v2.sb2



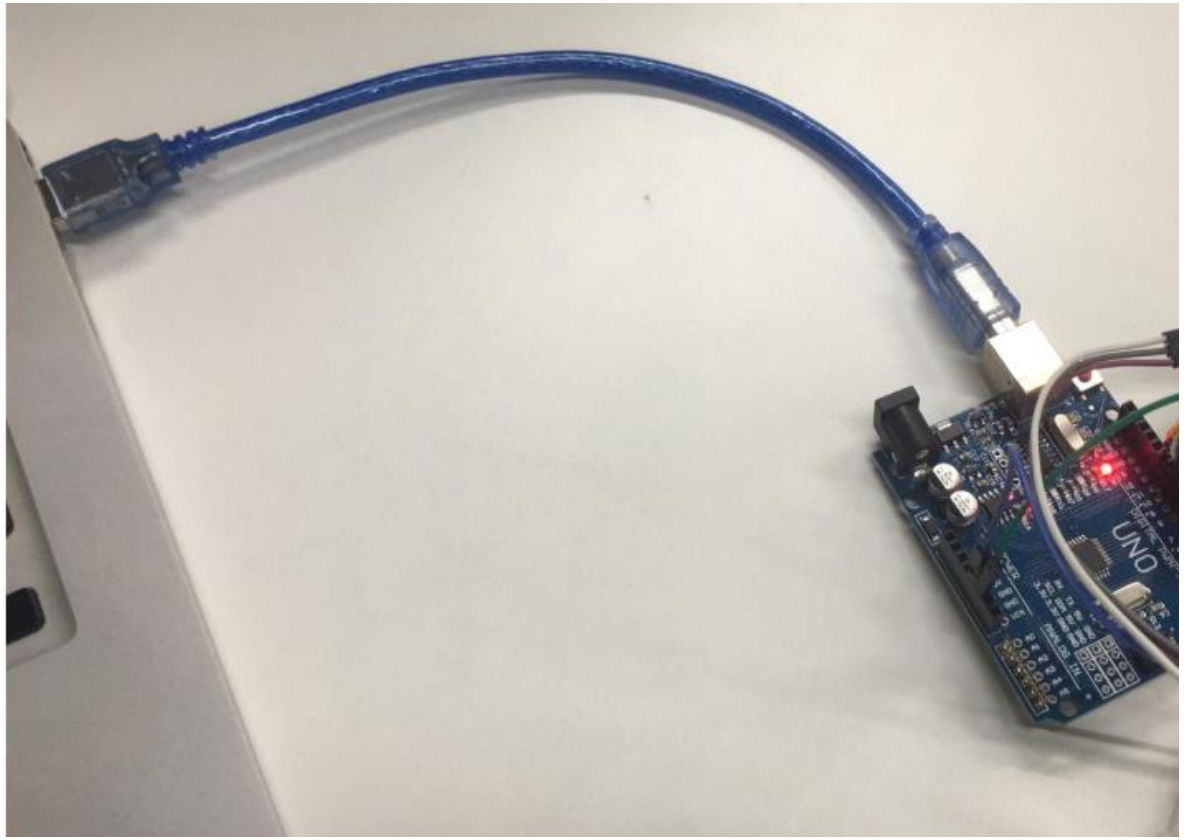
4. 點選Board和Extension - Arduino



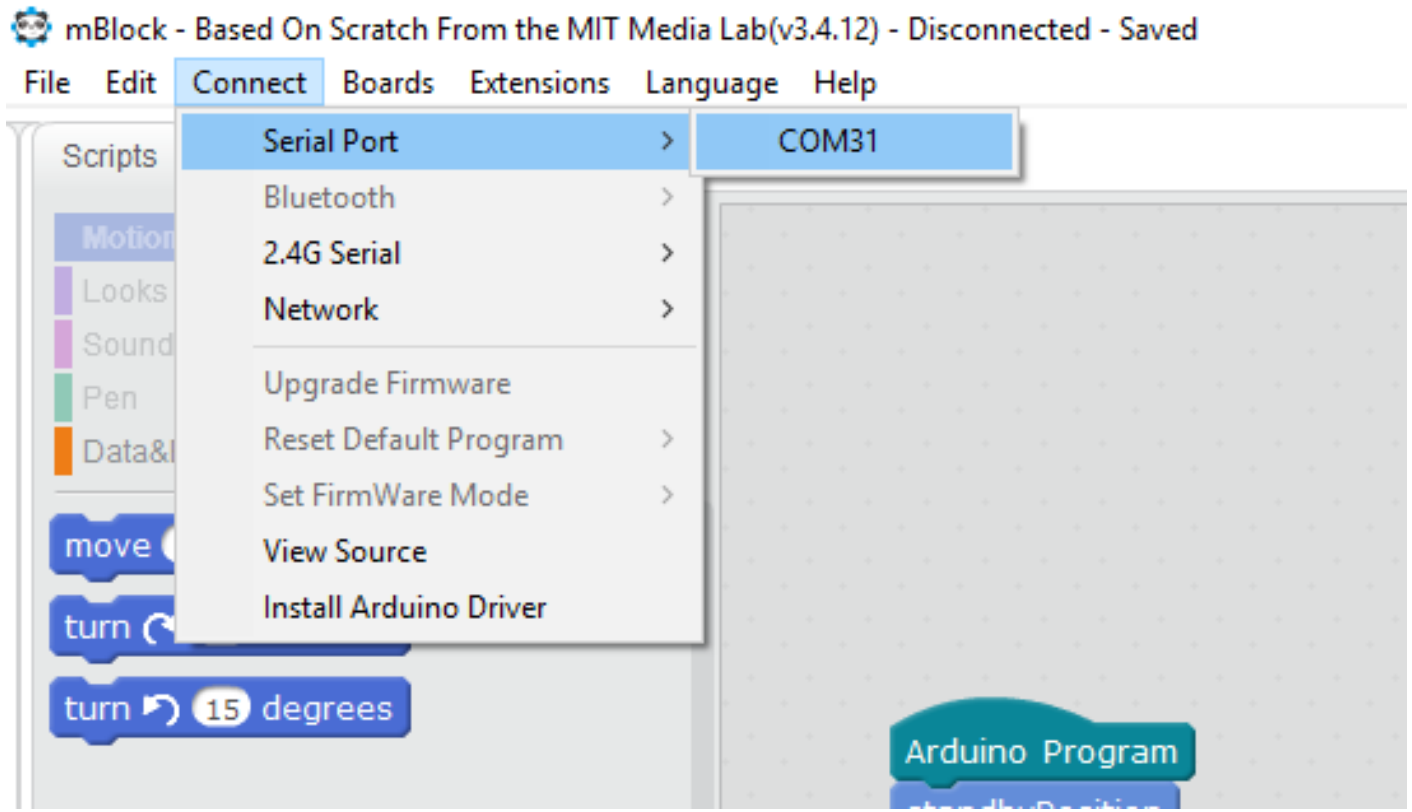
5. 開啟Arduino mode



6. 把Arduino插上電腦



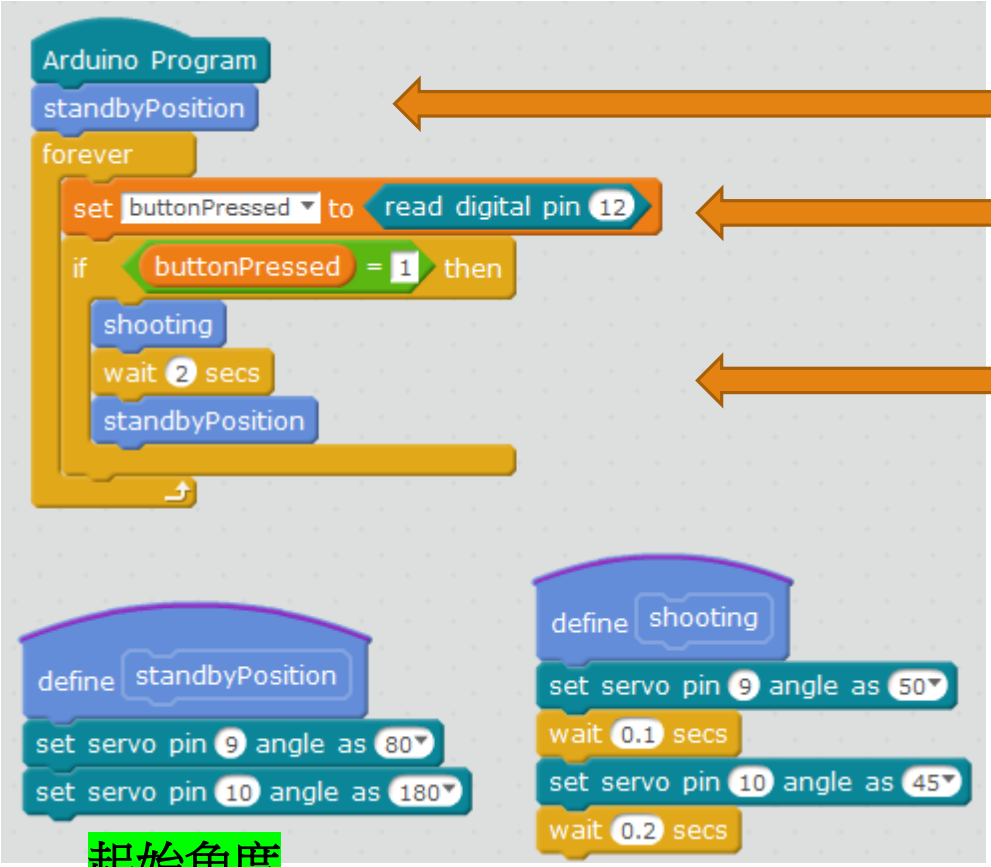
7. 點選合適的COM位


mBlock - Based On Scratch From the MIT Media Lab(v3.4.12) - Disconnected - Saved
File
Edit
Connect
