CoreMaker-01

聲控居家控制

指導單位：

主辦單位：財團法人資訊工業策進會 INSTITUTE FOR INFORMATION INDUSTRY

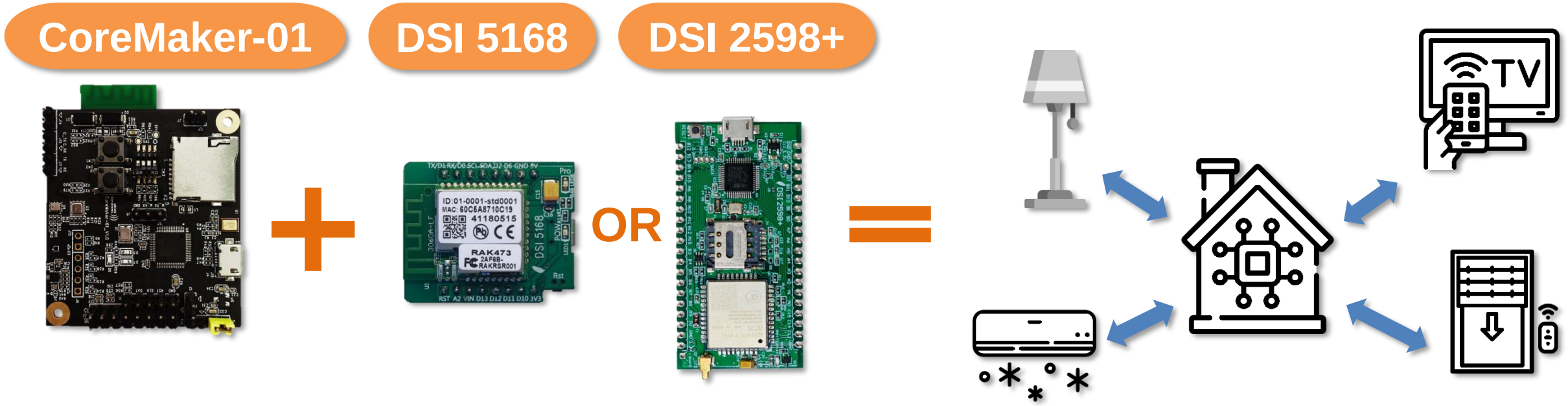
物聯網智造基地

合作單位：設計者：章育銘

程式位置:https://github.com/wildman8606/Coremaker01withIoT

前言

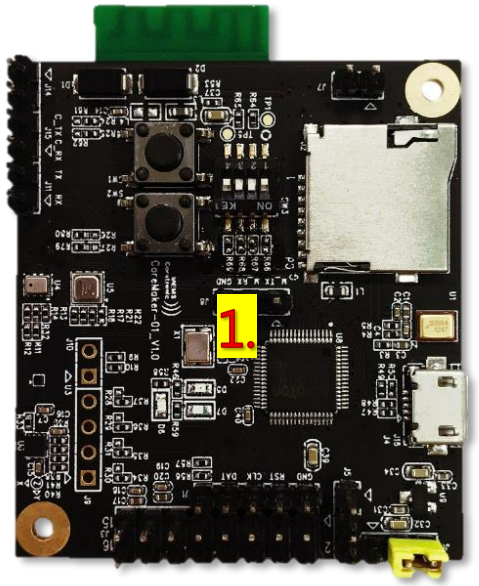
- 本案將2款國產IC開發套件DSI2598+或DSI5168(二擇一)、CoreMaker-01結合，設計可由遠端連網控制之智慧居家應用示範。
- 此案例可延伸應用於智慧遠端手勢遙控家電、電燈、大門等，例如：關閉窗簾, 開電視, 開冷氣28度等指令。

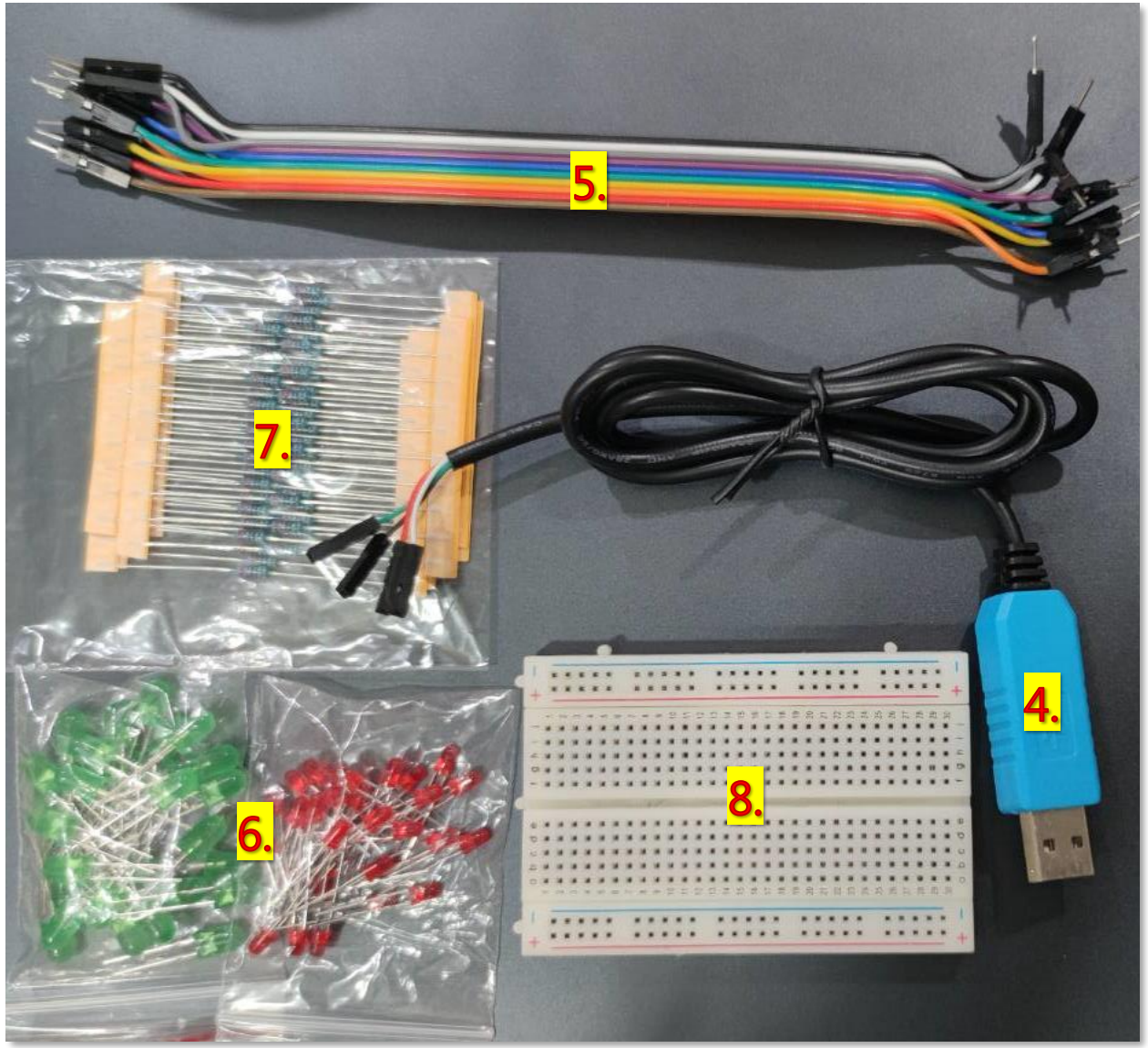


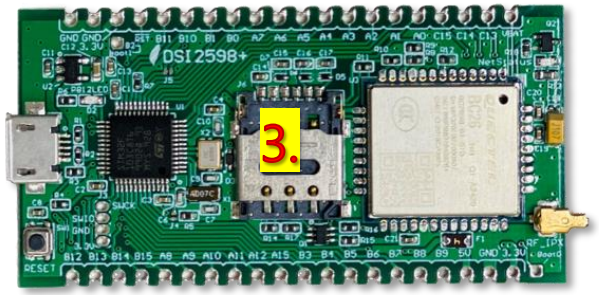
材料準備

準備材料:

1. Coremaker-01
2. DSI 5168
3. DSI 2598+
4. USB轉TTL(PL2303)
5. 杜邦線
6. LED*2色
7. 220Ω電阻
8. 麵包板
9. 電腦
10. MicroUSB傳輸線







CoreMaker-01 晶片介紹

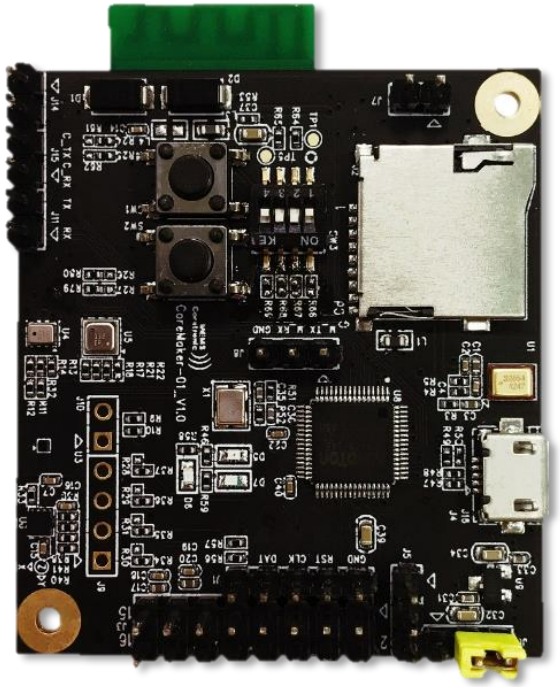
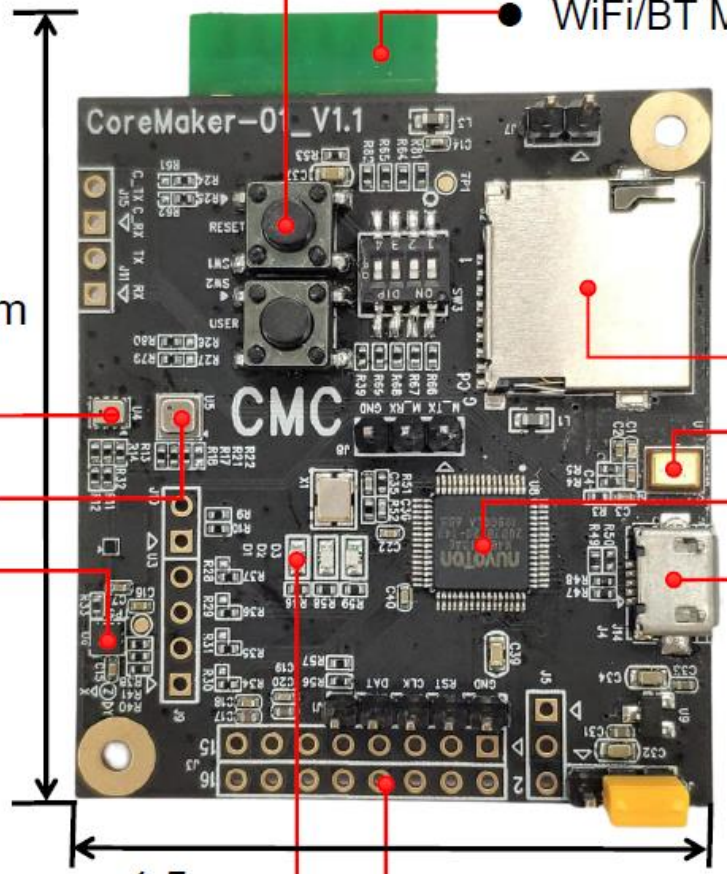


圖1 、CoreMaker-01 晶片

尺寸	**55mm x 45mm**
特色	採用新唐/M484SIDAE CoreMaker-01與您一起開拓AIoT進化路
介紹	晶片原廠: 中光電智能感測Coretronicmems 官網：https://www.coretronicmems.com/ CoreMaker-01使用新唐M484，以Arm® Cortex®-M4F為核心，帶有DSP指令集的高效能低功耗微控制器，支援可程設 UART / SPI / I²C。開發人員可運用ARM Mbed物聯網裝置平台，一款結合網際網路協定、資安與標準化管理的單一整合式解決方案，專門針對耗能與定價特別敏感的物聯網裝置所設計。 透過多維度感測模組，以Device AI概念打造高性價比AIoT方案，客戶可自行開發或委由CMC協助開發AI模型，燒錄至CoreMaker-01 MCU，即可完成一款具AI功能之裝置。

CoreMaker-01 晶片介紹



- 2 Buttons: reset and user button
- WiFi/BT Module: IoTTech ITM-D3F1
- Micro SD card socket
- Microphone: Knowles SPU0410LR5H
- MCU: Nuvton M484SIDAE
- Micro USB connector
- Barometer: CMC GMP102
- Environment Sensor: Bosch BME680
- Accelerometer: Kionix KX122-1037
- mikroBus-like pinout for expansion
- 3 LEDs: R, G, B

DSI5168 晶片介紹

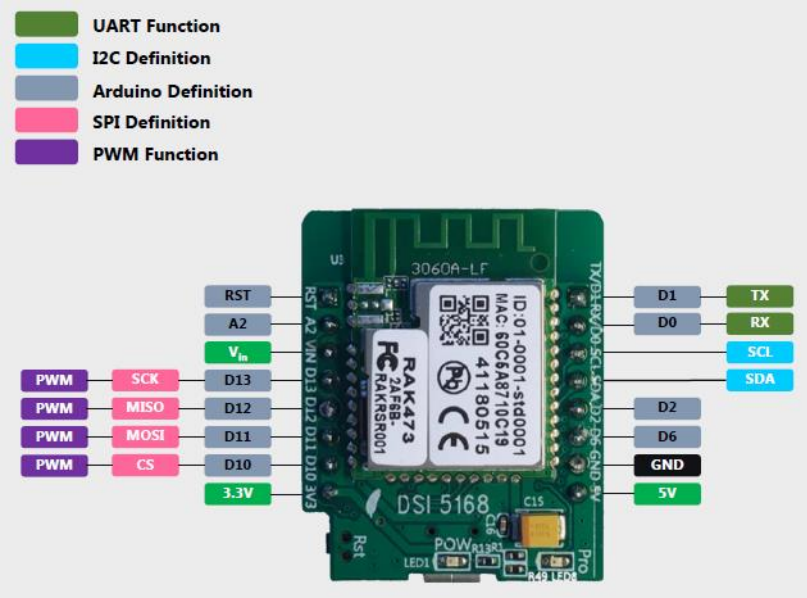


圖1 、DSI 5168 晶片

尺寸	**35mm x 27mm**
特色	採用Ameba RTL8711AM， 您的IoT產品開發 “最佳好幫手”
介紹	DSI5168對於maker來說是一項非常方便的開發工具，它包括了RTL8711AM無線模組以及集成配套式燒錄工具，完整兼容Arduino開發特性，並整合高性能MCU、Wi-Fi、Ethernet及豐富的外圍設備，提供標準化的Arduino庫，協助開發商與創客開發一套完整的物聯網解決方案。
產品案例	• O-take高階虛擬實境控制手套 • 無線物聯網環控系統 • 雞隻聲紋呼吸道疾病檢測儀器

DSI2598+ 晶片介紹

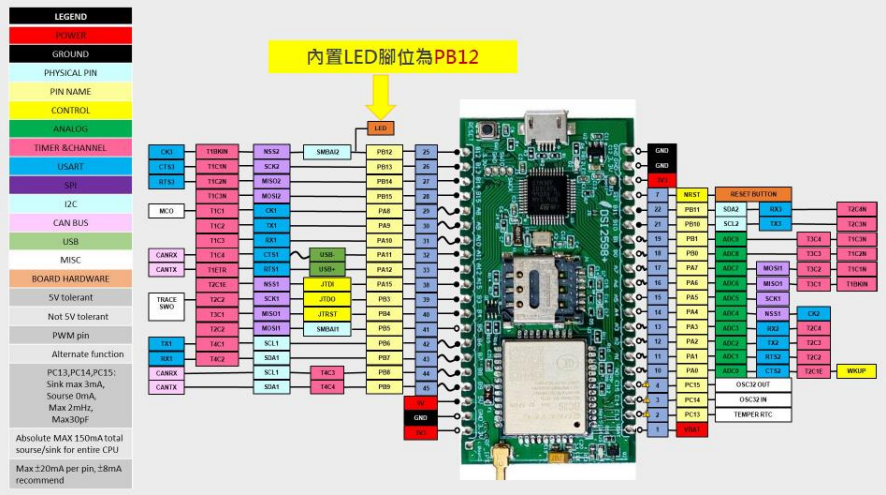


圖1 、DSI 2598+ 晶片

1. STM32duino bootloader- USB燒錄
2. Serial - FTDI工具
3. STLink - STLink工具

尺寸	**60mm x 30mm**
特色	全台首款小型**Arduino NB-IoT開發板**
介紹	DSI2598+使用**聯發科**技NB-IoT晶片-MT2625模組，搭配STM32 F103核心，有著PWM、I2C、SPI、ADC、UART等腳位功能，簡單但完整且有極佳運算能力，可讓使用者無縫接軌大部分Arduino程式庫，進行各項功能程式開發，尺寸僅6.0x3.0cm，是國內第一款小型NB-IoT開發板。
產品案例	• O-Care 共享機車自動消毒劑 • 發電機/空壓機/活氧機遠端監控裝置 • 社區型快扣式淹水預警系統 • 瓦斯鋼瓶液位偵測裝置 • 農業大數據擷取平台 • SimuGro水耕系統 • 家禽健康監控儀器

DSI2598+ 晶片介紹

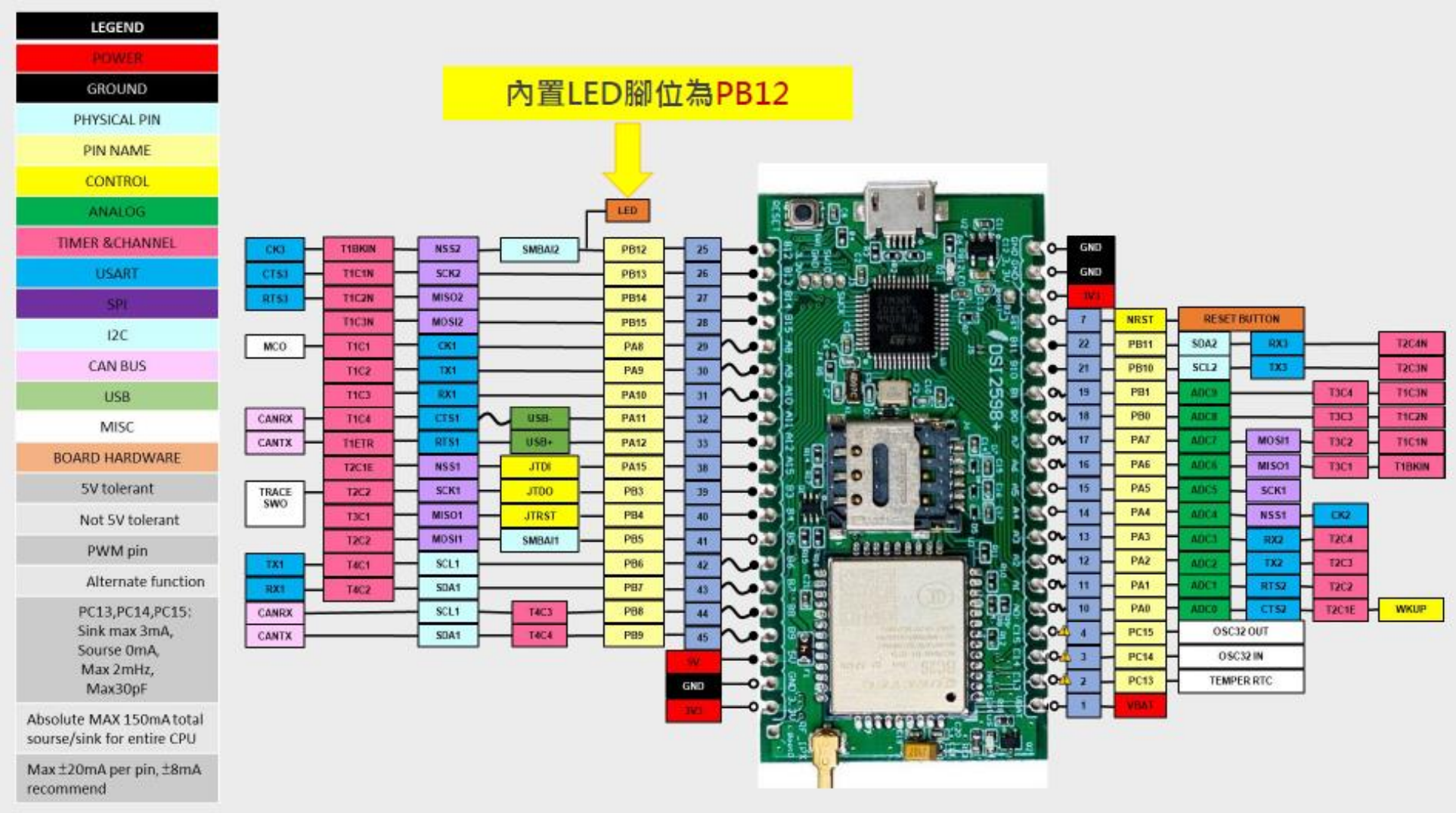


圖1 、DSI 2598+ 晶片

開始前需安裝軟體

20分鐘

安裝說明後置於附錄一

	Arduino	Notepad++	Python	Tera Term
必需性:	**必要**	**可替換**	**必要**	**可替換**
說　明:	國產晶片用 Arduino IDE 燒入、編譯方便上手	慣用程式編輯器都可，這較小、輕量、好用。	晶片編譯需要	UART顯示結果，可擇自己喜歡。

開始前安裝軟體二

25分鐘

CMake

git

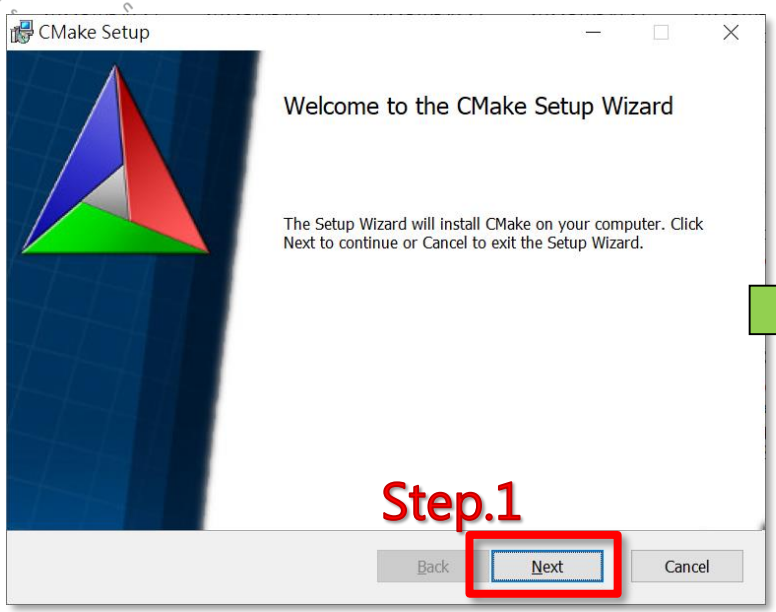
GNU Arm Embedded Toolchain

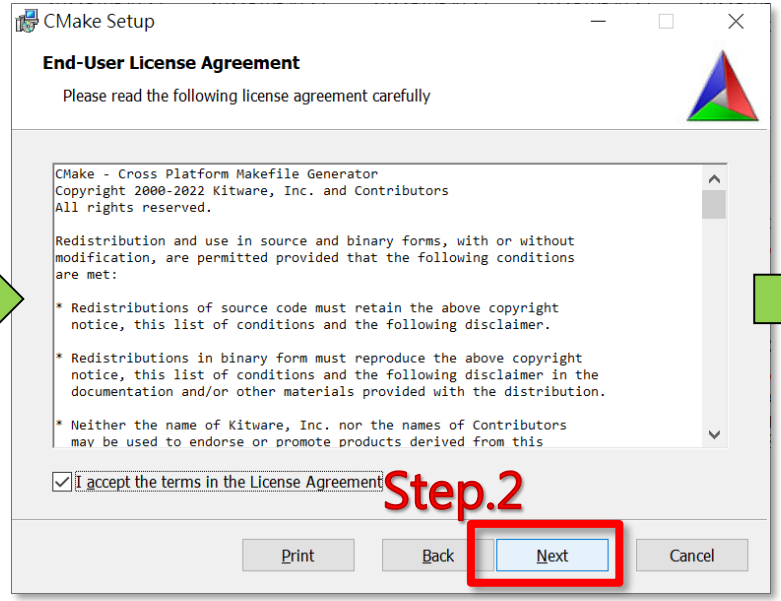
GNU Arm
Embedded
Toolchain

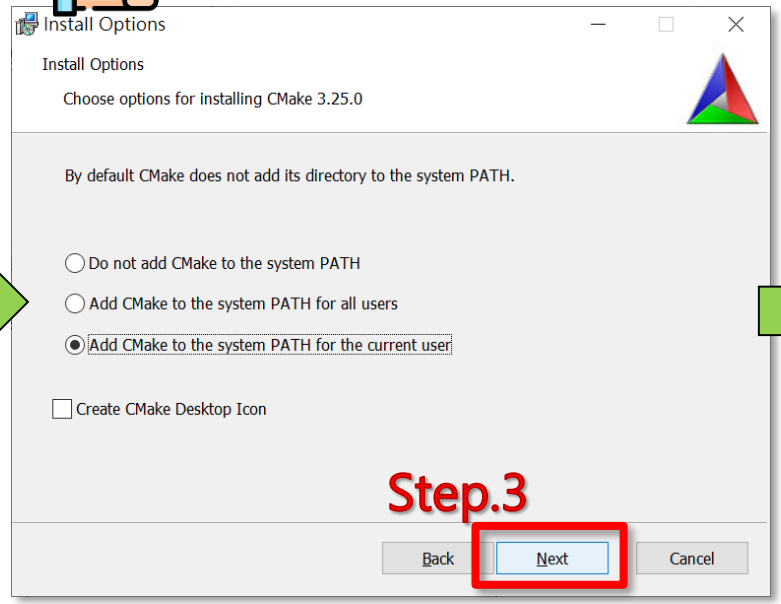
SensiML Data Capture Lab

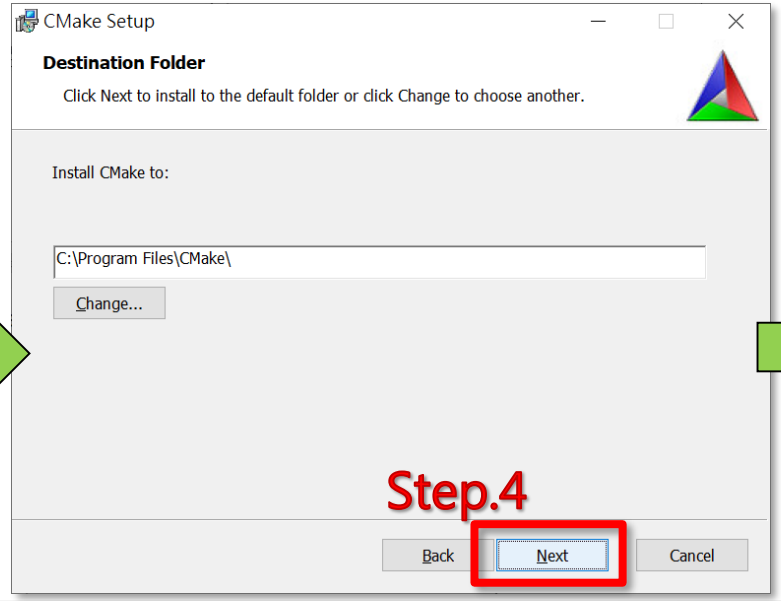
軟體安裝引導(CMake)

