Ameba 8195AM
網路程式開發基本介紹

崑山科技大學

微處理機應用暨實習(一)

講師：曹永忠

日期：105學年度第二學期

大 綱

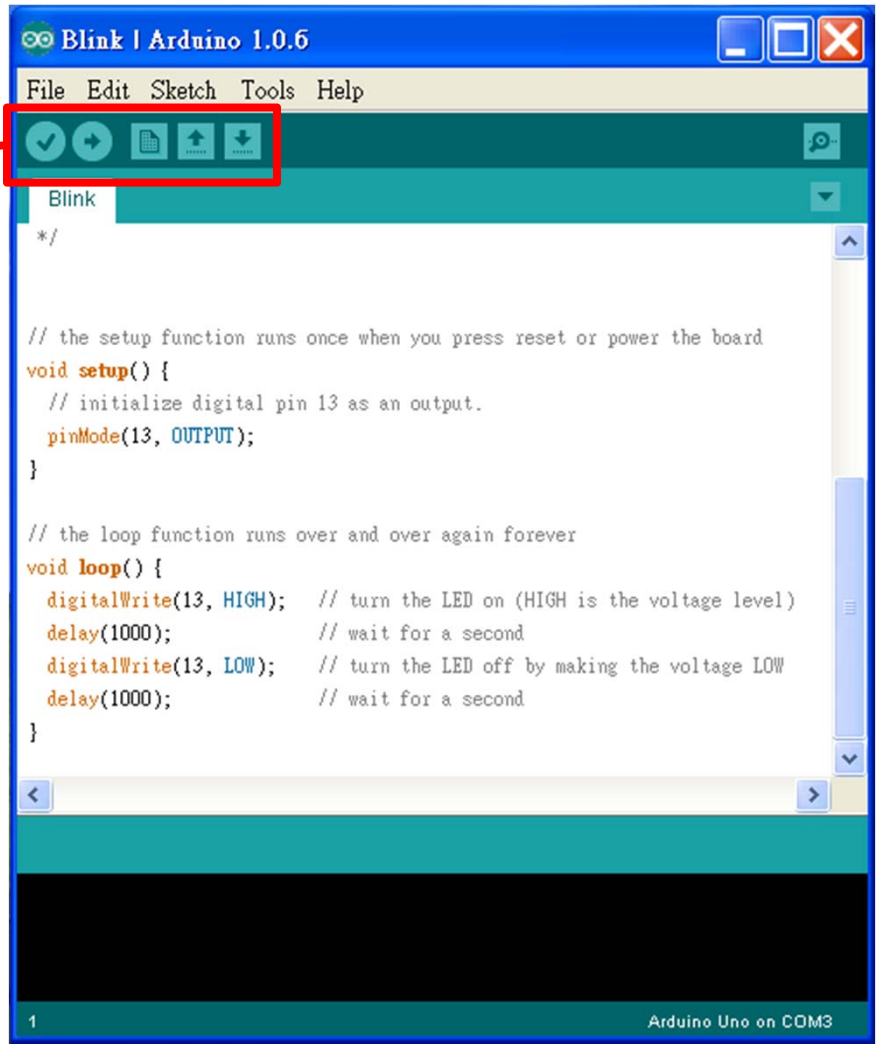
- 前言
- 空氣盒子產品
- **Arduino 程式介紹**
  - Arduino 程式介面
  - Arduino架構
- **程式開發**
  - 啟動開發環境
- **Q&A**
  - 關於作者
  - 參考資料

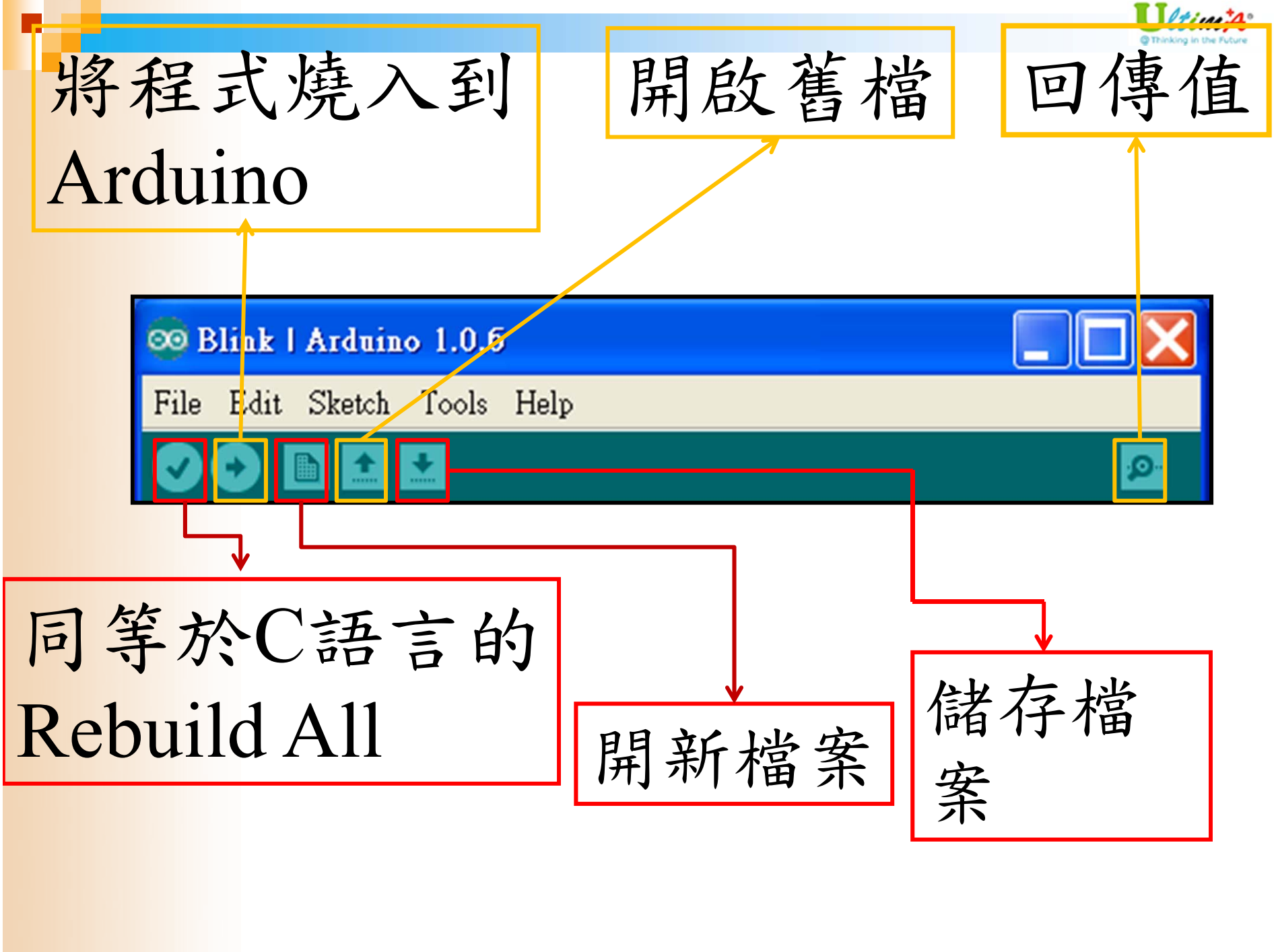
Arduino 程式介紹

Arduino 程式架構

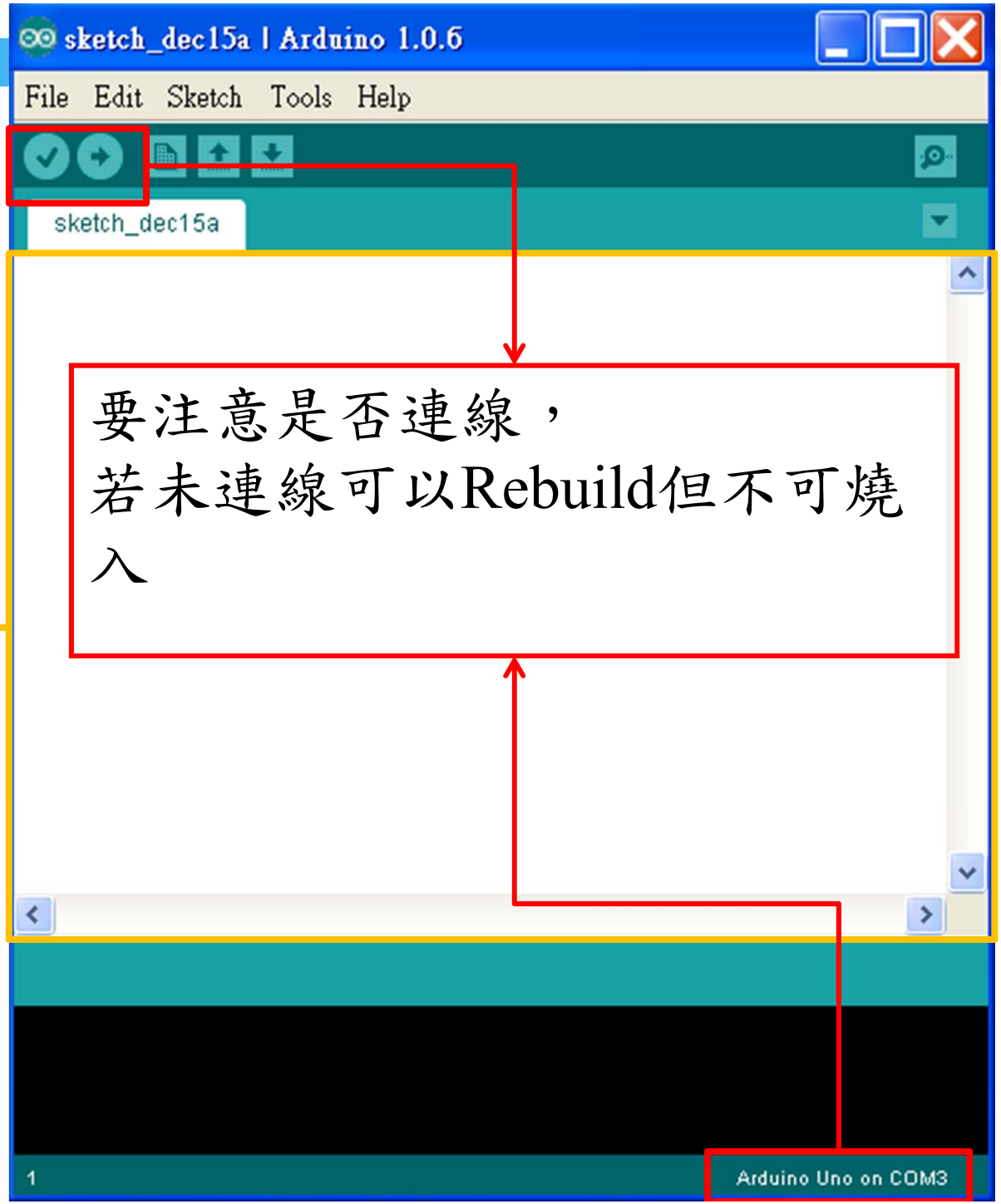
Arduino程式的介面

功能表

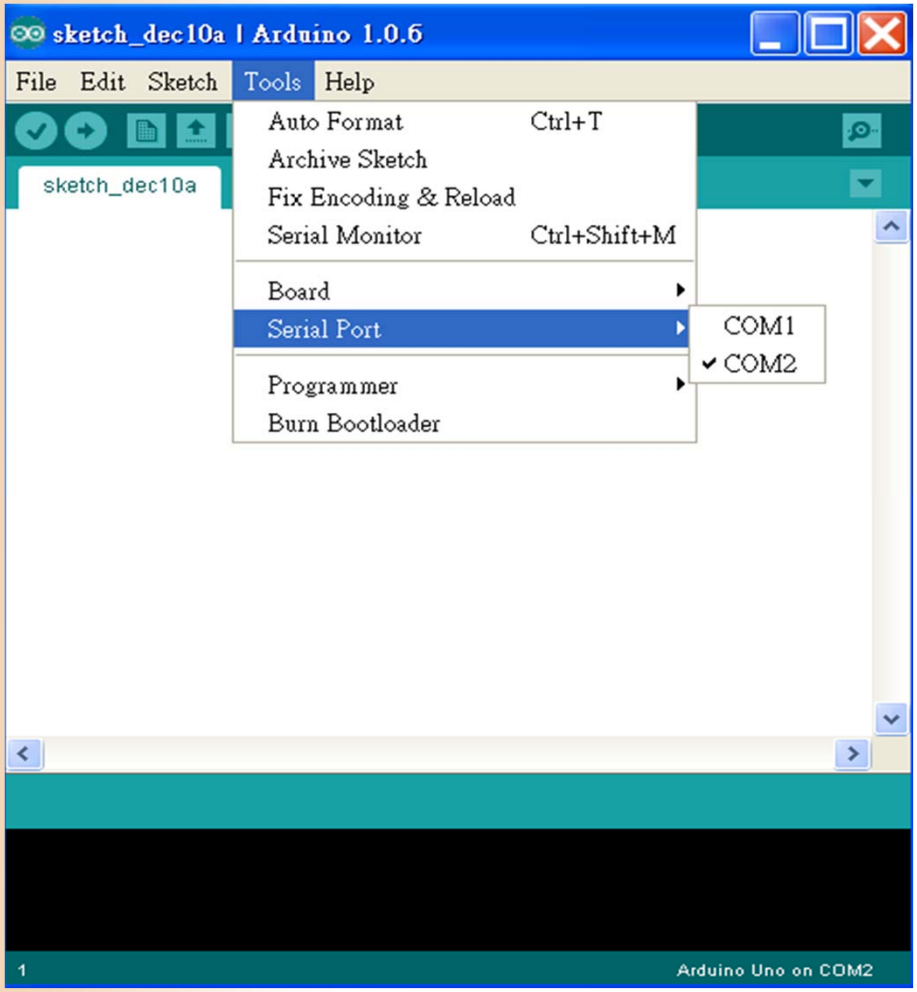



將程式燒入到Arduino
開啟舊檔
回傳值
Blink | Arduino 1.0.6
File Edit Sketch Tools Help
同等於C語言的Rebuild All
開新檔案
儲存檔案

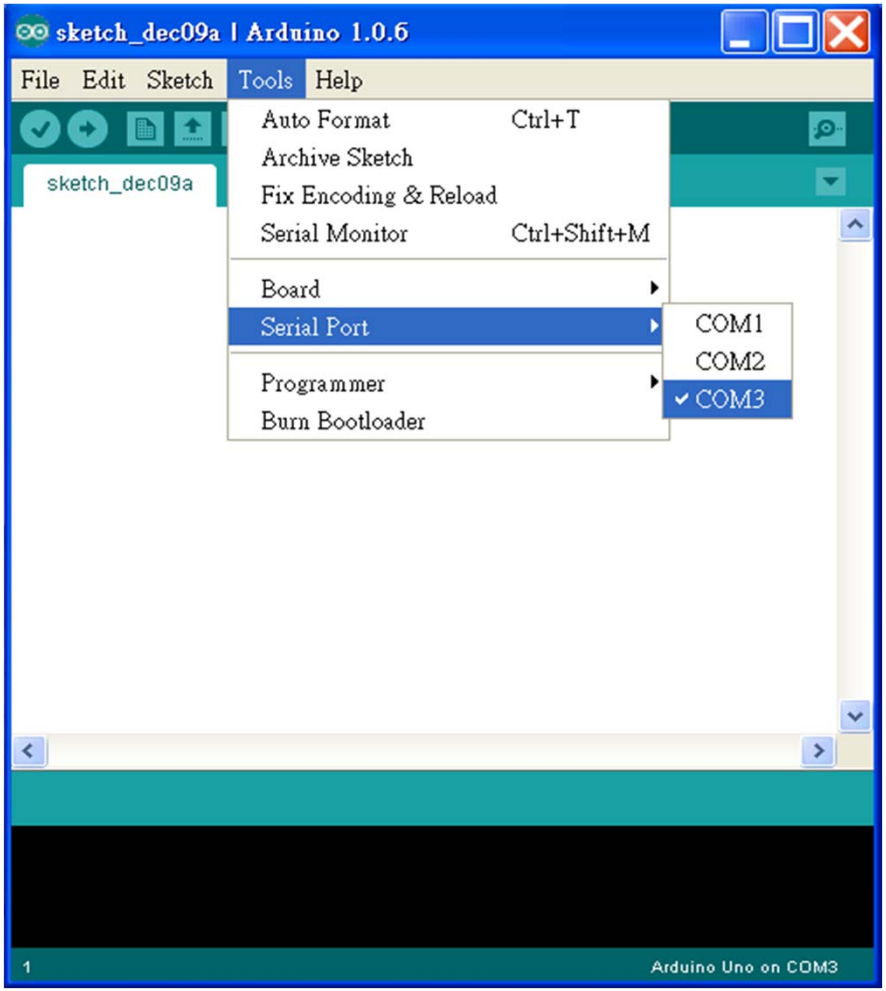
撰寫程式內容


sketch_dec15a | Arduino 1.0.6
File Edit Sketch Tools Help
sketch_dec15a
要注意是否連線，
若未連線可以Rebuild但不可燒入
1
Arduino Uno on COM3

未連線


sketch_dec10a | Arduino 1.0.6
File Edit Sketch Tools Help
sketch_dec10a
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Board
Serial Port
Programmer
Burn Bootloader
COM1
COM2
1
Arduino Uno on COM2

已連線


sketch_dec09a | Arduino 1.0.6
File Edit Sketch Tools Help
sketch_dec09a
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Board
Serial Port
Programmer
Burn Bootloader
COM1
COM2
COM3
1
Arduino Uno on COM3

Arduino程式架構

(一.)宣告:

Arduino宣告方式與C相同,例如:int，float…

(二.)初始化 Setup():

使Arduino板子裝置妥當的指令

EX:

```
int ledPin=7;        / 宣告Arduino7號腳為輸入腳/
 Setup()
 {
      pinMode(ledPin,INPUT);
 }
```

(三.)執行Loop():

為程式的主要內容,這程式內容會一直重複被執行

EX:

```
Loop()
{
  ……
}
```

(四.)函式:

1. pinMode(7,INPUT)

//將腳位7設定為輸入模式

2. digitalWrite(8,HIGH)(**數位腳專用**)

//將腳位8設定輸出高電位

3. val=digitalRead(7) (**數位腳專用**)

//讀出腳位7的值並指定給val變數

4.analogWrite(9,128)　(數位訊號專用所設計的函式)