Boards
Extensions
Language
Help
Scripts
Serial Port
Bluetooth
2.4G Serial
Network
Upgrade Firmware
Reset Default Program
Set FirmWare Mode
View Source
Install Arduino Driver
COM31
Motion
Looks
Sound
Pen
Data&
move
turn
turn 15 degrees
Arduino Program

8. 上傳

aved
x: -2
y: -16
am
Back
Upload to Arduino
Edit with Arduino IDE
1 #include <Arduino.h>
2 #include <Wire.h>
3 #include <SoftwareSerial.h>
4
5 #include <Servo.h>
6
7 double angle_rad = PI/180.0;
8 double angle_deg = 180.0/PI;
9 void standbyPosition();
10 Servo servo_9;
11 Servo servo_10;
12 void shooting();

程序分析1



起始角度

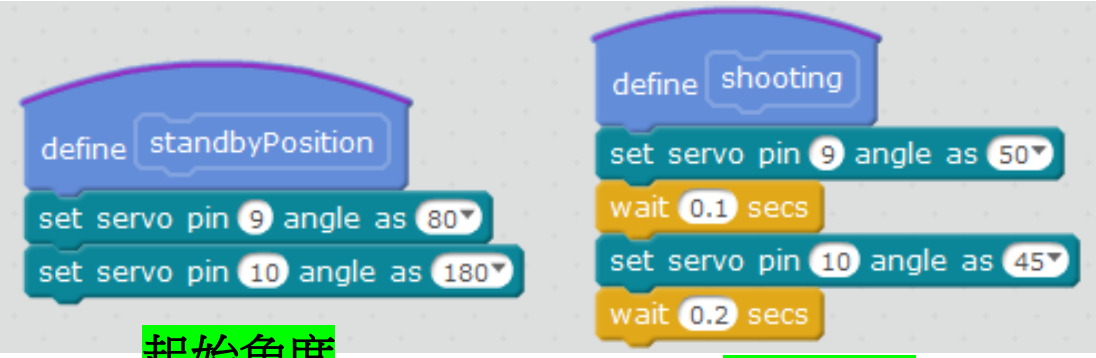
投擲程序

1. 準備狀態 (起始角度)