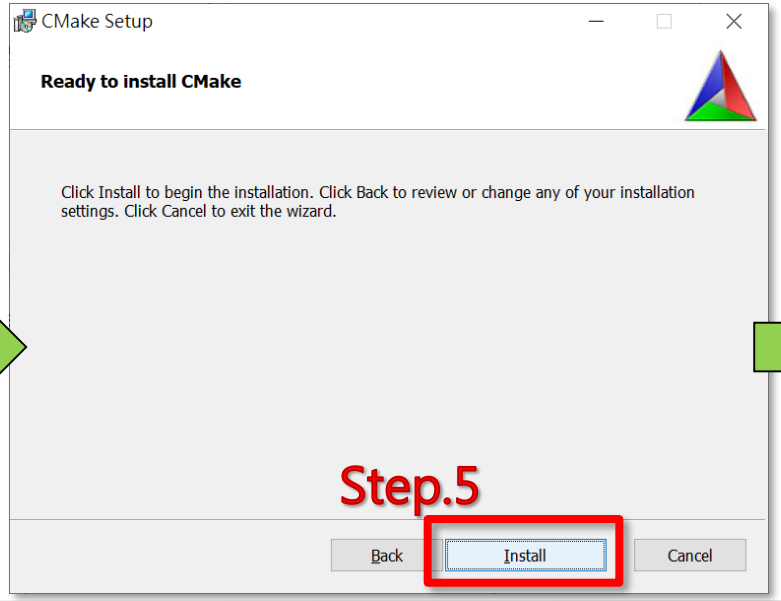
https://cmake.org/download/

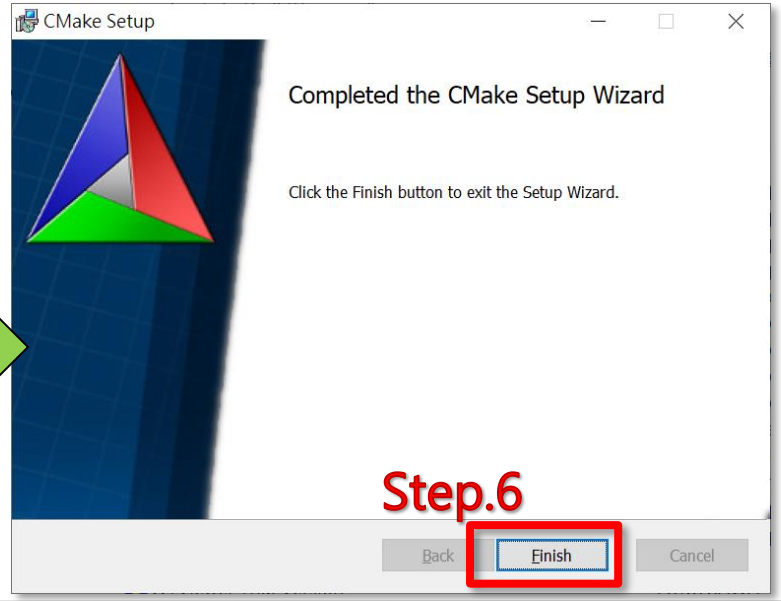






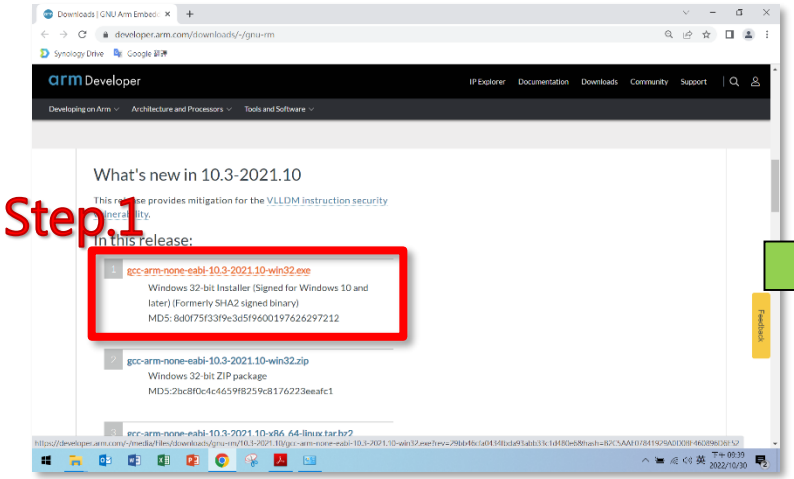


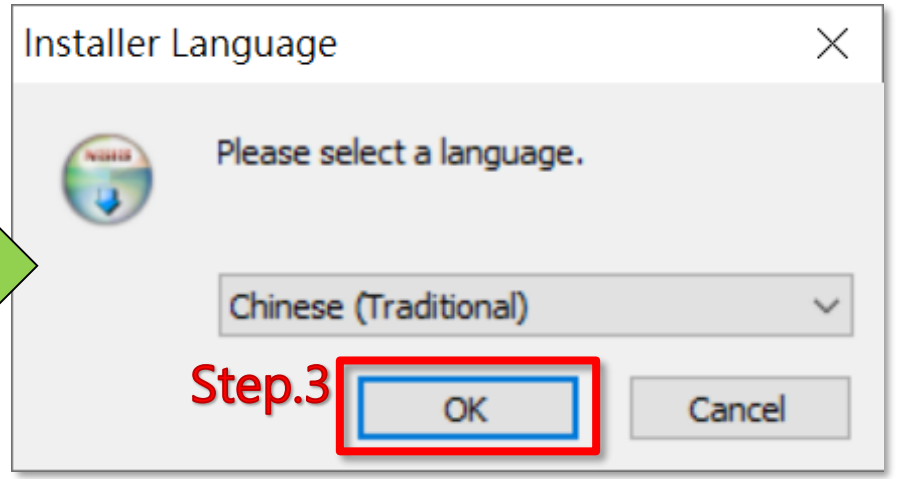


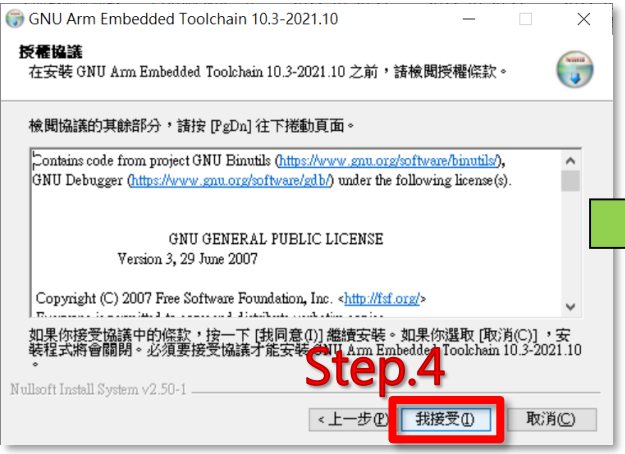


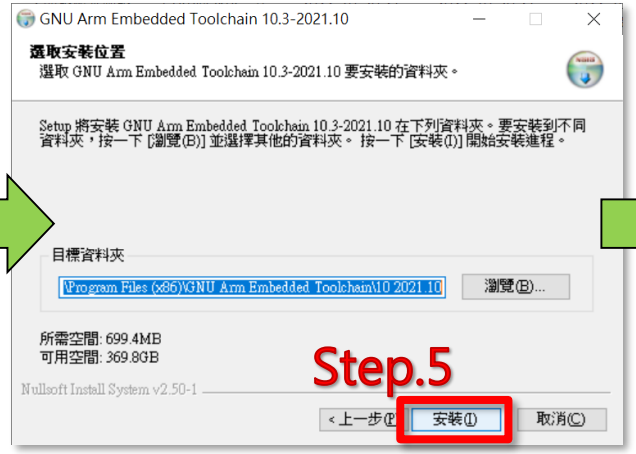
軟體安裝引導(GNU Arm Embedded Toolchain)

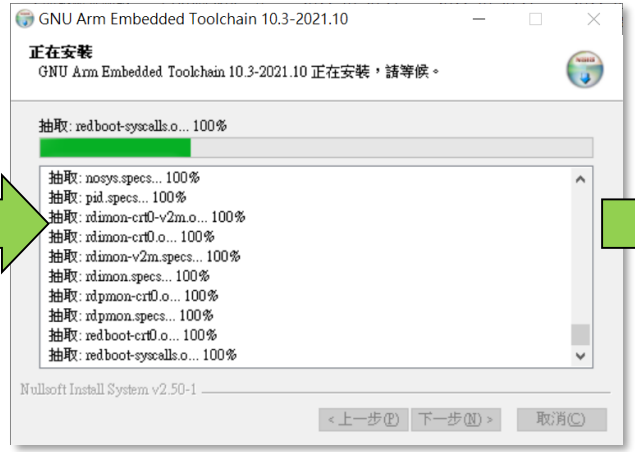
https://developer.arm.com/downloads/-/gnu-rm/











軟體安裝引導(git)

如有其他慣用git下載方法可以免安裝這個

https://git-scm.com/downloads

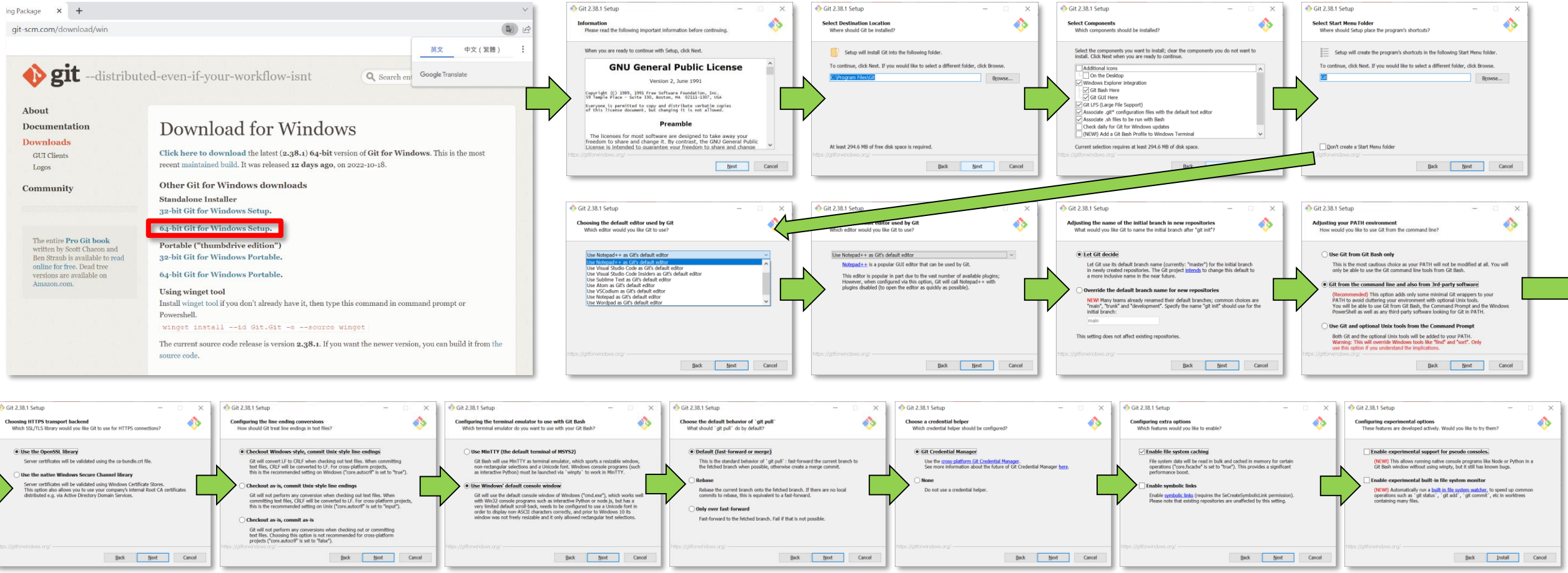
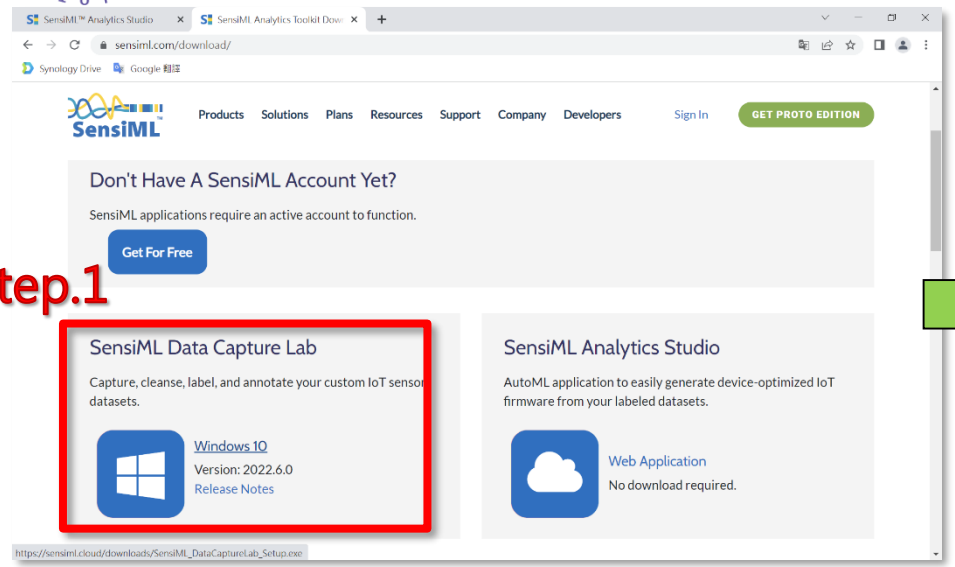


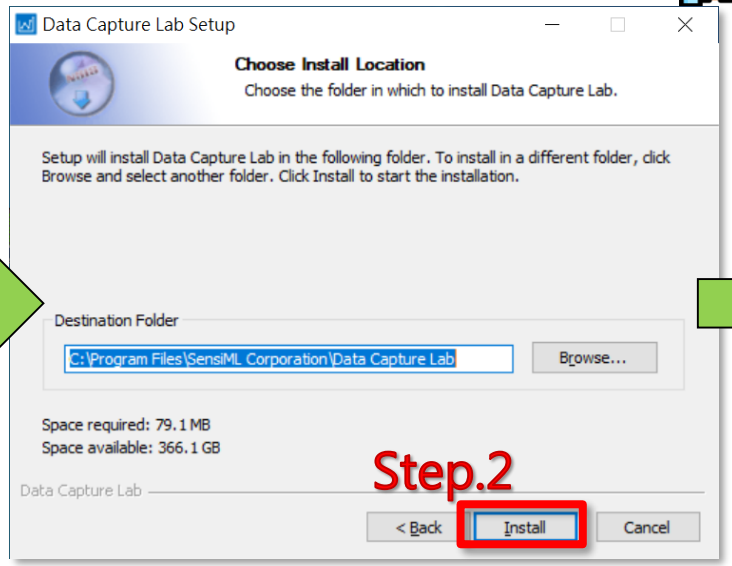
圖 1~16.git安裝引導

軟體安裝引導(SensiML Data Capture Lab)

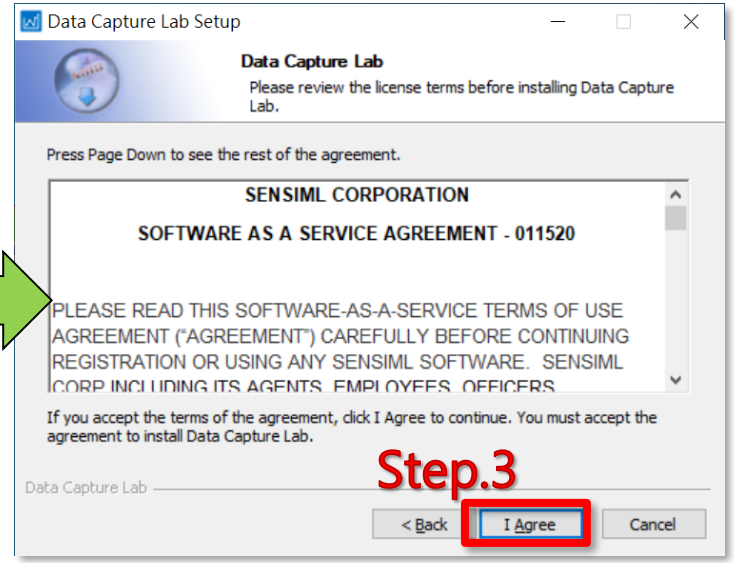
https://sensiml.com/download/



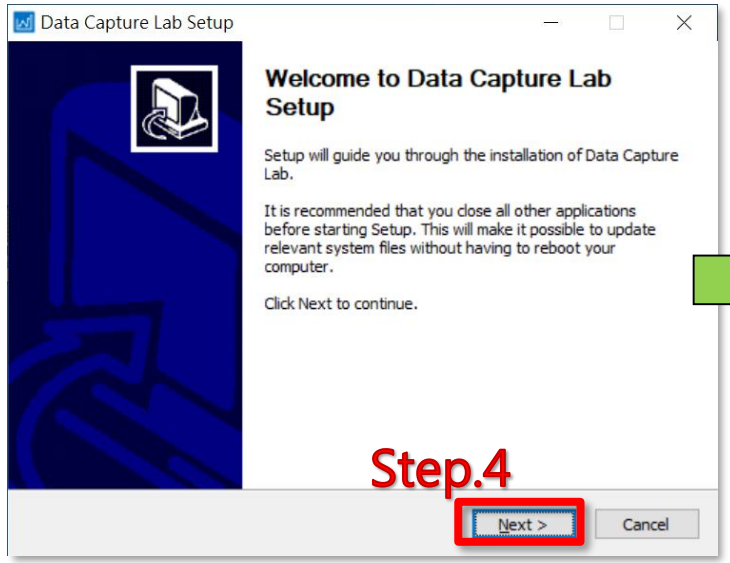
Step.1



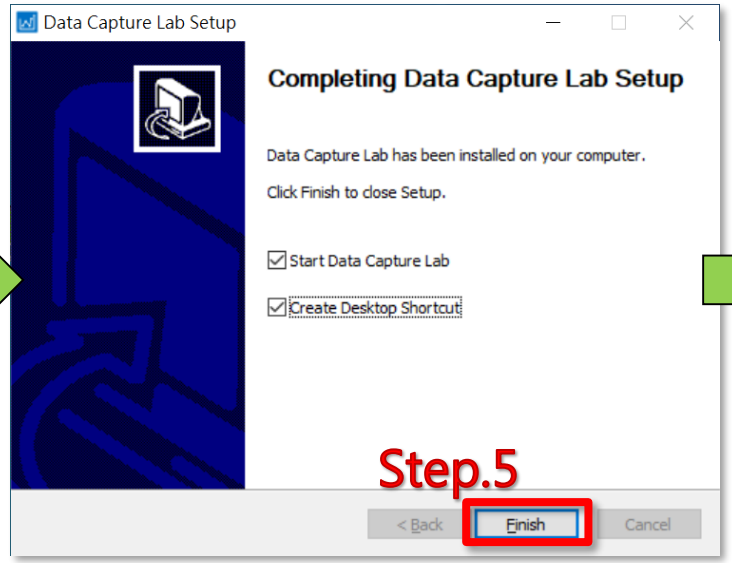
Step.2



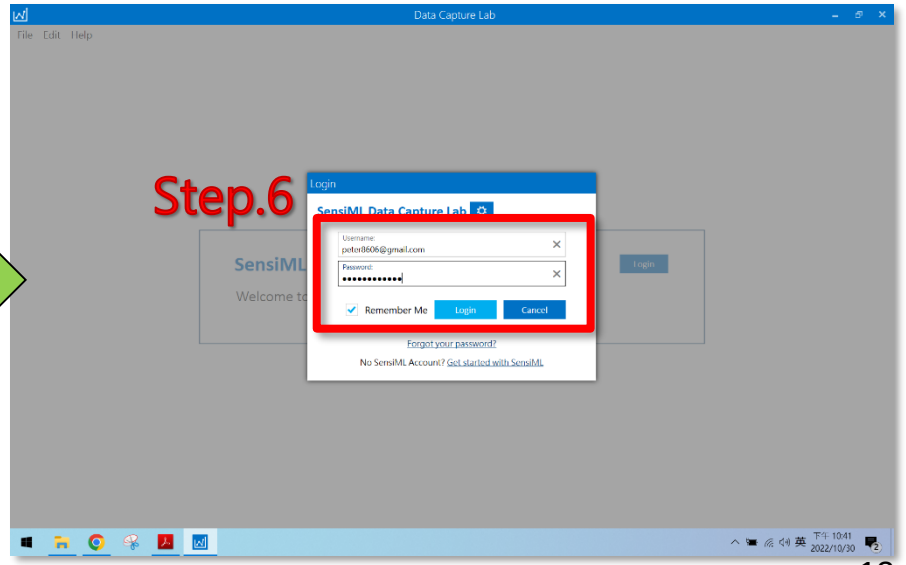
Step.3



Step.4



Step.5



Step.6

製作Coremaker01映像檔所需準備

25分鐘

安裝Ninja與Mbed CLI 2套件

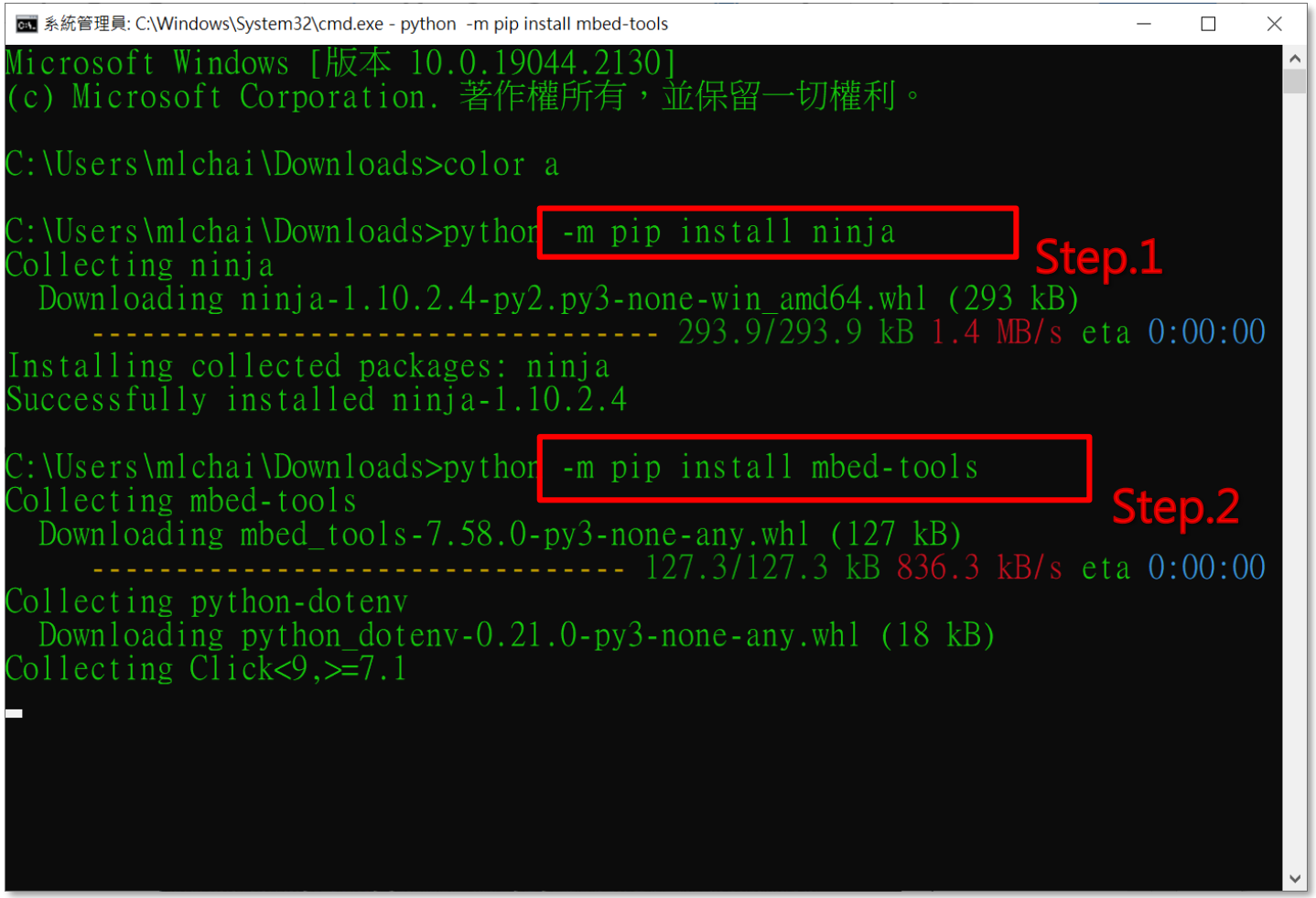
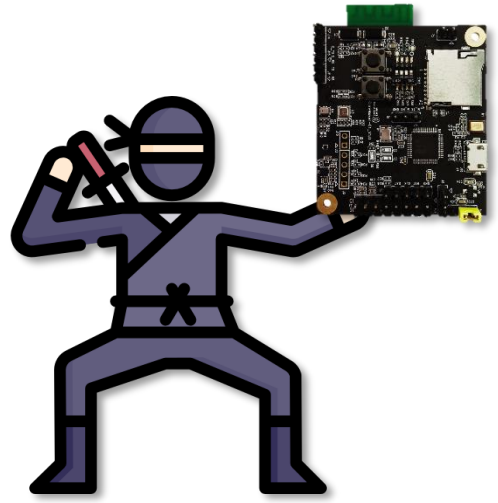


圖 1.輸入指令安裝編譯所需套件

Step1. 輸入指令安裝

```
> python -m pip install update
> python -m pip install ninja
> python -m pip install mbed-tools
```



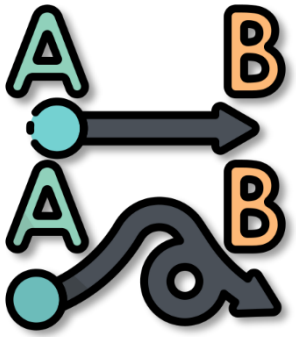
製作Coremaker01映像檔所需準備

25分鐘

額外需要東西

Step2. 輸入指令安裝

```
> pip install prettytable
> pip install future
> pip install intelhex
```



講師幫助大家
排除問題

```
系統管理員: C:\Windows\System32\cmd.exe - mbed-tools  compile -m AIOT2101 -t GCC_ARM
Microsoft Windows [版本 10.0.19044.2130]
(c) Microsoft Corporation. 著作權所有，並保留一切權利。

C:\Users\mlchai\Desktop\CoreMaker-01>pip install prettytable
Collecting prettytable
  Downloading prettytable-3.5.0-py3-none-any.whl (26 kB)
Collecting wcwidth
  Downloading wcwidth-0.2.5-py2.py3-none-any.whl (30 kB)
Installing collected packages: wcwidth, prettytable
Successfully installed prettytable-3.5.0 wcwidth-0.2.5

C:\Users\mlchai\Desktop\CoreMaker-01>pip install future
Collecting future
  Downloading future-0.18.2.tar.gz (829 kB)
     ---------------------------------------- 829.2/829.2 kB 2.4 MB/s eta 0:00:00
  Preparing metadata (setup.py) ... done
Installing collected packages: future
  DEPRECATION: future is being installed using the legacy 'setup.py install' method, because it does not have a 'pyproject.toml' and the 'wheel' p
ot installed. pip 23.1 will enforce this behaviour change. A possible replacement is to enable the '--use-pep517' option. Discussion can be found
github.com/pypa/pip/issues/8559
  Running setup.py install for future ... done
Successfully installed future-0.18.2

C:\Users\mlchai\Desktop\CoreMaker-01>pip install intelhex
Collecting intelhex
  Downloading intelhex-2.3.0-py2.py3-none-any.whl (50 kB)
     ---------------------------------------- 50.9/50.9 kB 199.4 kB/s eta 0:00:00
Installing collected packages: intelhex
Successfully installed intelhex-2.3.0

C:\Users\mlchai\Desktop\CoreMaker-01>mbed-tools compile -m AIOT2101 -t GCC_ARM
Configuring project and generating build system...
-- Checking for Python package intelhex -- found
-- Configuring done
-- Generating done
-- Build files have been written to: C:/Users/mlchai/Desktop/CoreMaker-01/cmake_build/AIOT2101/develop/GCC_ARM
Building Mbed project...
[0/1] Linking CXX executable AIOT_2101.elf
```

Step.1

Step.2

Step.3

圖 2.輸入指令安裝編譯所需套件二

下載Coremaker軟體包

25分鐘

下載Coremaker軟體包

存放路徑不能中文

```
系統管理員: 命令提示字元
Microsoft Windows [版本 10.0.19044.2130]
(c) Microsoft Corporation. 著作權所有，並保留一切權利。

C:\Users\mlchai>color a

C:\Users\mlchai>cd Desktop

C:\Users\mlchai\Desktop>git clone --recurse-submodules https://github.com/CoretronicMEMS/CoreMaker-01.git

Cloning into 'CoreMaker-01'...
remote: Enumerating objects: 625, done.
remote: Counting objects: 100% (123/123), done.
remote: Compressing objects: 100% (52/52), done.
remote: Total 625 (delta 85), reused 90 (delta 71), pack-reused 502
65 MiB | 1.92 MiB/s
Receiving objects: 100% (625/625), 23.39 MiB | 858.00 KiB/s, done.
Resolving deltas: 100% (372/372), done.
Submodule 'mbed-os' (https://github.com/CoretronicMEMS/mbed-os.git) registered for path 'mbed-os'
Cloning into 'C:/Users/mlchai/Desktop/CoreMaker-01/mbed-os'...
remote: Enumerating objects: 420174, done.
remote: Counting objects: 100% (1/1), done.
remote: Total 420174 (delta 0), reused 0 (delta 0), pack-reused 420173
Receiving objects: 100% (420174/420174), 466.66 MiB | 4.11 MiB/s, done.
Resolving deltas: 100% (293191/293191), done.
Submodule path 'mbed-os': checked out '875ce5bfca68fd74d22ffec266e542d0ebadc0b6'
```

圖 1.輸入指令下載Coremaker軟體包

```
系統管理員: 命令提示字元
C:\Users\mlchai\Desktop>
C:\Users\mlchai\Desktop>
C:\Users\mlchai\Desktop>
C:\Users\mlchai\Desktop>cd CoreMaker-01

C:\Users\mlchai\Desktop\CoreMaker-01>dir
 磁碟區 C 中的磁碟是 OS
 磁碟區序號:  36BC-EB09

 C:\Users\mlchai\Desktop\CoreMaker-01 的目錄

2022/10/30  下午 10:09    <DIR>          .
2022/10/30  下午 10:09    <DIR>          ..
2022/10/30  下午 10:09                44 .gitignore
2022/10/30  下午 10:09                94 .gitmodules
2022/10/30  下午 10:09             1,896 CMakeLists.txt
2022/10/30  下午 10:09    <DIR>          CMC_ISP
2022/10/30  下午 10:09               611 custom_targets.json
2022/10/30  下午 10:09             2,786 DebounceIn.cpp
2022/10/30  下午 10:09             1,870 DebounceIn.h
2022/10/30  下午 10:09    <DIR>          docs
2022/10/30  下午 10:09             1,751 global.h
2022/10/30  下午 10:09            22,567 jRead.c
2022/10/30  下午 10:09             5,033 jRead.h
2022/10/30  下午 10:09            14,558 jWrite.c
2022/10/30  下午 10:09             7,622 jWrite.h
2022/10/30  下午 10:09    <DIR>          libsensiml
2022/10/30  下午 10:09             1,092 LICENSE.txt
2022/10/30  下午 10:09             3,243 lightEffect.hpp
2022/10/30  下午 10:09             5,080 main.cpp
```

圖 2.檢查檔案是否完整

Step1. 輸入指令GIT下載

```
> git clone --recurse-submodules https://github.com/CoretronicMEMS/CoreMaker-01.git
```

請勿直接使用GitHub 網頁上的下載功能,
因為會缺少Mbed-OS 相關資料庫檔案

下載Coremaker軟體包

25分鐘

Coremaker軟體包初次編譯

```
系統管理員: C:\Windows\System32\cmd.exe
  Downloading intelhex-2.3.0-py2.py3-none-any.whl (50 kB)
     ---------------------------------------- 50.9/50.9 kB 199.4 kB/s eta 0:00:00
Installing collected packages: intelhex
Successfully installed intelhex-2.3.0

C:\Users\mlchai\Desktop\CoreMaker-01>mbed-tools compile -m AIOT2101 -t GCC_ARM
Configuring project and generating build system
-- Checking for Python package intelhex -- found
-- Configuring done
-- Generating done
-- Build files have been written to: C:/Users/mlchai/Desktop/CoreMaker-01/cmake_build/AIOT2101/develop/GCC_ARM
Building Mbed project...
[1/1] Linking CXX executable AIOT_2101.elf
-- built: C:/Users/mlchai/Desktop/CoreMaker-01/cmake_build/AIOT2101/develop/GCC_ARM/AIOT_2101.bin
-- built: C:/Users/mlchai/Desktop/CoreMaker-01/cmake_build/AIOT2101/develop/GCC_ARM/AIOT_2101.hex
| Module                          |             .text |             .data |              .bss |
|---------------------------------|-------------------|-------------------|-------------------|
| DebounceIn.cpp.obj              |       676(+676)   |         0(+0)     |           0(+0)   |
| [fill]                          |       212(+212)   |         0(+0)     |          52(+52)  |
| [lib]\c.a                       |  11236(+11236)    |  2108(+2108)      |          58(+58)  |
| [lib]\gcc.a                     |      3528(+3528)  |         0(+0)     |           0(+0)   |
| [lib]\m.a                       |      3864(+3864)  |         0(+0)     |           0(+0)   |
| [lib]\misc                      |       188(+188)   |         4(+4)     |          28(+28)  |
| [lib]\sensiml.a                 |  13976(+13976)    |    104(+104)      |    4399(+4399)    |
| [lib]\stdc++.a                  |           0(+0)   |         0(+0)     |           0(+0)   |
| jWrite.c.obj                    |       630(+630)   |         0(+0)     |           0(+0)   |
| main.cpp.obj                    |      1938(+1938)  |         0(+0)     |    4804(+4804)    |
| mbed-os\cmsis                   |      8820(+8820)  |    168(+168)      |    5953(+5953)    |
| mbed-os\connectivity            |       200(+200)   |         0(+0)     |          16(+16)  |
| mbed-os\drivers                 |  11766(+11766)    |         0(+0)     |     166(+166)     |
| mbed-os\hal                     |      1776(+1776)  |         4(+4)     |          59(+59)  |
| mbed-os\platform                |      6280(+6280)  |    260(+260)      |     440(+440)     |
| mbed-os\rtos                    |      1096(+1096)  |         0(+0)     |           0(+0)   |
| mbed-os\targets                 |  14356(+14356)    |    920(+920)      |     321(+321)     |
| sensors\AcousticNode.cpp.obj    |       638(+638)   |         0(+0)     |           0(+0)   |
| sensors\BME680                  |      5060(+5060)  |         0(+0)     |           8(+8)   |
| sensors\GMC306.cpp.obj          |       726(+726)   |         0(+0)     |           0(+0)   |
| sensors\GMP102                  |      1508(+1508)  |         0(+0)     |           8(+8)   |
| sensors\KX122-1037              |       854(+854)   |         0(+0)     |           0(+0)   |
| sensors\SensorHub.cpp.obj       |      1988(+1988)  |        40(+40)    |      988(+988)    |
| Subtotals                       |  91316(+91316)    |  3608(+3608)      |  17300(+17300)    |
Total Static RAM memory (data + bss): 20908(+20908) bytes
Total Flash memory (text + data): 94924(+94924) bytes

C:\Users\mlchai\Desktop\CoreMaker-01>_
```