//將擁有PWM的數位腳位9設定輸出電位2.5V對應值大約為128

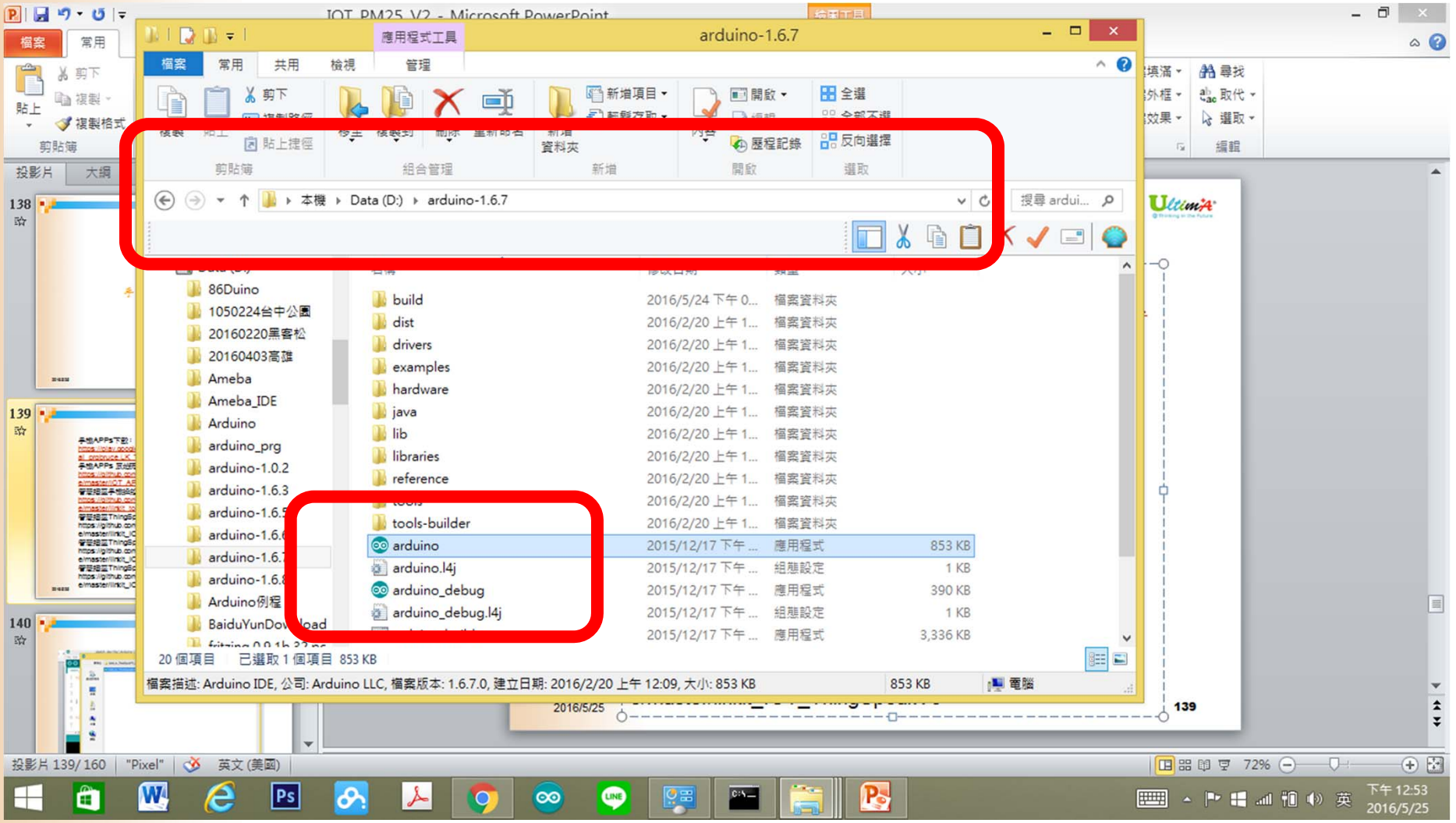
5. val=analogRead(0)　(類比腳專用)

//讀出腳位0的值並指定給val變數(且analogRead可讀取範圍0(0V)~1023(5V))

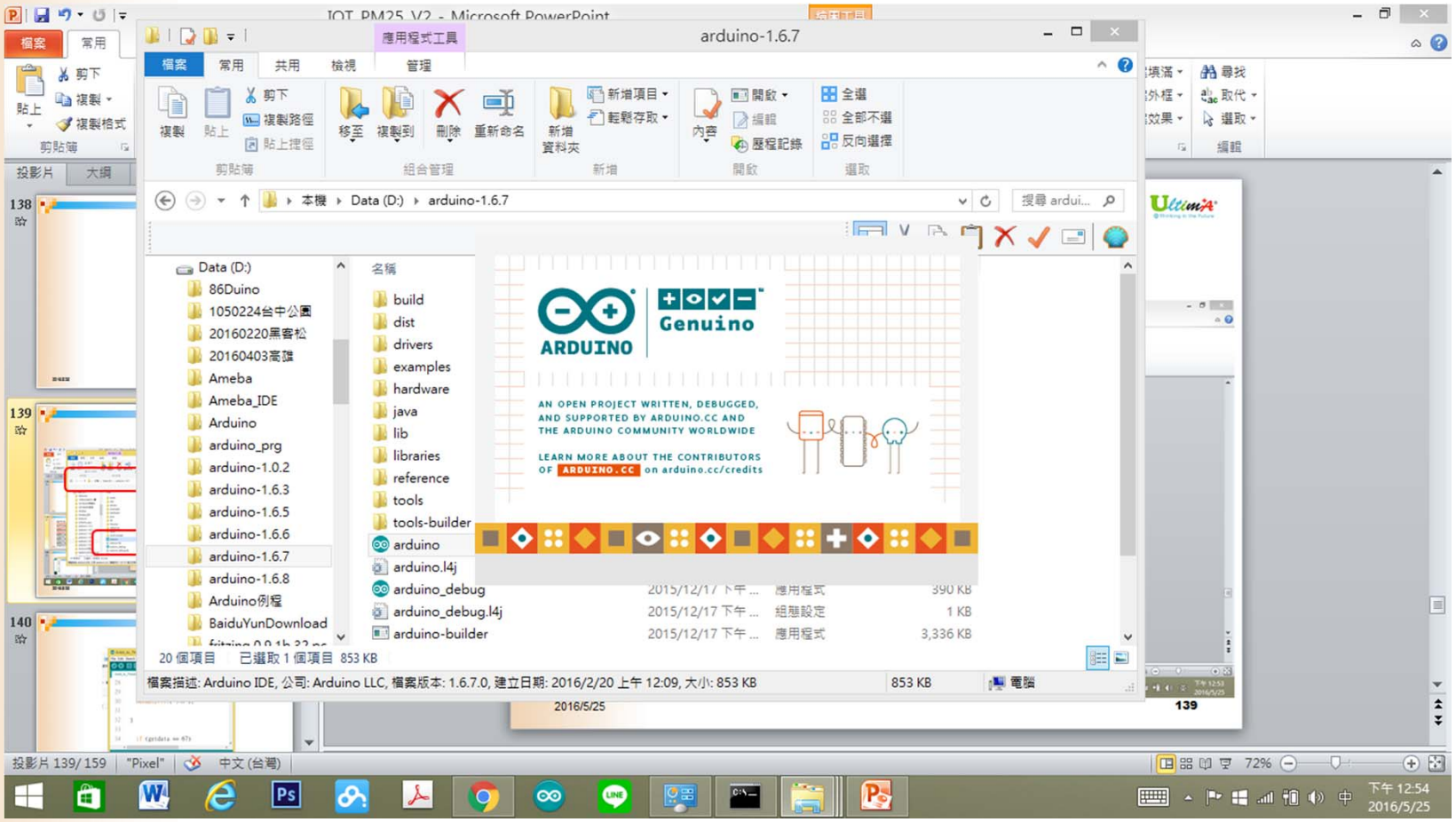
系統開發

啟動開發環境

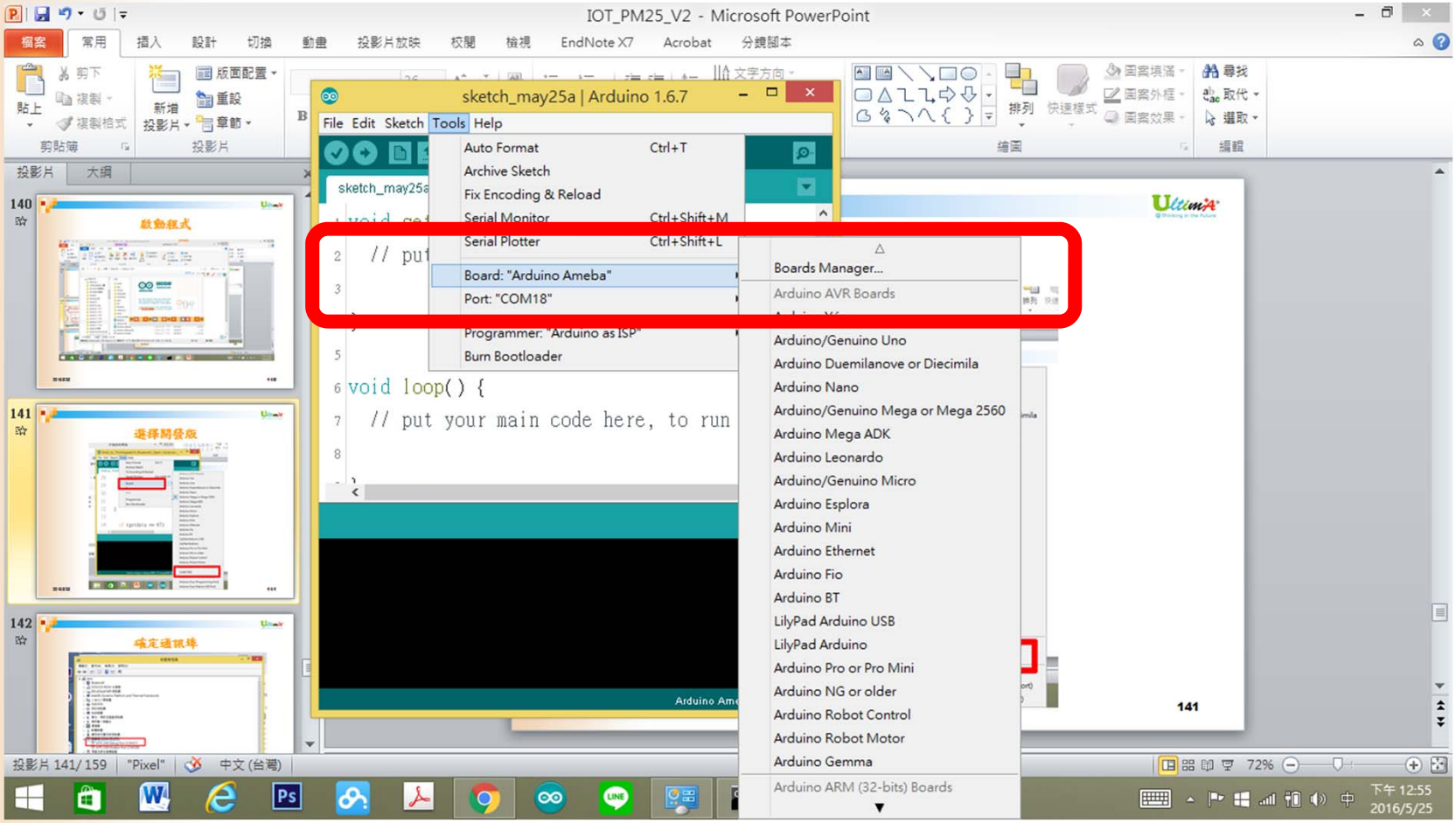
開啟程式


arduino-1.6.7
本機 ▸ Data (D:) ▸ arduino-1.6.7
86Duino
1050224台中公園
20160220黑客松
20160403高雄
Ameba
Ameba_IDE
Arduino
arduino_prg
arduino-1.0.2
arduino-1.6.3
arduino-1.6.7
Arduino例程
build
dist
drivers
examples
hardware
java
lib
libraries
reference
tools-builder
arduino
arduino.l4j
arduino_debug
arduino_debug.l4j
20 個項目 已選取 1 個項目 853 KB
檔案描述: Arduino IDE, 公司: Arduino LLC, 檔案版本: 1.6.7.0, 建立日期: 2016/2/20 上午 12:09, 大小: 853 KB

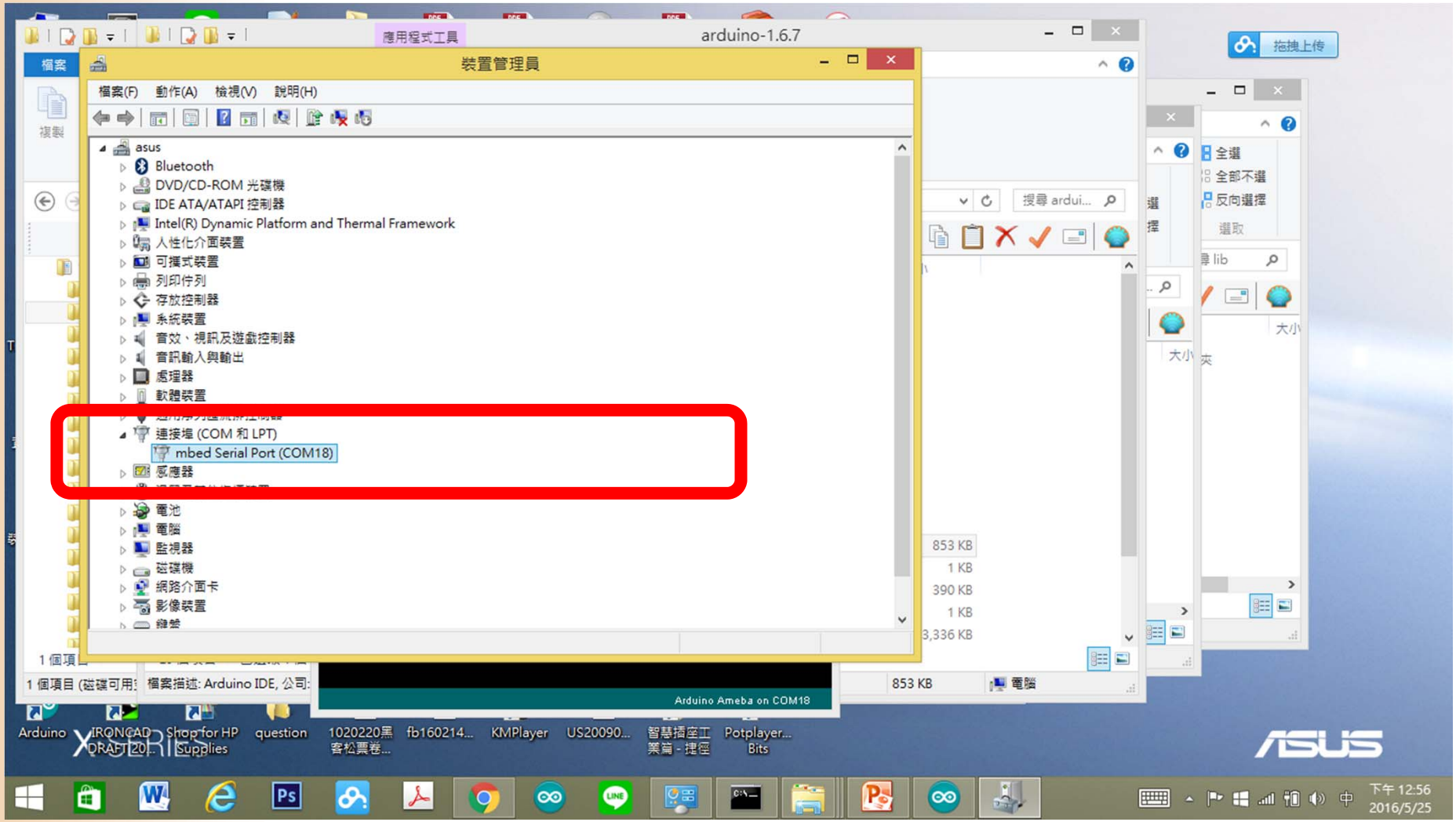
啟動程式


arduino-1.6.7
ARDUINO
Genuino
AN OPEN PROJECT WRITTEN, DEBUGGED, AND SUPPORTED BY ARDUINO.CC AND THE ARDUINO COMMUNITY WORLDWIDE
LEARN MORE ABOUT THE CONTRIBUTORS OF ARDUINO.CC on arduino.cc/credits
build
dist
drivers
examples
hardware
java
lib
libraries
reference
tools
tools-builder
arduino
arduino.l4j
arduino_debug
arduino_debug.l4j
arduino-builder
86Duino
Ameba
Ameba_IDE
Arduino
arduino_prg
arduino-1.0.2
arduino-1.6.3
arduino-1.6.5
arduino-1.6.6
arduino-1.6.7
arduino-1.6.8
Arduino例程
BaiduYunDownload

選擇開發版


IOT_PM25_V2 - Microsoft PowerPoint
sketch_may25a | Arduino 1.6.7
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
Board: "Arduino Ameba"
Port: "COM18"
Programmer: "Arduino as ISP"
Burn Bootloader
Boards Manager...
Arduino AVR Boards
Arduino/Genuino Uno
Arduino Duemilanove or Diecimila
Arduino Nano
Arduino/Genuino Mega or Mega 2560
Arduino Mega ADK
Arduino Leonardo
Arduino/Genuino Micro
Arduino Esplora
Arduino Mini
Arduino Ethernet
Arduino Fio
Arduino BT
LilyPad Arduino USB
LilyPad Arduino
Arduino Pro or Pro Mini
Arduino NG or older
Arduino Robot Control
Arduino Robot Motor
Arduino Gemma
Arduino ARM (32-bits) Boards
void loop() {
// put your main code here, to run
141