2. 程序會不斷檢測按鈕

3. 當按鈕檢測到被按下時,
- 執行投擲程序
- 2秒後
- 回到起始角度

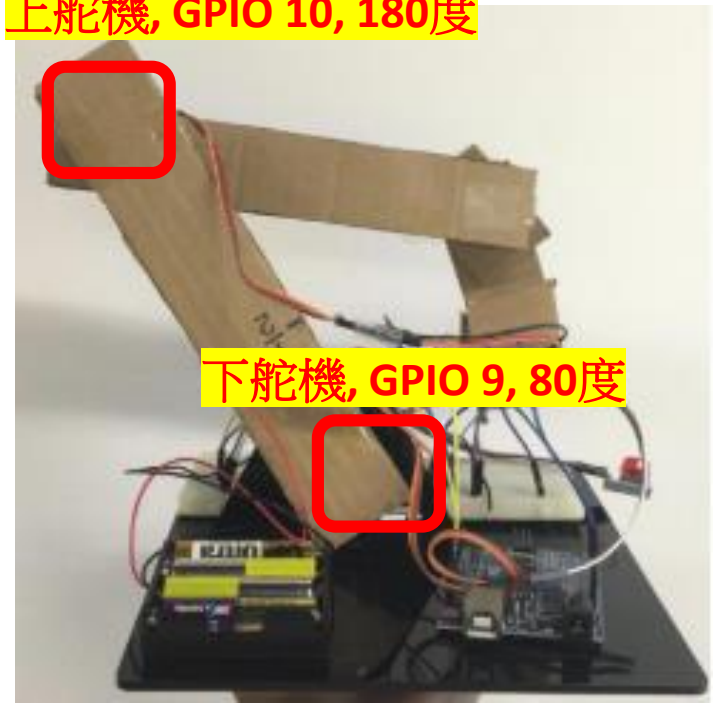
程序分析2



起始角度

投擲程序

上舵機, GPIO 10, 180度



下舵機, GPIO 9, 80度

上舵機, GPIO 10, 45度

下舵機, GPIO 9, 50度

分析:
上舵機轉動了135度
下舵機轉動了30度

部份4: 製作機械人手臂