圖 3.編譯成功結果

初次編譯需要較長的時間

Step1. 進入資料夾

```
> cd CoreMaker-01
```

Step2. 執行mbed工具指令

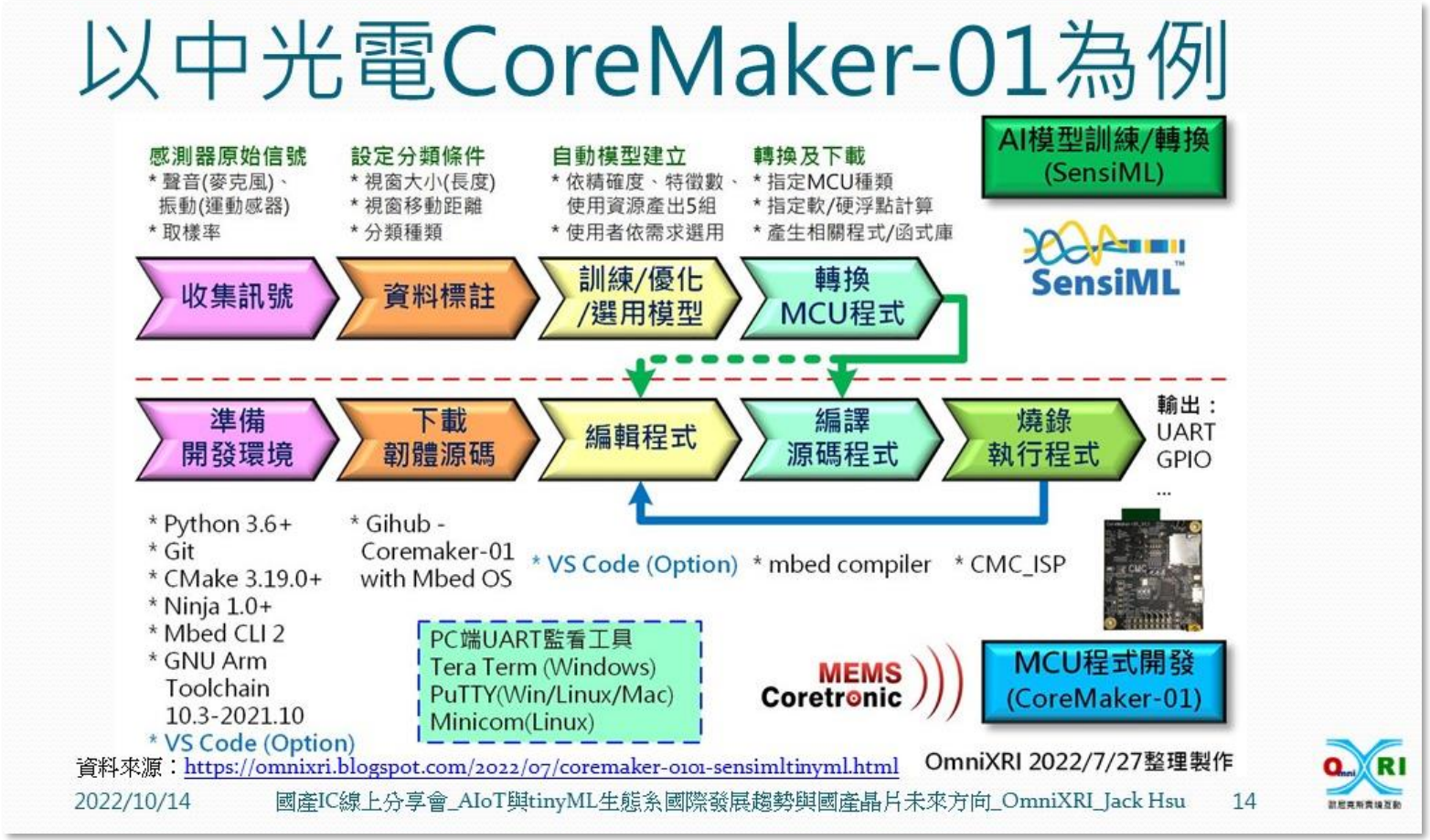
```
> mbed-tools compile -m AIOT2101 -t GCC_ARM
```

Step3. 出現'.bin'檔以及記憶體大小即為成功

成功編譯

Coremaker-01操作流程

由於許博士已於網路上將Coremaker-01操作架構撰寫詳細,
這邊引用歐尼克斯實境互動工作室(OmniXRI)資料:



資料來源:
http://omnixri.blogspot.com/2022/10/icaiottinyml.html

Coremaker-01操作流程

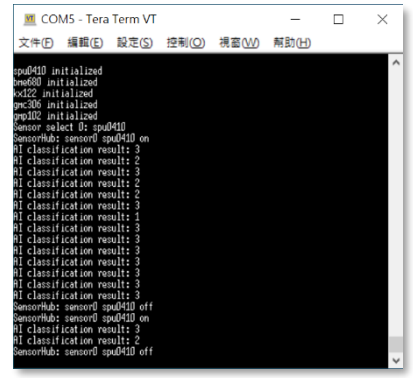
因此前兩個科目以執行完畢，於下個科目前須將支線任務做完

蒐集資料

資料標註

訓練模型

SensiML Data Capture Lab



CMake

git

GNU Arm Embedded Toolchain

Arduino

Tera Term

Python

Notepad++

> git clone CoretronicMEMS

準備 軟體&環境

下載編譯 coremaker包

修改及燒入 程式

執行

Coremaker01燒入模式

Step1. 使用Micro USB to USB 轉接線，連接CoreMaker 與PC。
Step2. 同時按下SW1 及SW2，後先放開SW1，再放開SW2，
Step3. CoreMaker 上的紅色LED不再閃爍，表示進入燒錄模式，
若紅色LED 仍然閃爍，重複步驟。

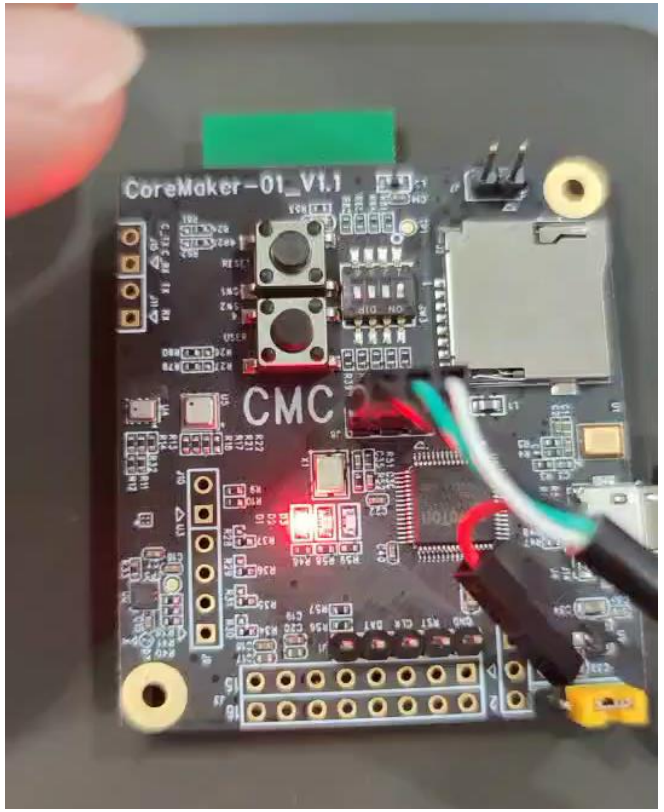


圖 1.切換燒入模式影片

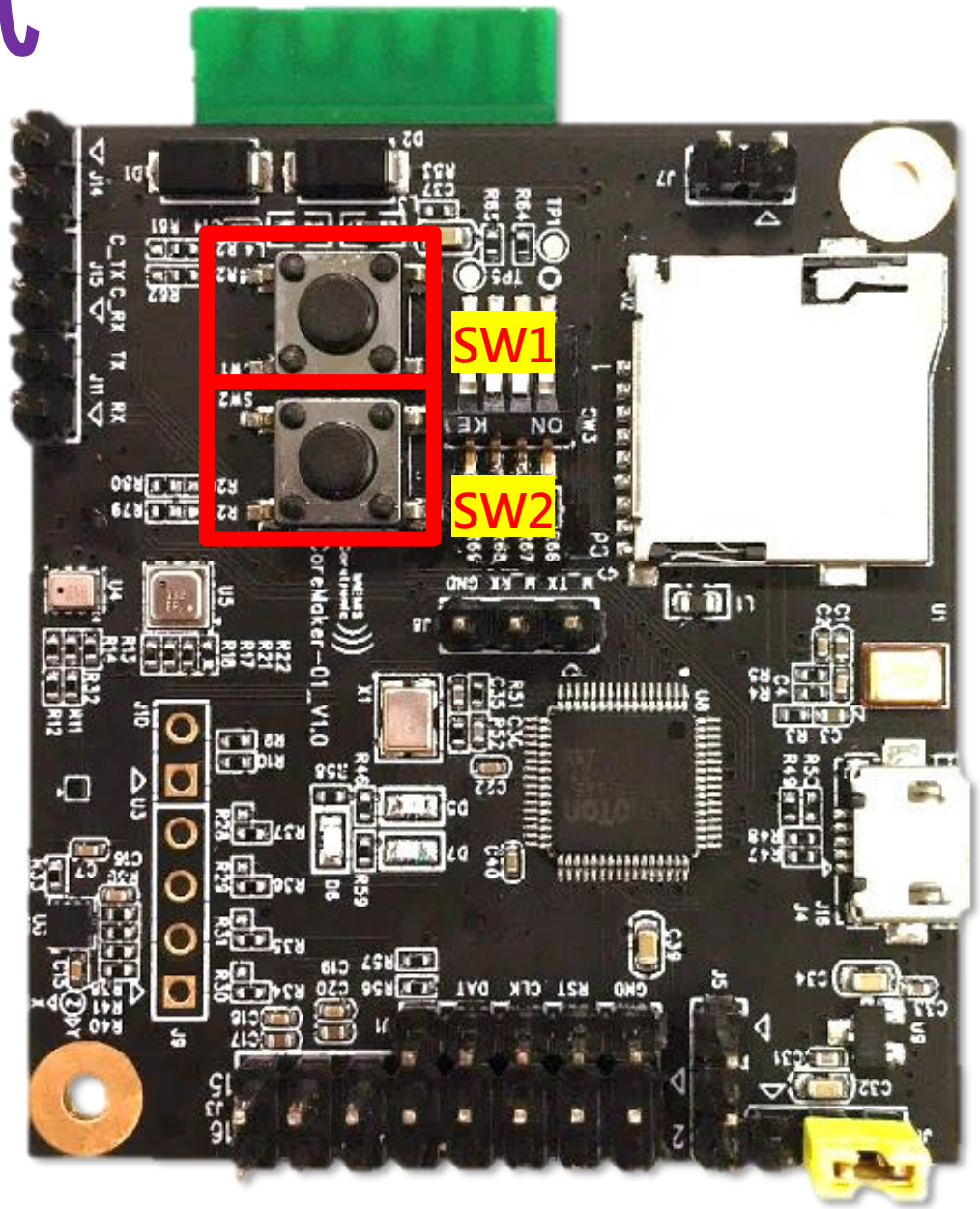


圖 2. Coremaker01按鈕位置

Coremaker01一般模式

SW1: reset button
SW2: user button

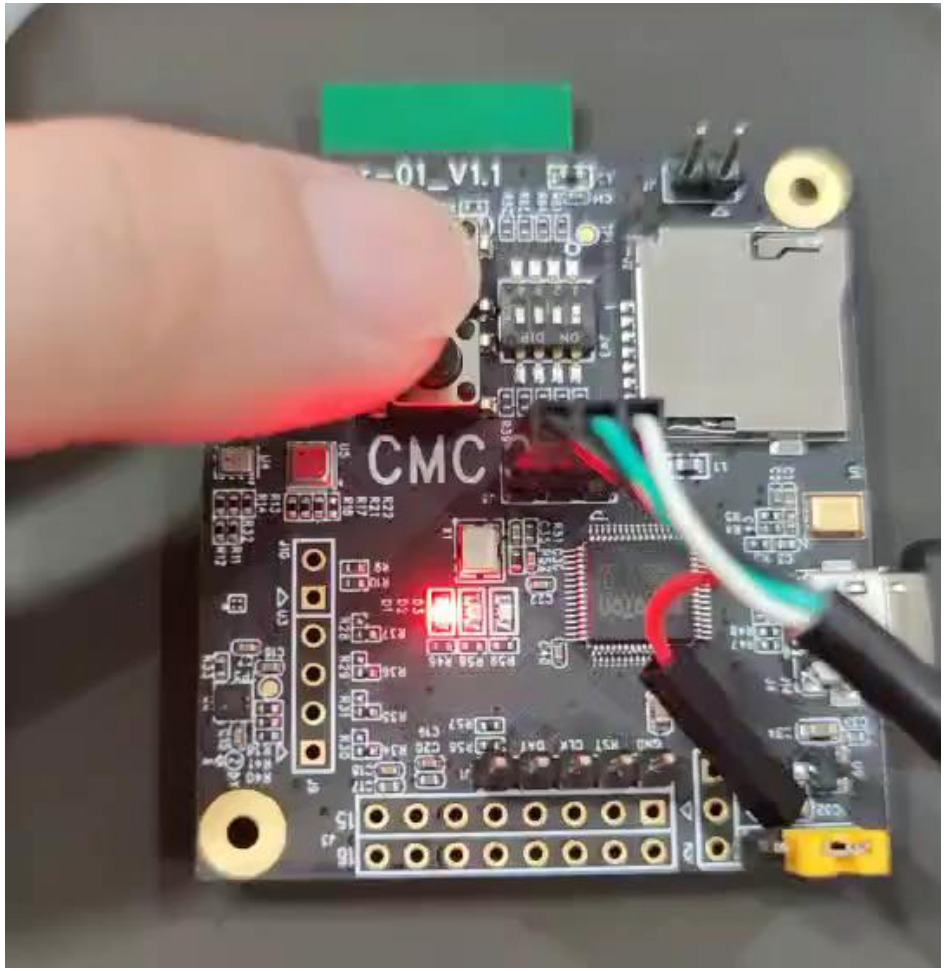


圖 1.切換一般模式影片

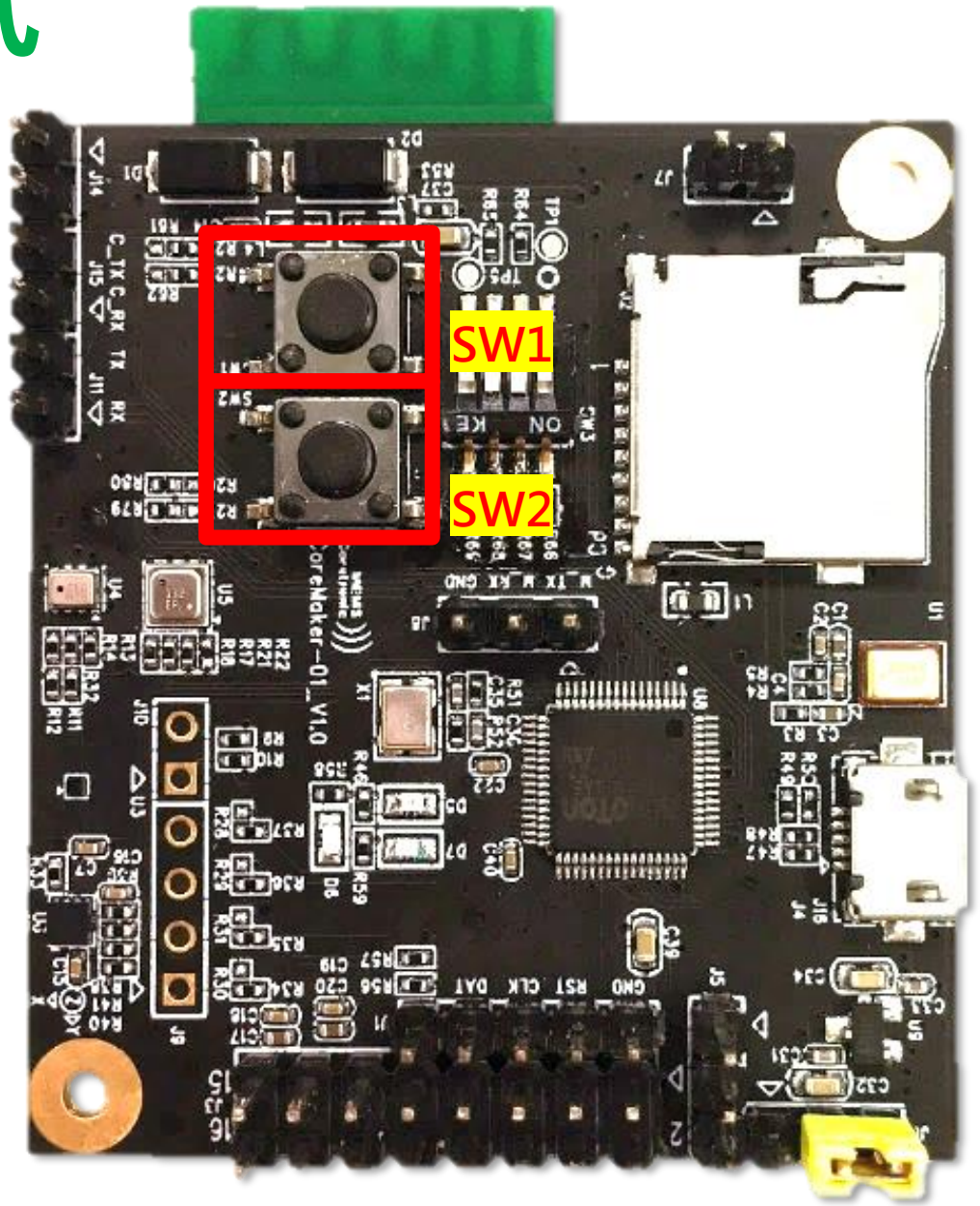
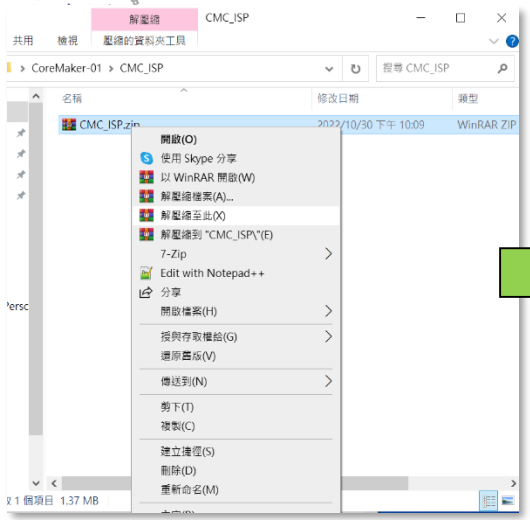
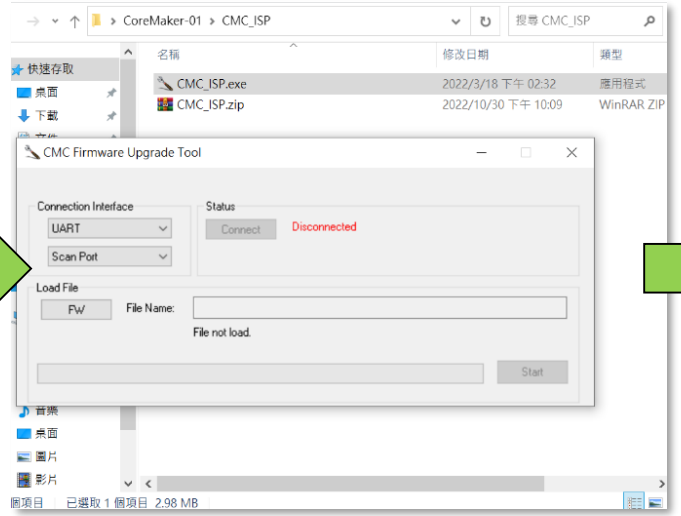


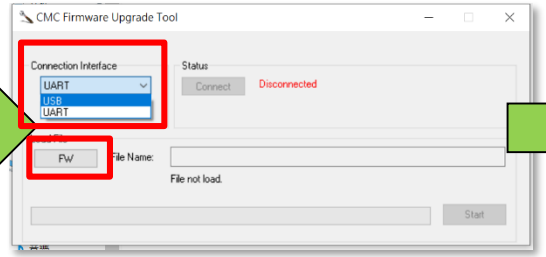
圖 2. Coremaker01按鈕位置

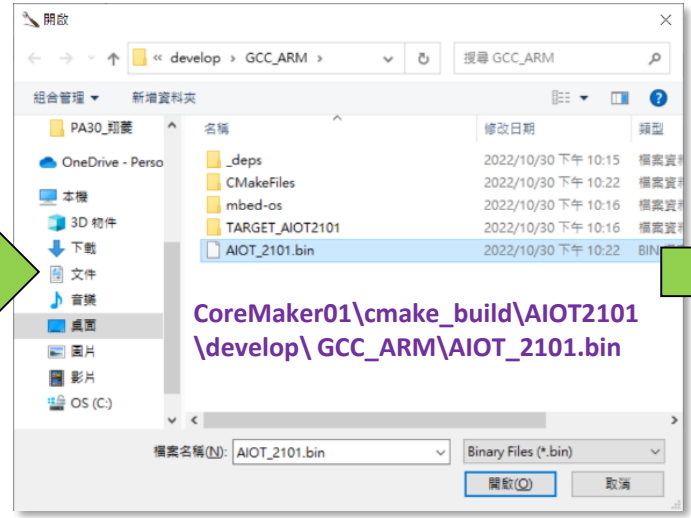
coremaker01燒入操作

(亦可先進燒入模式再選燒入檔)

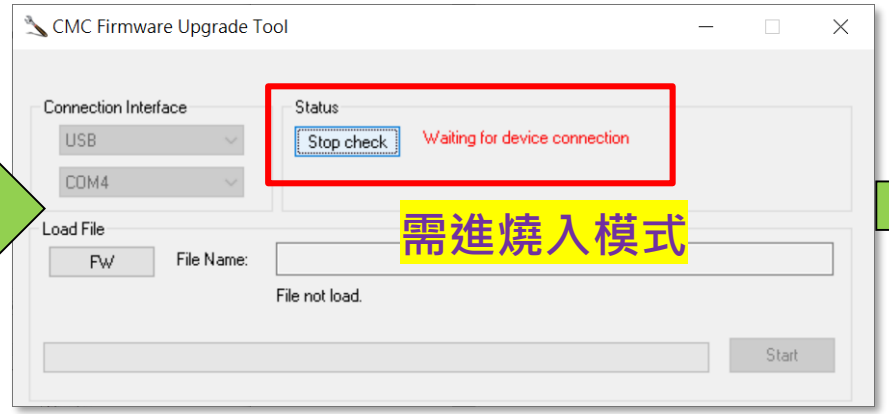




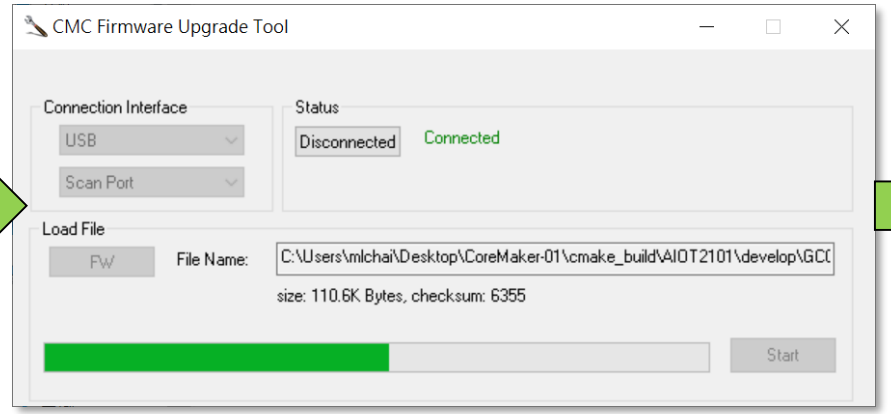


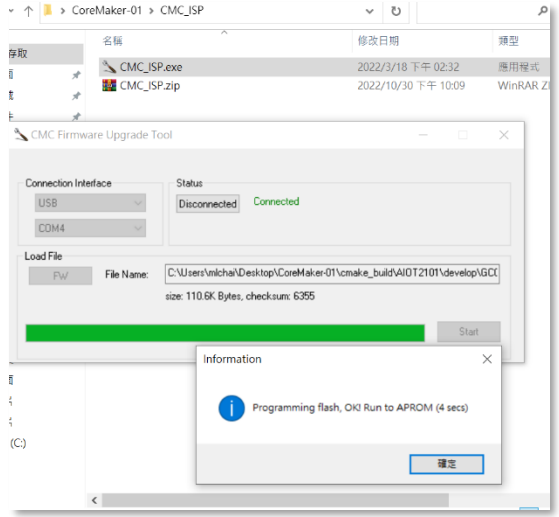


CoreMaker01\cmake_build\AIOT2101
\develop\ GCC_ARM\AIOT_2101.bin



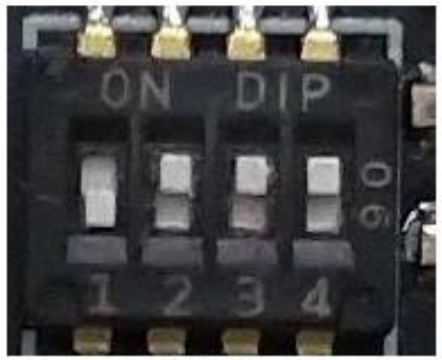
需進燒入模式





Coremaker-01蒐集資料設定

於晶片上須設定使用感測器，本案例需選聲音類別:



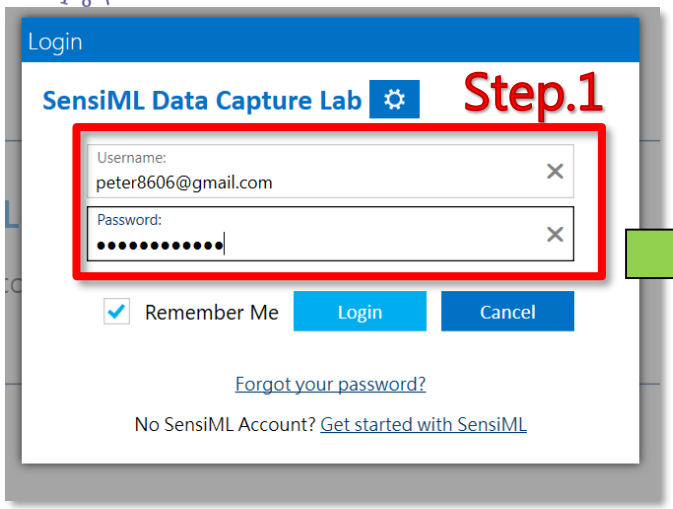
聲音

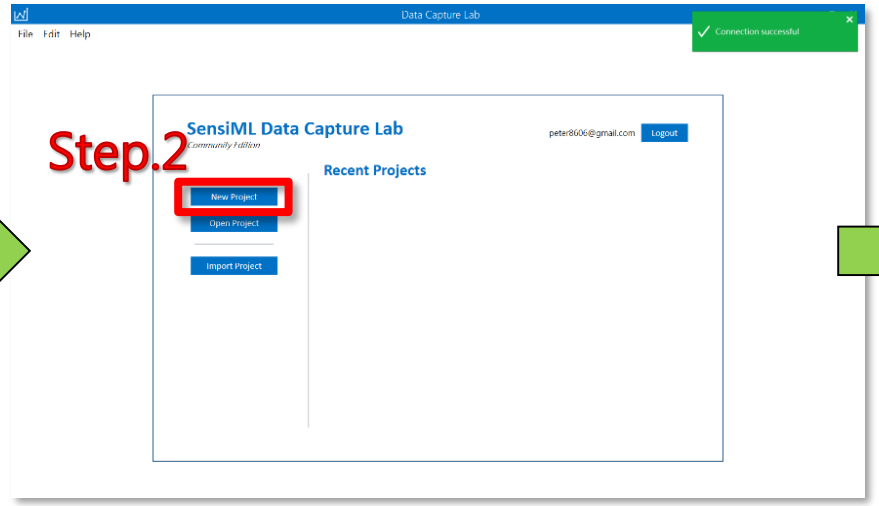
加速度

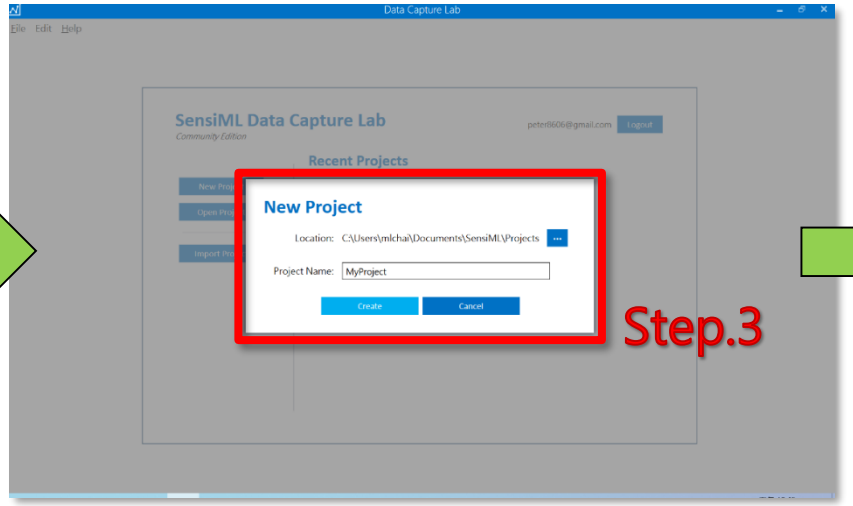
環境

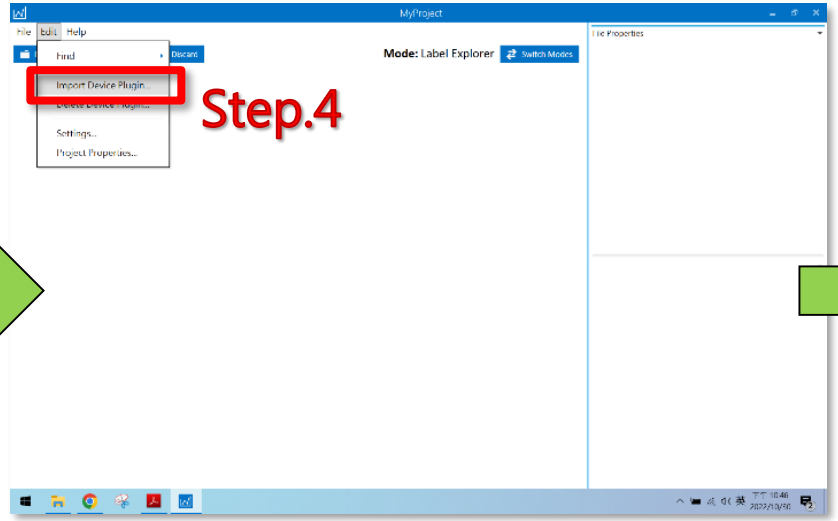
壓力

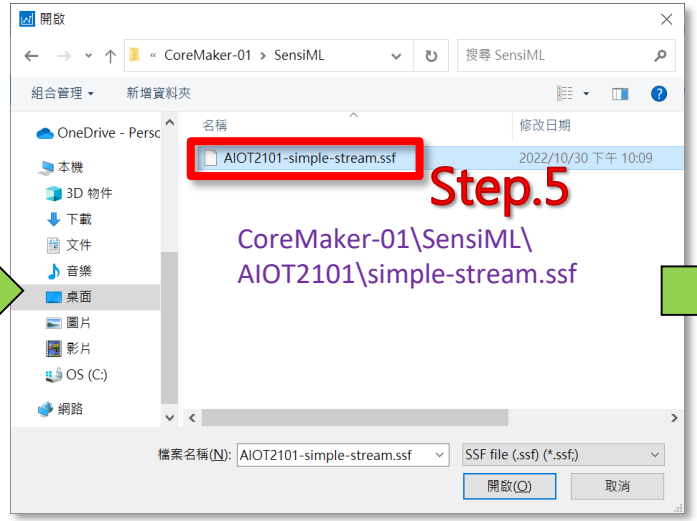
蒐集數據1

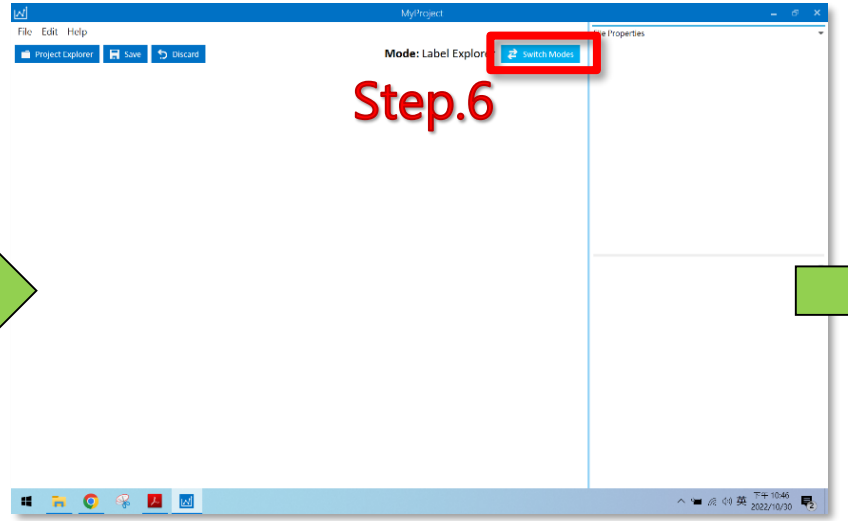






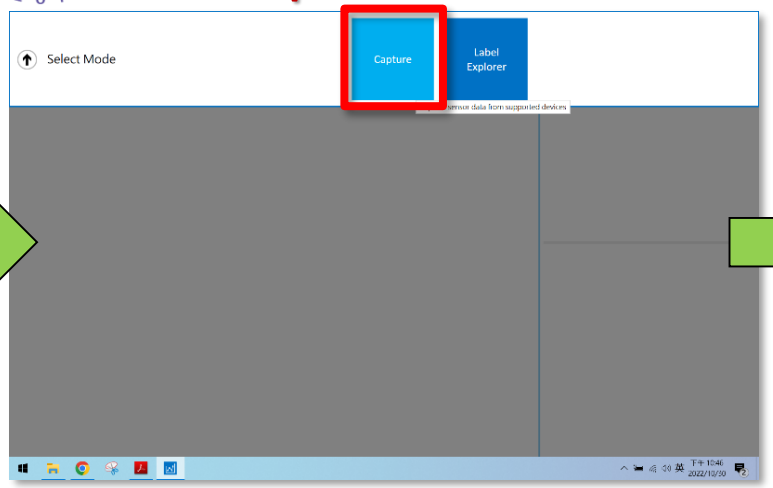


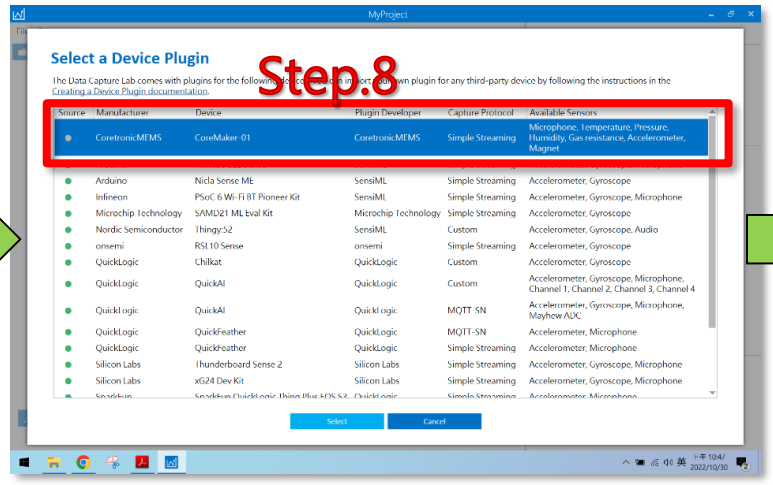


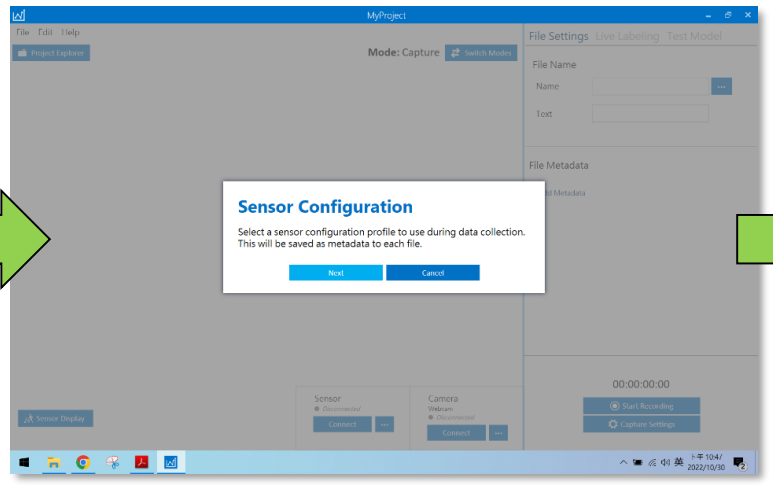


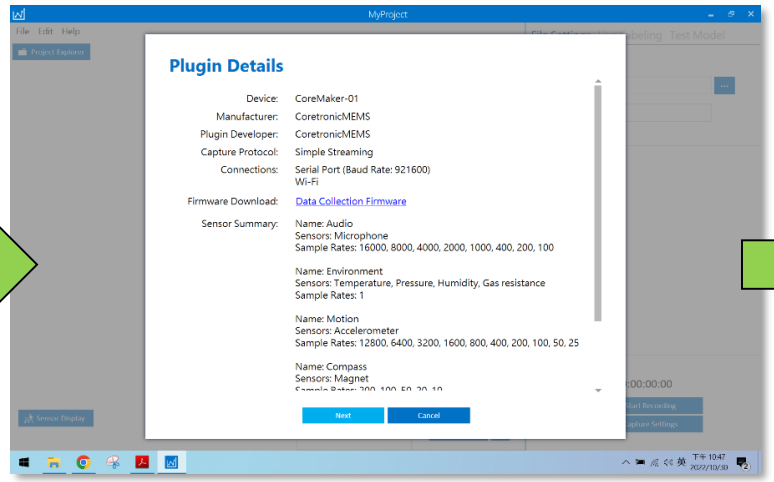
蒐集數據2

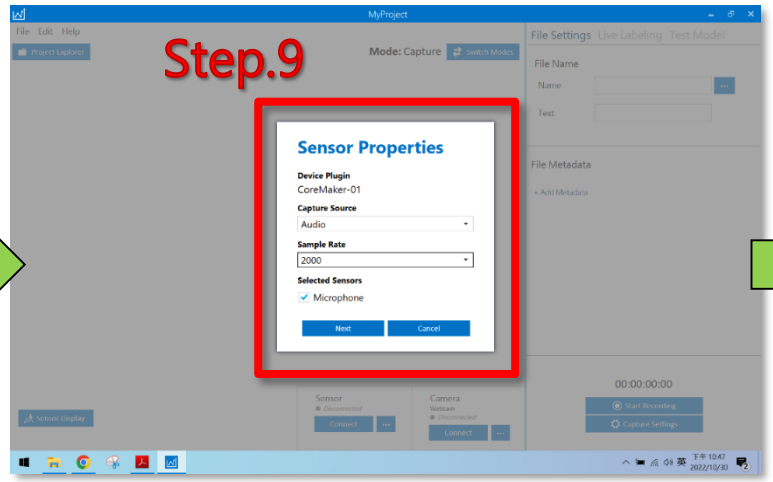
Step.7

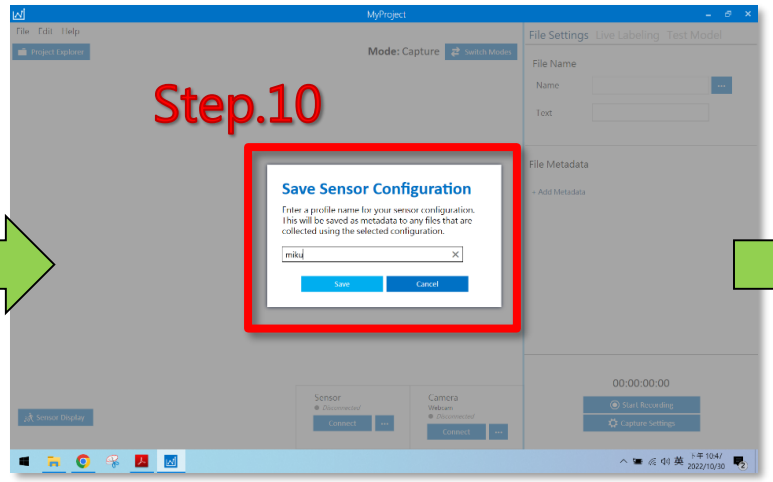












蒐集數據3

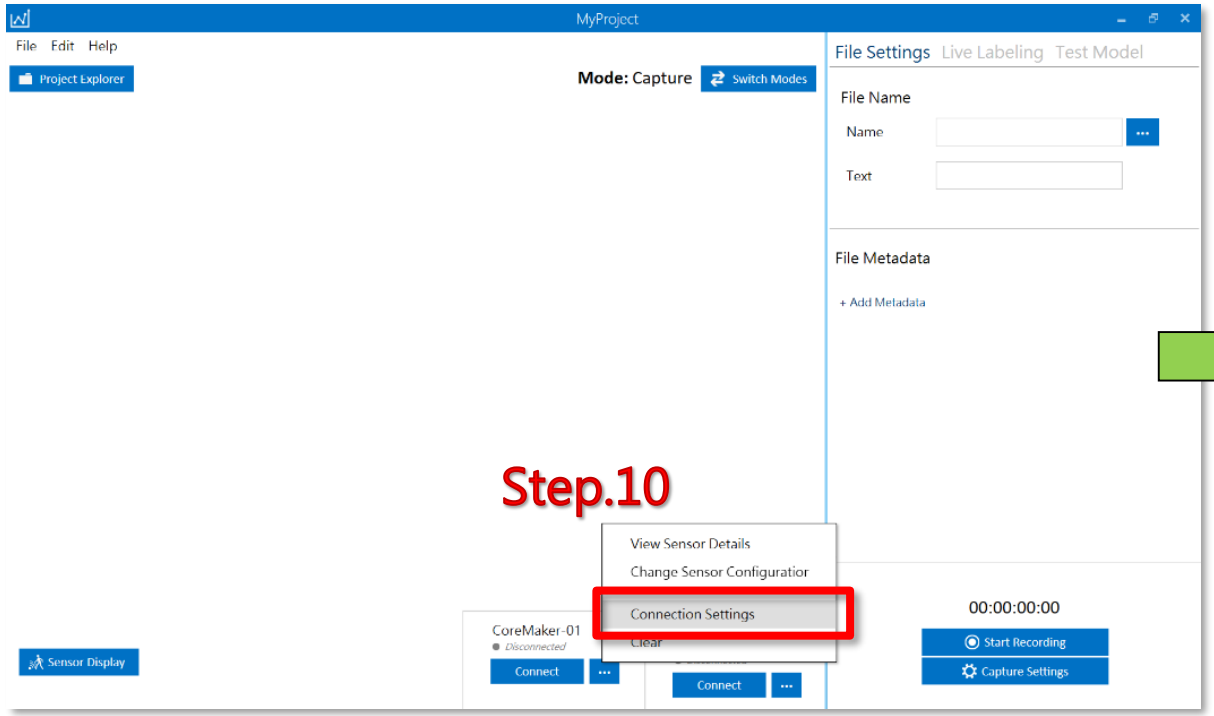


圖 1.點選連線設定'Connection Settings'

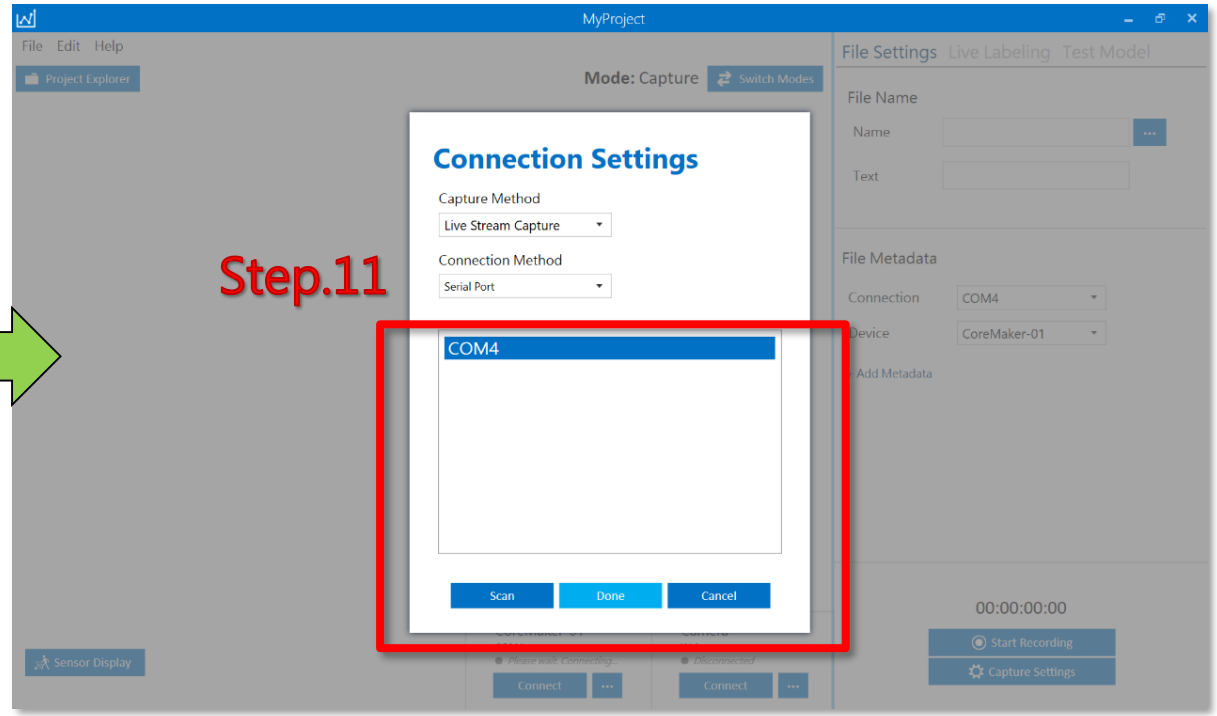


圖 2. 先按下'Scan'找到序列埠選之後再按'Done'

蒐集數據4

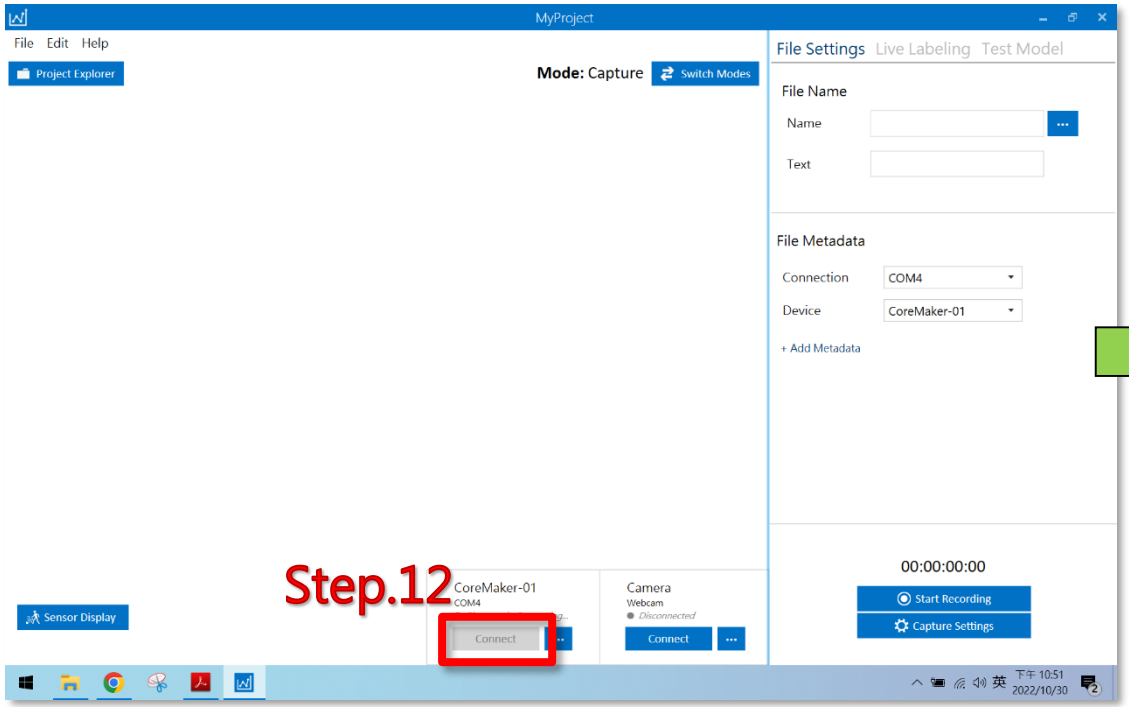


圖 1.點選連線設定'Connection'

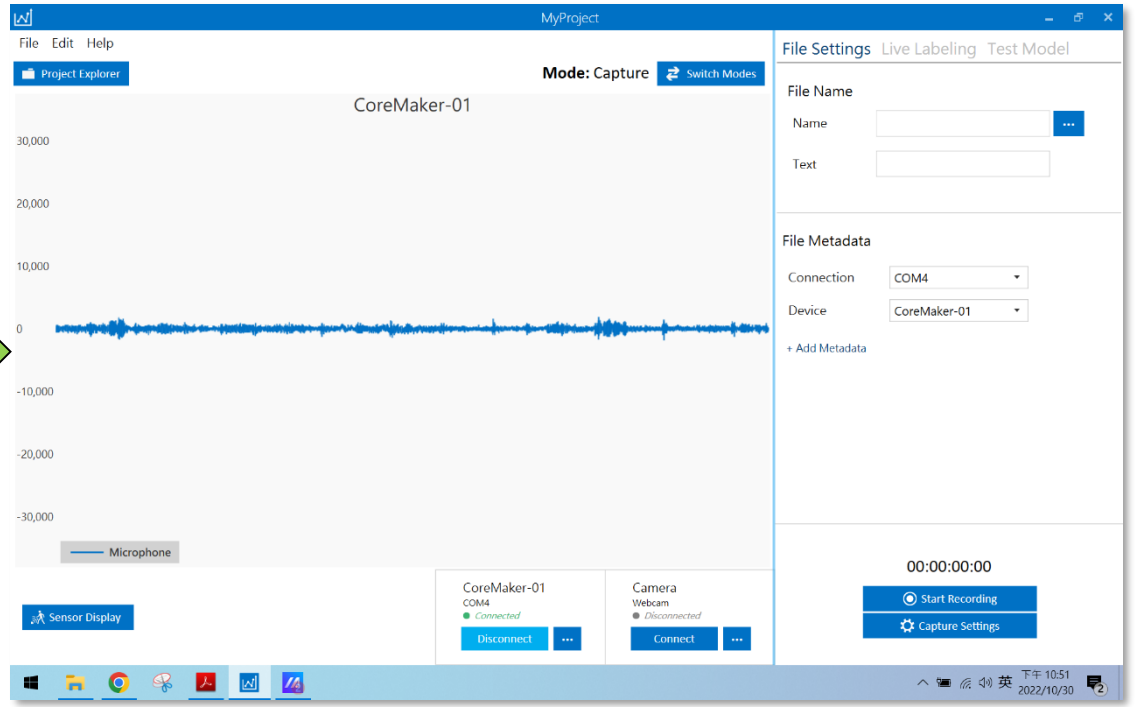
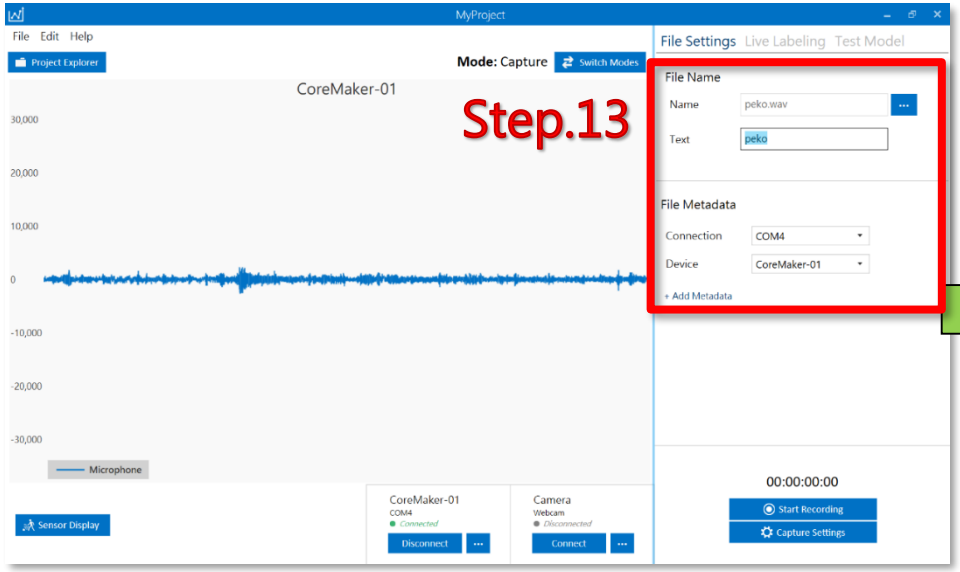
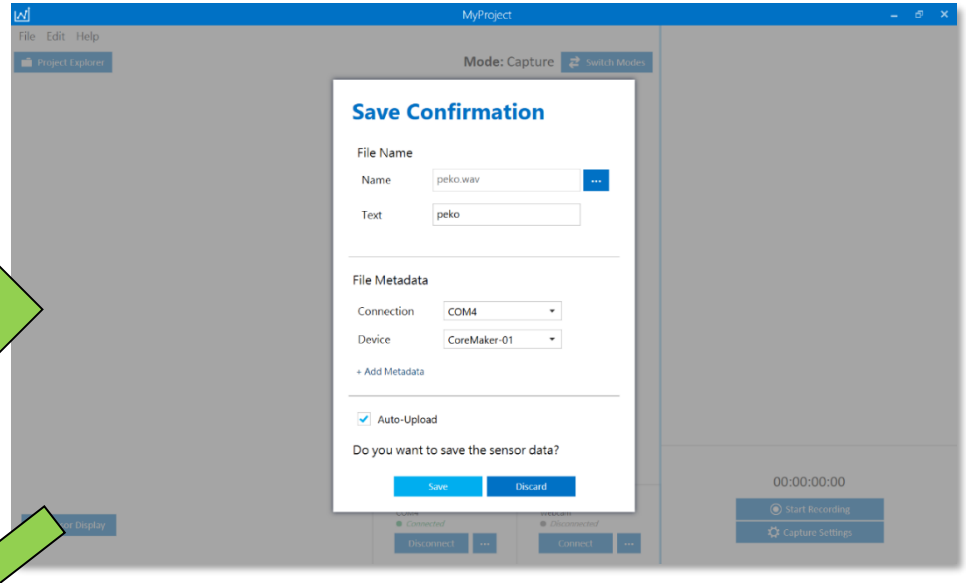


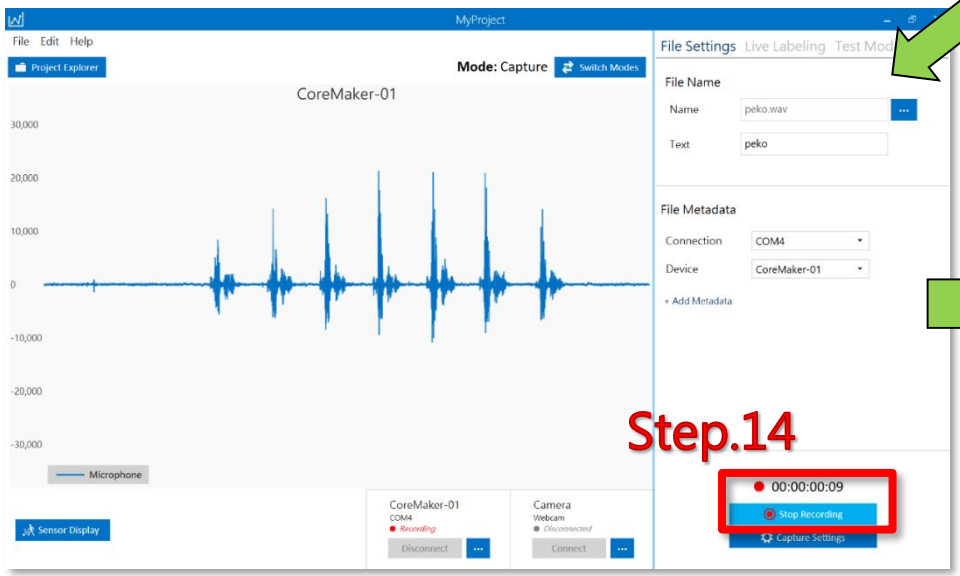
圖 2. 成功連線

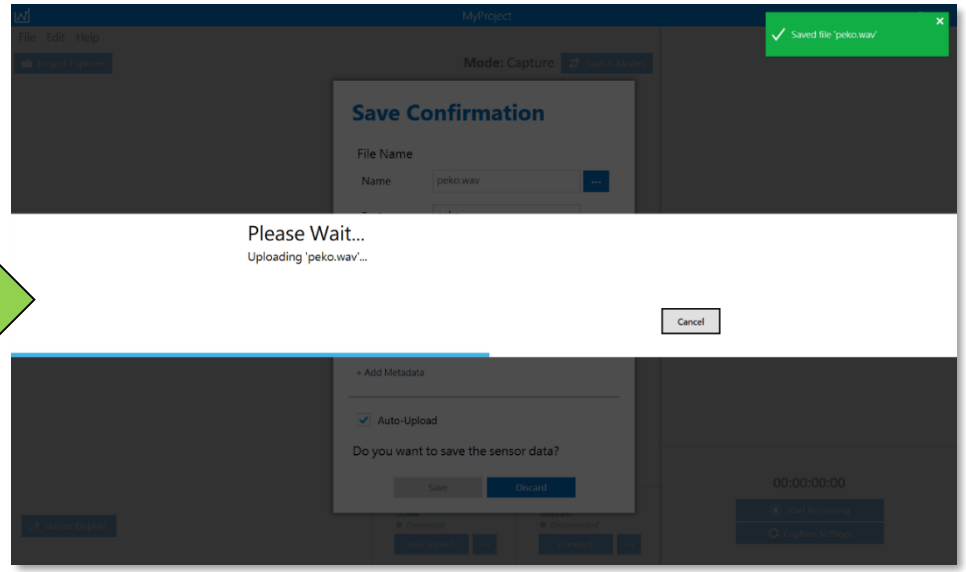
點選頁面下方CoreMaker-01 的Connect 按鈕， 當狀態列出現Retrieving Configuration 時，
按壓CoreMaker-01 上的SW2 按鍵即可連線。連線成功後，
頁面中間會顯示輸入資料的波型圖。