確定通訊埠


arduino-1.6.7
裝置管理員
檔案(F) 動作(A) 檢視(V) 說明(H)
asus
Bluetooth
DVD/CD-ROM 光碟機
IDE ATA/ATAPI 控制器
Intel(R) Dynamic Platform and Thermal Framework
人性化介面裝置
可攜式裝置
列印佇列
存放控制器
系統裝置
音效、視訊及遊戲控制器
音訊輸入與輸出
處理器
軟體裝置
連接埠 (COM 和 LPT)
mbed Serial Port (COM18)
感應器
電池
電腦
監視器
磁碟機
網路介面卡
影像裝置
Arduino Ameba on COM18
Arduino
IRONCAD DRAFT 20...
Shop for HP Supplies
question
1020220黑客松票卷...
fb160214...
KMPlayer
US20090...
智慧插座工業篇 - 捷徑
Potplayer... Bits
ASUS
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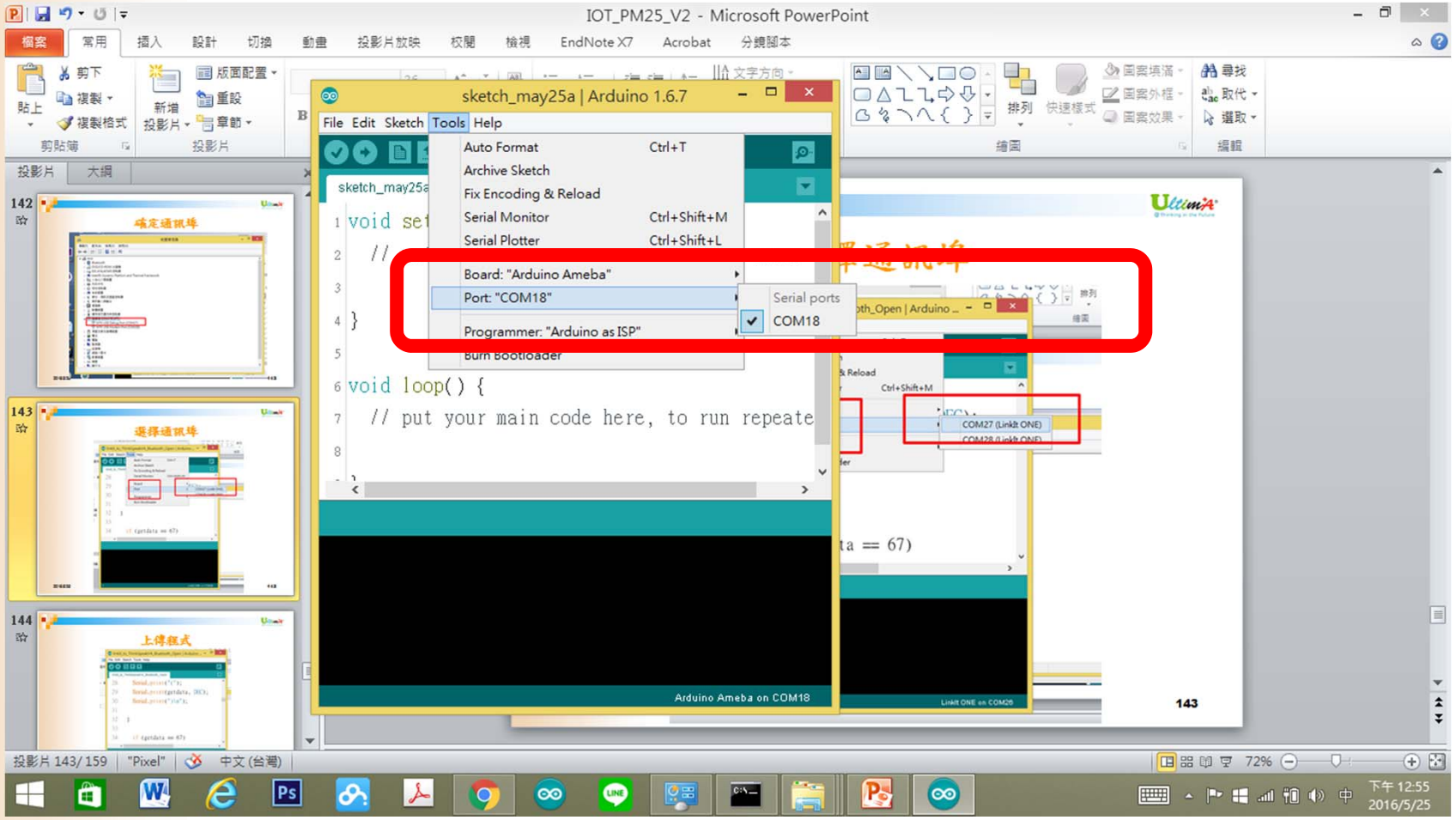
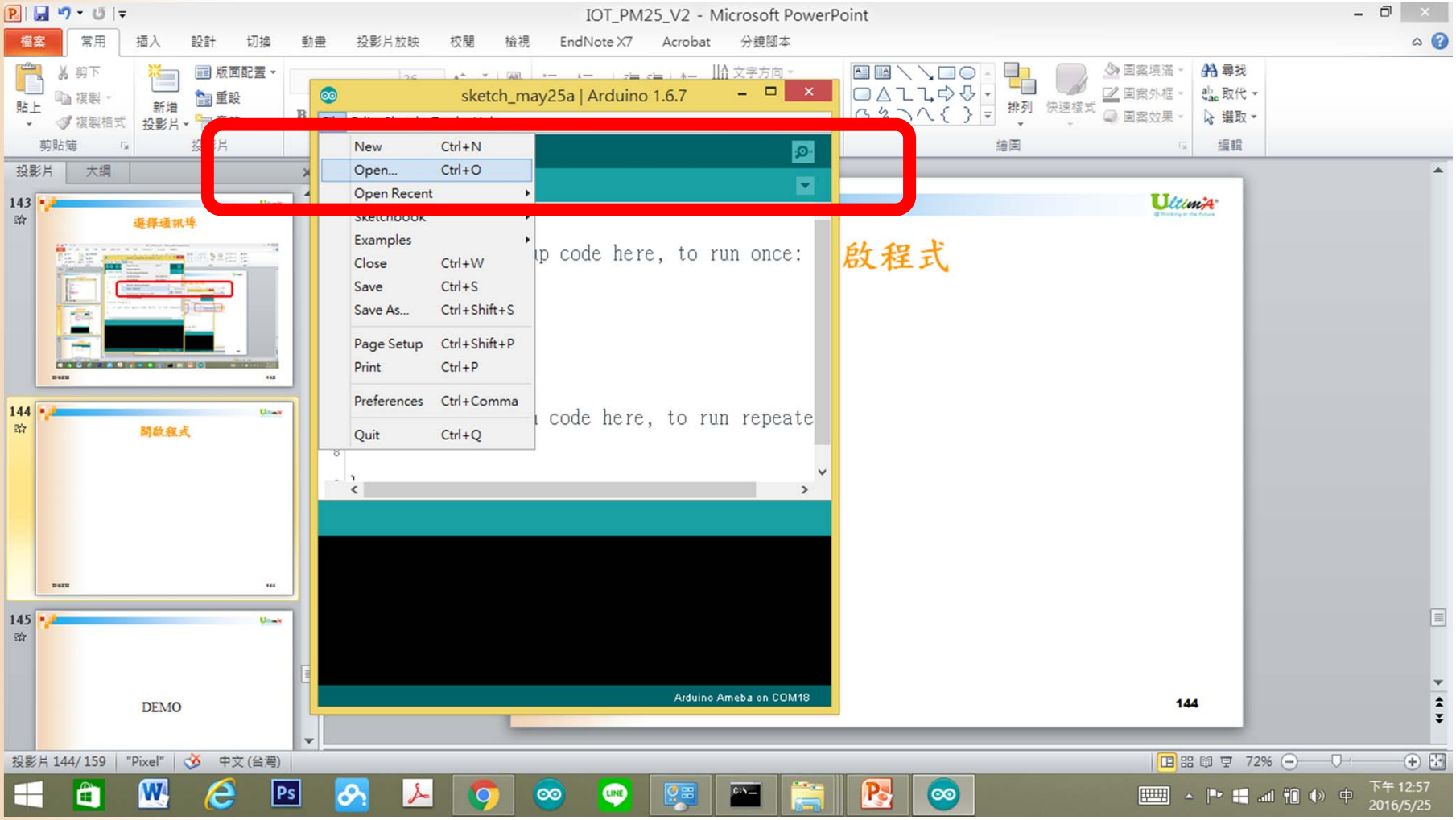
2016/5/25

選擇通訊埠

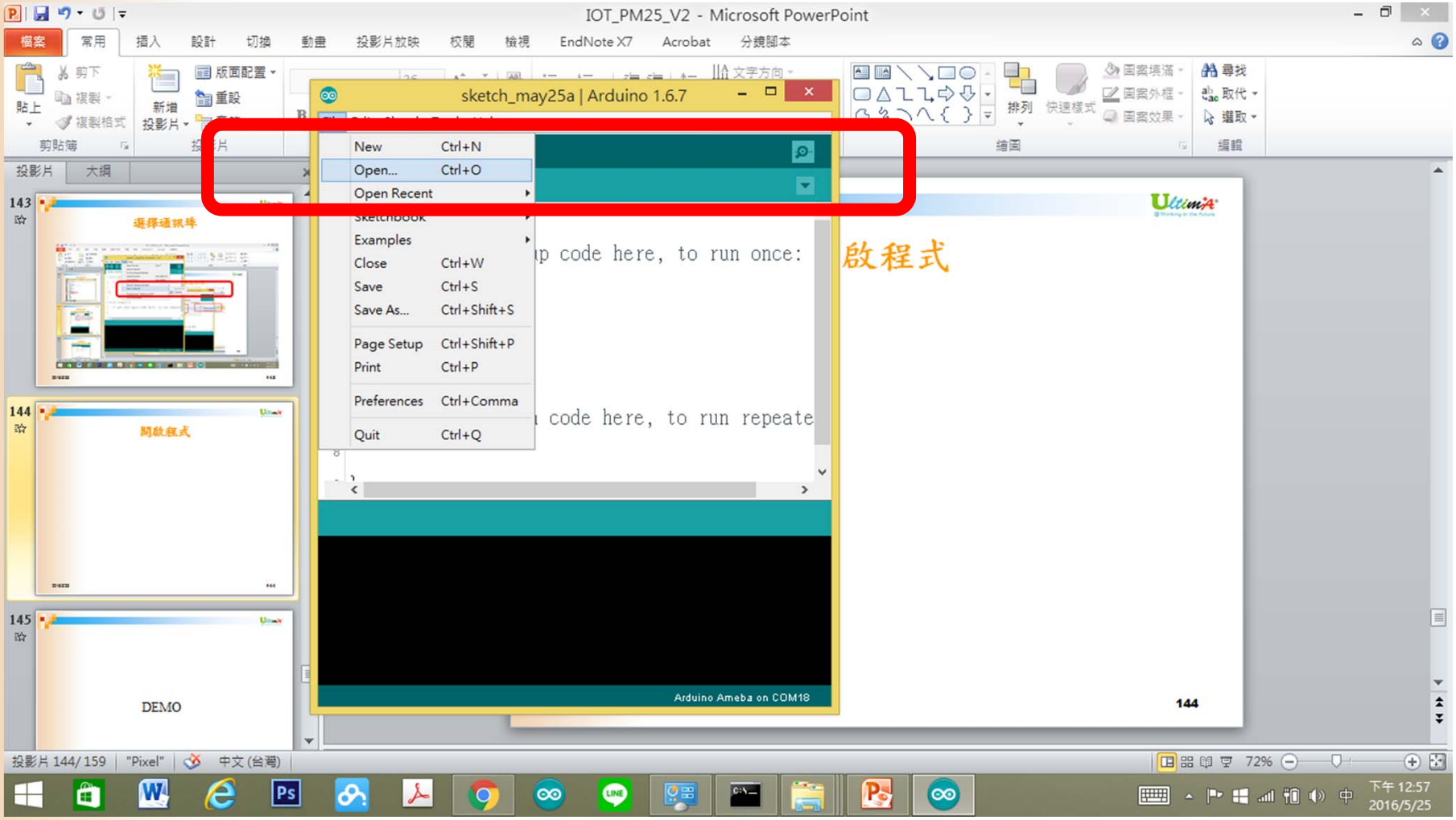

IOT_PM25_V2 - Microsoft PowerPoint
sketch_may25a | Arduino 1.6.7
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
Board: "Arduino Ameba"
Port: "COM18"
Programmer: "Arduino as ISP"
Burn Bootloader
Serial ports
COM18
void loop() {
// put your main code here, to run repeate
Arduino Ameba on COM18
143

開啟程式


IOT_PM25_V2 - Microsoft PowerPoint
sketch_may25a | Arduino 1.6.7
New Ctrl+N
Open... Ctrl+O
Open Recent
Examples
Close Ctrl+W
Save Ctrl+S
Save As... Ctrl+Shift+S
Page Setup Ctrl+Shift+P
Print Ctrl+P
Preferences Ctrl+Comma
Quit Ctrl+Q
p code here, to run once:
code here, to run repeate
Arduino Ameba on COM18
啟程式
144
DEMO

讀取WIFI MAC資料

開啟程式CheckMac

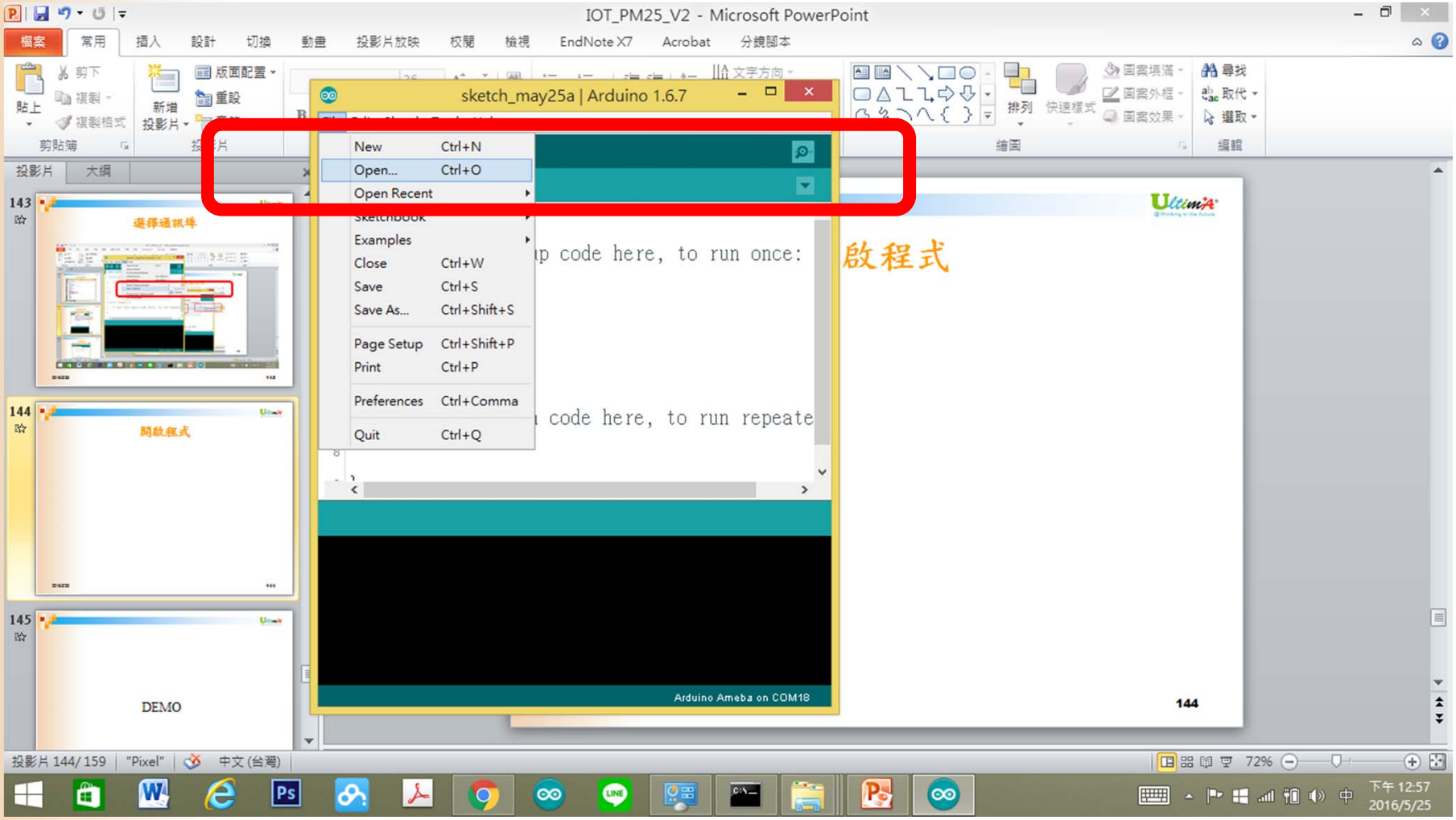


CheckMac 程式重點解說

- #include <WiFi.h> 使用網路必要函數
- uint8_t MacData[6];　儲存 MAC資料
- GetWifiMac()　取得MAC函數
- WiFi.status();　顯示WIFI狀態
- WiFi.macAddress(MacData);　取得MAC資料
- print2HEX()　轉換內容為十六進位碼

檢查AP是否連接的上

開啟程式CheckAP



CheckAP程式重點解說

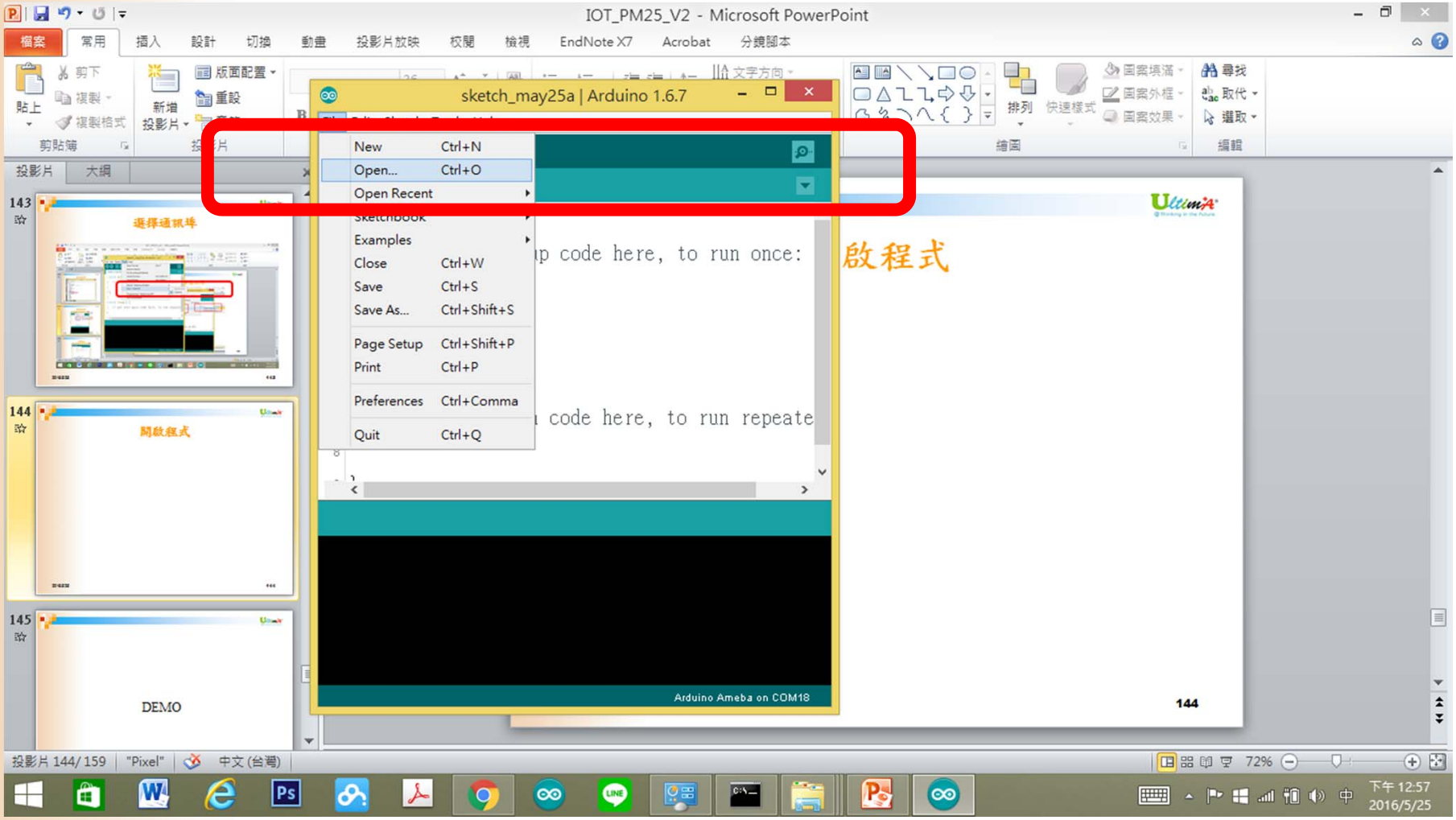
- #include <WiFi.h> 使用網路必要函數
- uint8_t MacData[6];　儲存 MAC資料
- IPAddress　Meip ,Megateway ,Mesubnet ; 宣告ip、閘道器、子網路遮罩
- int status = WL_IDLE_STATUS;　　連線網路狀態
- GetWifiMac()　　取得MAC函數
- ShowMac() ;　　秀出MAC資料
- WiFi.status();　　顯示WIFI狀態
- WiFi.macAddress(MacData);　取得MAC資料
- initializeWiFi();　　進行連線
- printWifiData() ;　　列印網路狀態資訊

CheckAP程式重點解說

- status = WiFi.begin(ssid);　　不使用加密連AP
- status = WiFi.begin(ssid, pass); 使用加密連AP
- status == WL_CONNECTED　　連AP是否成功
- WiFi.status()　連接成功狀態
- Meip = WiFi.localIP();　　取得連線IP
- Megateway = WiFi.gatewayIP();取得連線閘道器
- WiFi.subnetMask();　　取得連線子網路遮罩
-

ScanNetworks(掃描AP)