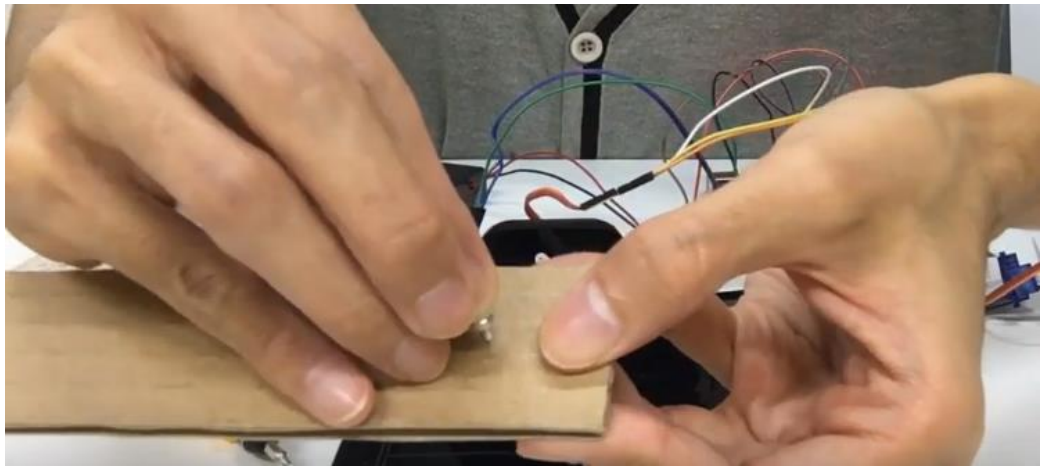
1. 使用紙皮製作手臂

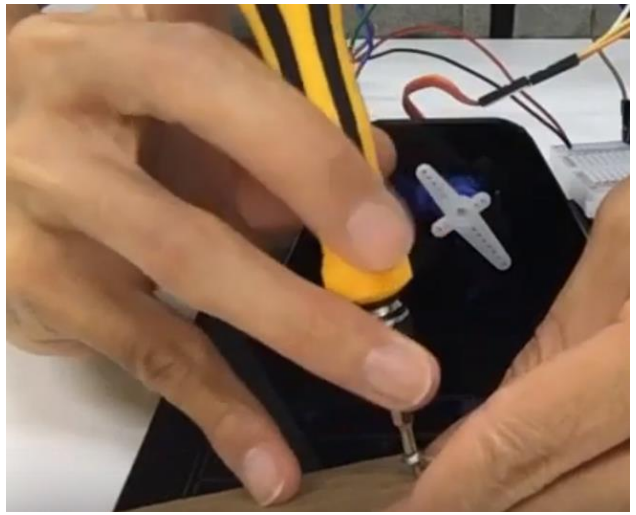
- 3個長方形, 濶4cm x 長20cm

部份5: 安裝及調試下舵機

1. 先把舵機安裝在洞內

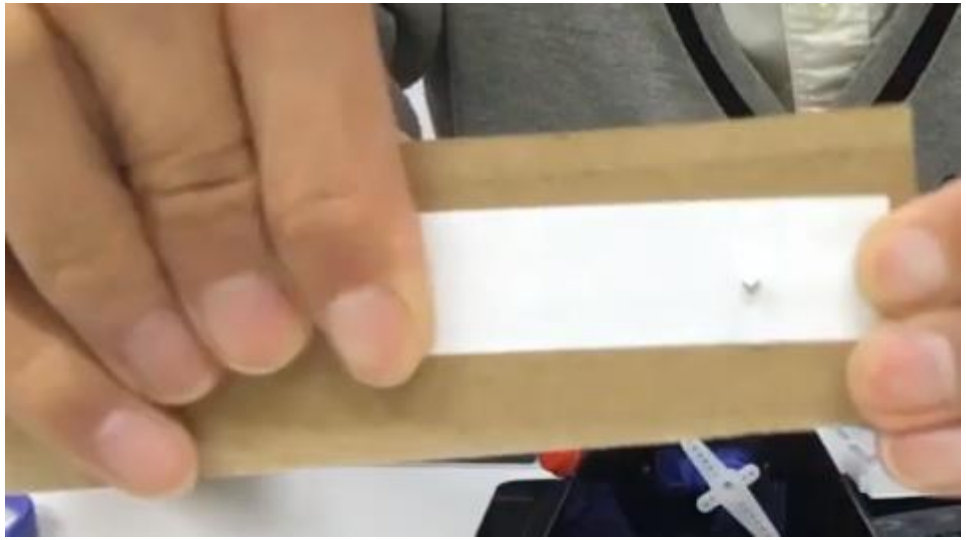
2. 把螺絲釘加在紙板上



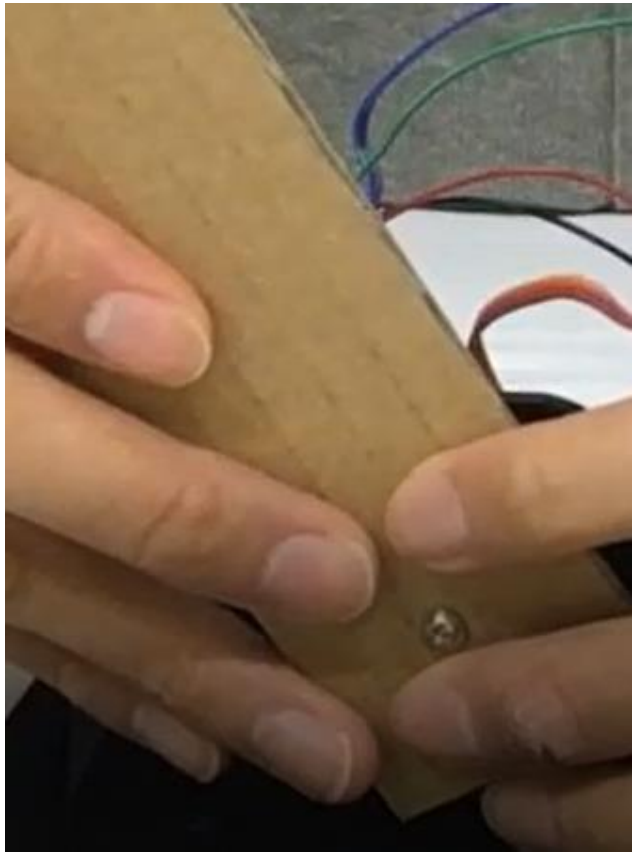