蒐集數據5

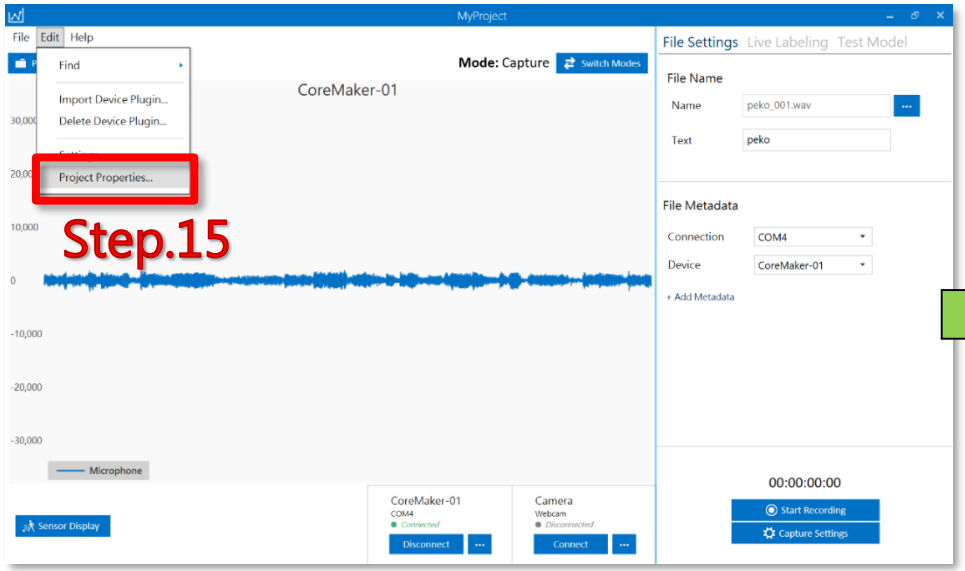


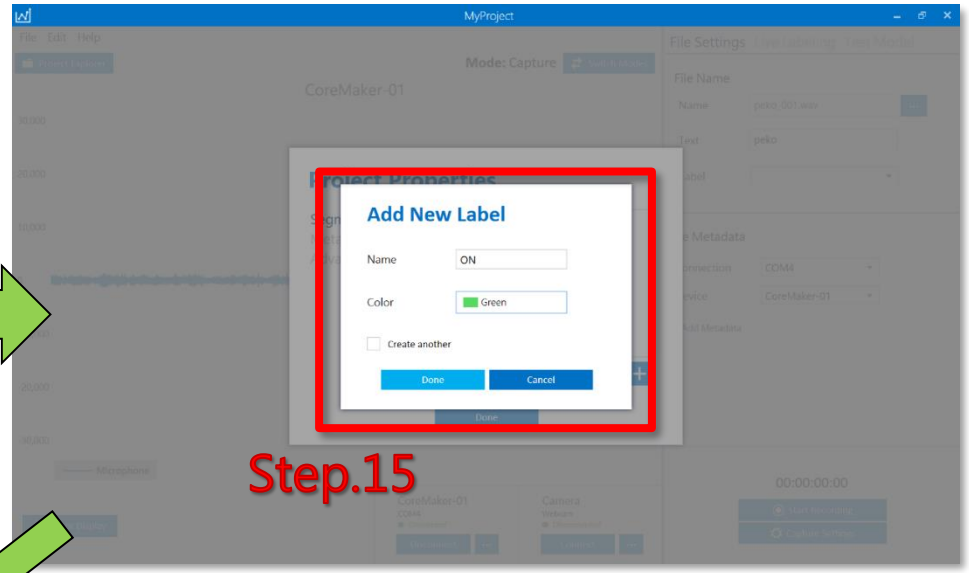


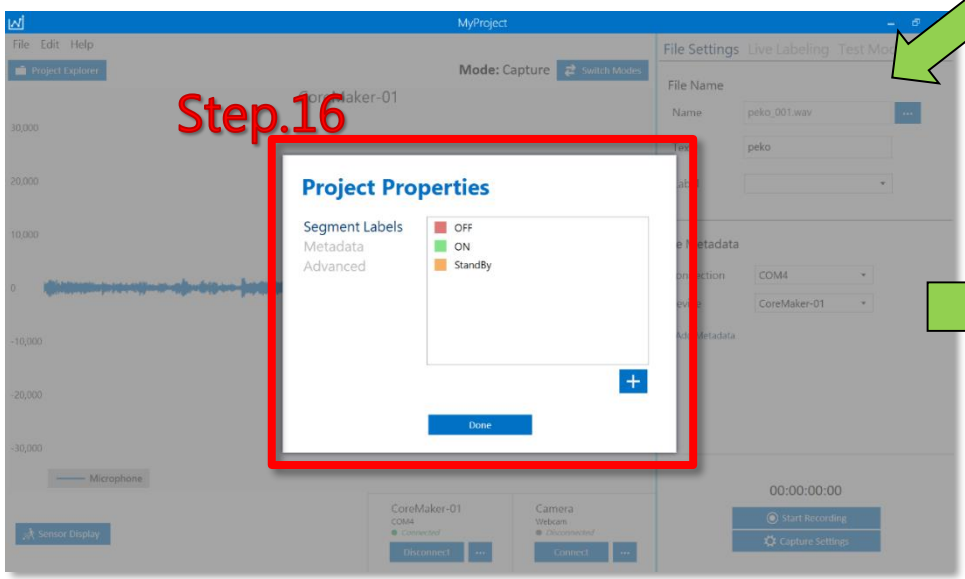


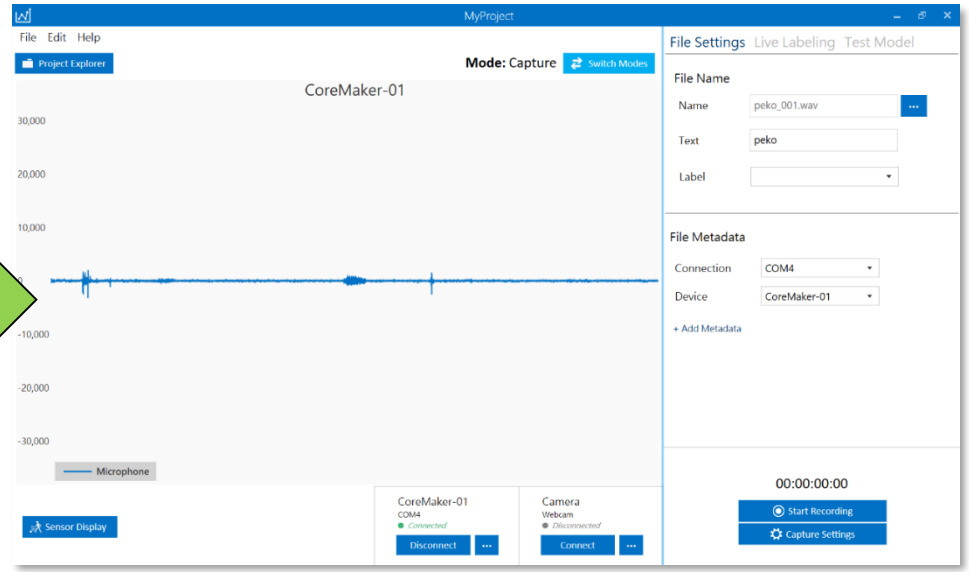


蒐集數據6



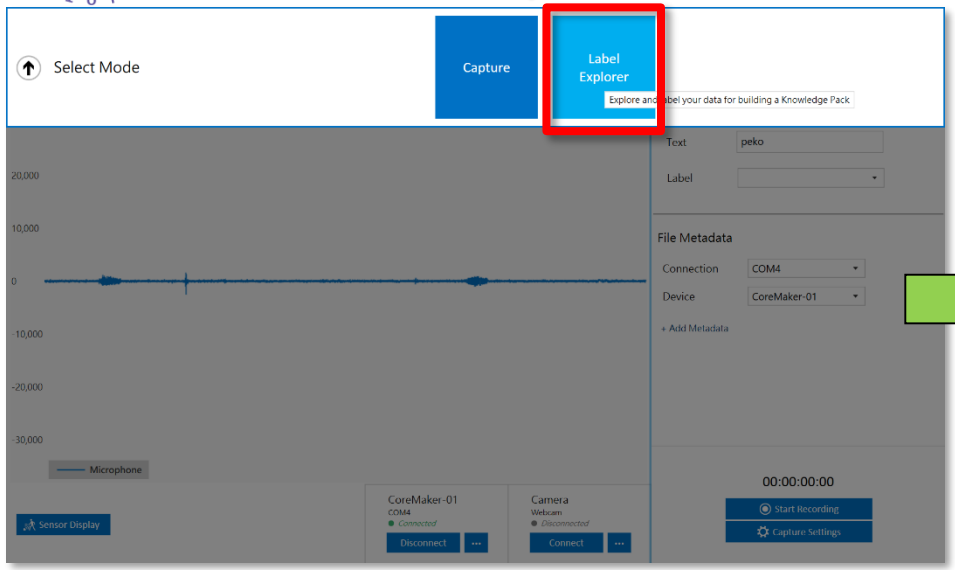




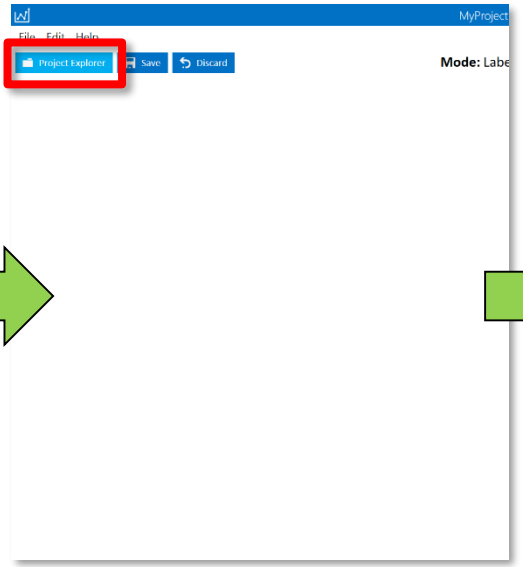


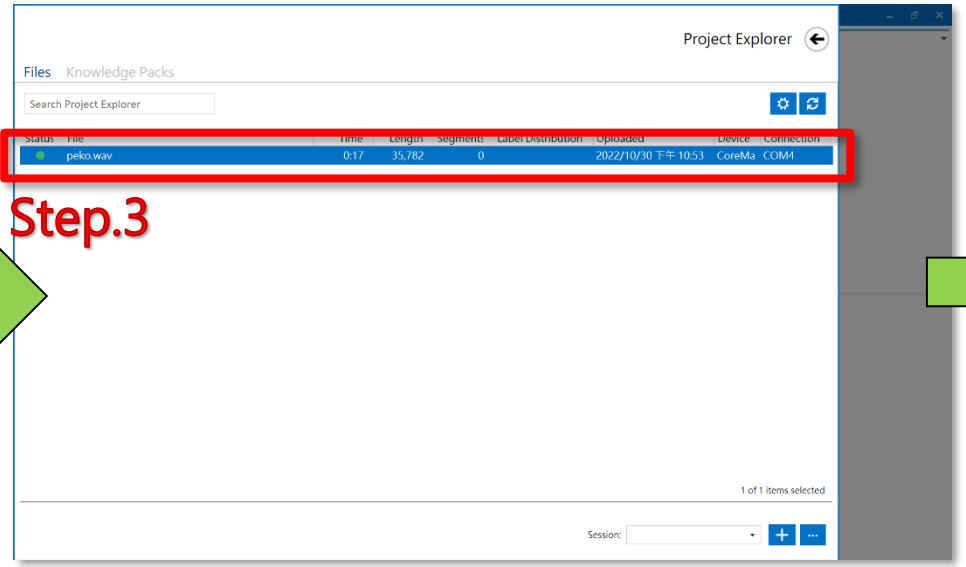
分類標註1

Step.1



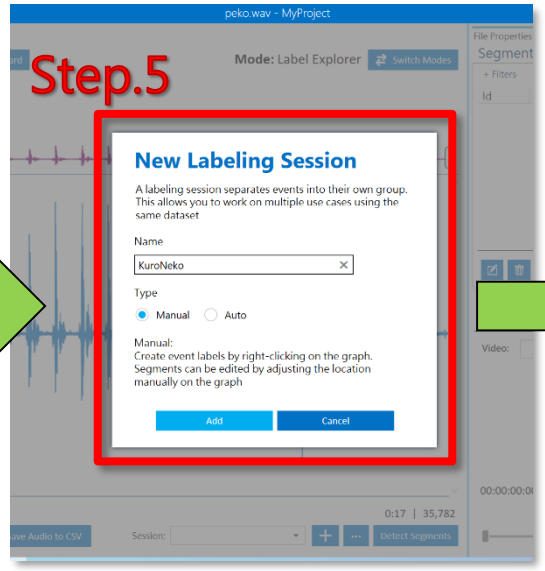
Step.2

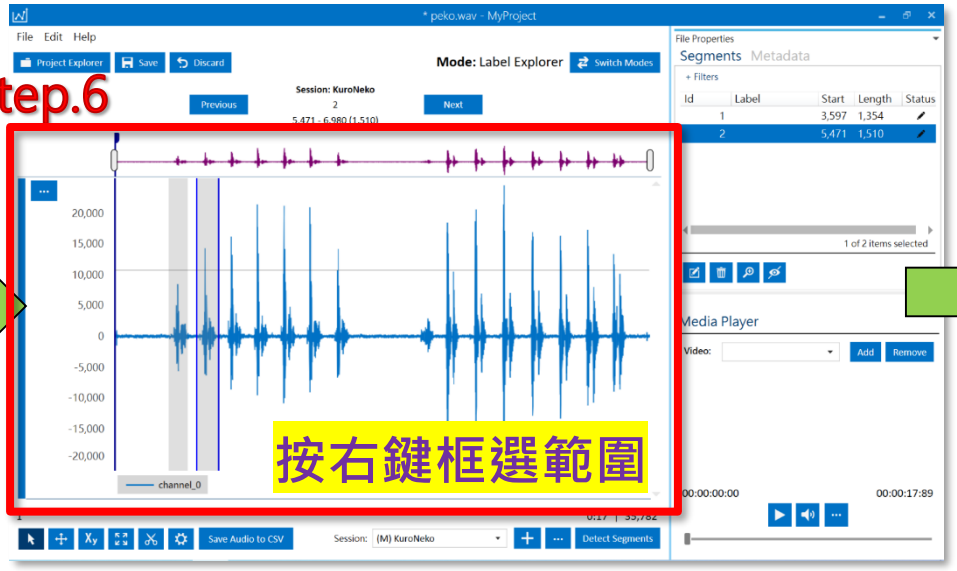


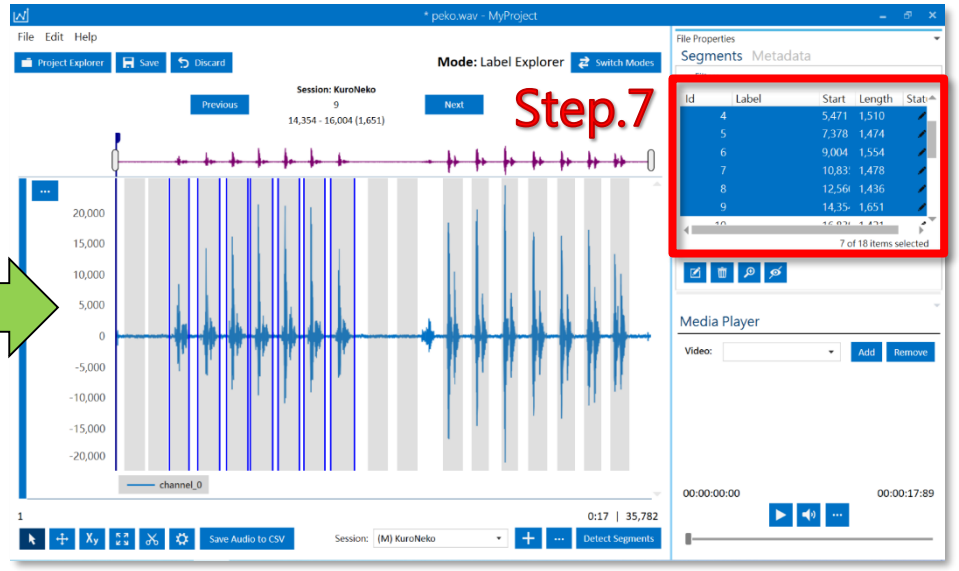


Step.3

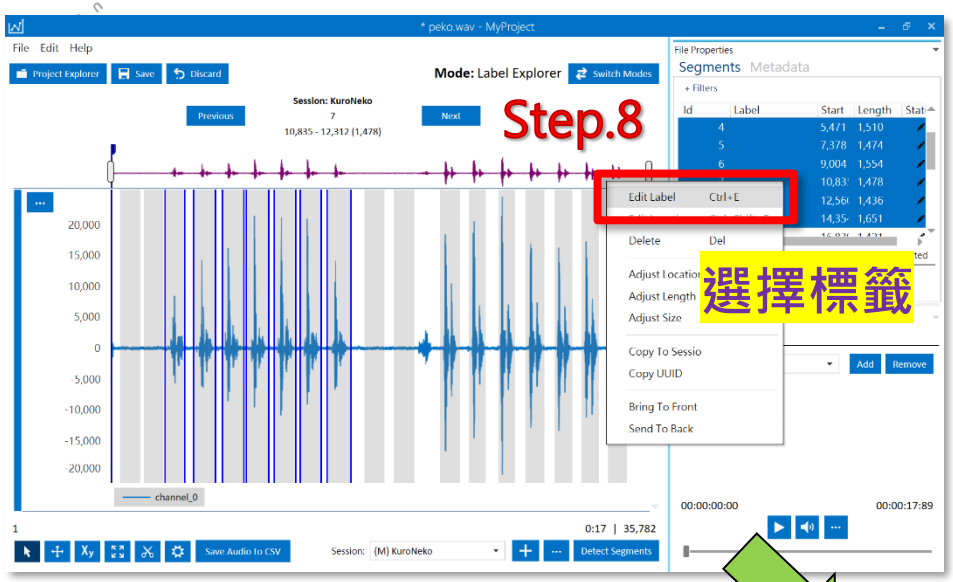
分類標註2







分類標註3



模型訓練

https://app.sensiml.cloud

前往SensiML網站 ➔

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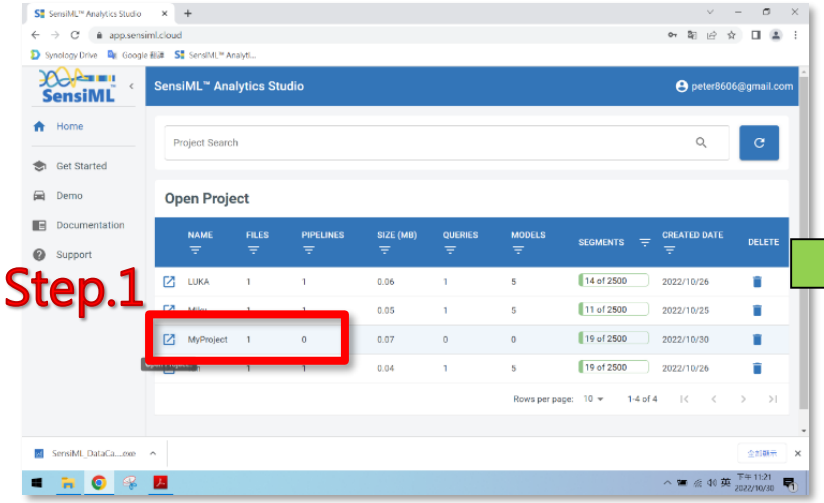
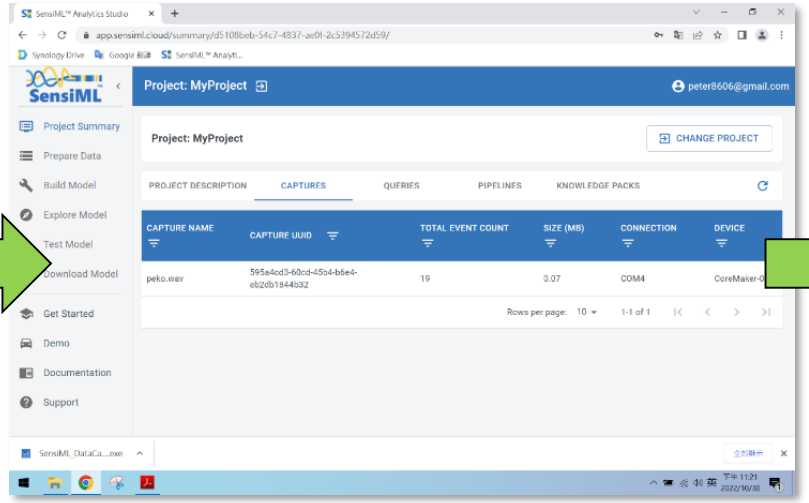
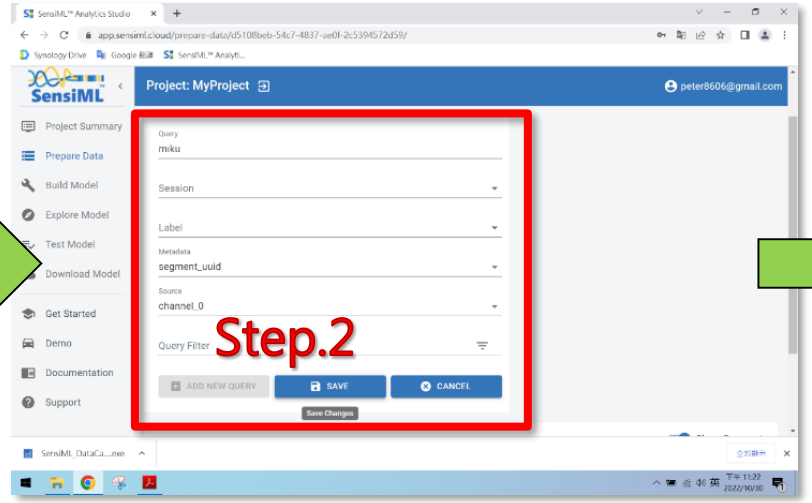
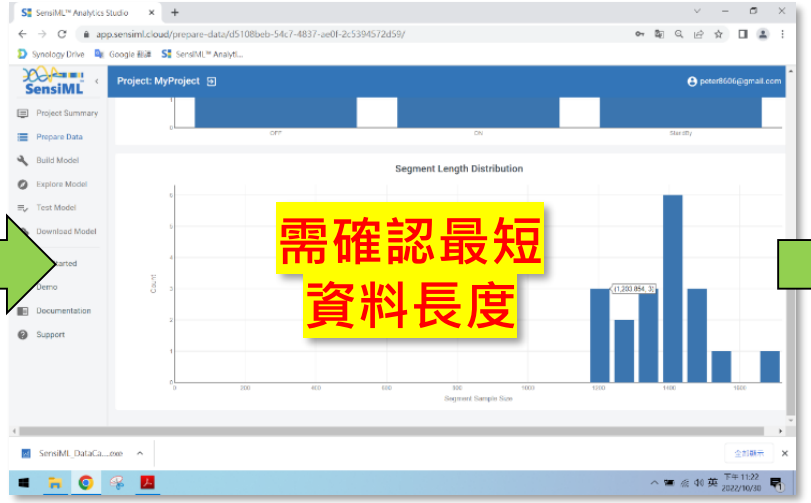
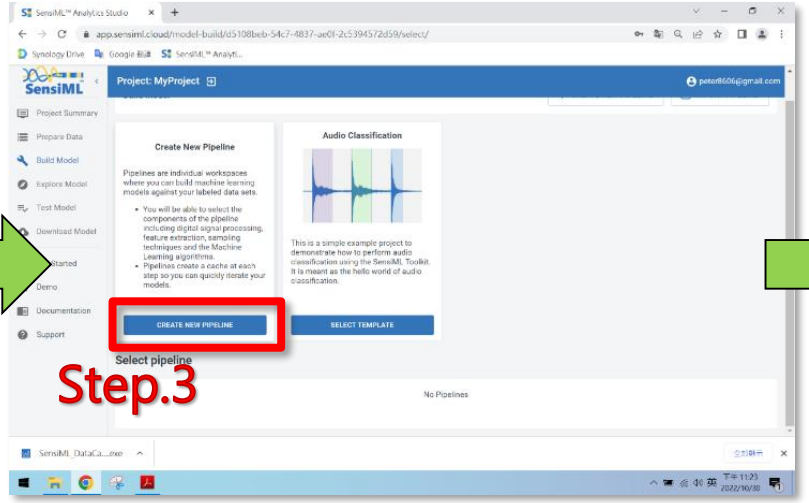
模型訓練1