開啟程式ScanNetworks

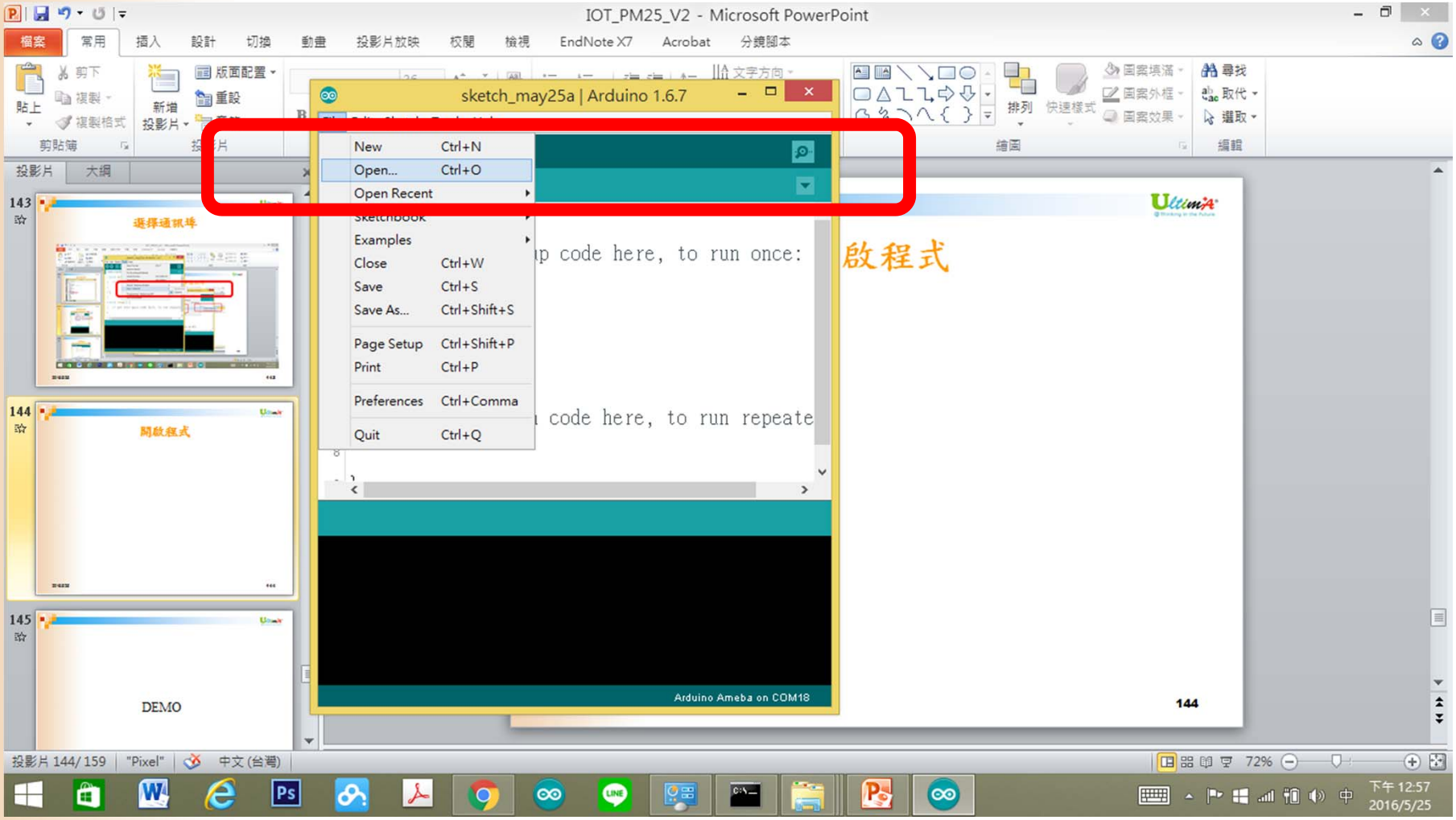


ScanNetworks 程式重點解說

- #include <WiFi.h> 使用網路必要函數
- WiFi.status() == WL_NO_SHIELD　　檢查有網路供能否
- WiFi.firmwareVersion();檢查網路韌體版本
- listNetworks()　　列出可連接到的AP(自訂)
- WiFi.scanNetworks();　取得可連接到的AP並存入(-1為沒有AP可連接)
- WiFi.SSID(n)　　可連接到的AP(n)的名字
- WiFi.RSSI(n)　　可連接到的AP(n)的RSSI
- WiFi.encryptionTypeEx(n)可連接到的AP(n)的加密方式I

WIFIAPMODE(啟動AP模式)

開啟程式WIFIAPMODE

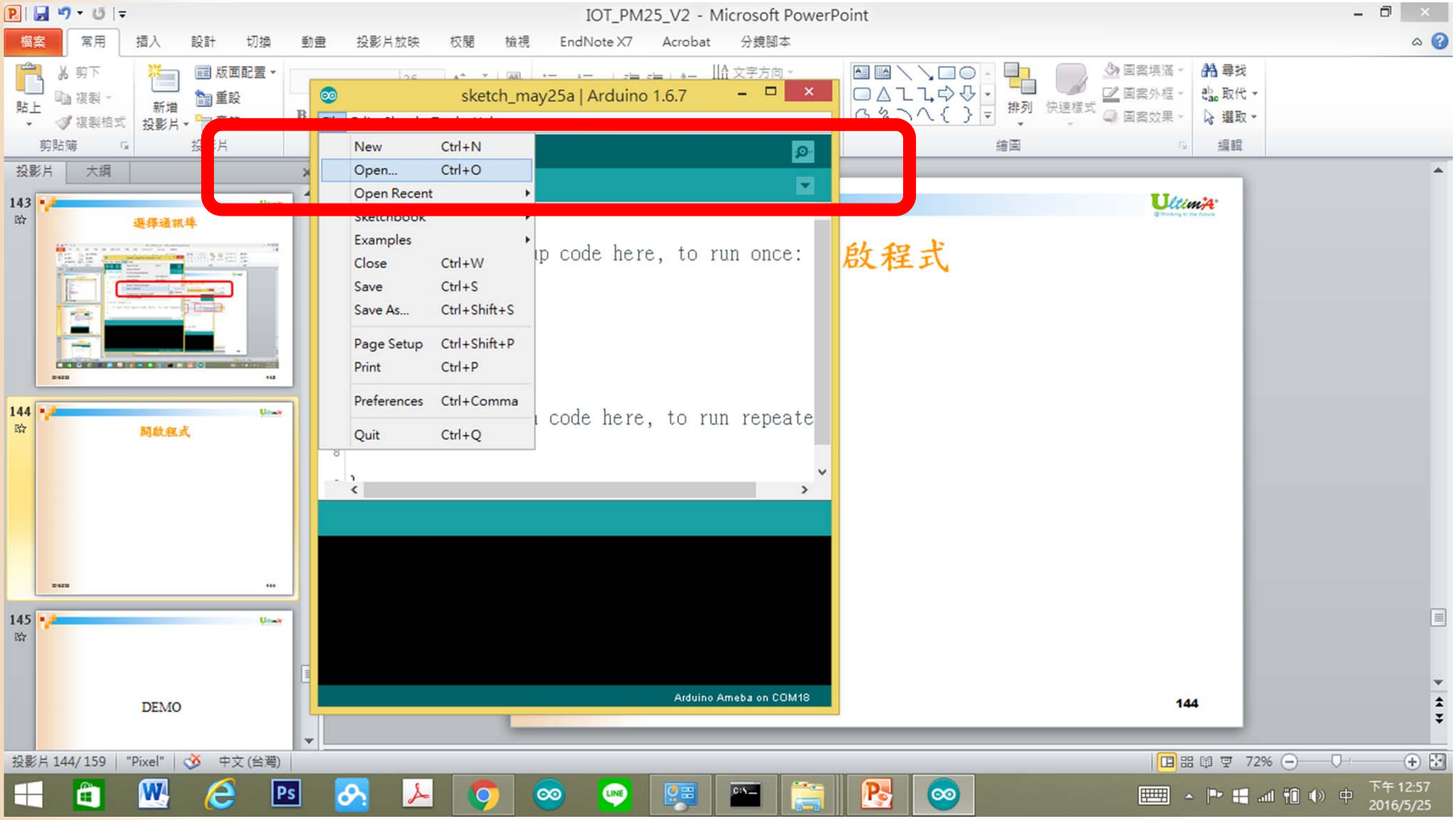


WIFIAPMODE程式重點解說

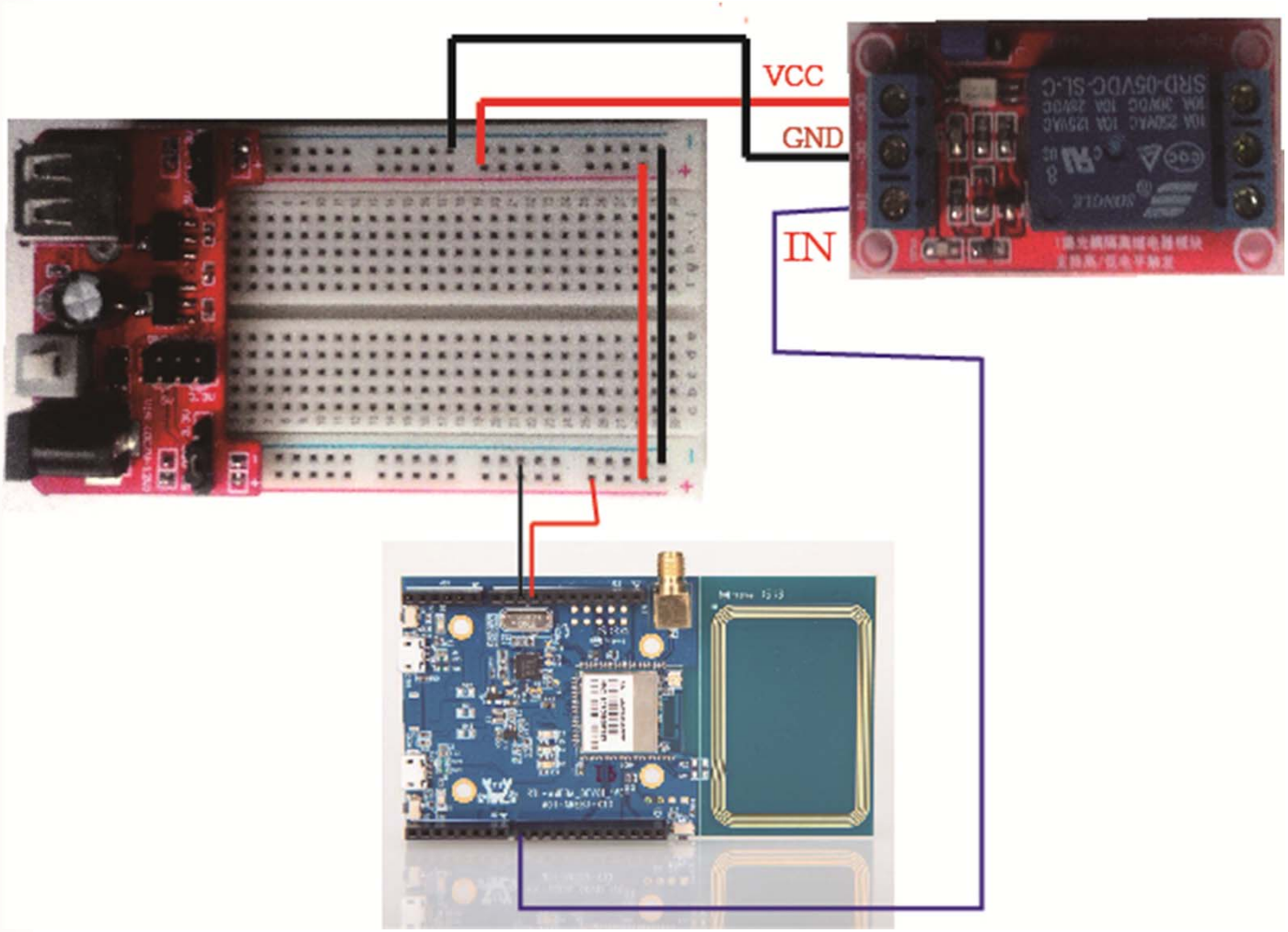
- WiFi.apbegin(ssid, pass, channel); 啟動AP模式
  - Ssid➔AP名字
  - Pass➔AP 連線密碼
  - Channel➔AP 連線通道
- printWifiData(); 列印網路資訊
- WiFi.BSSID(bssid); 列印AP網路資訊
- WiFi.encryptionType(); AP加密狀態

WebServerControlRelay
使用Client模式建立網頁伺服器

開啟程式WebServerControlRelay



電路連接



WebServerControlRelay程式重點解說

- #include <WiFi.h> 使用網路必要函數
- WiFiServer server(80); 啟動PORT 80進行
- status = WiFi.begin(ssid); 不使用加密連AP
- status = WiFi.begin(ssid, pass); 使用加密連AP
- server.begin(); 開始啟動PORT 80 傾聽
- printWifiStatus(); 列印網路資訊
- WiFiClient client = server.available(); 有人連接Port 80
- client.connected() 有用戶連接中
- client.available() 用戶送資料進來

WebServerControlRelay程式重點解說

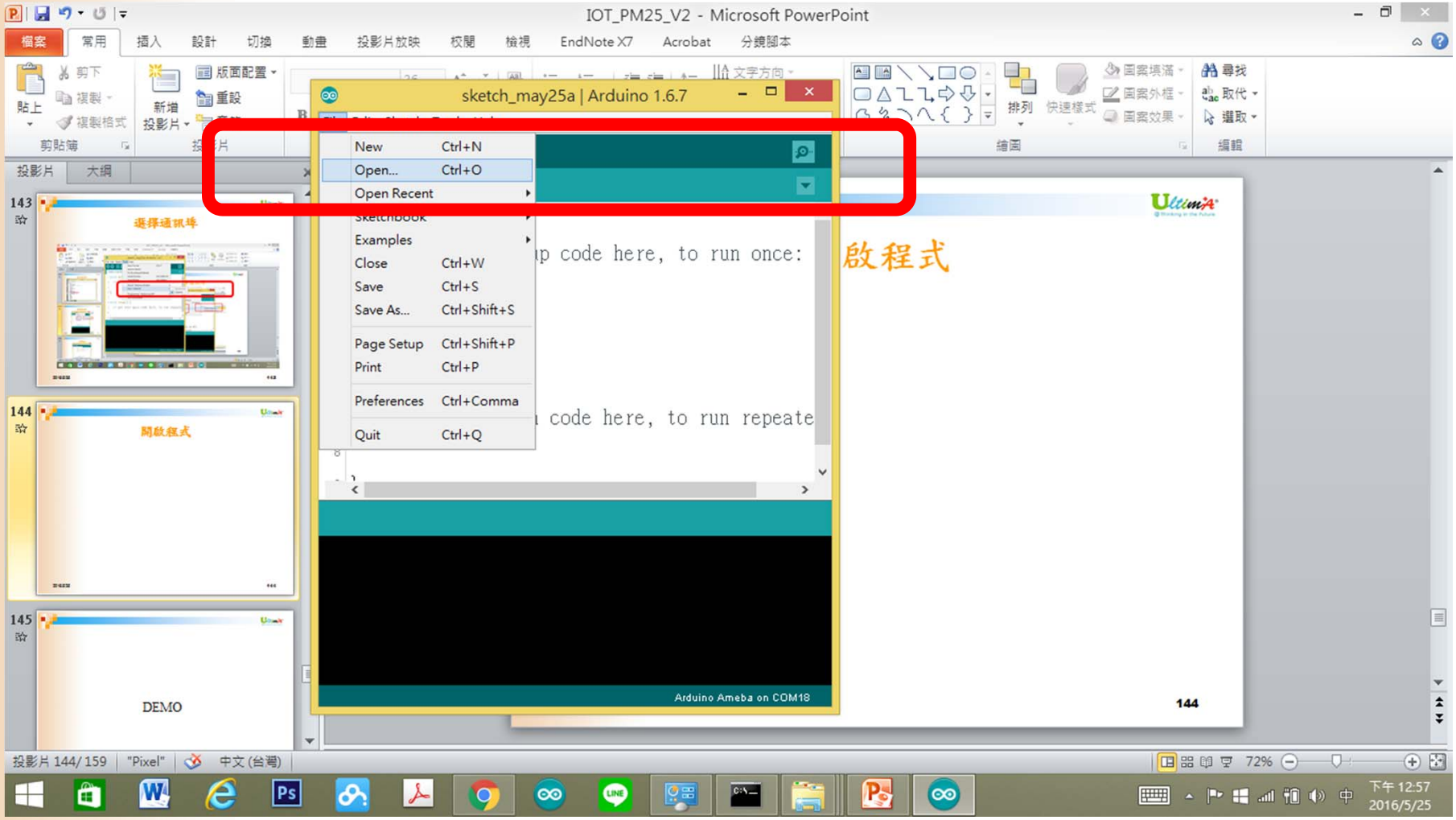
- char c = client.read();　　讀出用戶送的資料(一個位元組)
- client.println(“HTTP/1.1 200 OK”); ….　送給用戶端一段HTML碼，用瀏覽器方能顯示
- currentLine.endsWith(“GET /H”)　判斷是否用/H結束
- currentLine.endsWith(“GET /L”)　判斷是否用/L結束
- client.stop();　與用戶連線停止傳輸資料