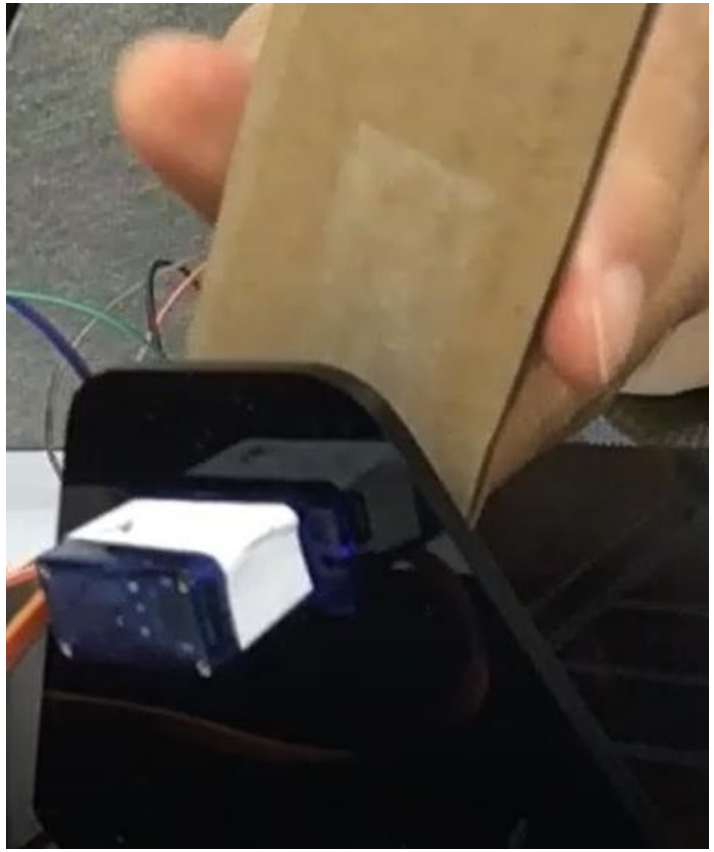
底部穿洞

3. 使用雙面膠紙



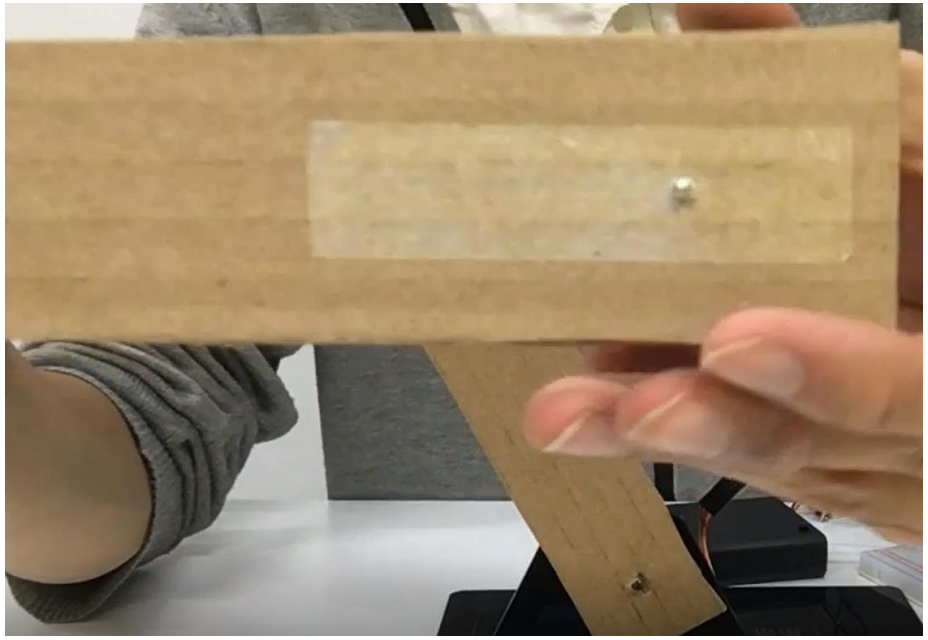
4. 安裝下舵機





部份6: 安裝及調試上舵機

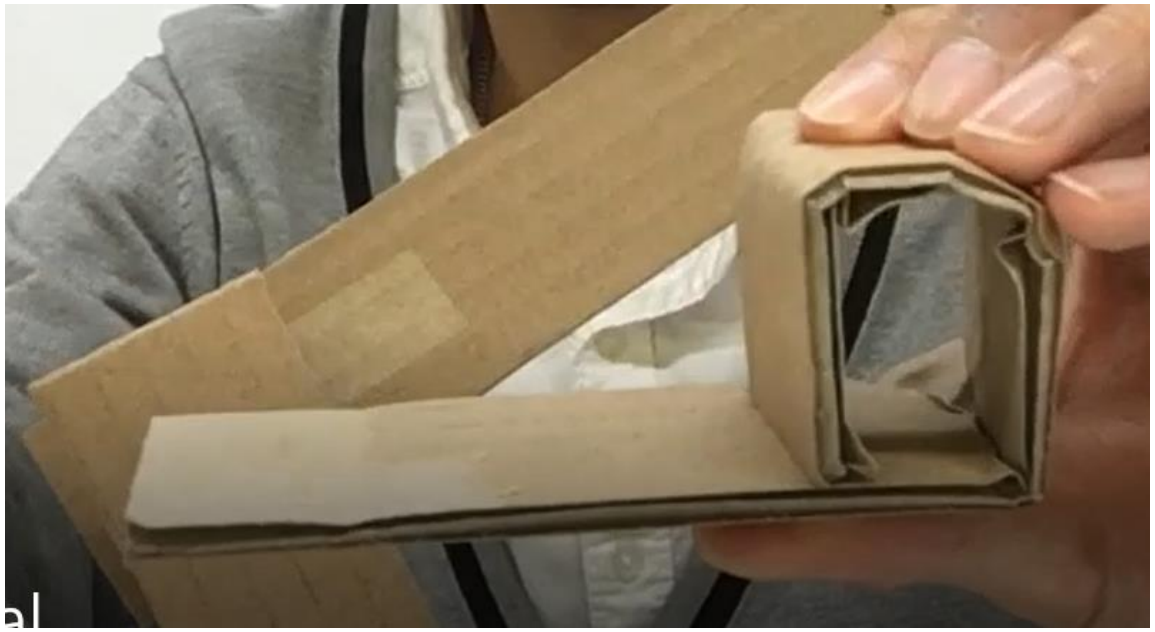
1. 製作另一紙皮, 並把螺絲釘和雙面膠貼上



2. 把上舵機安裝

部份7: 製作射球裝置