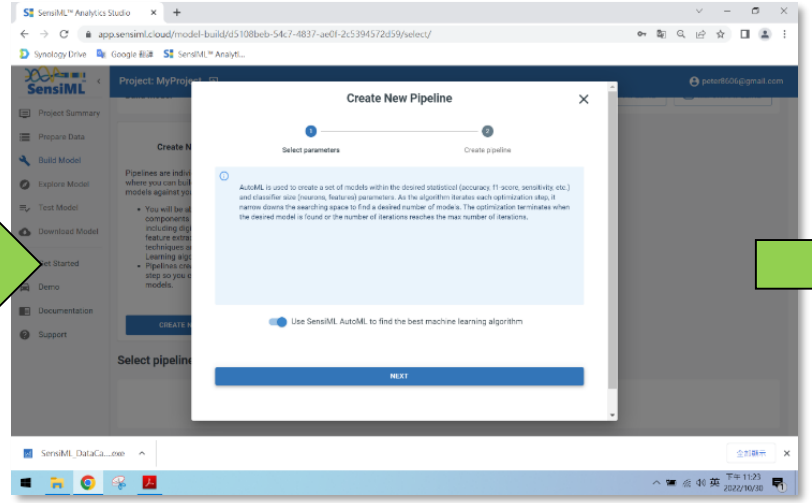




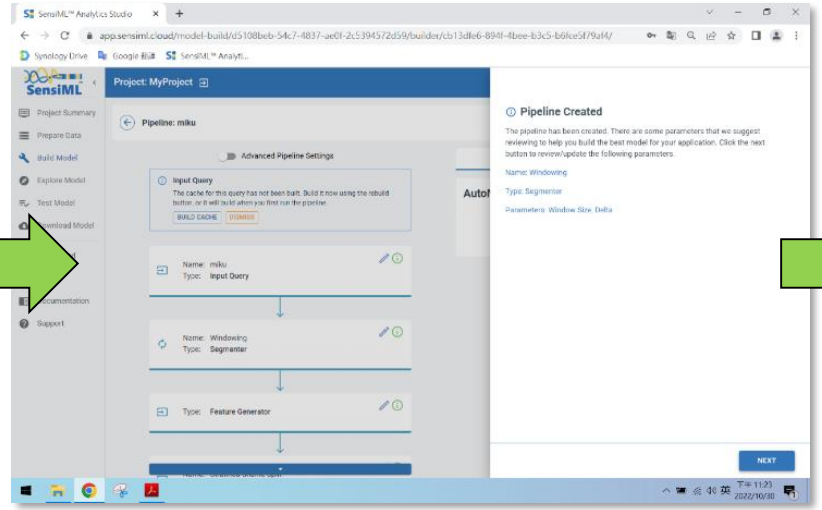


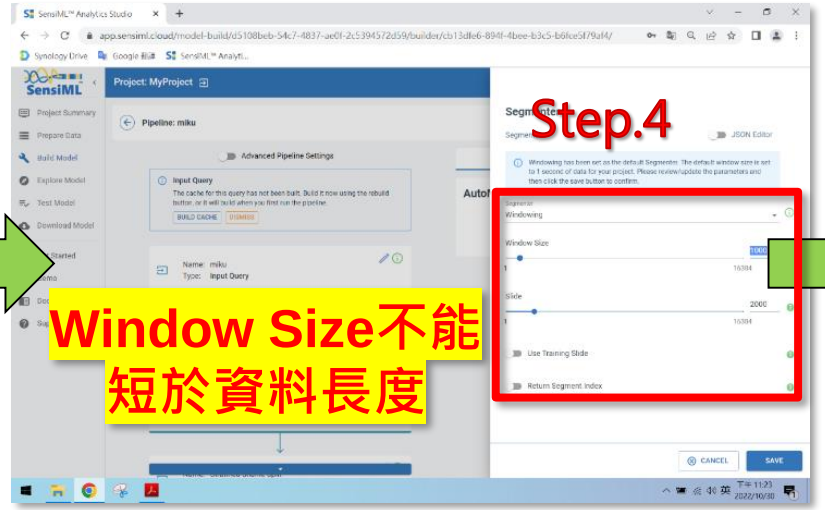


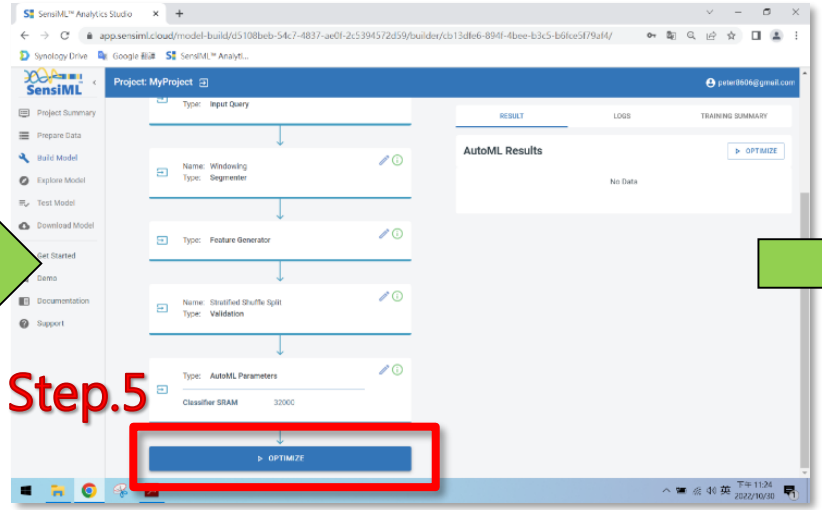


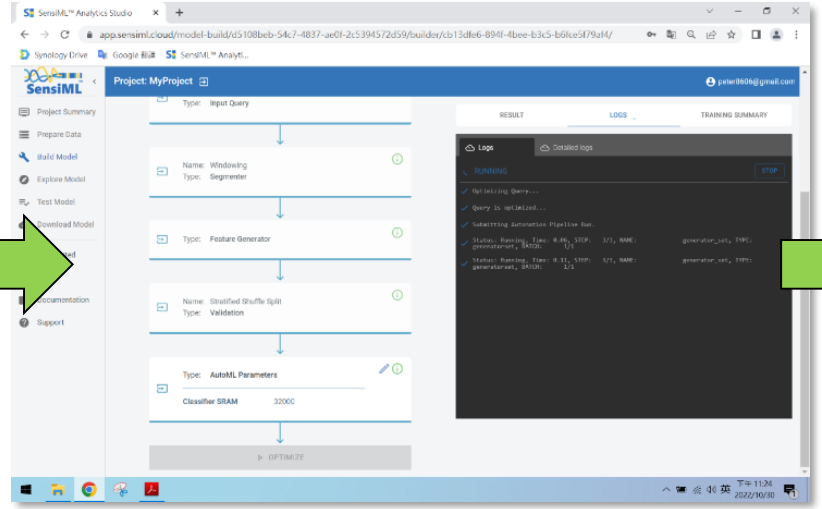


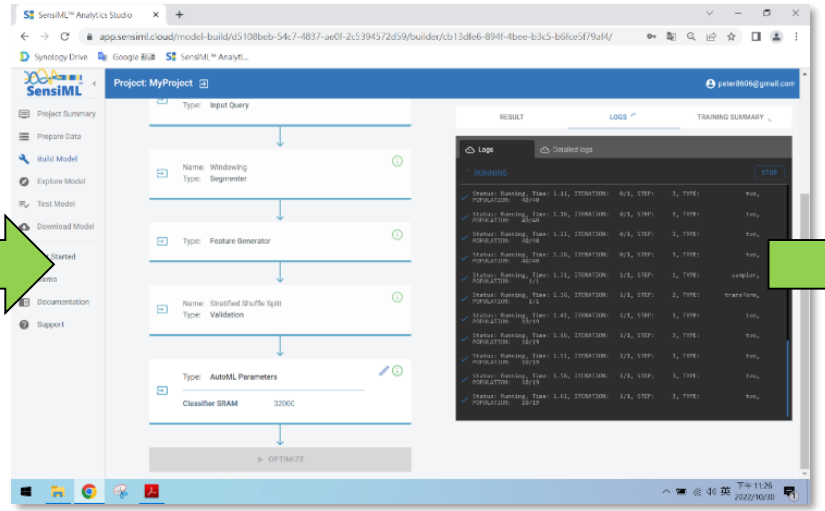
模型訓練2

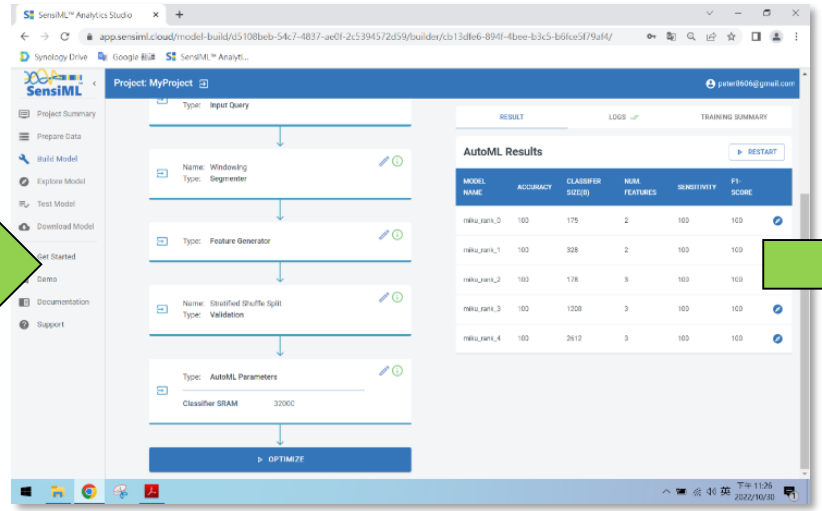




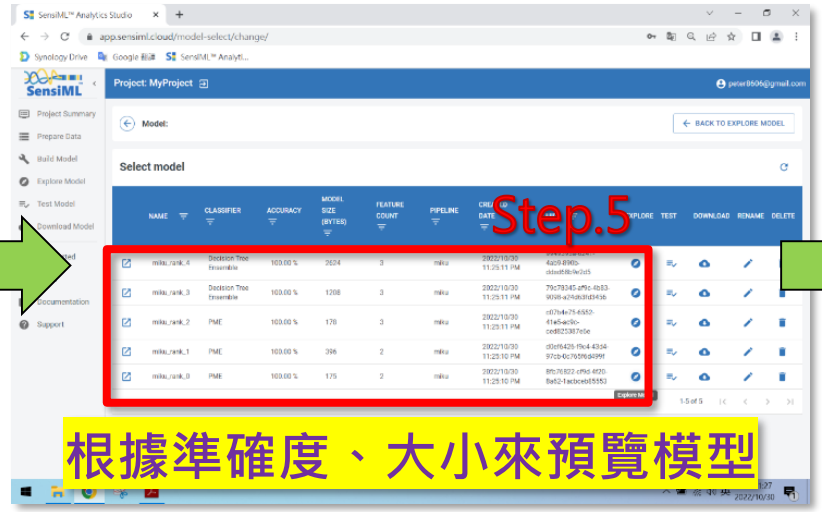


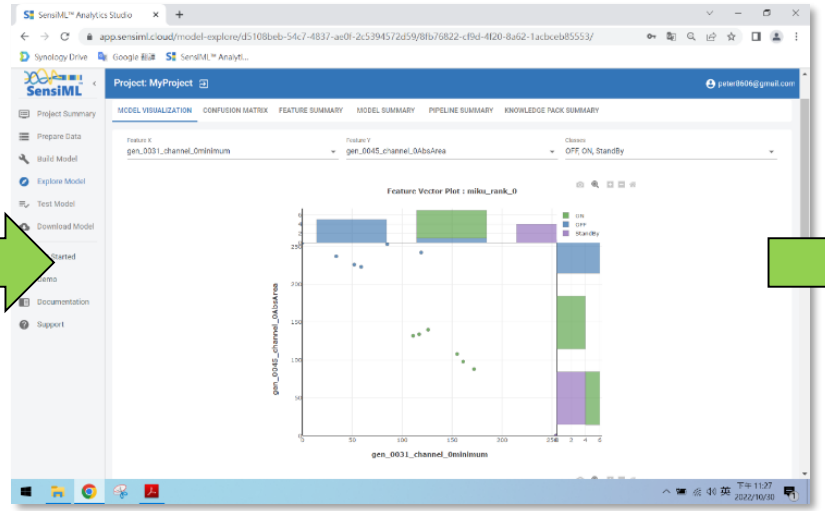


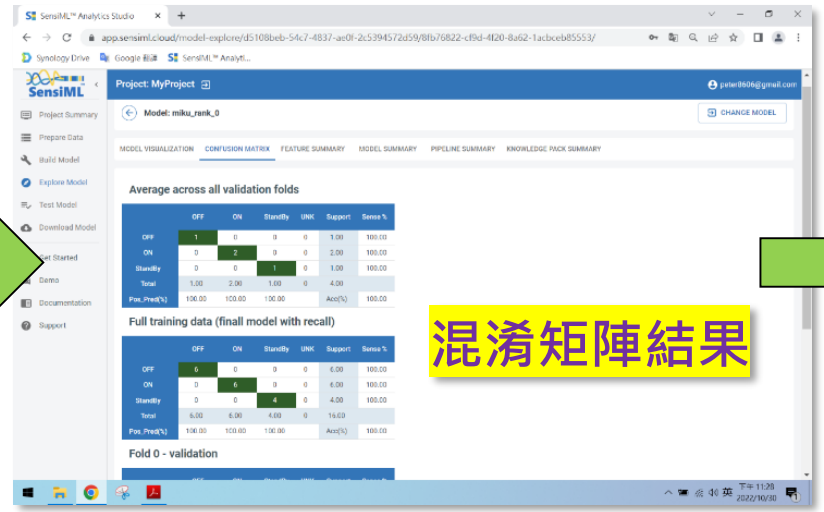


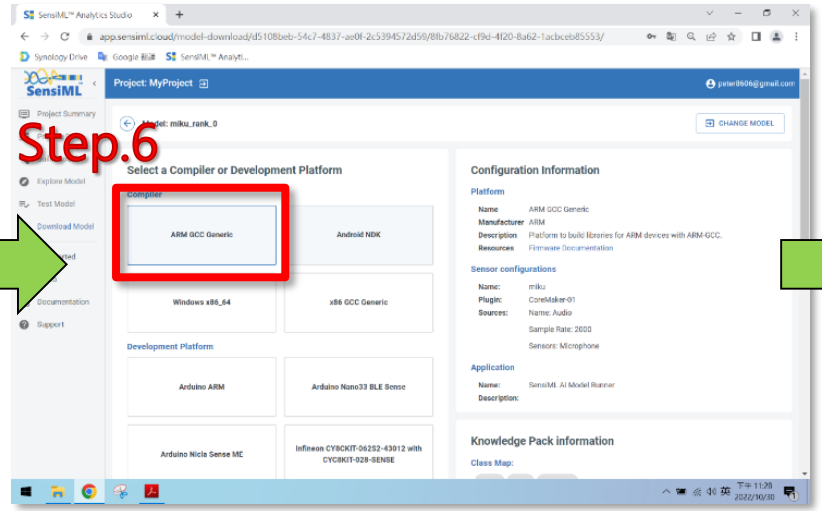


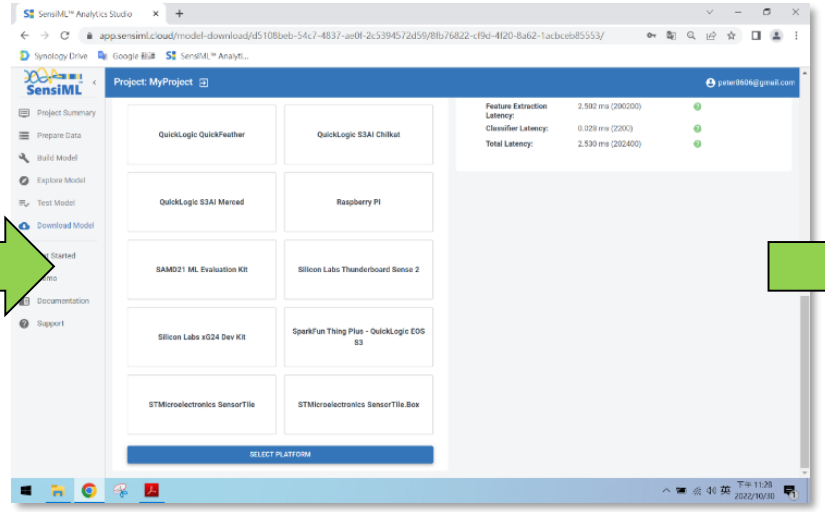
模型訓練3

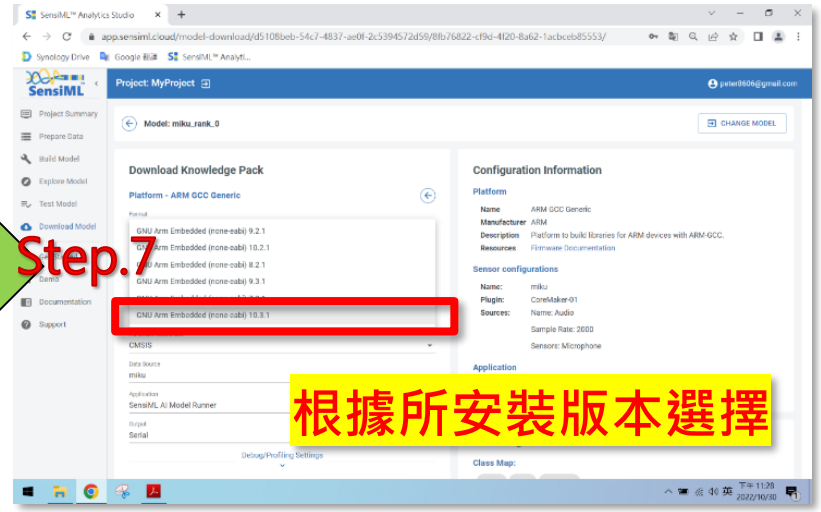




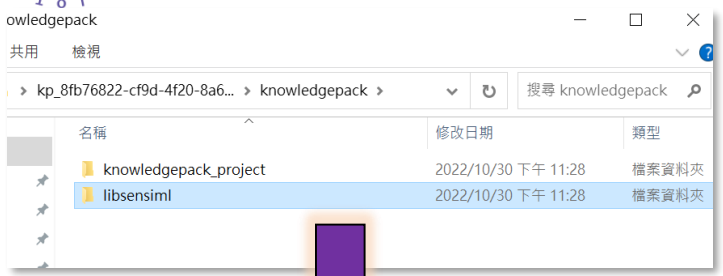


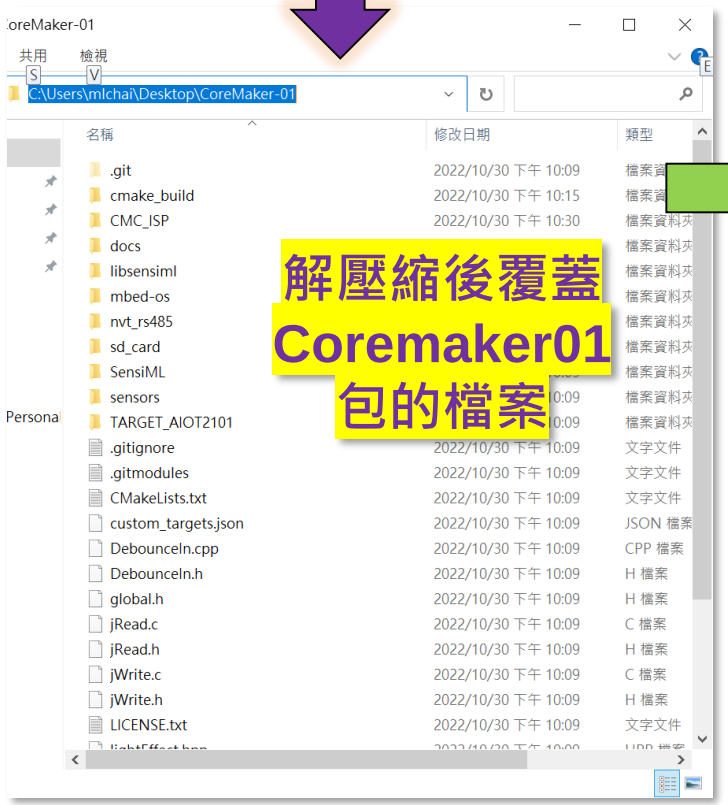


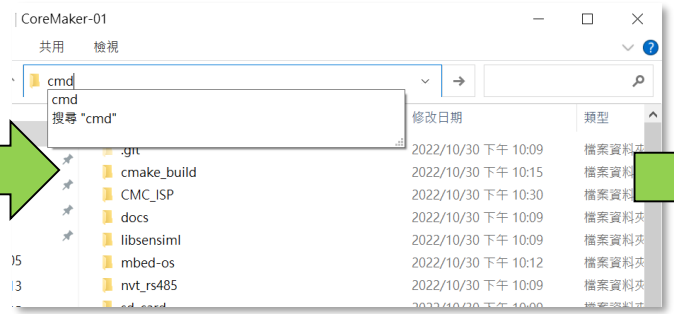


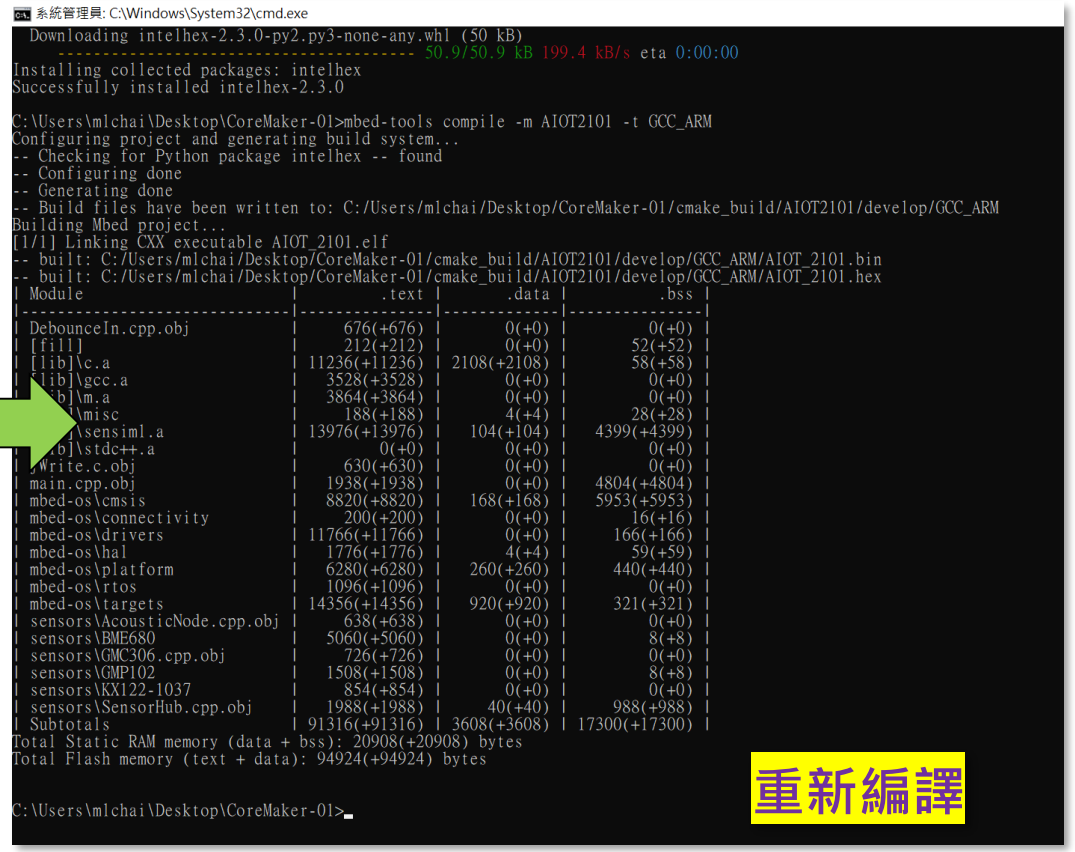


Coremaker-01燒入









> mbed-tools compile -m AIOT2101 -t GCC_ARM

Coremaker-01燒入

Step1.至CoreMaker-01\CMC_ISP
Step2.CoreMaker-01進入燒入模式
Step3.選擇'USB'連線
Step4.按下'Connect'連線
Step5.選擇.bin檔案位置
Step6.開始燒入

CoreMaker01\cmake_build\AIOT2101\develop\
GCC_ARM\AIOT_2101.bin

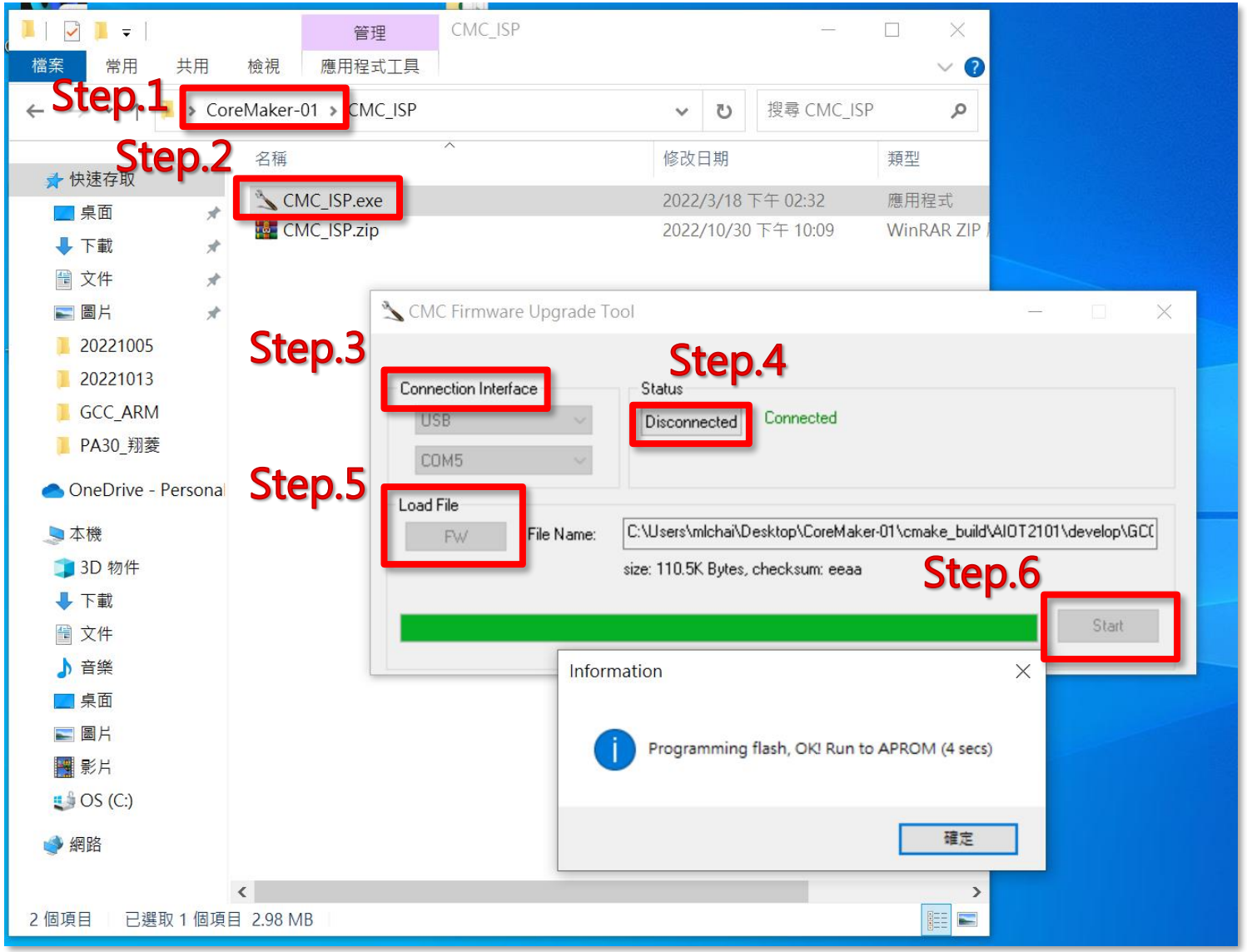


圖 1. Coremaker-01燒入介面操作

Coremaker-01燒入

圖 1. 打開Tera Term設定鮑率115200

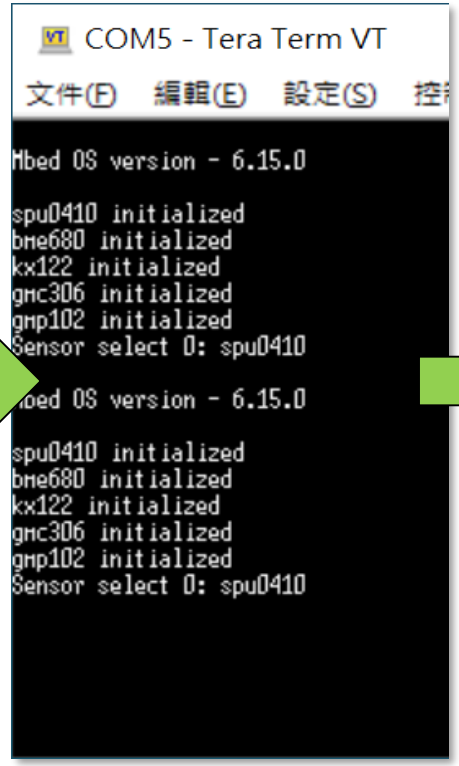


圖 2. 成功連上初始化資料

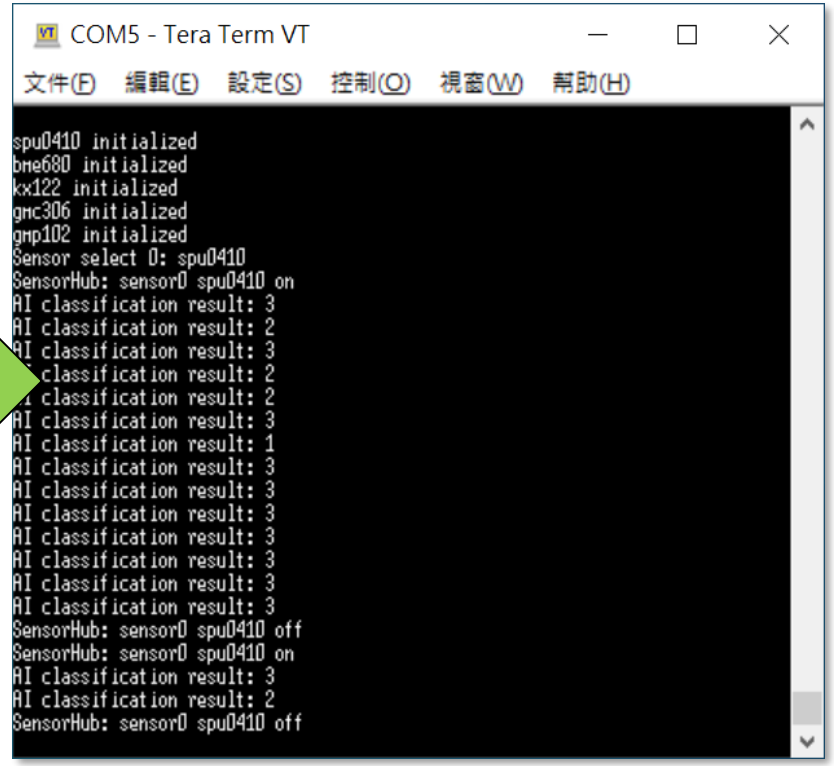


圖 3. 按下'SW2'開始辨識

更改Coremaker-01輸出

Step1. 至 CoreMaker-01/sensors/SensorHub.cpp 的260行

Step2. 將print內改為想要輸出方式

Step3. 重新編譯後燒入

```
> mbed-tools compile -m AIOT2101 -t GCC_ARM
```

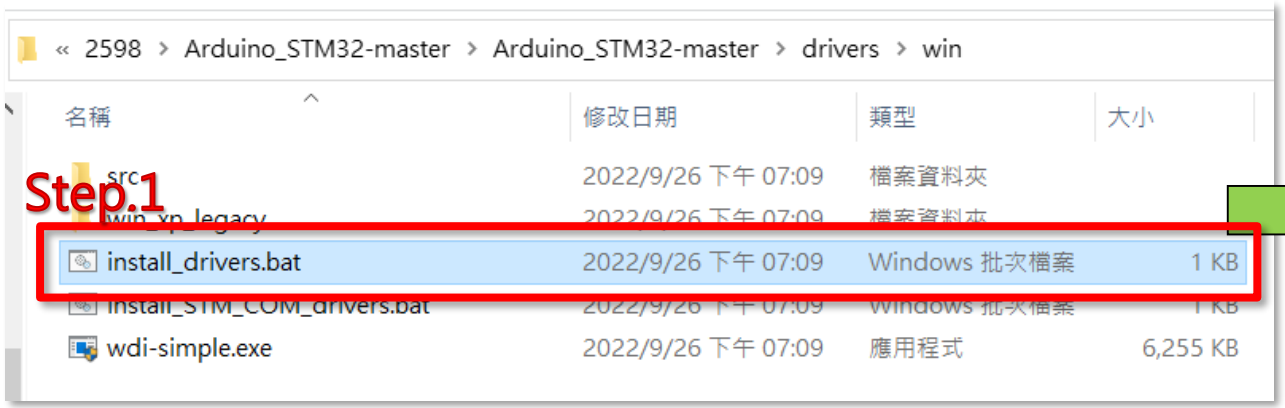
```
// if(i == SENSOR_GMP102)
//     gmp102.PrintFormatedData(m_dataBuffer);

if(m_DCLStatus == DCL_CONNECTED)
{
    serial.send((uint8_t*)m_dataBuffer, m_dataLen);
}
else if(run_ai_model[i])
{
    int ret = run_ai_model[i]((SENSOR_DATA_T*)m_dataBuffer, m_dataLen/sizeof(short), 0);
    if (ret > -1)
    {
        printf("AI classification result: %d\n", ret);
        kb_reset_model(0); // Reset running model to initial state.
    }
    else if (ret == -2)
        printf("This segment has been filtered.\n");
    else if (ret < -2)
        printf("AI error: %d\n", ret);
}
```

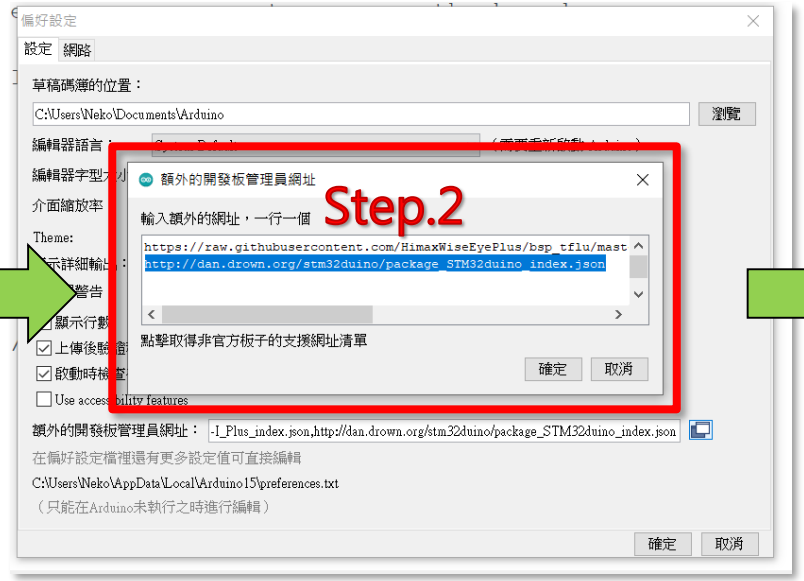
```
// if(i == SENSOR_GMP102)
//     gmp102.PrintFormatedData(m_dataBuffer);

if(m_DCLStatus == DCL_CONNECTED)
{
    serial.send((uint8_t*)m_dataBuffer, m_dataLen);
}
else if(run_ai_model[i])
{
    int ret = run_ai_model[i]((SENSOR_DATA_T*)m_dataBuffer, m_dataLen/sizeof(short), 0);
    if (ret > -1)
    {
        printf("%d\n", ret);
        kb_reset_model(0); // Reset running model to initial state.
    }
    else if (ret == -2)
        printf("This segment has been filtered.\n");
    else if (ret < -2)
        printf("AI error: %d\n", ret);
}
```

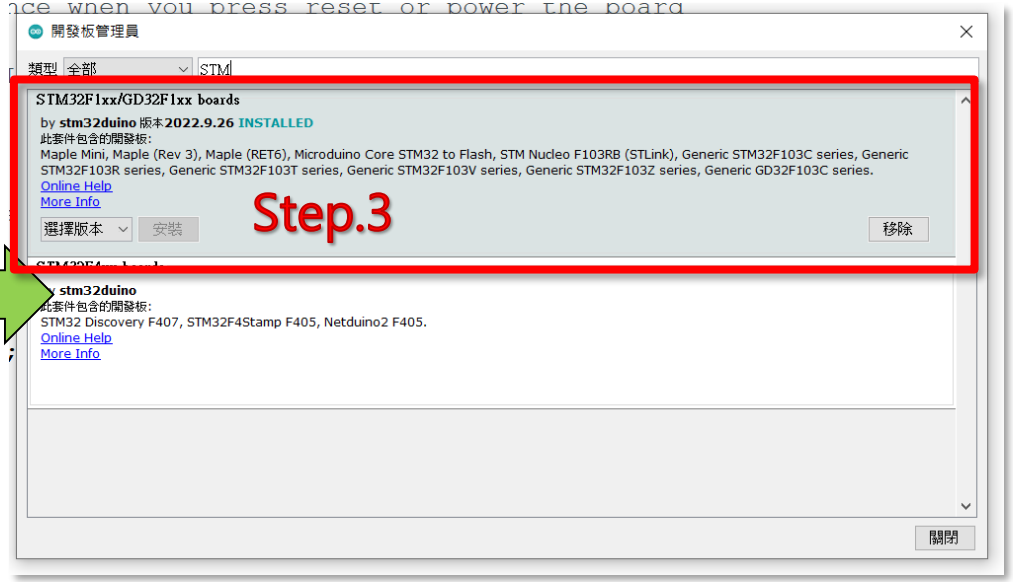
2598+設定

Step1. 下載並安裝驅動程式

https://github.com/rogerclarkmelbourne/Arduino_STM32







Step3.在Arduino IDE 功能列的'工具'中選擇'開發板管理員',連網狀態下安裝"STM32F1xx/GD32F1xx boards"
確認開發板'STM32F1xx'並且按下更新。

Step2.於額外的開發板管理員網址中輸入：

http://dan.drown.org/stm32duino/package_STM32duino_index.json

2598+設定

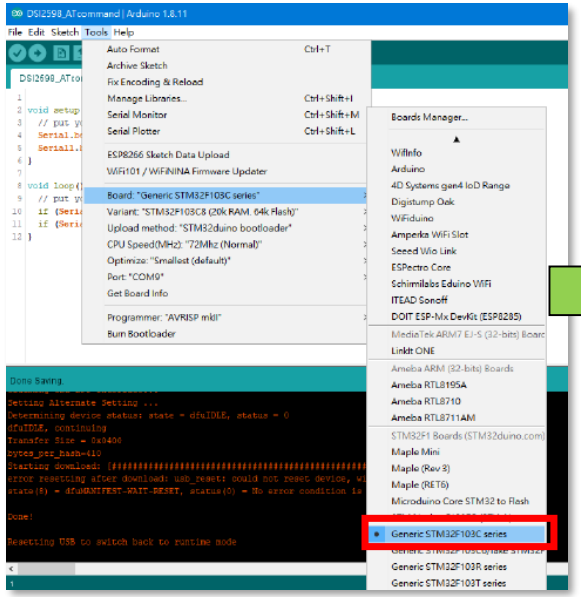


圖 1.選擇開發板: "Generic STM32F103C series"