網頁畫面

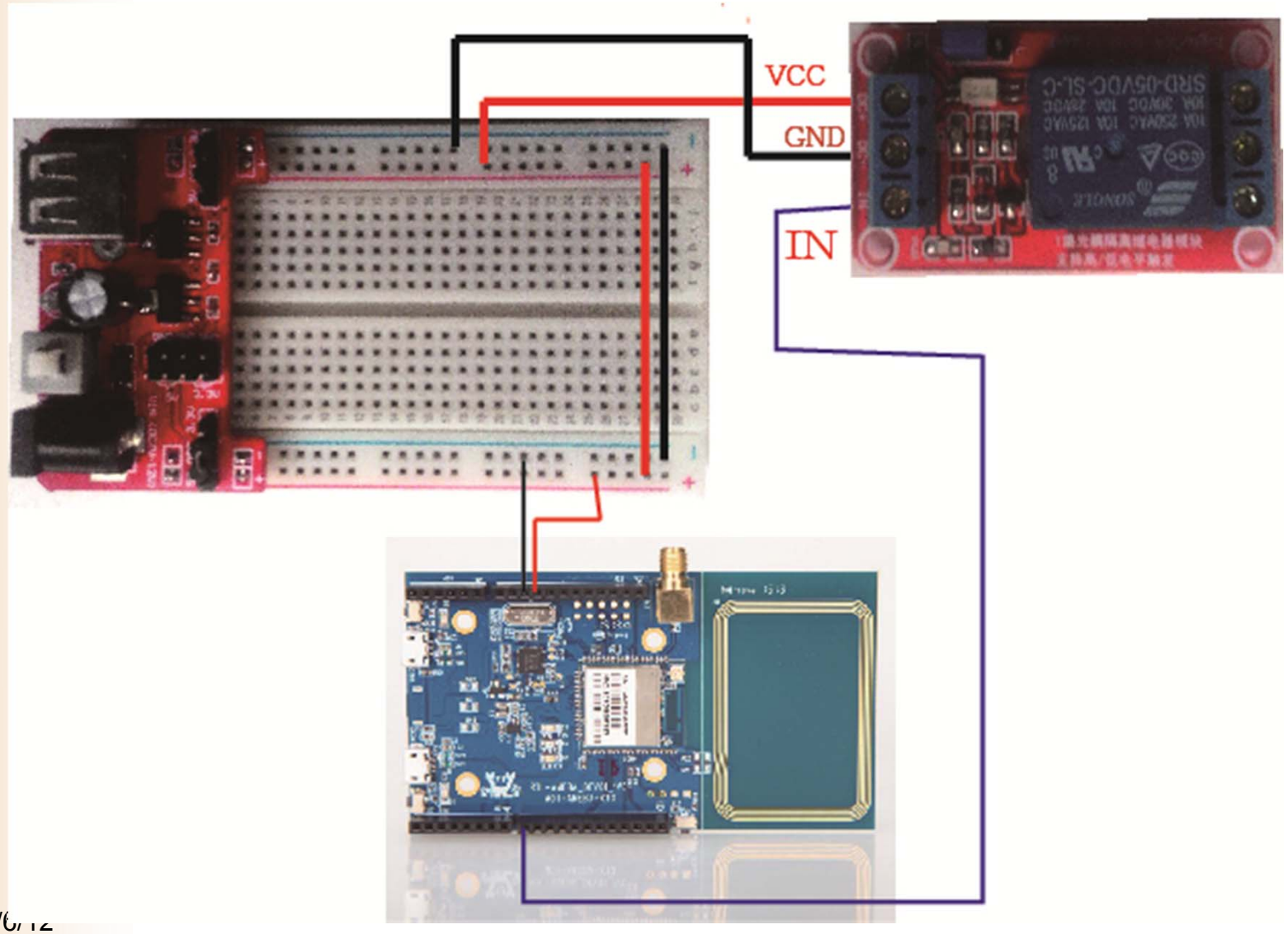

192.168.2.102
Click here turn Power on
Click here turn Power off

APMODEControlRelay
使用AP模式建立網頁伺服器

開啟程式APMODEControlRelay



電路連接



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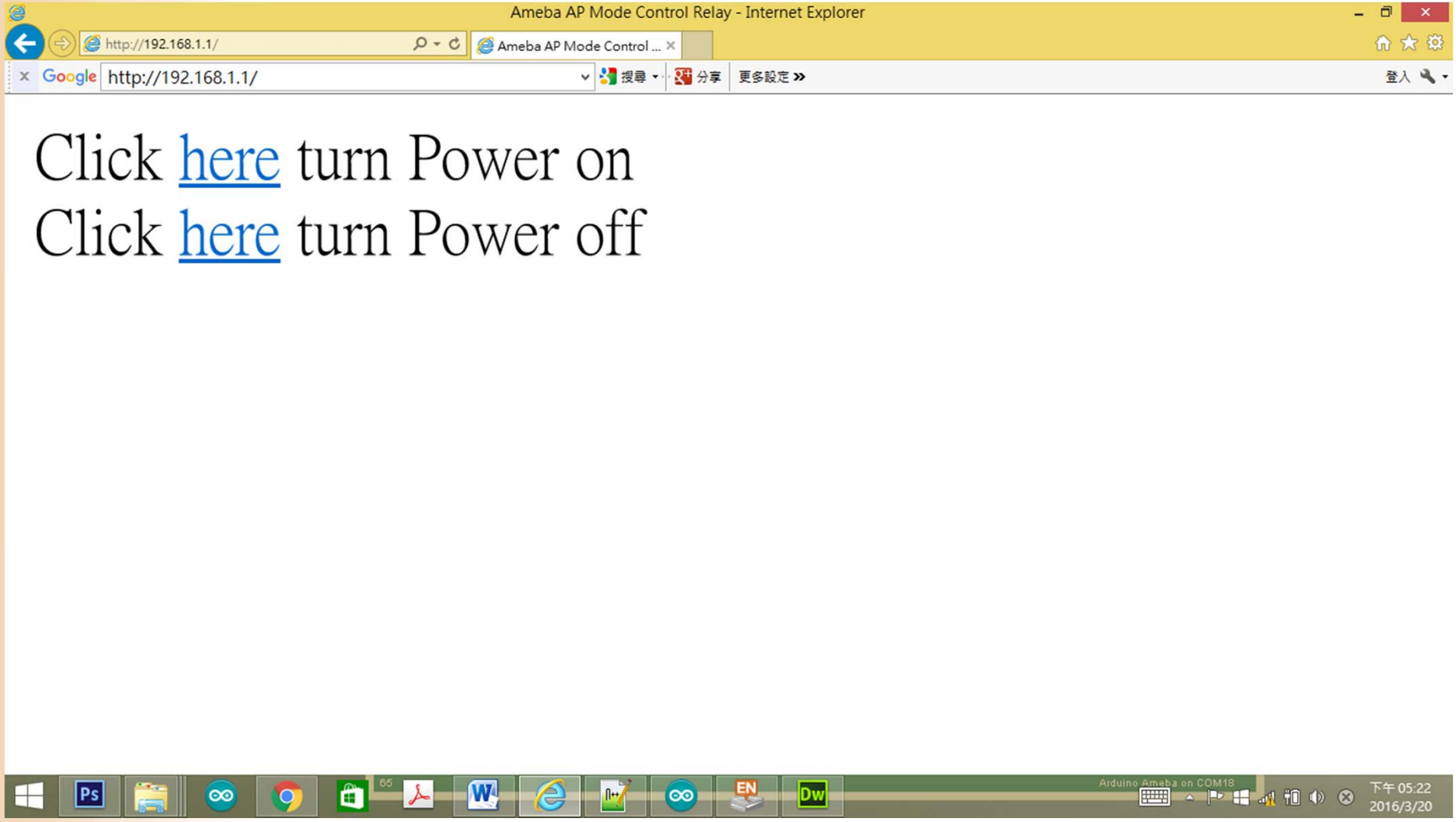
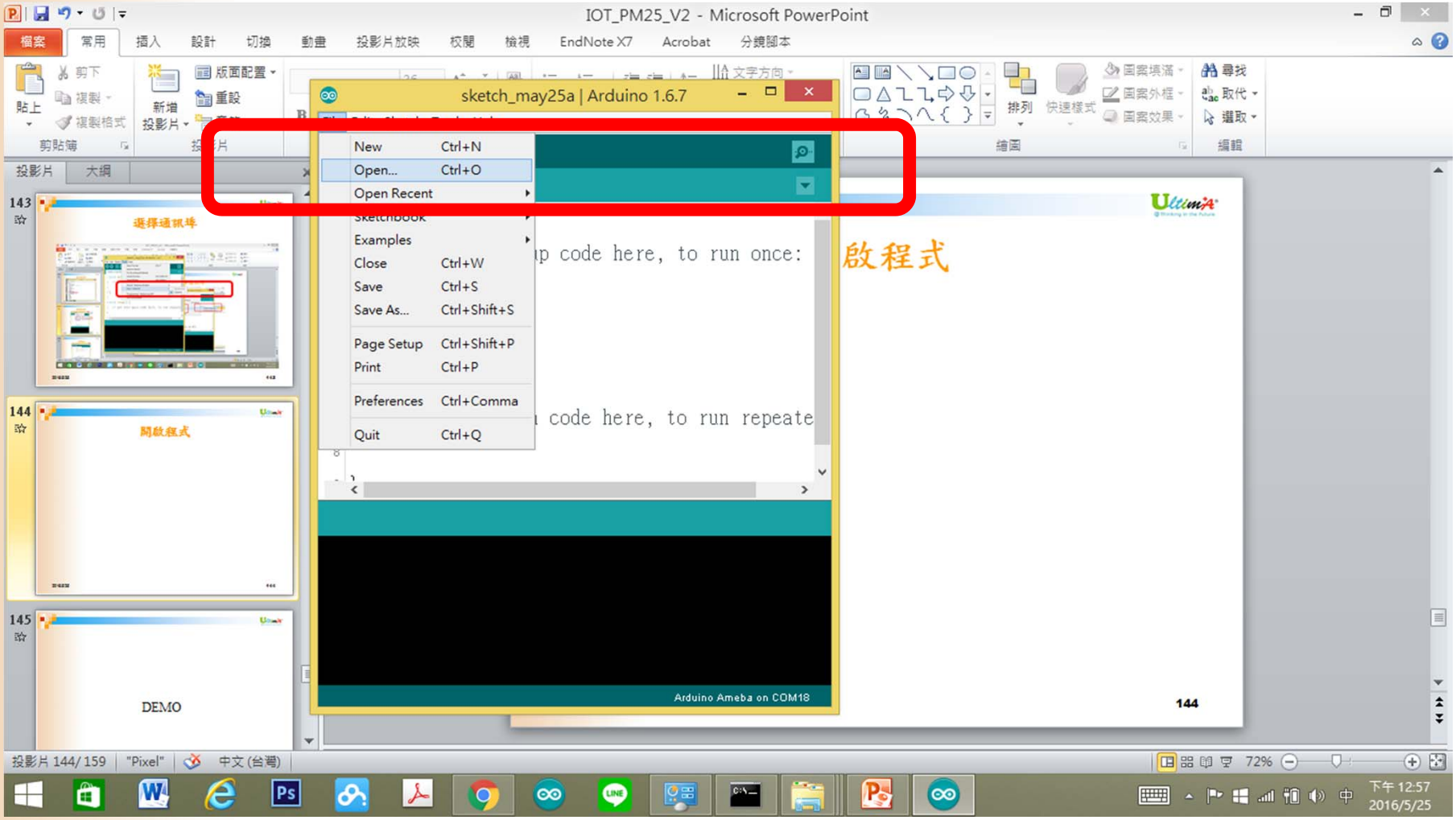
- currentLine.endsWith(“GET /H”)　判斷是否用/H結束
- currentLine.endsWith(“GET /L”)　判斷是否用/L結束
- client.stop();　與用戶連線停止傳輸資料

網頁畫面

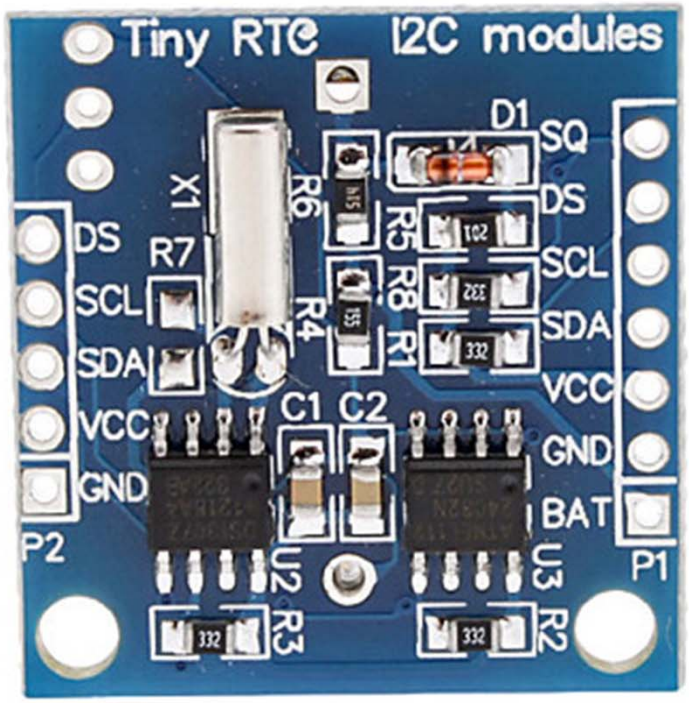

Ameba AP Mode Control Relay - Internet Explorer
http://192.168.1.1/
Ameba AP Mode Control ...
Google
http://192.168.1.1/
搜尋
分享
更多設定 »
登入
Click here turn Power on
Click here turn Power off
Arduino Ameba on COM18
下午 05:22
2016/3/20

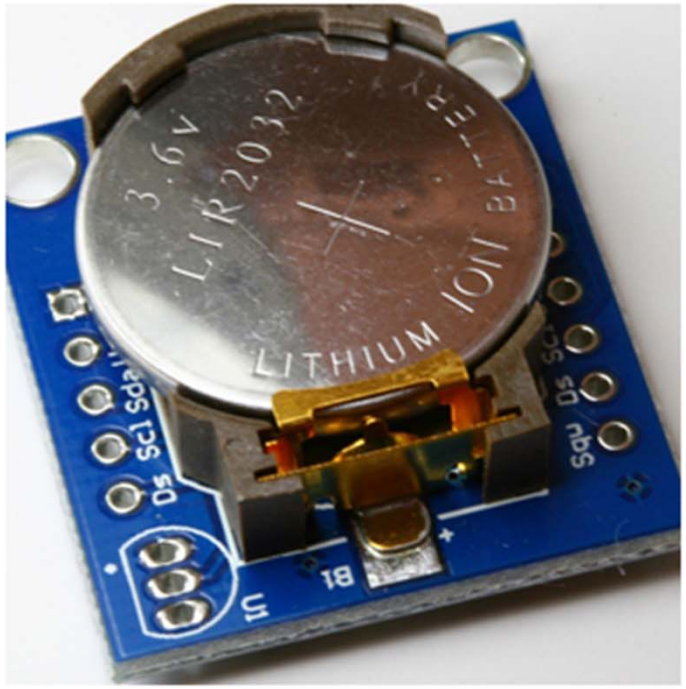
Set_RTC_Data(設定RTC時間)