1. 把第3條長方形紙板卷上



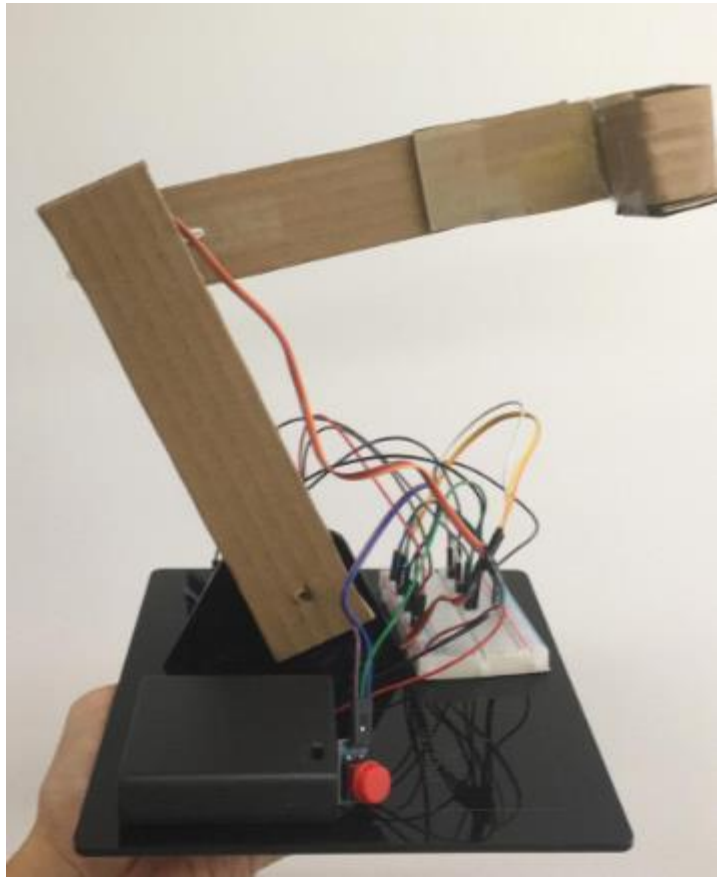
2. 製作多一個正方形紙板

1個正方形, 大約3厘米 x 4厘米

3. 貼上載球裝置

進行測試及講解細則

完成



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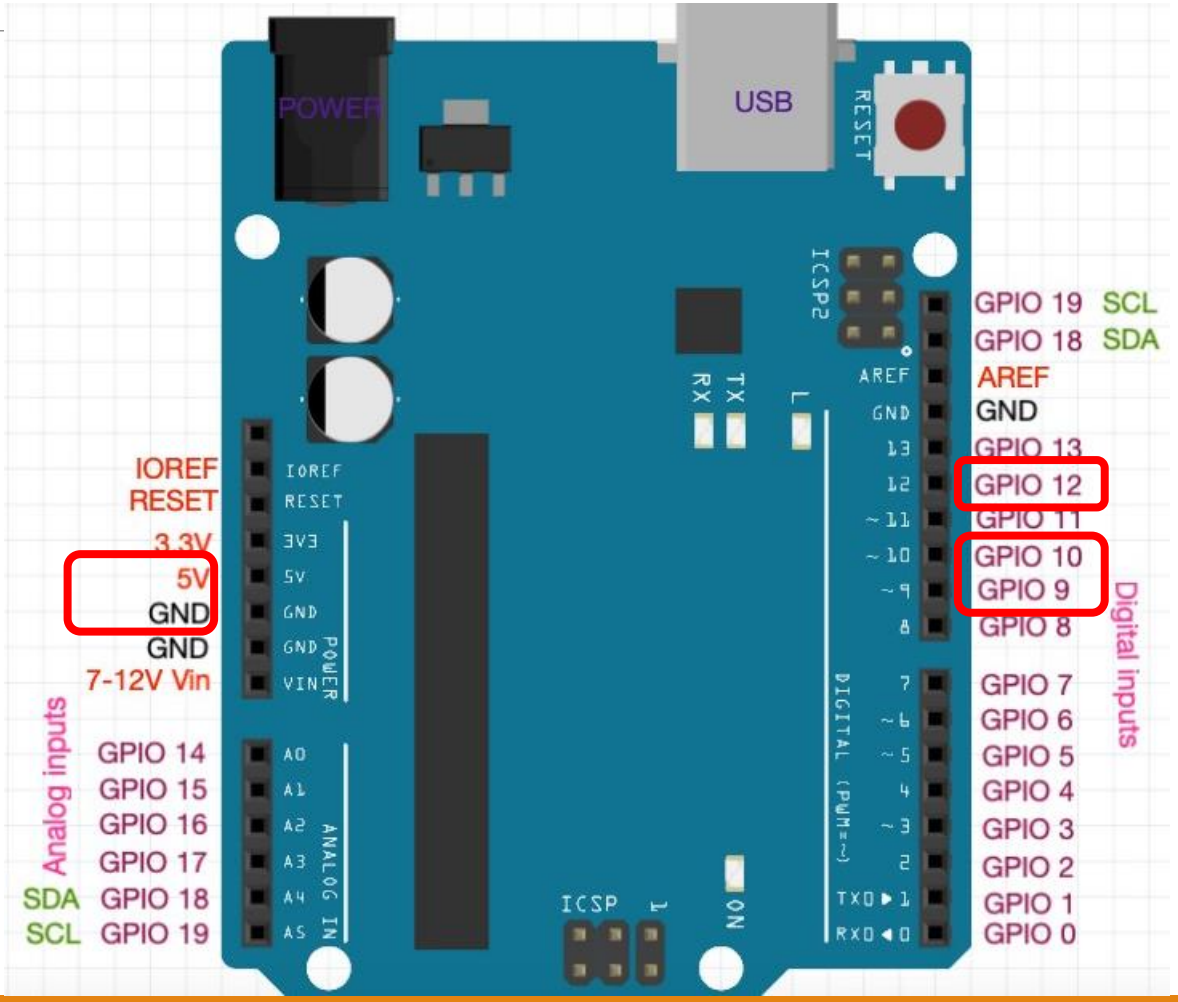
Thank you