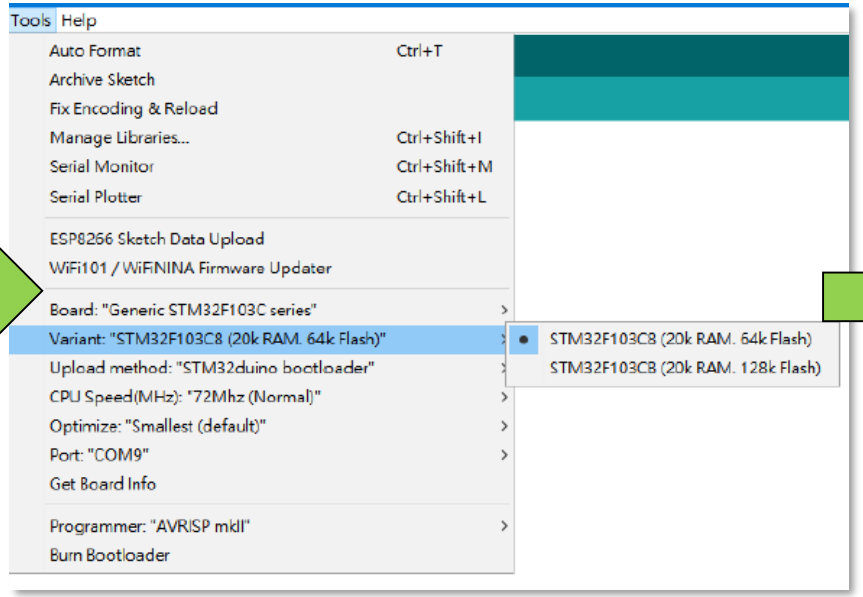


圖 2.選擇64k 的Flash 版本

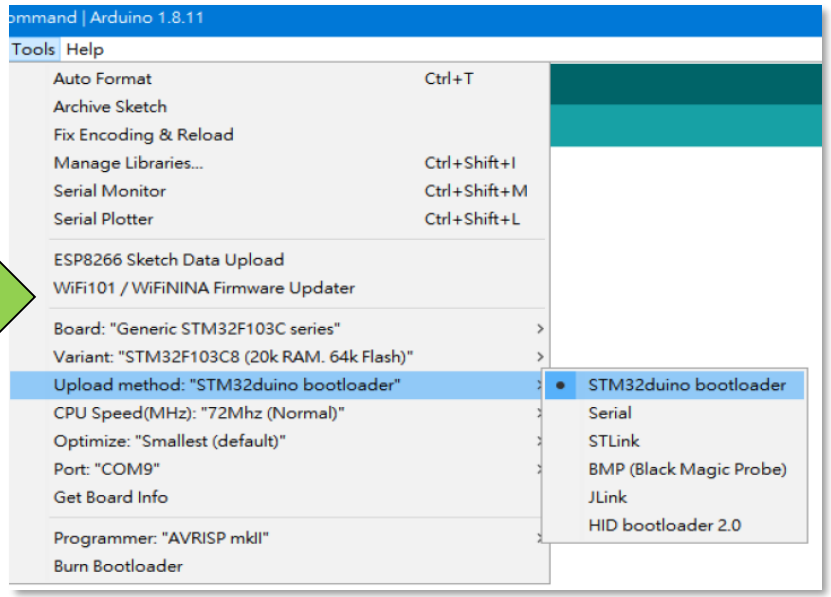


圖 3.預設使用DSI 2598+上的USB，配合已經先預載的bootloader來燒錄。

2598+ 燒入測試

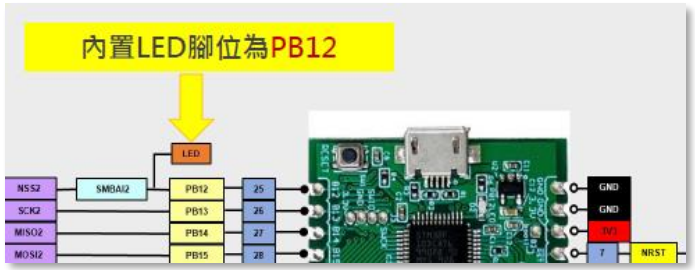
確認可操作2598+燒入以及驗證該晶片運作正常

2598_Blink | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

2598_Blink

```
#define pin_led PB12

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

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



程式會使內建LED(PB12)每秒閃爍

程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/2598/2598_Blink

2598+ 串接Coremaker-01

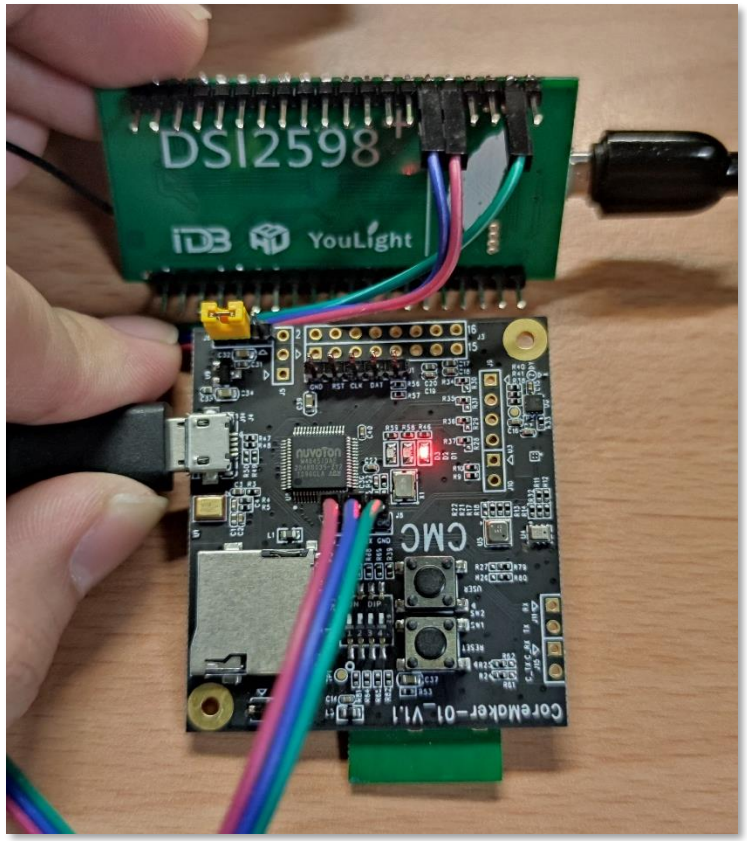


圖 1. 串接實體

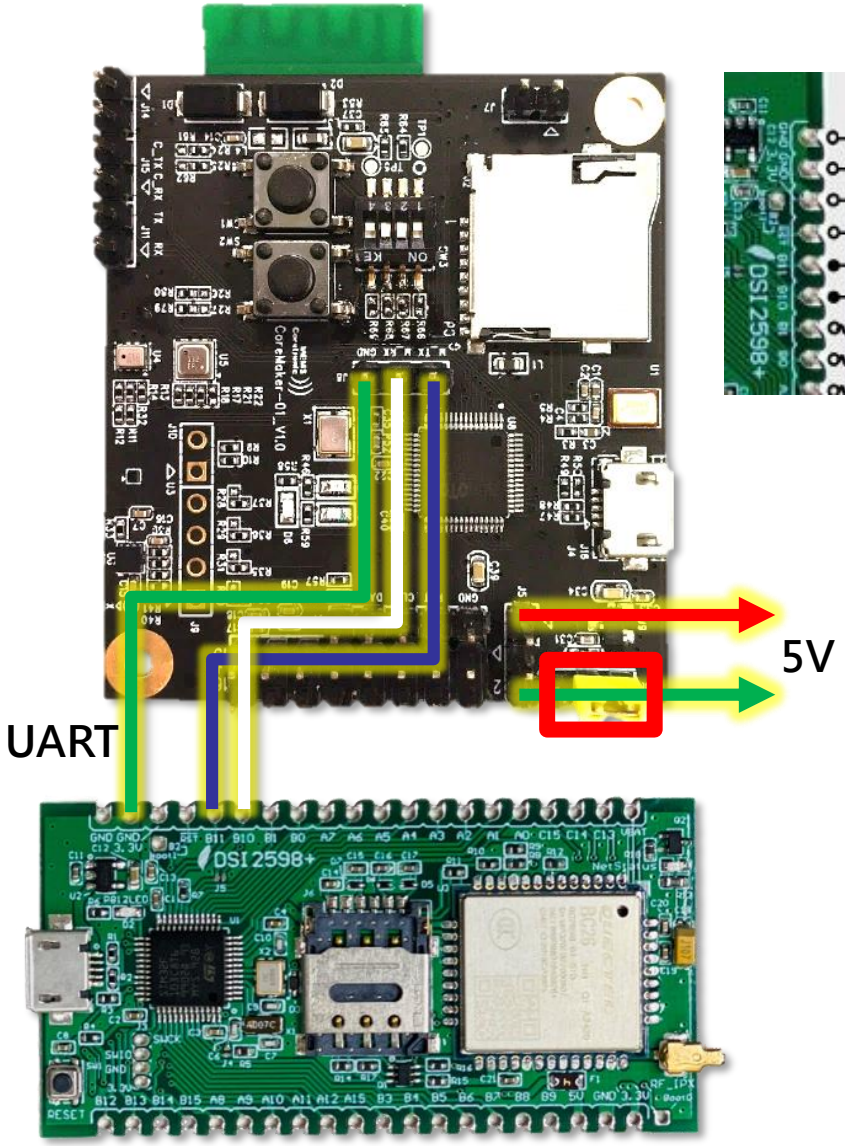


圖 2. 串接線路圖(額外供電)

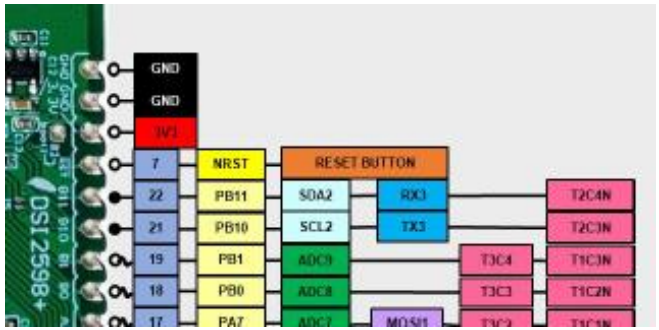


圖 3. 接點放大圖

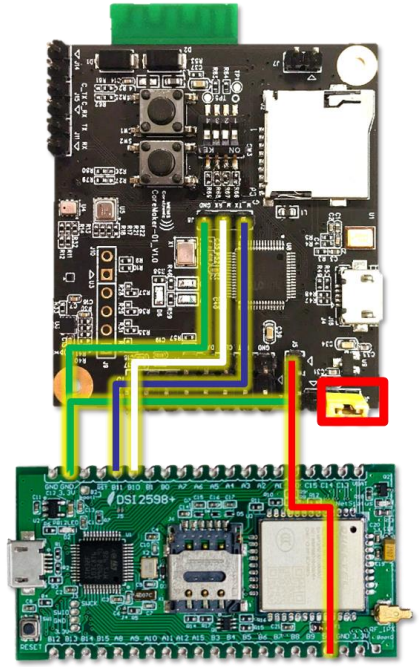


圖 4. 串接線路圖(共同供電)

DSI-2598+ RX3/B11	→	CoreMaker-01 TX
DSI-2598+ TX3/B10	→	CoreMaker-01 RX
DSI-2598+ GND	→	CoreMaker-01 GND

2598+ 串接Coremaker-01

2598_Byte | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

2598_Byte

```
void setup() {
  Serial.begin(115200);
  Serial3.begin(115200);
}

void loop() {
  // read from port 0, send to port 1:
  if (Serial.available()) {
    int inByte = Serial.read();
    Serial3.print(inByte);
  }
  // read from port 1, send to port 0:
  if (Serial3.available()) {
    int inByte = Serial3.read();
    Serial.print(inByte);
  }
}
```

會收到來自Coremaker-01byte訊號,需經ASCII轉換

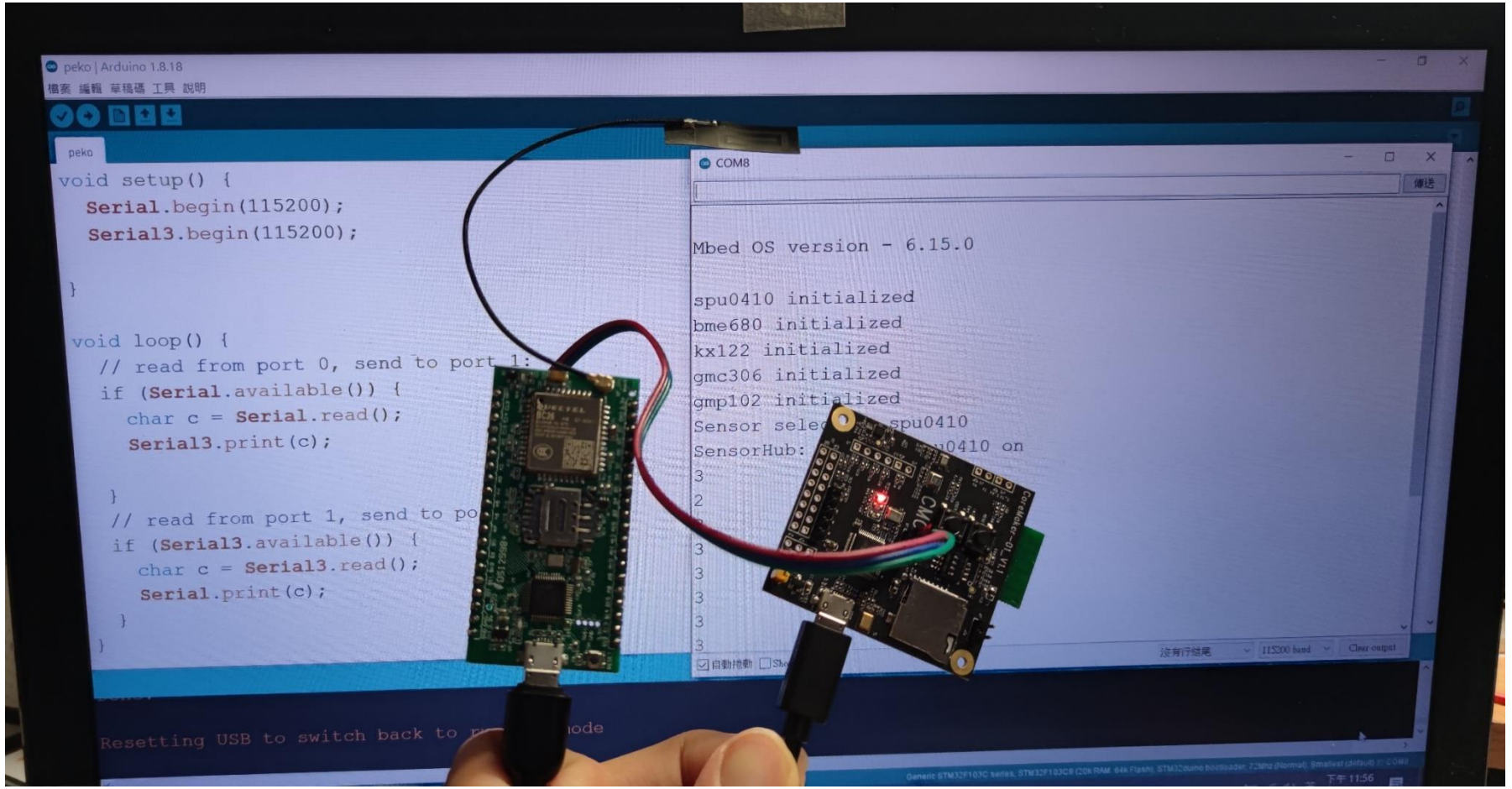
ASCII補充資料: https://zh.wikipedia.org/wiki/ASCII

程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/2598/2598_Byte

2598+ 串接Coremaker-01

經轉換後應可以從2598+收到Coremaker-01資料



程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/2598/2598_char

2598+ 串接Coremaker-01動作流程圖

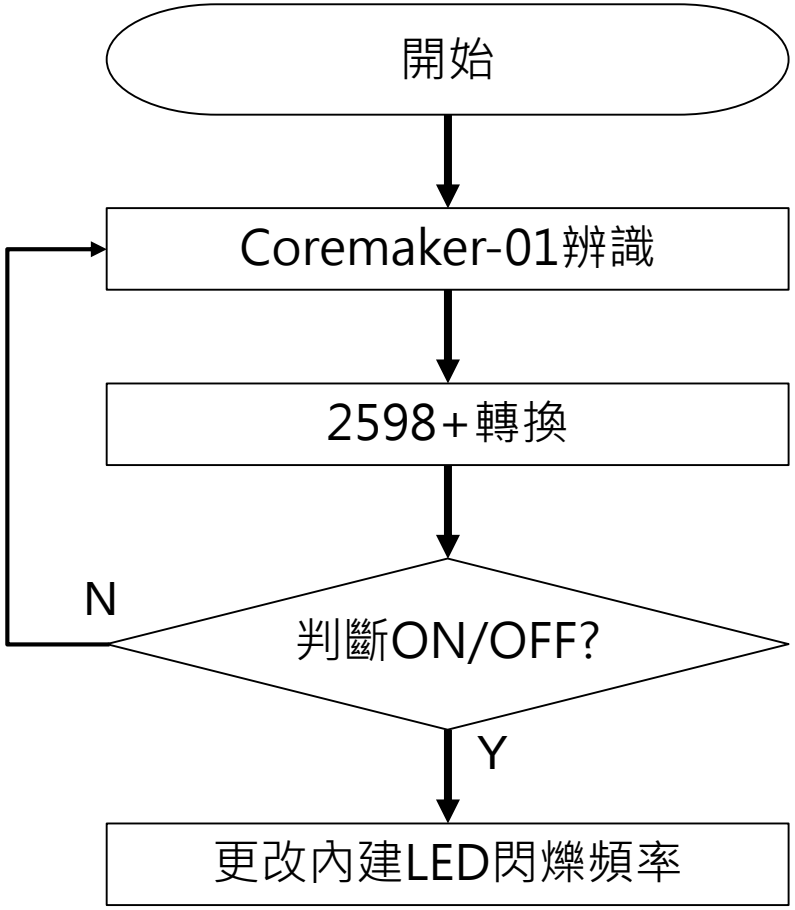


圖 1. 流程圖

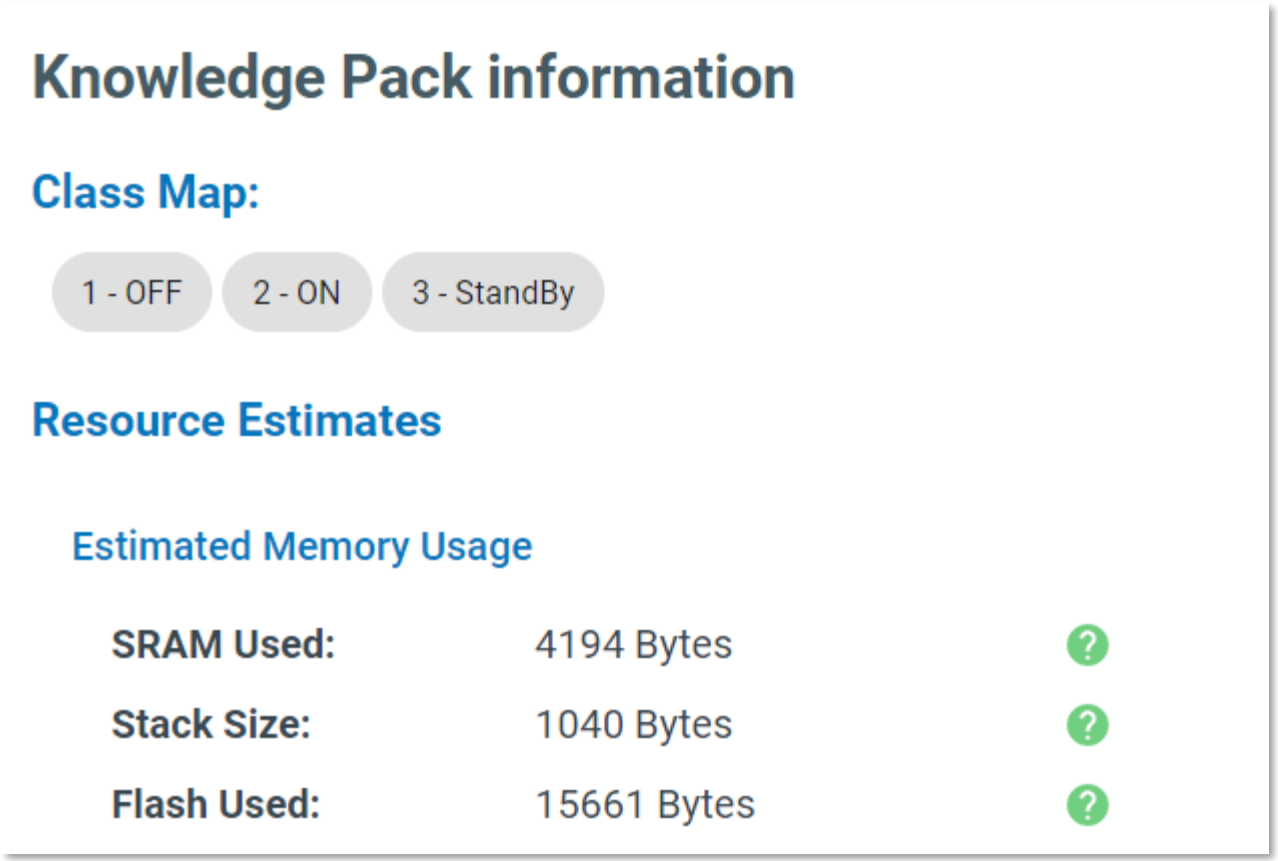


圖 2. 於SensiML網站輸出標籤說明

2598+ 串接Coremaker-01

收到ON/OFF訊號
後會改變閃爍頻率

2598_Coremaker01 | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

2598_Coremaker01 §

```
#define pin_led PB12
/*間隔 1000ms / 1秒*/
long interval = 10;
int ledState = LOW; // LED I/O 狀態
unsigned long previousMillis = 0;

void setup() {
  Serial.begin(9600);
  Serial3.begin(115200);
  pinMode(pin_led,OUTPUT);
}

void loop() {
  // read from port 3, send to port 0:
  if (Serial3.available()) {
    char c = Serial3.read();
    Serial.print(c);
  if (c=='1'){
    interval = 250;
  } else if (c=='2'){
    interval = 1000;
  }
  }
  unsigned long currentMillis = millis();
  if(currentMillis - previousMillis >= interval ){
    previousMillis = currentMillis;
    ledState == LOW ? ledState = HIGH : ledState = LOW;
    digitalWrite(pin_led,ledState);
  }
}
```

收到來自Coremaker-01byte訊號

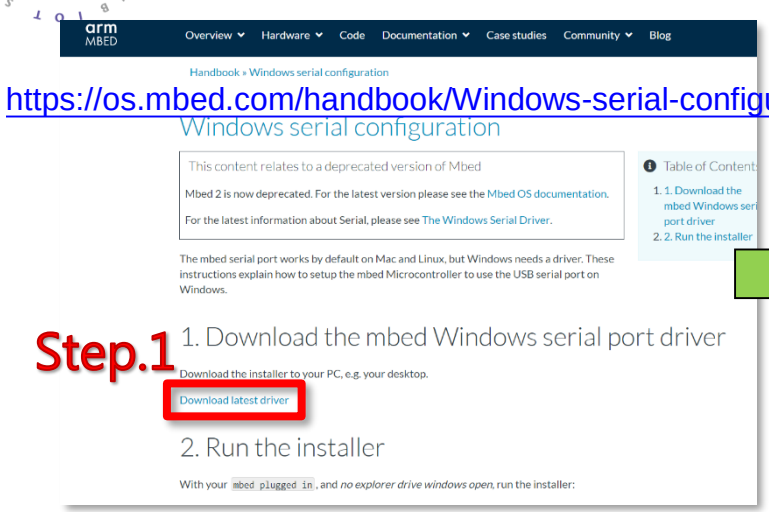
判斷並更改閃爍時間參數

持續閃爍

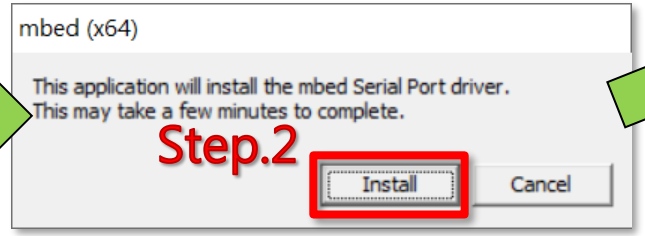
程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/2598/2598_Coremaker01

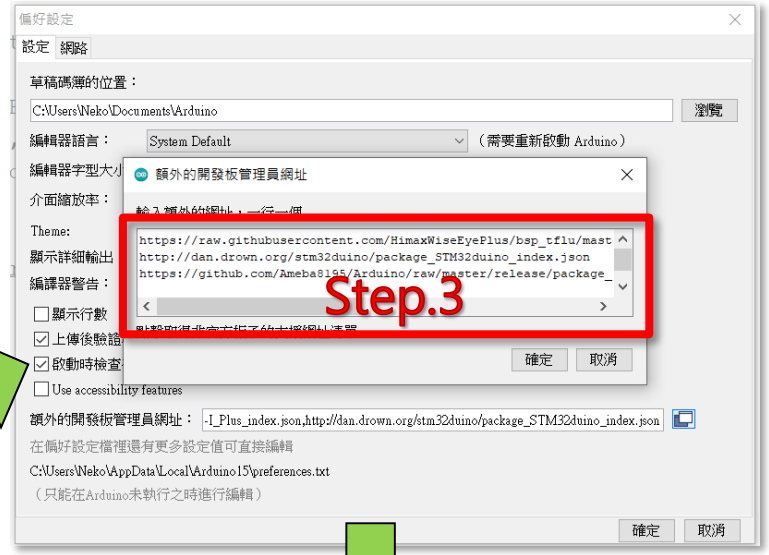
5168設定

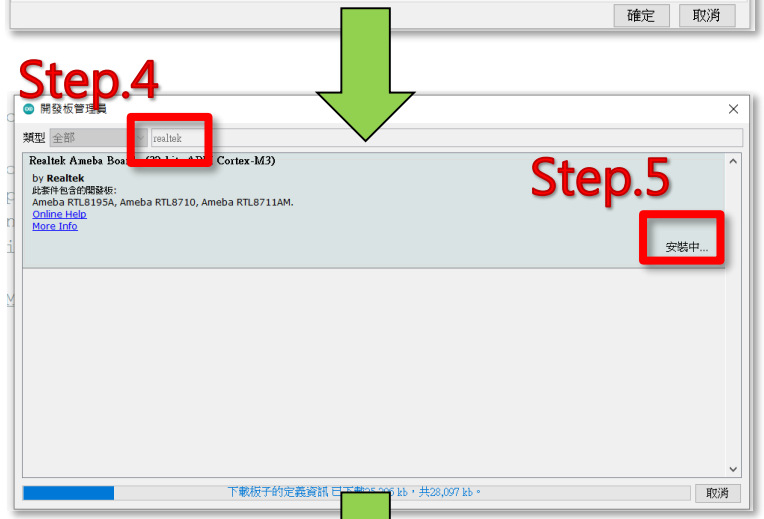


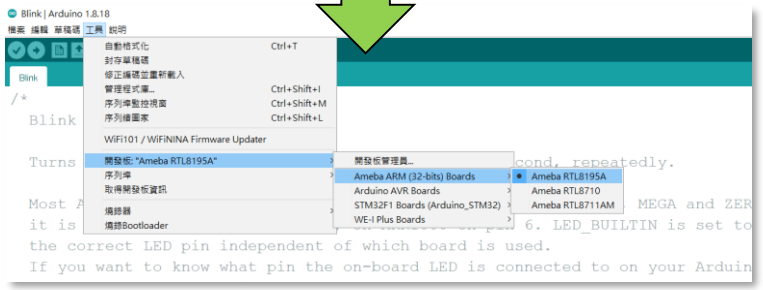
https://os.mbed.com/handbook/Windows-serial-configuration



Step2. 安裝之







Step1. 前往arm mbed官網下載驅動程式

https://os.mbed.com/handbook/Windows-serial-configuration/media/downloads/drivers/mbedWinSerial_16466.exe

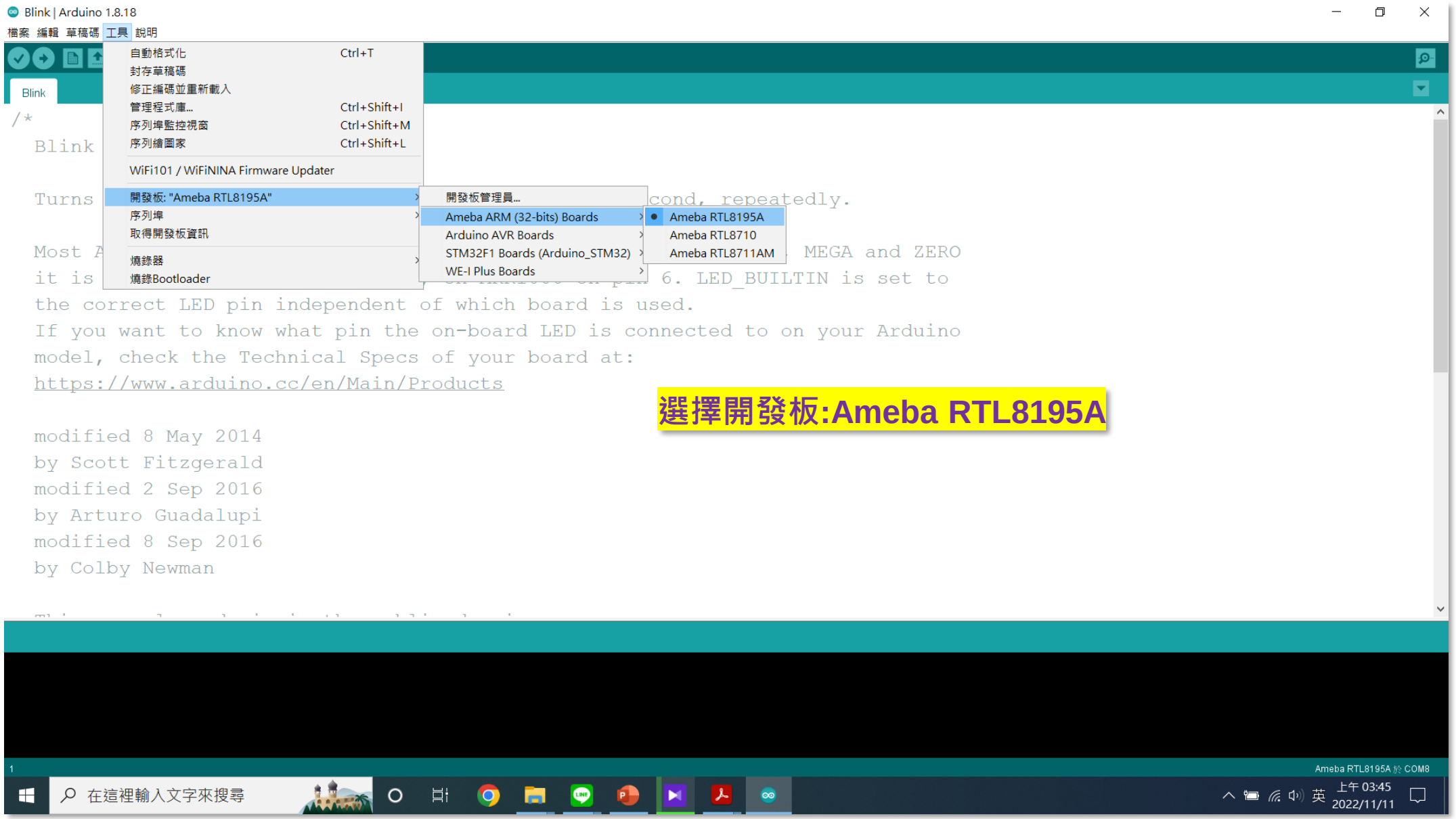
Step2. 開啟Arduino 程式, 選擇 【檔案】→【偏好設定 (Preference) 】, 設定額外的開發板管理員網址：

https://github.com/Ameba8195/Arduino/raw/master/release/package_realtek.com_ameba_index.json

Step3.在Arduino 功能列選擇 【工具】 →【開發版】 →【開發版管理者】, 在上方輸入列輸入 Realtek, 在畫面上即可看到 Realtek Ameba Boards (32-bits ARM Cortex-M3) 等字樣, 可選擇最新版按下其右下角的安裝 (install)。

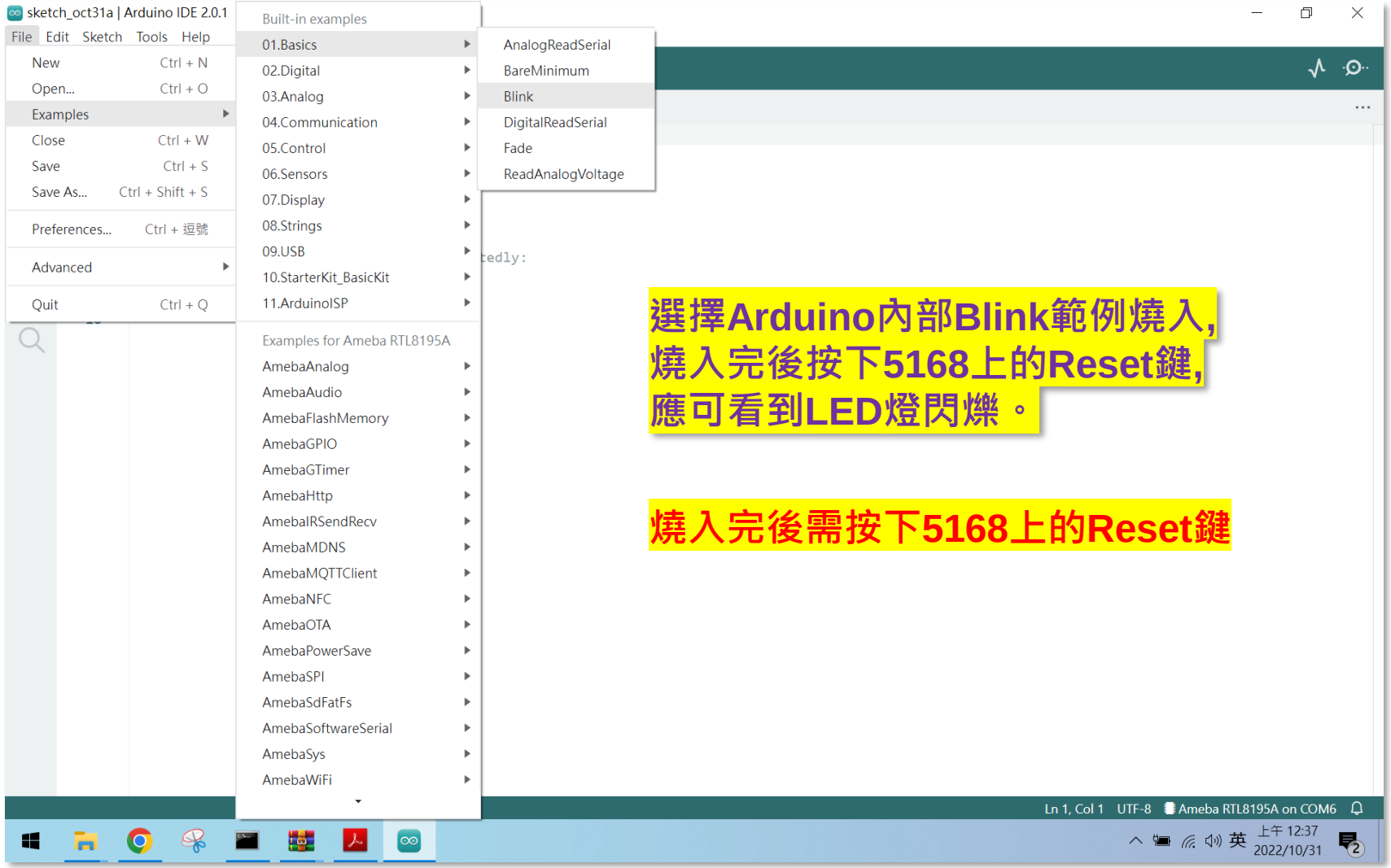
資策會官網補充資料: https://iforum.ideaschain.com.tw/iforum/devtool/board.do?board=1

5168設定



5168 燒入測試

確認可操作5168燒入以及驗證該晶片運作正常



5168 串接Coremaker-01

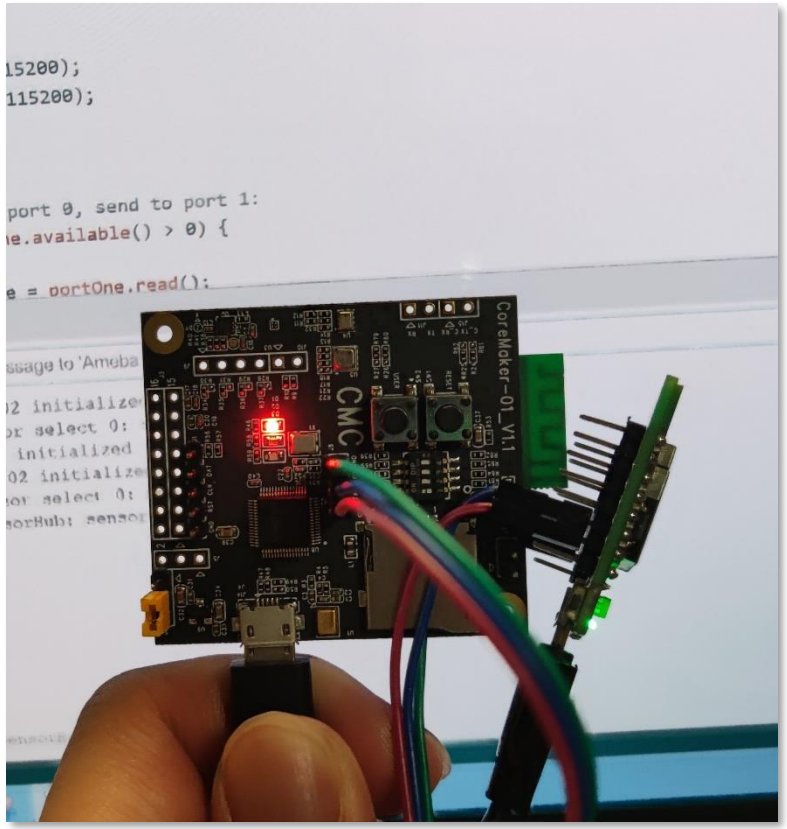


圖 1. 串接實體

DSI-2598+ RX3/D11 → CoreMaker-01 TX
DSI-2598+ TX3/D10 → CoreMaker-01 RX
DSI-2598+ GND → CoreMaker-01 GND

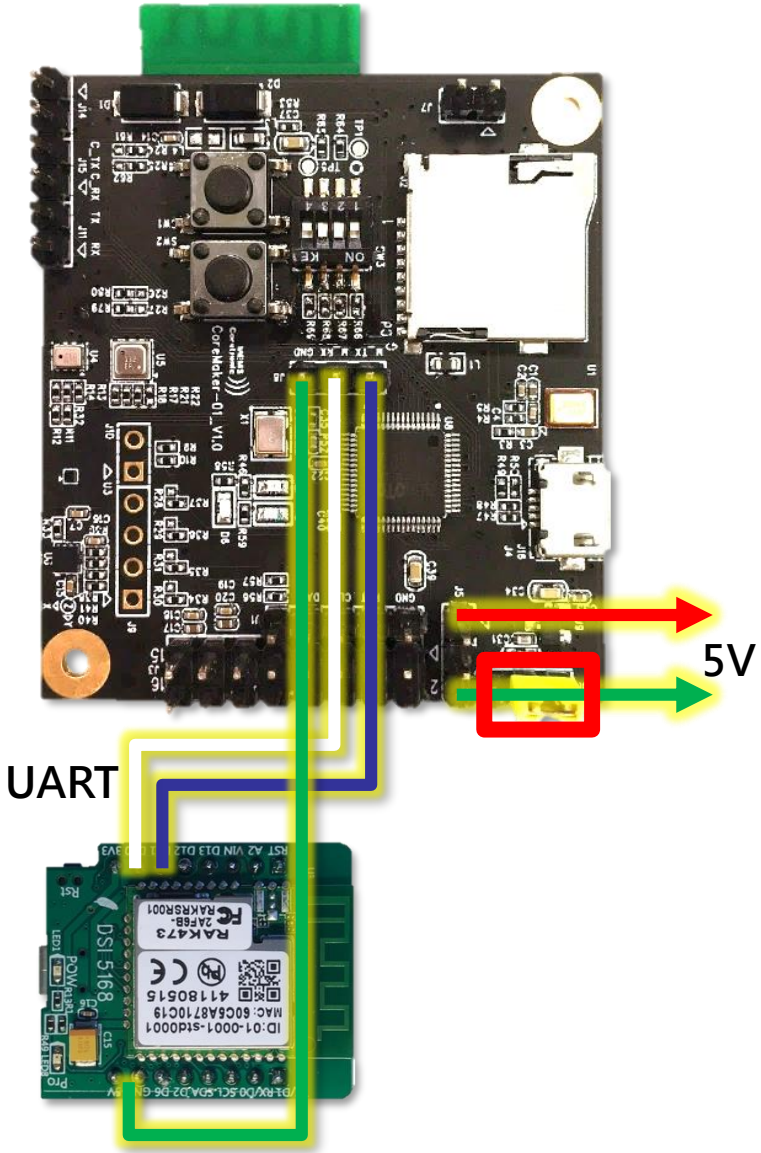


圖 2. 串接線路圖(額外供電)

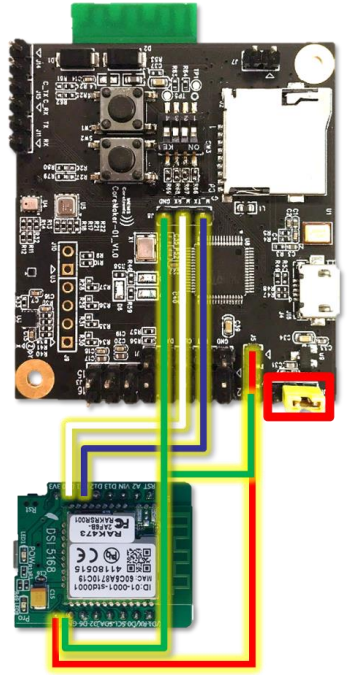


圖 3. 串接線路圖(共同供電)

5168 串接Coremaker-01

5168_Serial2 | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

5168_Serial2 §