開啟程式Set_RTC_Data

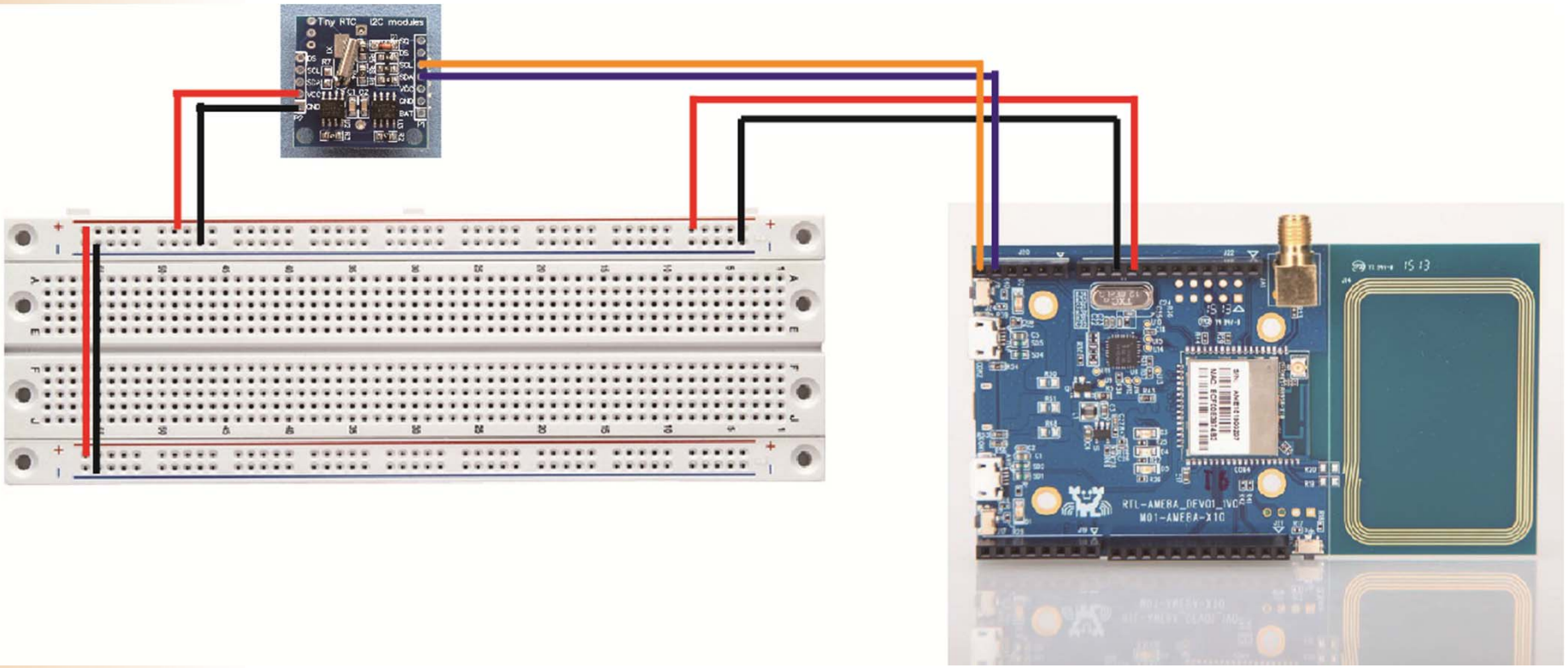


電路連接


Tiny RTC I2C modules
D1
SQ
DS
SCL
SDA
VCC
GND
BAT
X1
R6
R5
R8
R1
R4
R7
C1
C2
U2
U3
R3
R2
P2
P1


3.6v
LIR2032
LITHIUM ION
SCL
SDA
GND
VCC

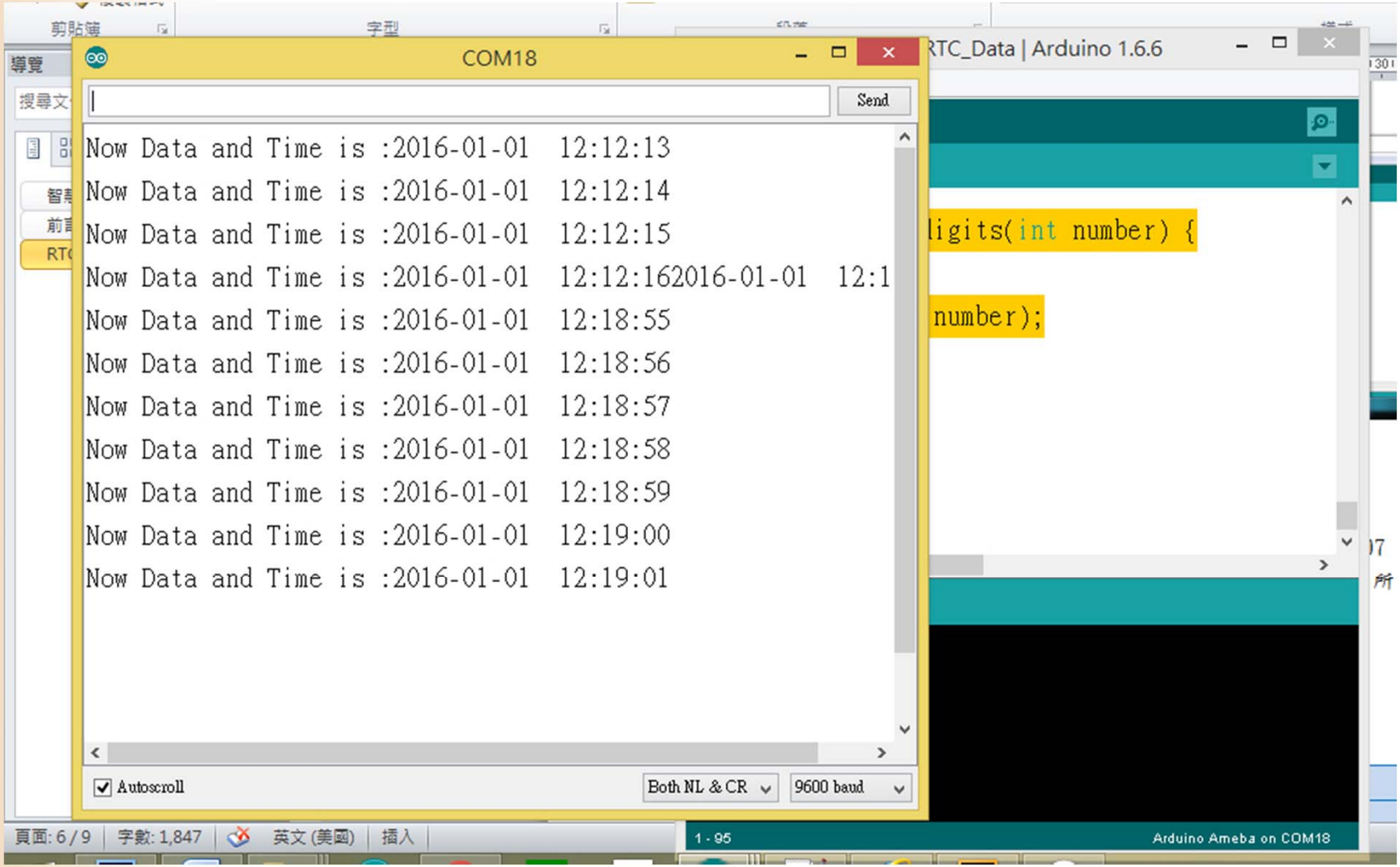
電路連接



Set_RTC_Data程式重點解說

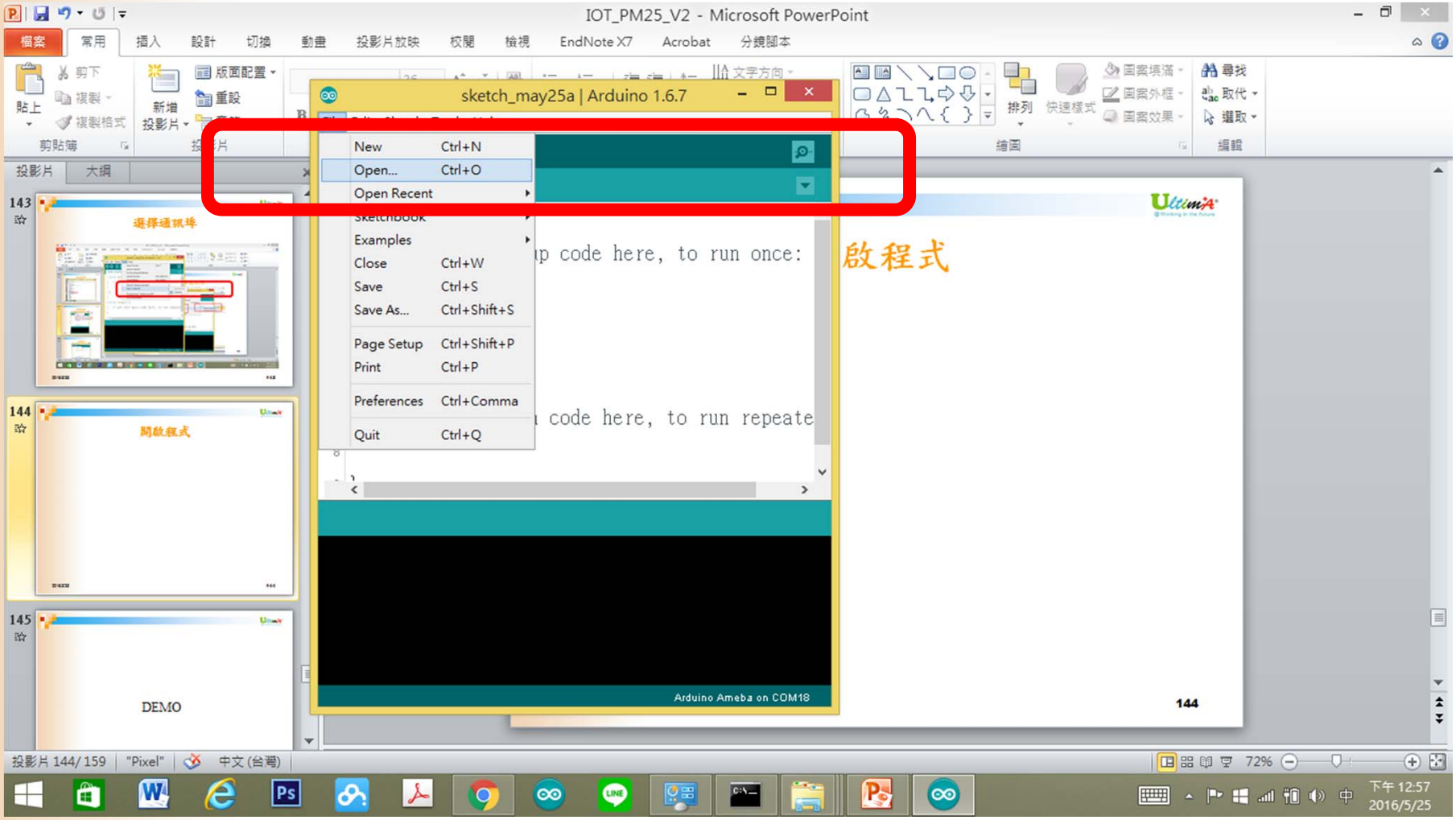
- #include <Wire.h>　　I2C通訊用
- #include “RTClib.h“　　DS1307 時鐘模組用
- RTC_DS1307 RTC;　　宣告時鐘物件
- initRTC() ; 啟動時鐘物件(自訂)
  - Wire.begin();　開始I2C通訊
  - RTC.begin();　開始時鐘物件通訊
  - RTC.isrunning()　時鐘物件順利啟動
- RTC.adjust(DateTime(mYear,mMonth,mDay,mHour,mMinute,mSecond));　調整設定DS1307 時鐘模組時間內容

執行畫面

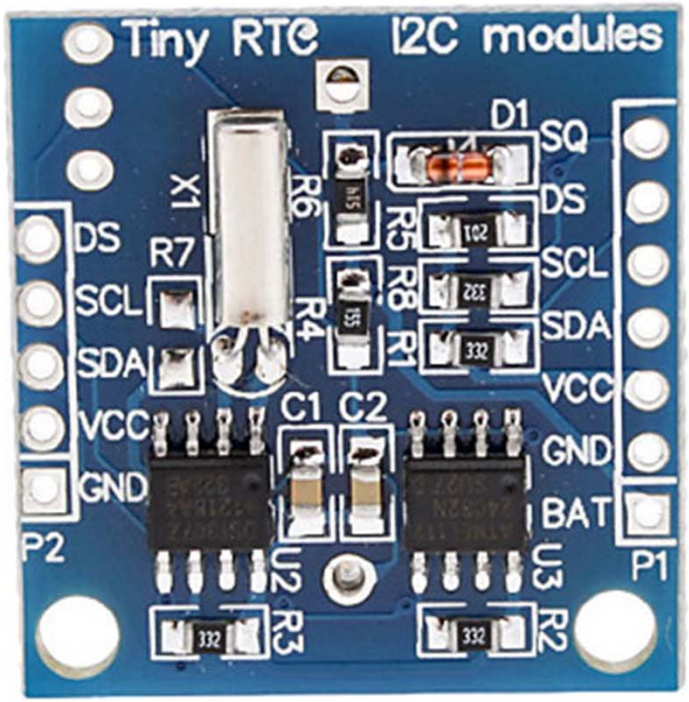

COM18
Send
Now Data and Time is :2016-01-01 12:12:13
Now Data and Time is :2016-01-01 12:12:14
Now Data and Time is :2016-01-01 12:12:15
Now Data and Time is :2016-01-01 12:12:162016-01-01 12:1
Now Data and Time is :2016-01-01 12:18:55
Now Data and Time is :2016-01-01 12:18:56
Now Data and Time is :2016-01-01 12:18:57
Now Data and Time is :2016-01-01 12:18:58
Now Data and Time is :2016-01-01 12:18:59
Now Data and Time is :2016-01-01 12:19:00
Now Data and Time is :2016-01-01 12:19:01
Autoscroll
Both NL & CR
9600 baud
RTC_Data | Arduino 1.6.6
ligits(int number) {
number);
Arduino Ameba on COM18

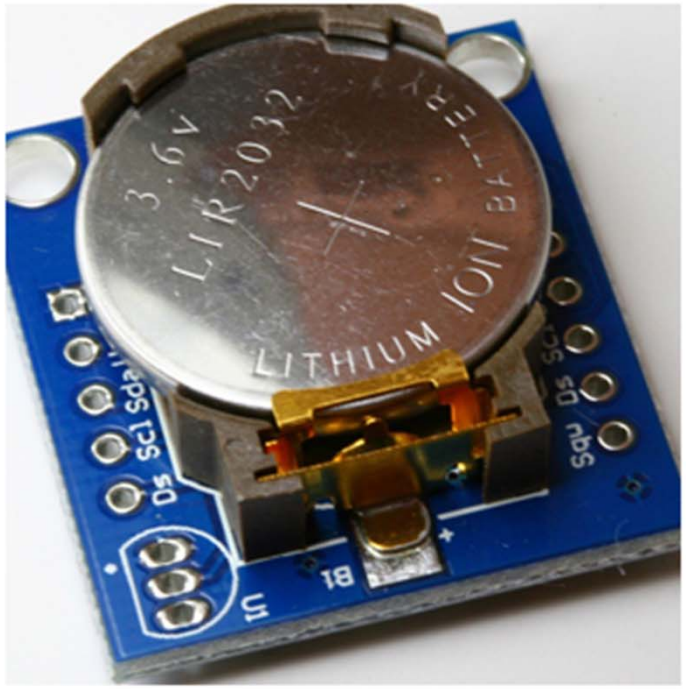
ReadTime(讀取RTC時間)

開啟程式ReadTime

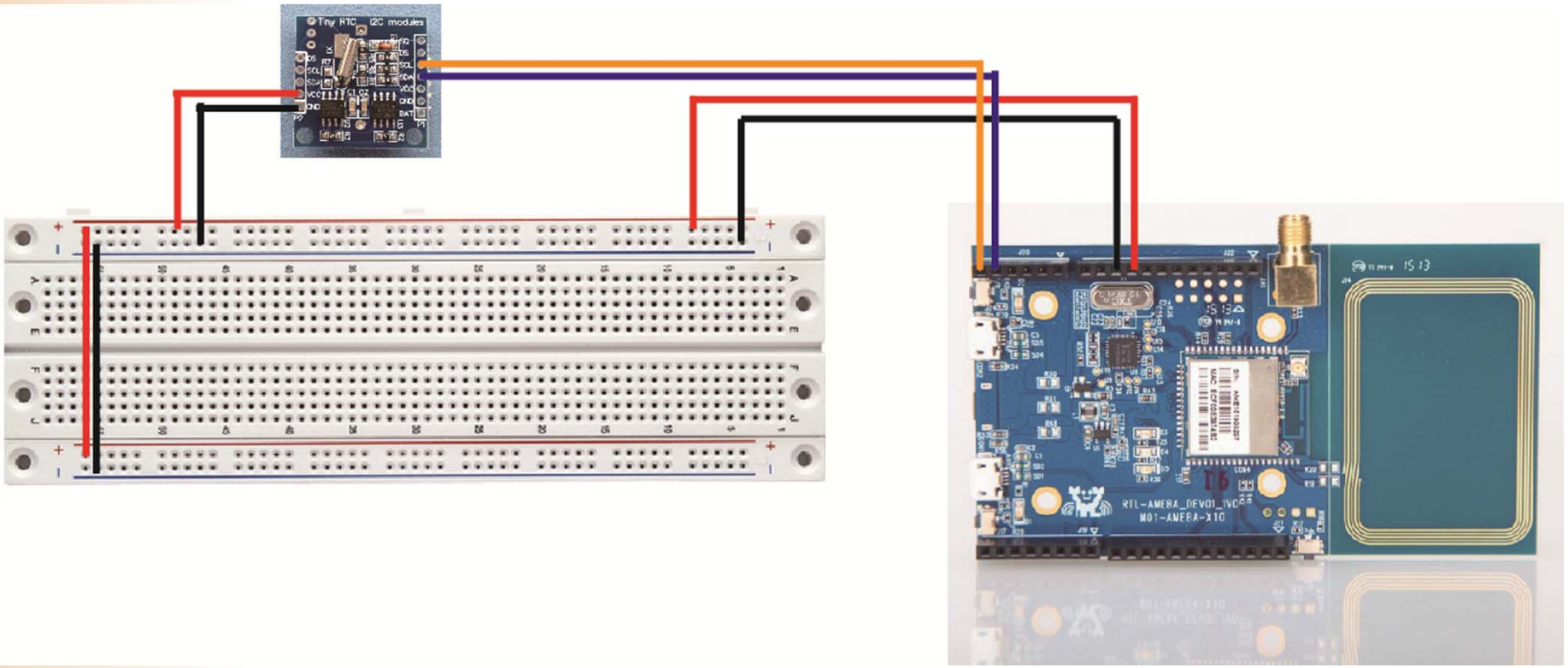


電路連接


Tiny RTC I2C modules
D1
SQ
DS
SCL
SDA
VCC
GND
BAT
X1
R6
R5
R8
R1
R4
R7
C1
C2
U2
U3
R3
R2
P2
P1


3.6v
LIR2032
LITHIUM ION
SCL SDA
SDA SCL
BT1

電路連接



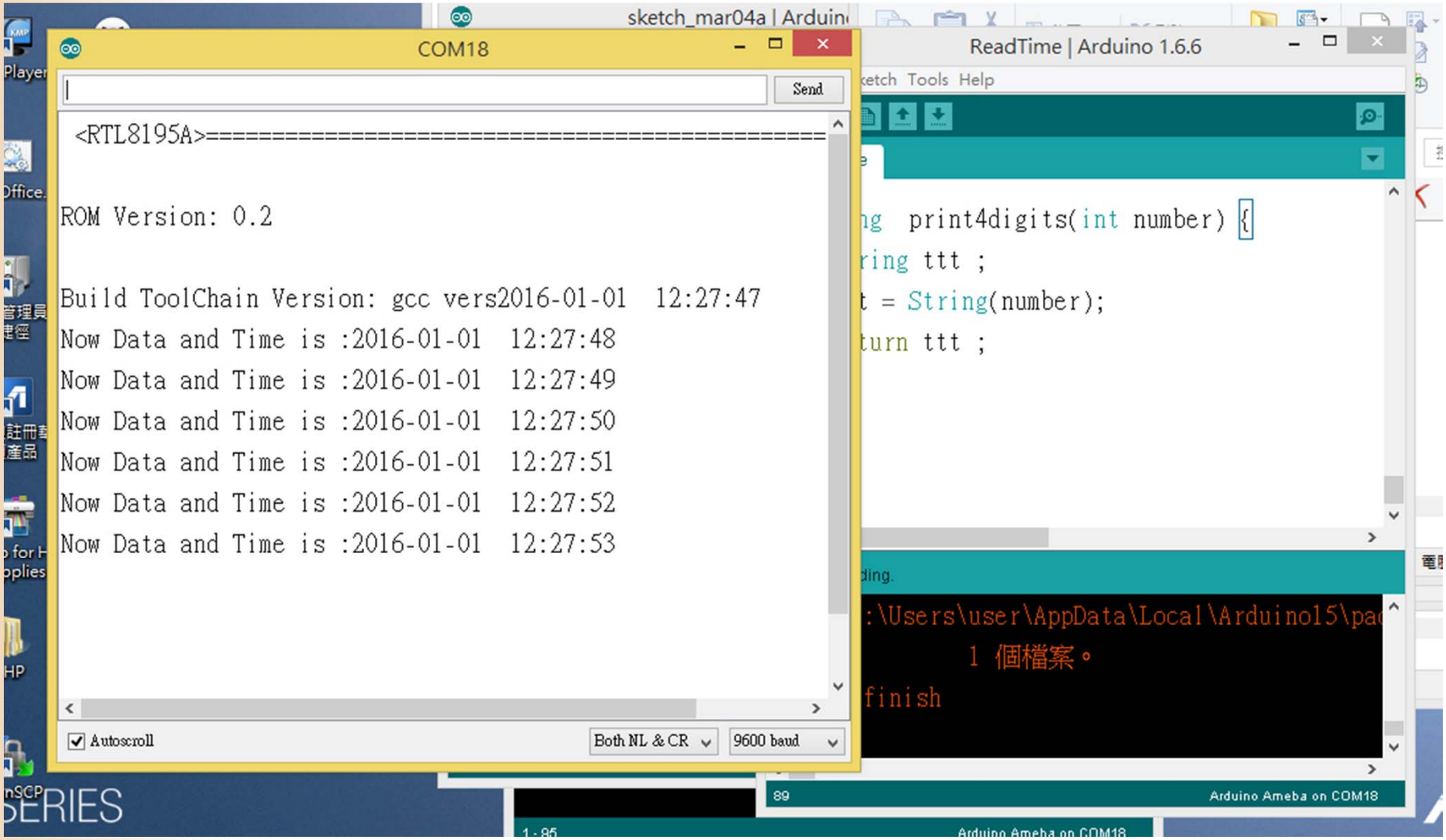
ReadTime程式重點解說

- #include <Wire.h>　　I2C通訊用
- #include “RTClib.h“　　DS1307 時鐘模組用
- RTC_DS1307 RTC;　　宣告時鐘物件
- initRTC() ; 啟動時鐘物件(自訂)
  - Wire.begin();　開始I2C通訊
  - RTC.begin();　　開始時鐘物件通訊
  - RTC.isrunning()　時鐘物件順利啟動
- ShowDateTime() 顯示DS1307 時鐘內容(自訂)

ReadTime程式重點解說

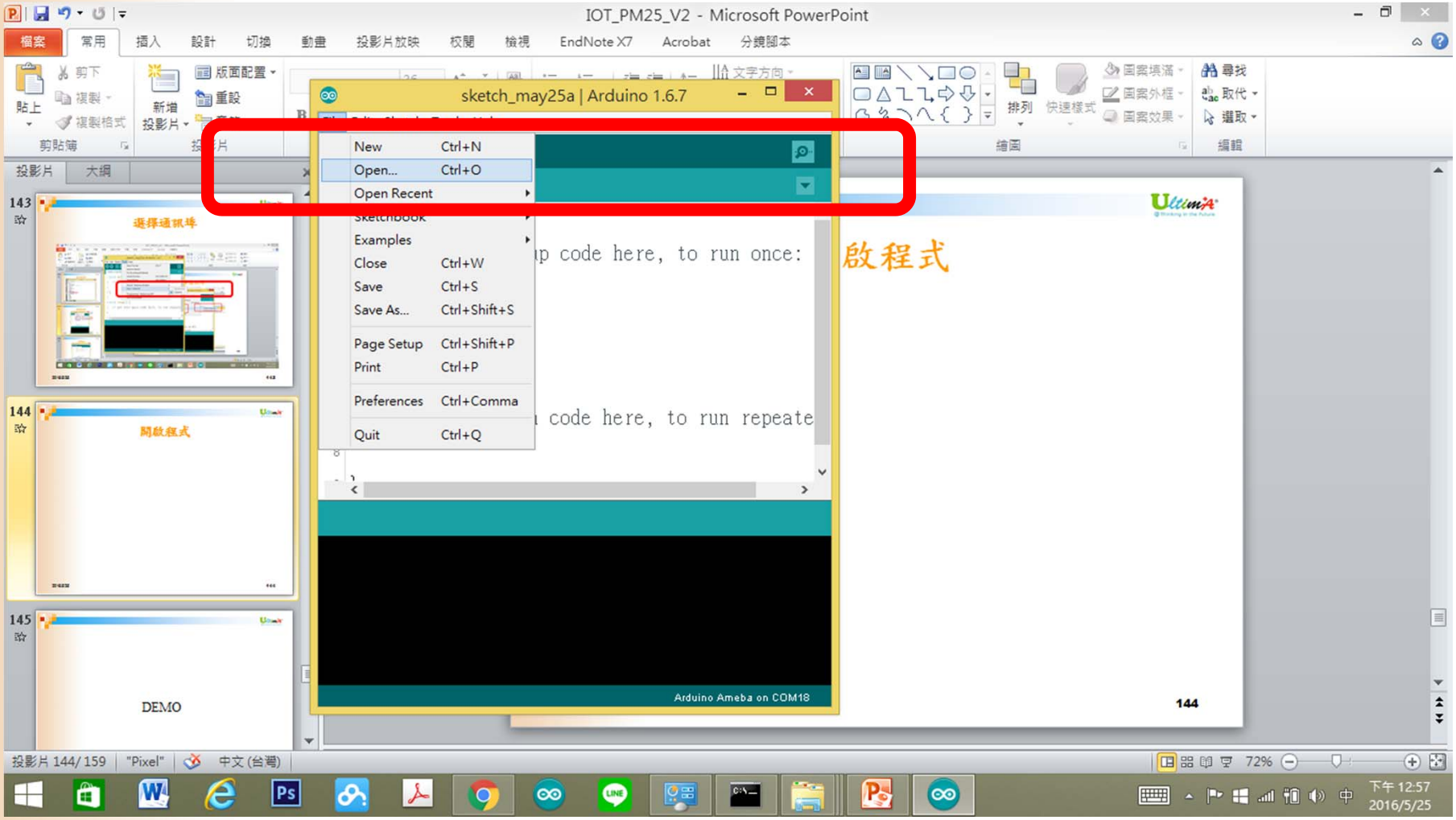
- DateTime now = RTC.now();　取得RTC時鐘物件
  - now.hour()　　取得小時
  - now.minute()　取得分
  - now.second()　取得秒
  - now.year()　　取得年
  - now.month()　取得月
  - now.day()　　取得日