Website: http://www.smarthon.cc | Contact: 3500-3963 | Phone: 5707-0679

1. 認識Arduino UNO

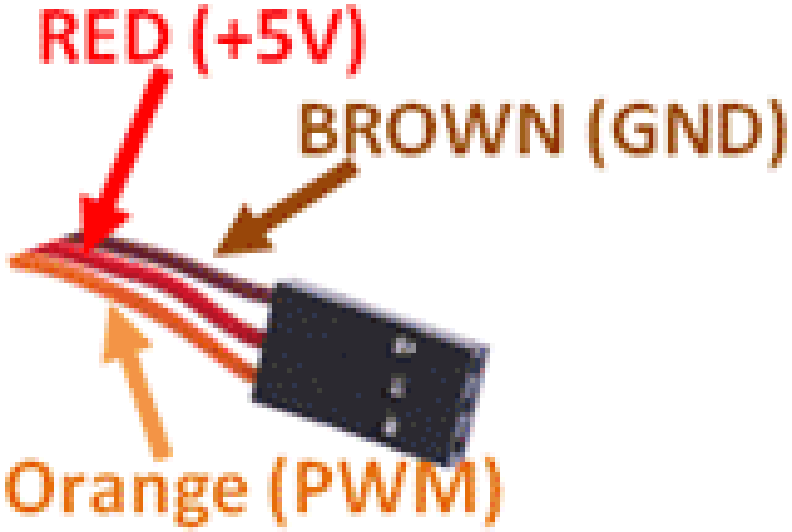
- Arduino UNO能把程序下載入去控制物件

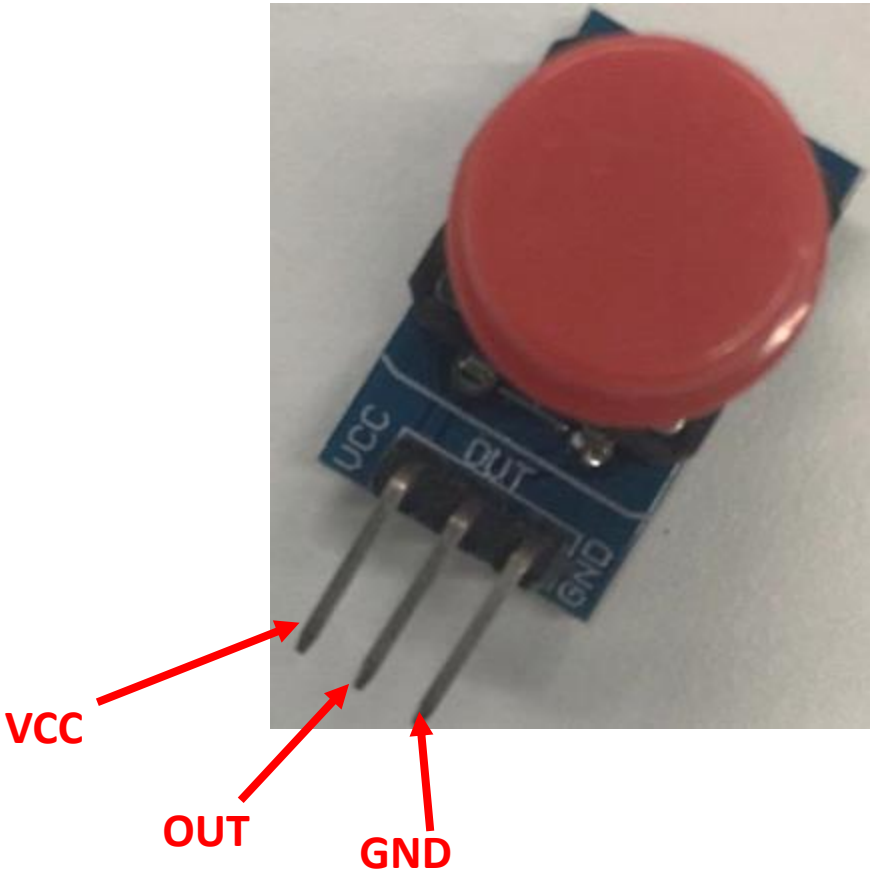
- Arduino 有後多管腳
- 接下來, 我們會使用合共5隻腳
- 5V和GND是外接電源作供電
- GPIO 9 用作下舵機
- GPIO 10用作上舵機
- GPIO 12用作按鈕



2. 認識180度舵機

- 我們可以控制角度由0-180度
- 舵機分別有3隻腳
  - 5V
  - GND
  - PWM



3. 認識按鈕

- 按鈕分別有3隻腳
  - VCC (5V)
  - GND
  - OUT