執行畫面


COM18
Send
<RTL8195A>==========
ROM Version: 0.2
Build ToolChain Version: gcc vers2016-01-01 12:27:47
Now Data and Time is :2016-01-01 12:27:48
Now Data and Time is :2016-01-01 12:27:49
Now Data and Time is :2016-01-01 12:27:50
Now Data and Time is :2016-01-01 12:27:51
Now Data and Time is :2016-01-01 12:27:52
Now Data and Time is :2016-01-01 12:27:53
Autoscroll
Both NL & CR
9600 baud
ReadTime | Arduino 1.6.6
print4digits(int number) {
String(number);
finish
Arduino Ameba on COM18

UdpNtpClient
讀取網路時間資料

開啟程式UdpNtpClient



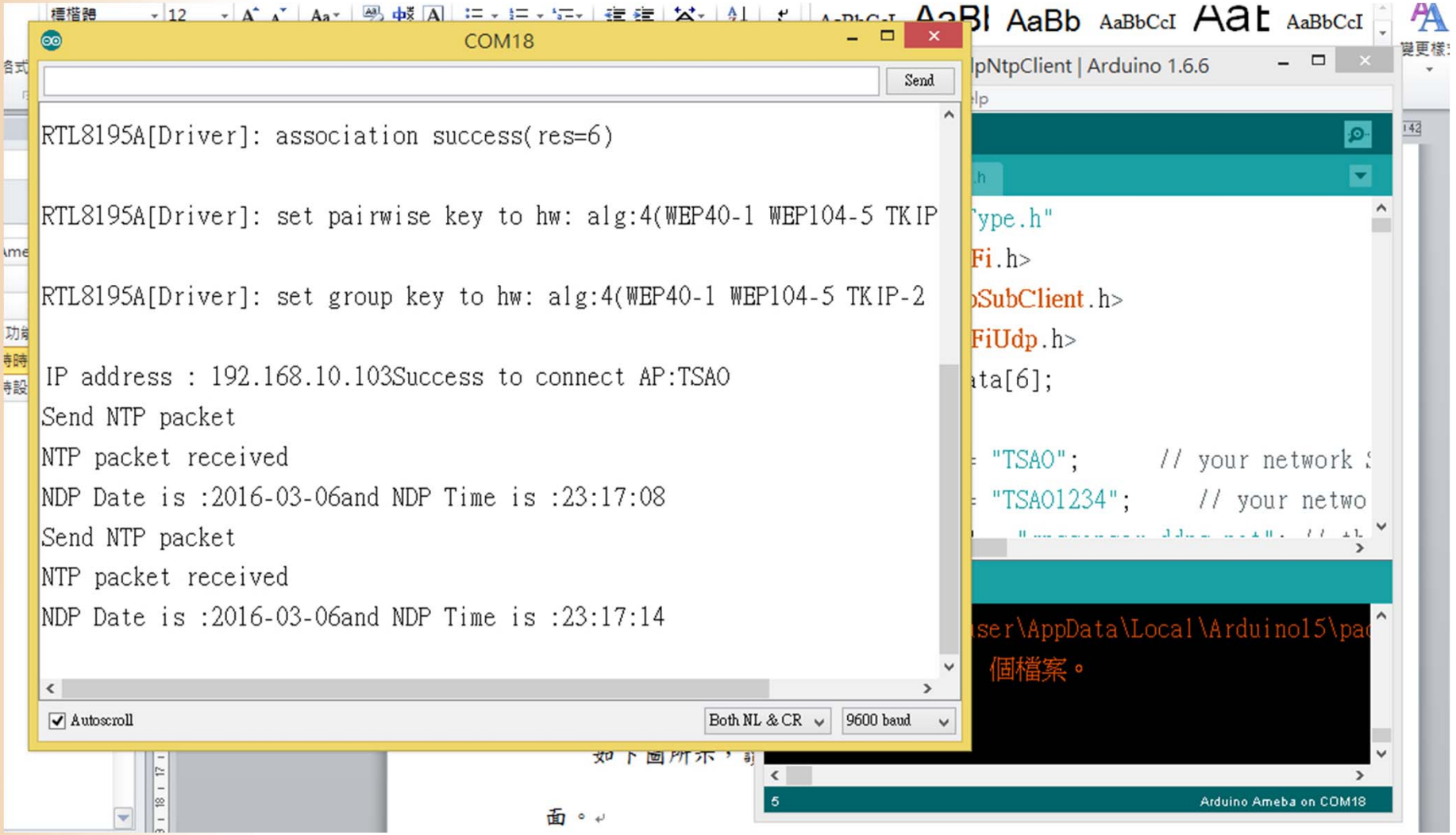
UdpNtpClient程式重點解說

- #include <WiFi.h> 使用網路必要函數
- #include <PubSubClient.h>使用網路UDP必要函數
- #include <WiFiUdp.h>使用網路UDP必要函數
- uint8_t MacData[6]; 儲存 MAC資料
- const char ntpServer[] = “pool.ntp.org”; 網路時間伺服器
- initializeWiFi(); 啟動網路
- ShowNTPDateTime() ; 取得網路時間並顯示
  - retrieveNtpTime() ;取得網路時間
  - getCurrentTime(epoch+timeZoneOffset, &NDPyear, &NDPmonth, &NDPday, &NDPhour, &NDPminute, &NDPsecond); 將網路時間存入變數

UdpNtpClient程式重點解說

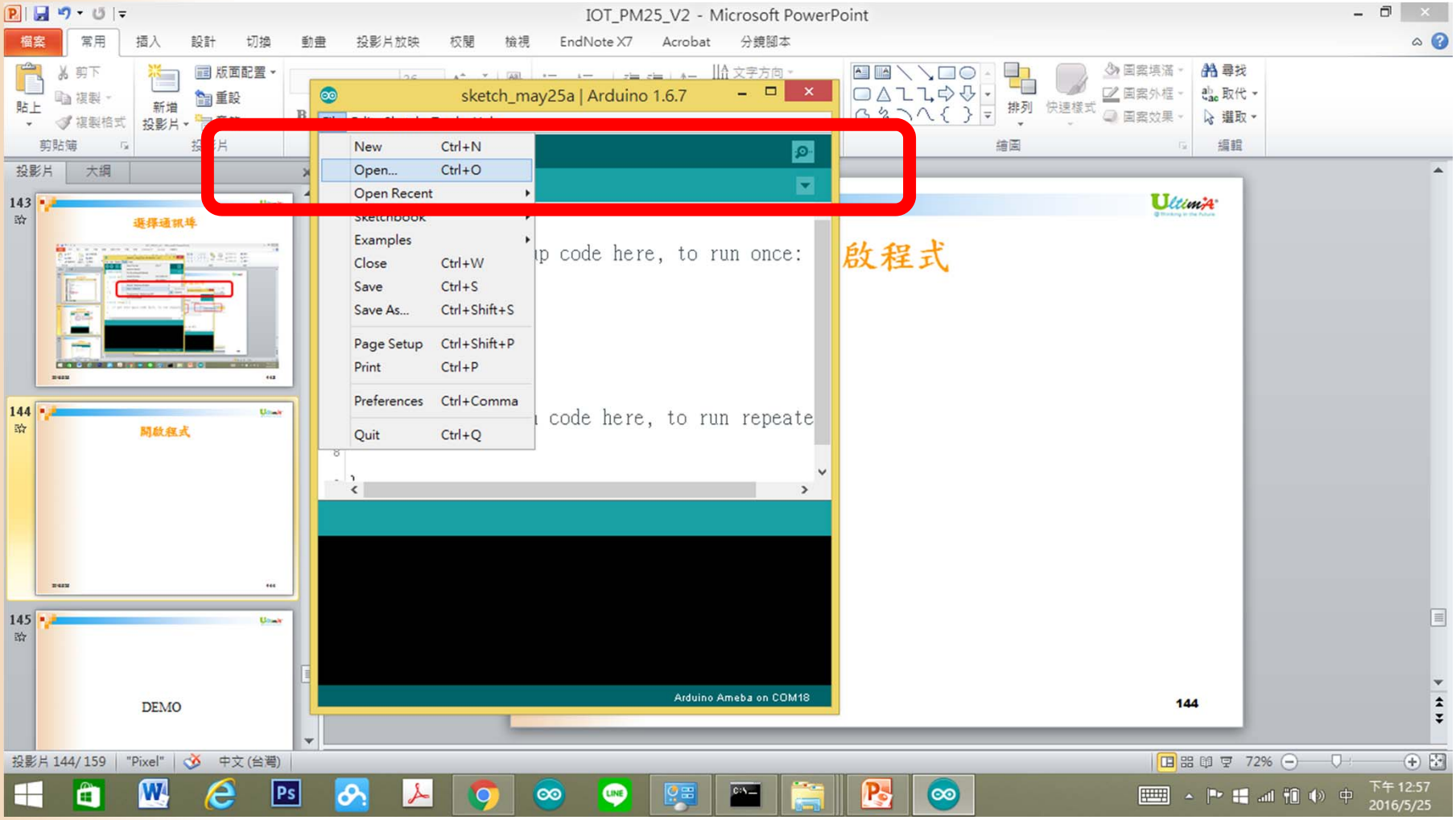
- Udp.beginPacket(ntpServer, 123)　與網路伺服器通訊
- Udp.write(nptSendPacket, NTP_PACKET_SIZE); 告訴網路伺服器要取得時間
- Udp.endPacket();　結束通訊
- Udp.parsePacket()　得到網路伺服器傳送時間資料通知
- Udp.read(ntpRecvBuffer, NTP_PACKET_SIZE) 讀取網路伺服器傳送時間資料
- epoch = secsSince1900 - seventyYears ; 計算時間
- epochSystem = epoch - millis() / 1000;計算時間(秒)
- getCurrentTime()　計算網路時間，回傳年、月、日、時、分、秒到變數

執行畫面


COM18
Send
RTL8195A[Driver]: association success(res=6)
RTL8195A[Driver]: set pairwise key to hw: alg:4(WEP40-1 WEP104-5 TKIP
RTL8195A[Driver]: set group key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2
IP address : 192.168.10.103Success to connect AP:TSAO
Send NTP packet
NTP packet received
NDP Date is :2016-03-06and NDP Time is :23:17:08
Send NTP packet
NTP packet received
NDP Date is :2016-03-06and NDP Time is :23:17:14
Autoscroll
Both NL & CR
9600 baud
pNtpClient | Arduino 1.6.6
"TSAO"; // your network
"TSAO1234"; // your netwo
Arduino Ameba on COM18

SetTime_fromNet
網路校時

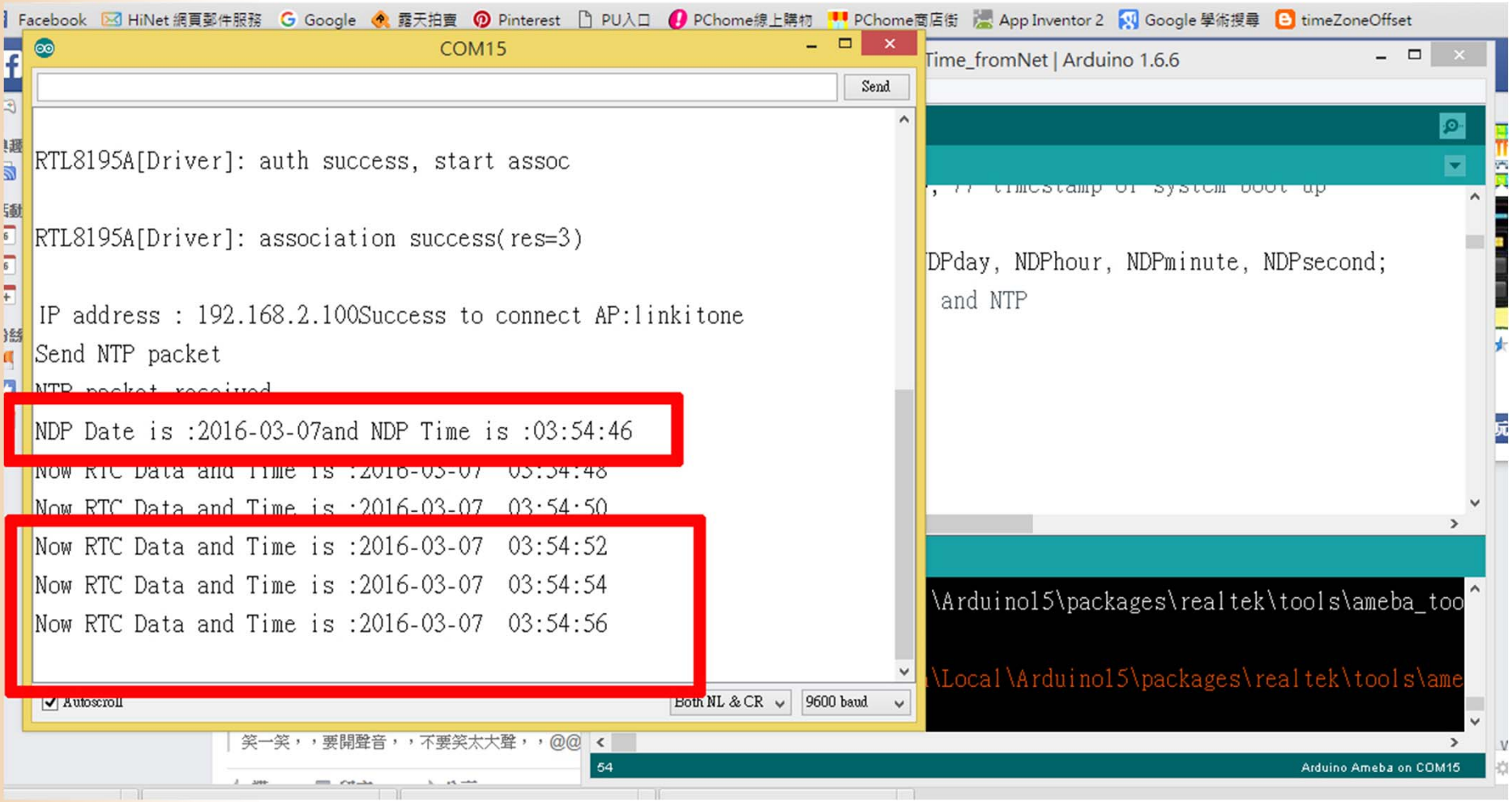
開啟程式SetTime_fromNet



SetTime_fromNet程式重點解說

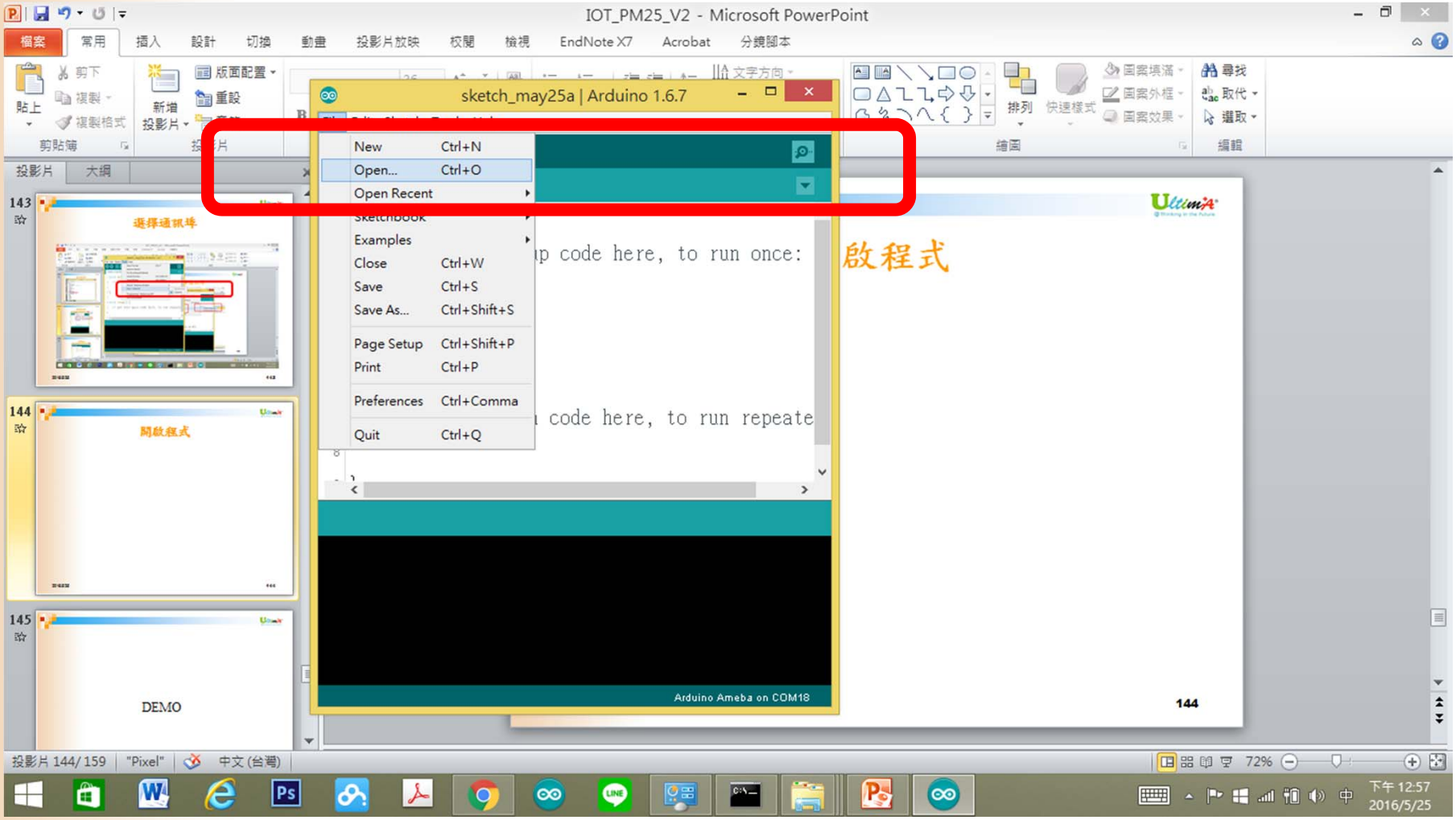
- #include <WiFi.h> 使用網路必要函數
- uint8_t MacData[6];　儲存 MAC資料
- initRTC() ;　初始化時鐘模組
- ShowNTPDateTime() ;　取得網路時間並顯示
  - retrieveNtpTime() ;取得網路時間
  - getCurrentTime(epoch+timeZoneOffset, &NDPyear, &NDPmonth, &NDPday, &NDPhour, &NDPminute, &NDPsecond); 將網路時間存入變數
- SetRTCTime(NDPyear, NDPmonth, NDPday, NDPhour, NDPminute, NDPsecond); 將取得網路時間調整時鐘模組

執行畫面


COM15
Send
RTL8195A[Driver]: auth success, start assoc
RTL8195A[Driver]: association success(res=3)
IP address : 192.168.2.100Success to connect AP:linkitone
Send NTP packet
NDP Date is :2016-03-07and NDP Time is :03:54:46
Now RTC Data and Time is :2016-03-07 03:54:50
Now RTC Data and Time is :2016-03-07 03:54:52
Now RTC Data and Time is :2016-03-07 03:54:54
Now RTC Data and Time is :2016-03-07 03:54:56
Autoscroll
Both NL & CR
9600 baud
Time_fromNet | Arduino 1.6.6
DPday, NDPhour, NDPminute, NDPsecond;
and NTP
\Arduino15\packages\realtek\tools\ameba_too
\Local\Arduino15\packages\realtek\tools\ame
Arduino Ameba on COM15

WiFiWebClient
讀取網頁資料

開啟程式WiFiWebClient

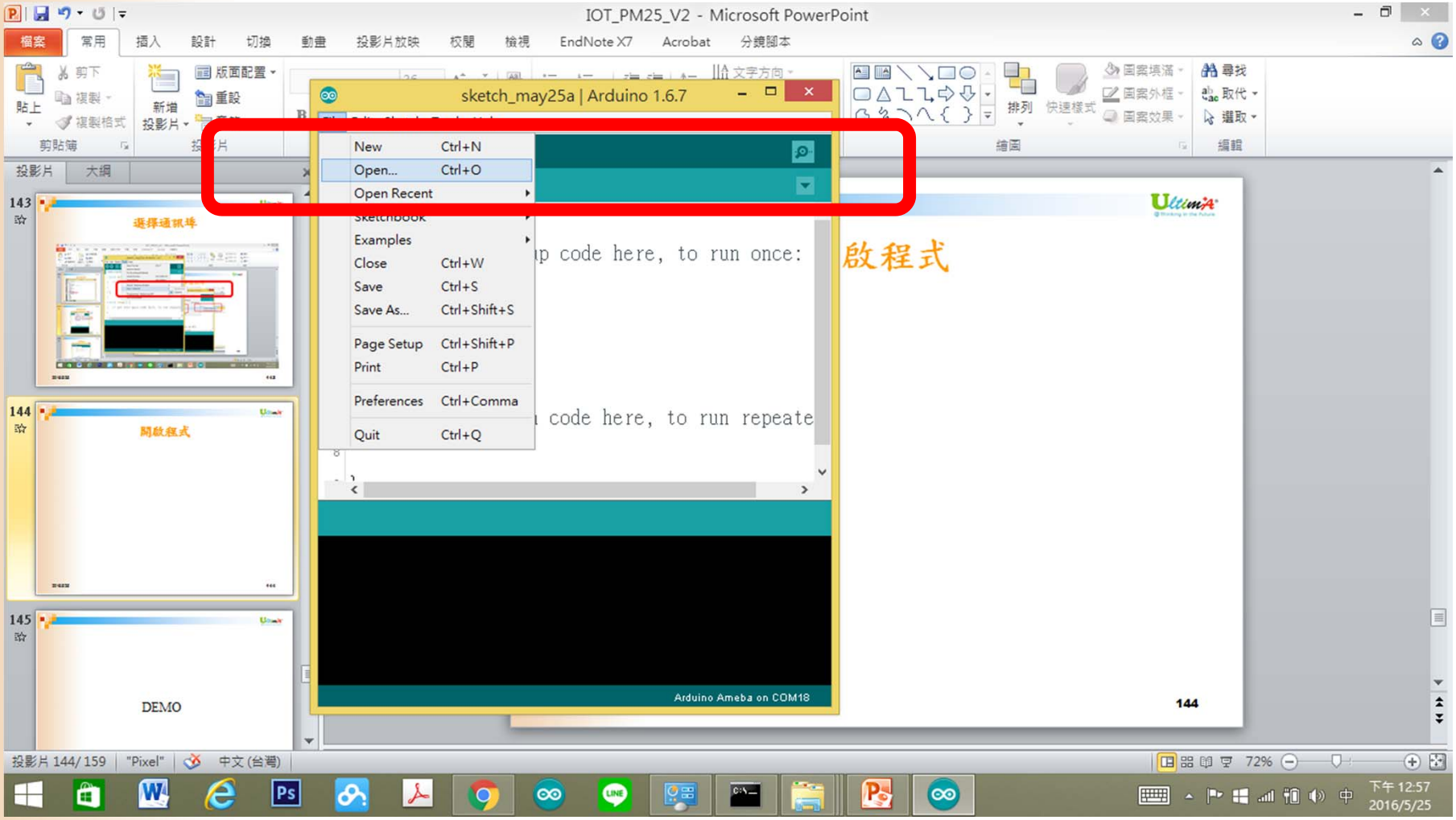


WiFiWebClient程式重點解說

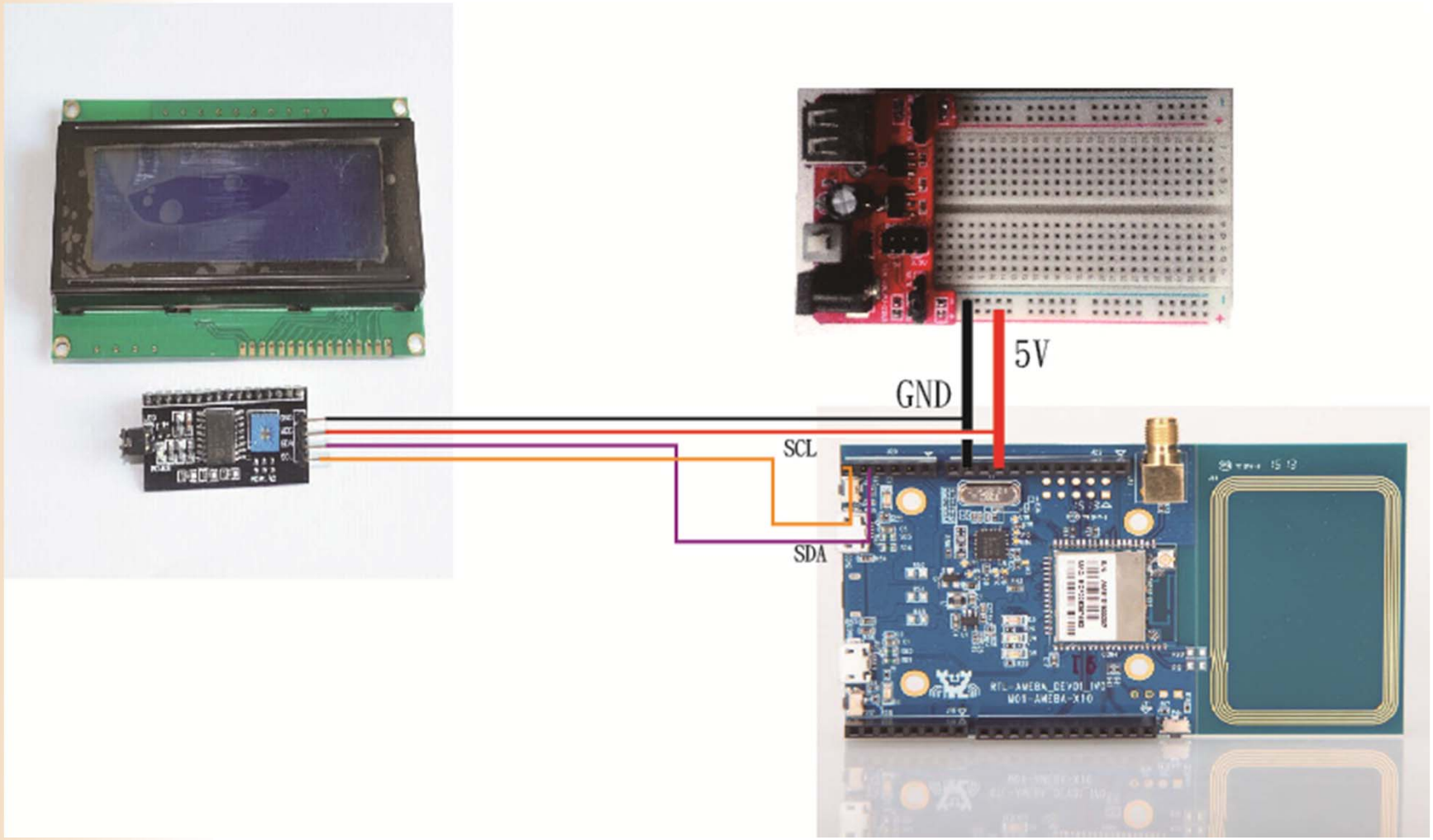
- #include <WiFi.h> 使用網路必要函數
- uint8_t MacData[6];　儲存 MAC資料
- GetWifiMac()　取得MAC函數
- WiFi.status();　顯示WIFI狀態
- printWifiStatus();　列印網路狀態
- client.connect(server, 80)　連到Server(用port80)
- client.println(“GET /search?q=ameba HTTP/1.1”);　送給伺服器端資料
- client.available()　連線對象要送資料
- char c = client.read();　讀取連線對象要送資料

lcd1602_I2C_mills
顯示資料在LCD上

開啟程式lcd1602_I2C_mills



開啟程式lcd1602_I2C_mills

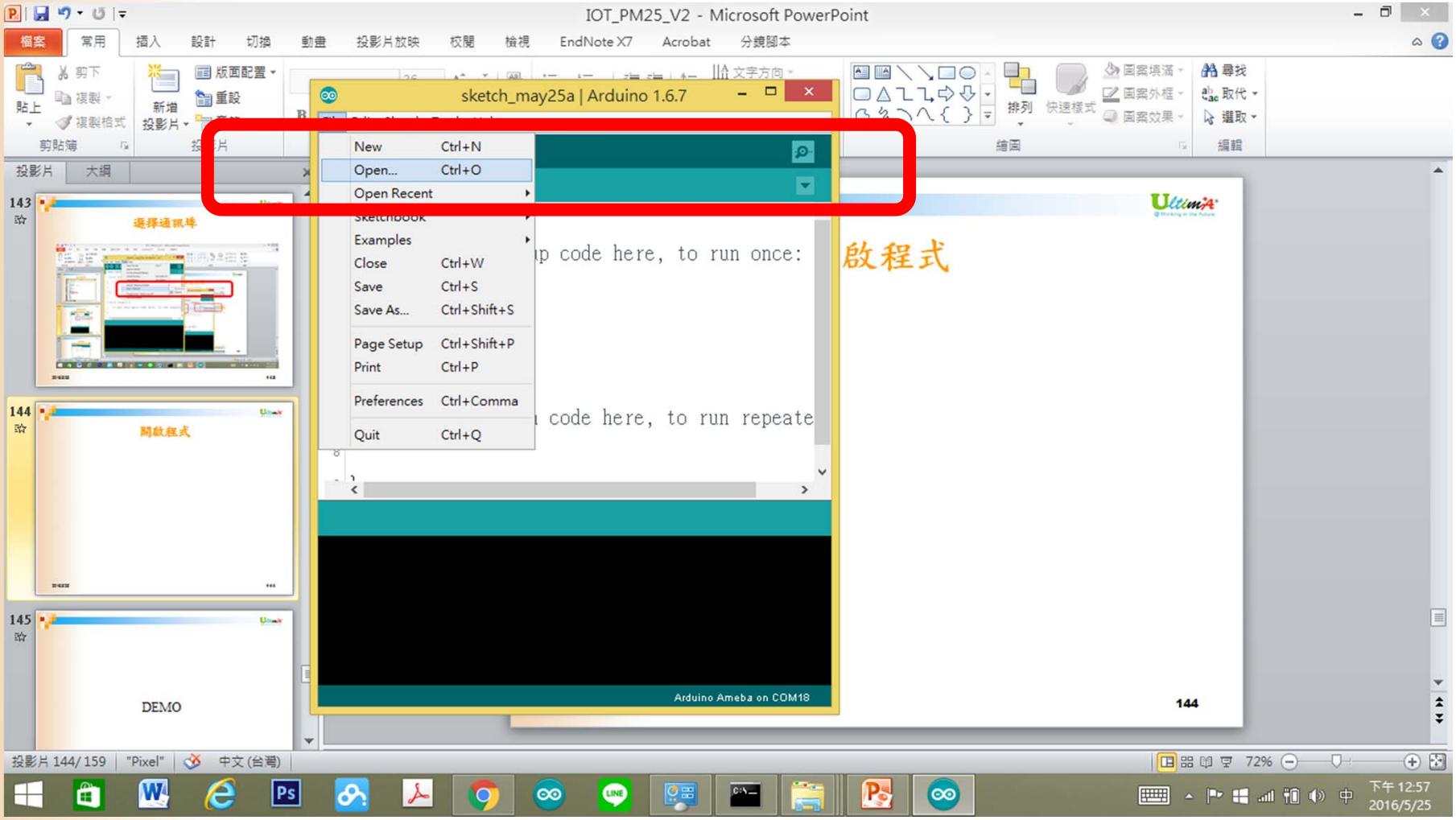


lcd1602_I2C_mills程式重點解說

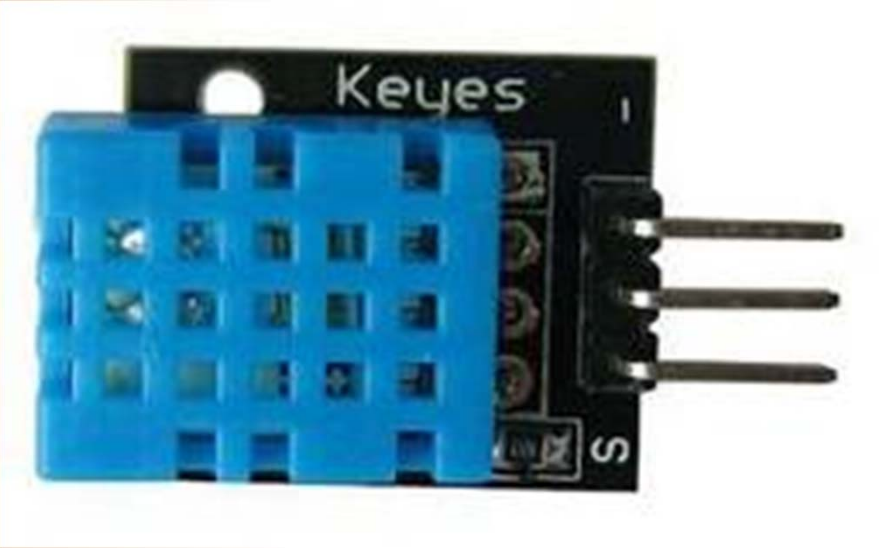
- #include <I2CIO.h> I2C 函數
- #include <LCD.h> LCD函數
- #include <LiquidCrystal_I2C.h> I2C版LCD函數
- #define I2C_ADDR 0x27 設定LCD I2C位址
- lcd.begin (16,2); 設定LCD寬度與高度
- lcd.setBacklight(LED_ON); 設定LCD背光
- lcd.backlight();啟動LCD背光
- lcd.setCursor(0,0); LCD歸零定位
- lcd.print(“Hello, world!”); 印出Hello World

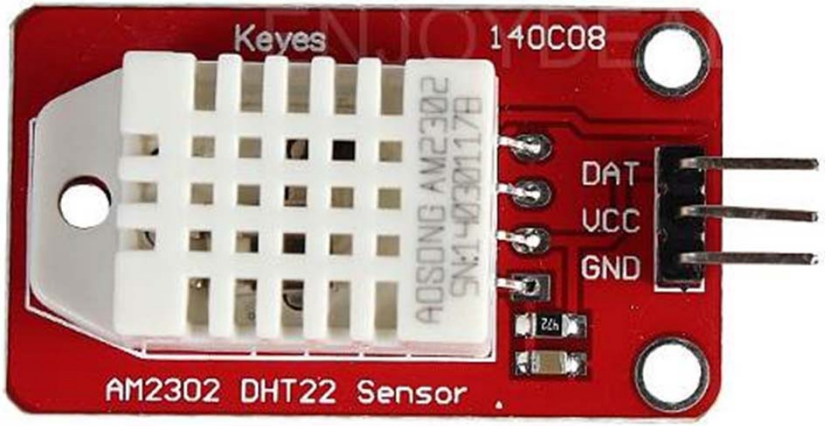
DHTx
讀取溫溼度資料

開啟程式DHTx

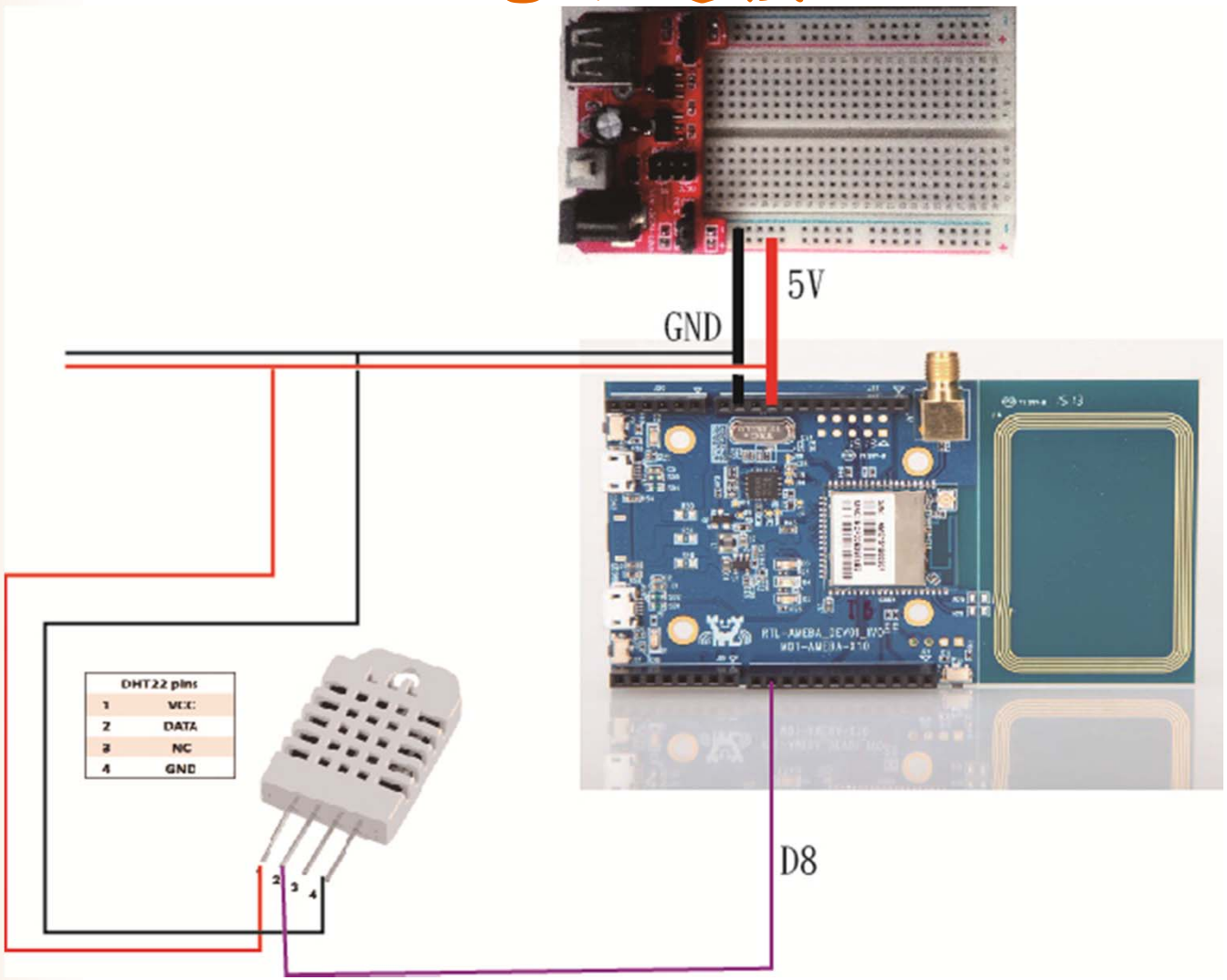

IOT_PM25_V2 - Microsoft PowerPoint
sketch_may25a | Arduino 1.6.7
New Ctrl+N
Open... Ctrl+O
Open Recent
Examples
Close Ctrl+W
Save Ctrl+S
Save As... Ctrl+Shift+S
Page Setup Ctrl+Shift+P
Print Ctrl+P
Preferences Ctrl+Comma
Quit Ctrl+Q
p code here, to run once:
code here, to run repeate
Arduino Ameba on COM18
啟程式
144
DEMO

電路連接





電路連接



DHTx 程式重點解說

- #include “DHT.h”　　使用溫溼度模組必要函數
- #define DHTTYPE DHT22　宣告使用哪種DHT溫溼度模組
- DHT dht(DHTSensorPin, DHTTYPE); 取得溫溼度物件
- dht.begin();　　溫溼度物件通訊
- ShowHumidity() ; 顯示溫溼度資料(自訂)
- dht.readHumidity();　讀取濕度
- ht.readTemperature(true);　讀取溫度

Q & A

感謝聆聽

恭請指教