```
#include <SoftwareSerial.h>
// software serial #1: RX = digital pin 10, TX = digital pin 11

SoftwareSerial SoftwareSerial2(10, 11);

void setup() {
  Serial.begin(9600);
  SoftwareSerial2.begin(115200);
}

void loop() {
  while (SoftwareSerial2.available() > 0) {
    char inByte = SoftwareSerial2.read();
    Serial.write(inByte);
  }
}
```

由於5168預設只有1個UART,
故使用<SoftwareSerial.h>函式庫,
可新增多組做通訊

儲存完畢

程式位置:
https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_Serial2

系統架構圖

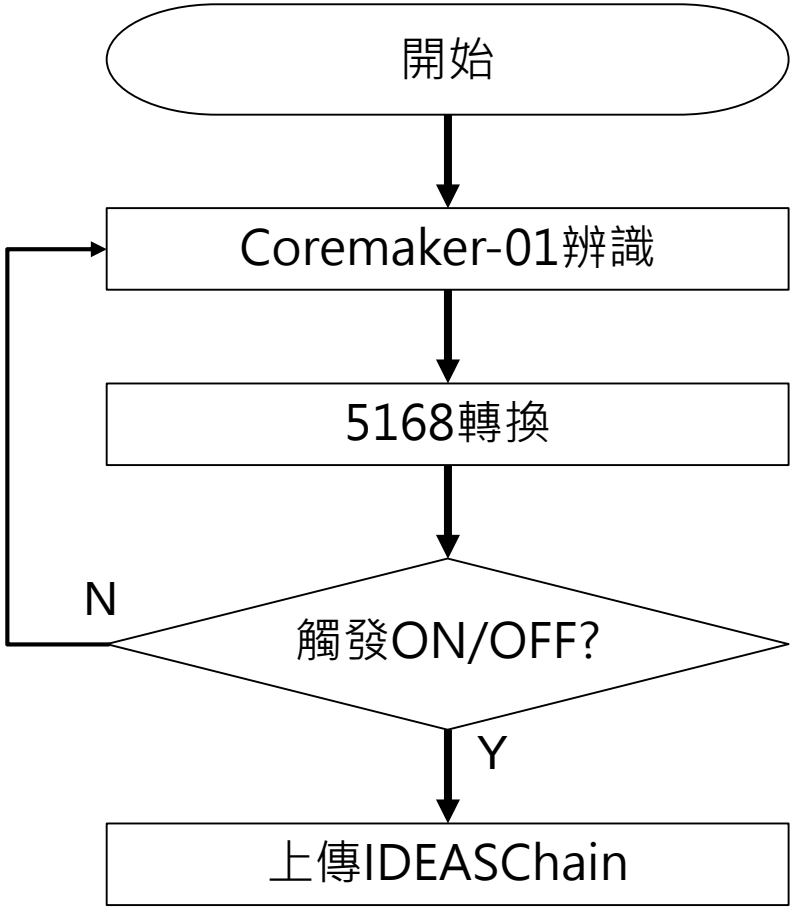


圖 1. 流程圖

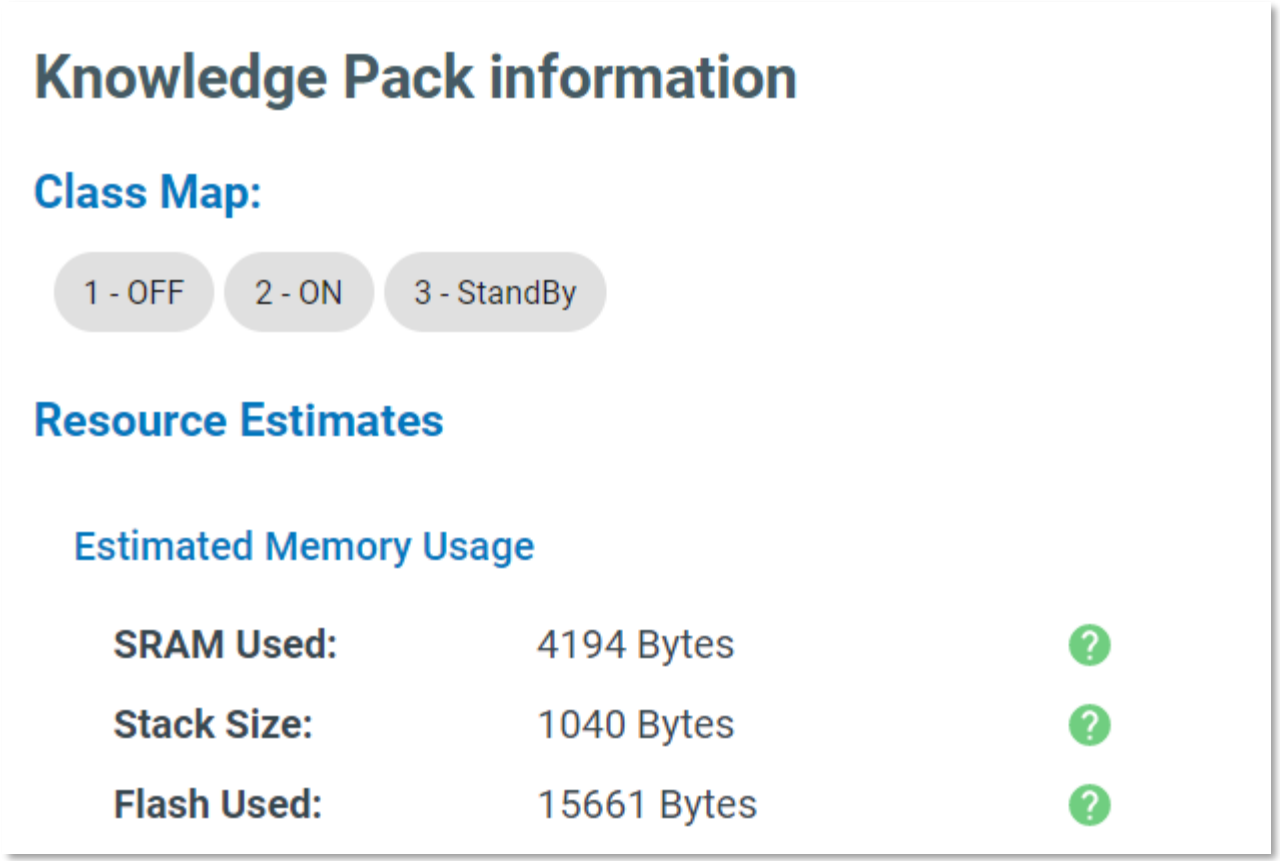


圖 2. 於SensiML網站輸出標籤說明

程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_MQTT

MQTT ?

國產IC開發套件 DSI 5168

MQTT基本架構

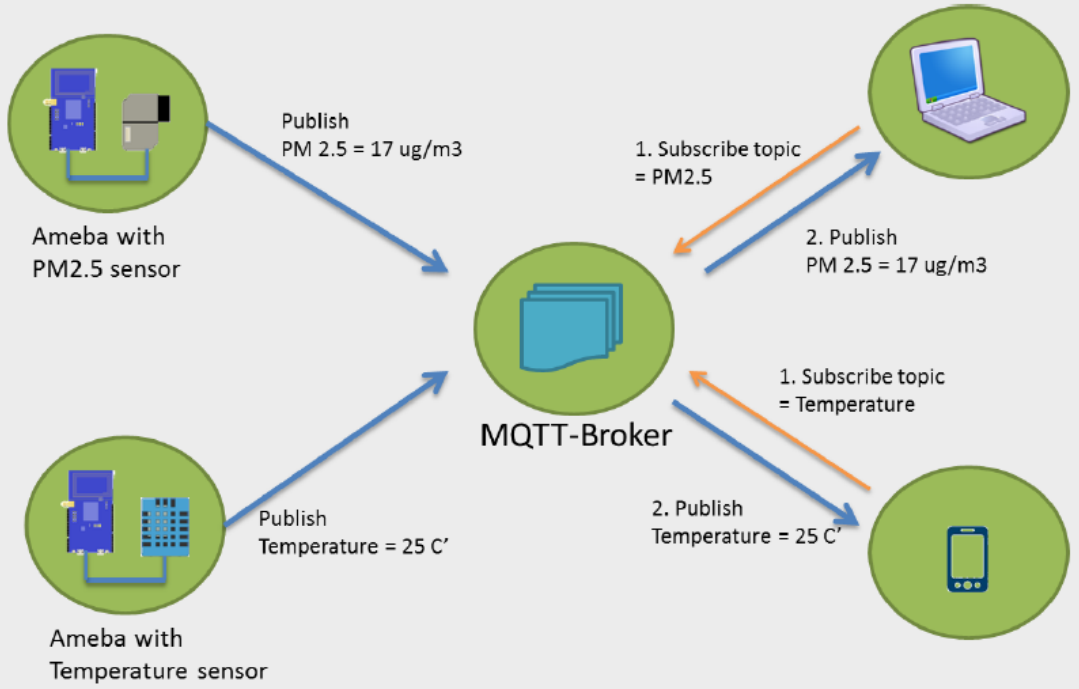
使用MQTT server測試工具，目的是為了要測試你所使用的server，可以順利地透過你所設定的topic來subscribe和publish你所要傳送的payload。

Subscribe

平台向Server端訂閱MQTT訊息

Publish

Sensor透過DSI5168發布MQTT訊息，訊息格式需為Json格式



（圖片來源：amebaiot.com）

MQTT 測試

MQTT的測試工具，如MQTTBox、MQTTLens等

https://chrome.google.com/webstore/detail/mqttbox/kaajoficamnjijhkeomgfljpicifbkaf?hl=zh-TW

Clientname: 任意指定
Username: 平台的存取權杖(可參考教學之page23)
MQTT Client id: 指定一個獨一無二的名稱
Host: https://ideaschain.com.tw
(使用IDEAS Chain作為Server及數據平台)

Topic: 為IDEAS Chain所指定之路徑
v1/devices/me/telemetry
Payload: 需為Json格式
設定完成後先按下Subscribe再按下Publish，若有成功訂閱到payload訊息，表示成功透過server收發MQTT訊息

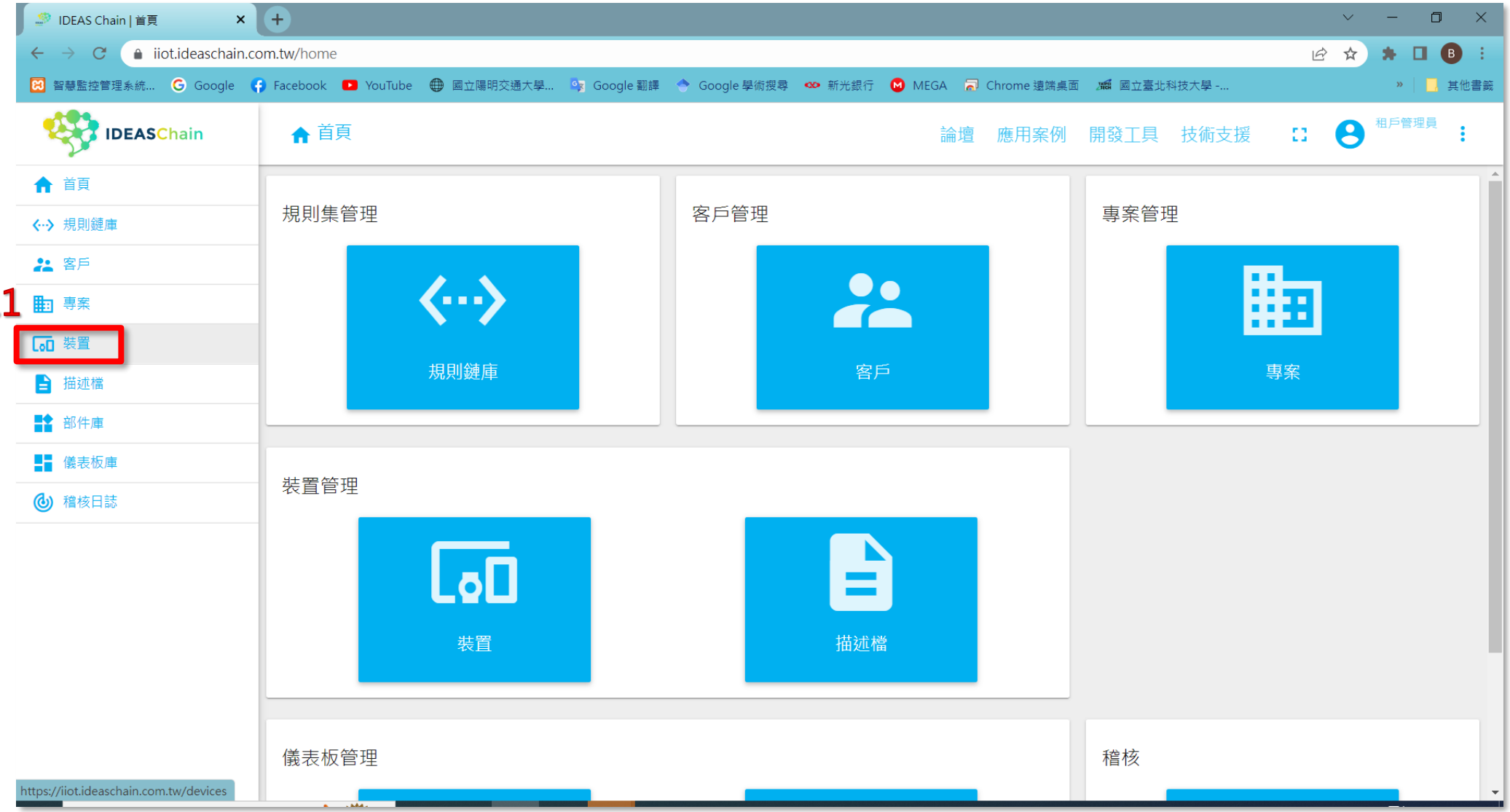
5168 串接 Coremaker01 再上IDEASChain

https://iiot.ideaschain.com.tw/home

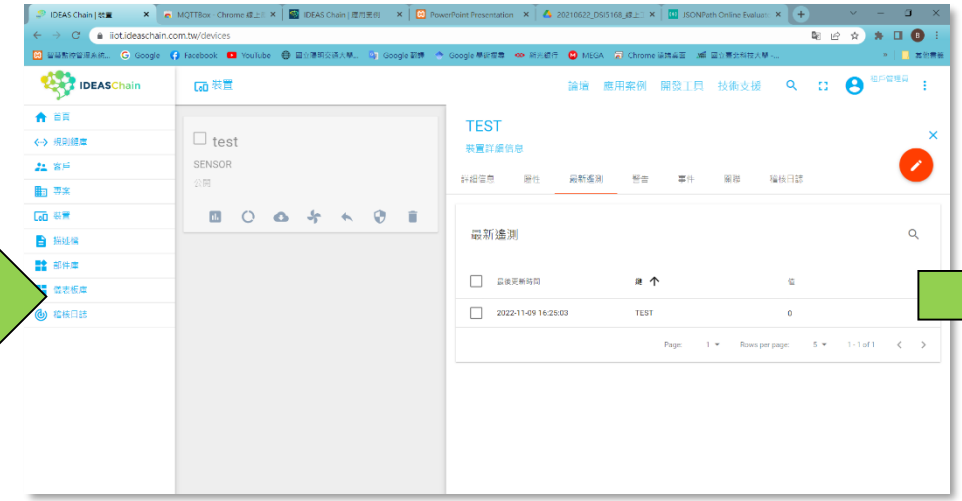
5168 串接 Coremaker01 再上IDEASChain

https://iiot.ideaschain.com.tw/home

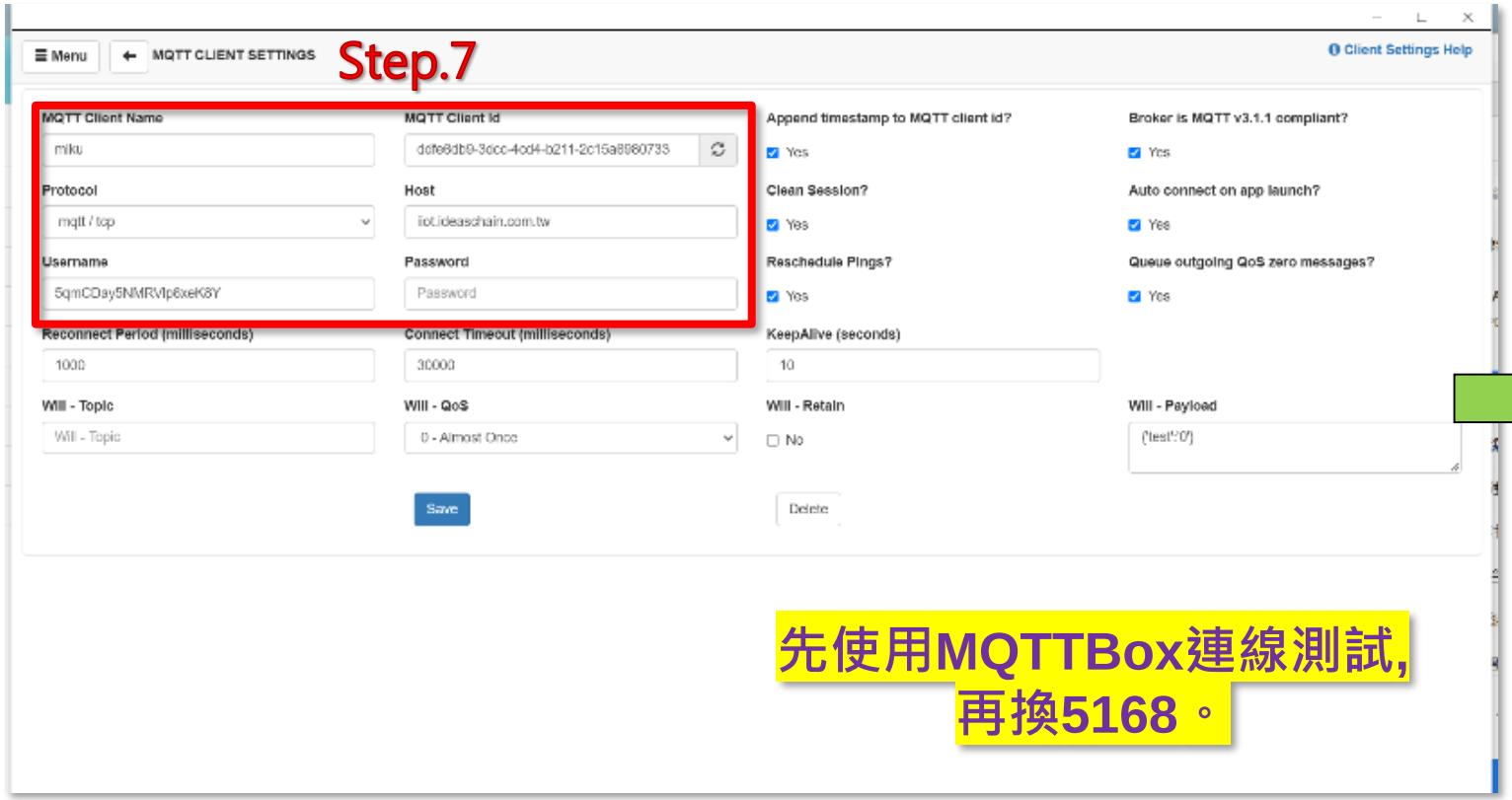
Step.1



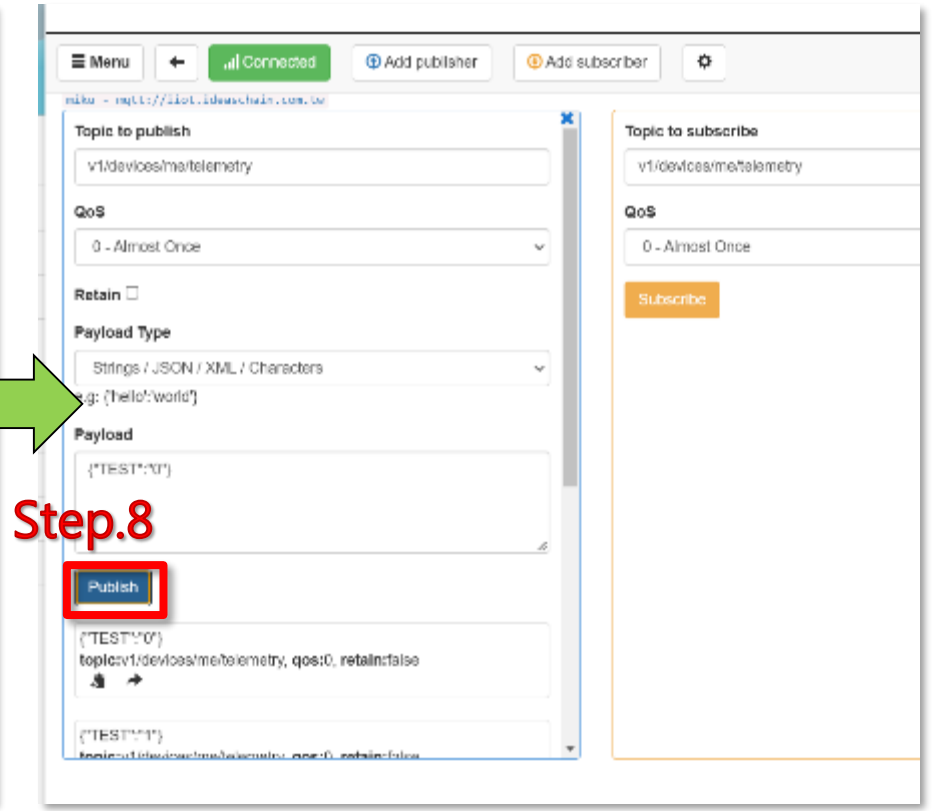
5168 串接 Coremaker01 再上IDEASChain



5168 串接 Coremaker01 再上IDEASChain

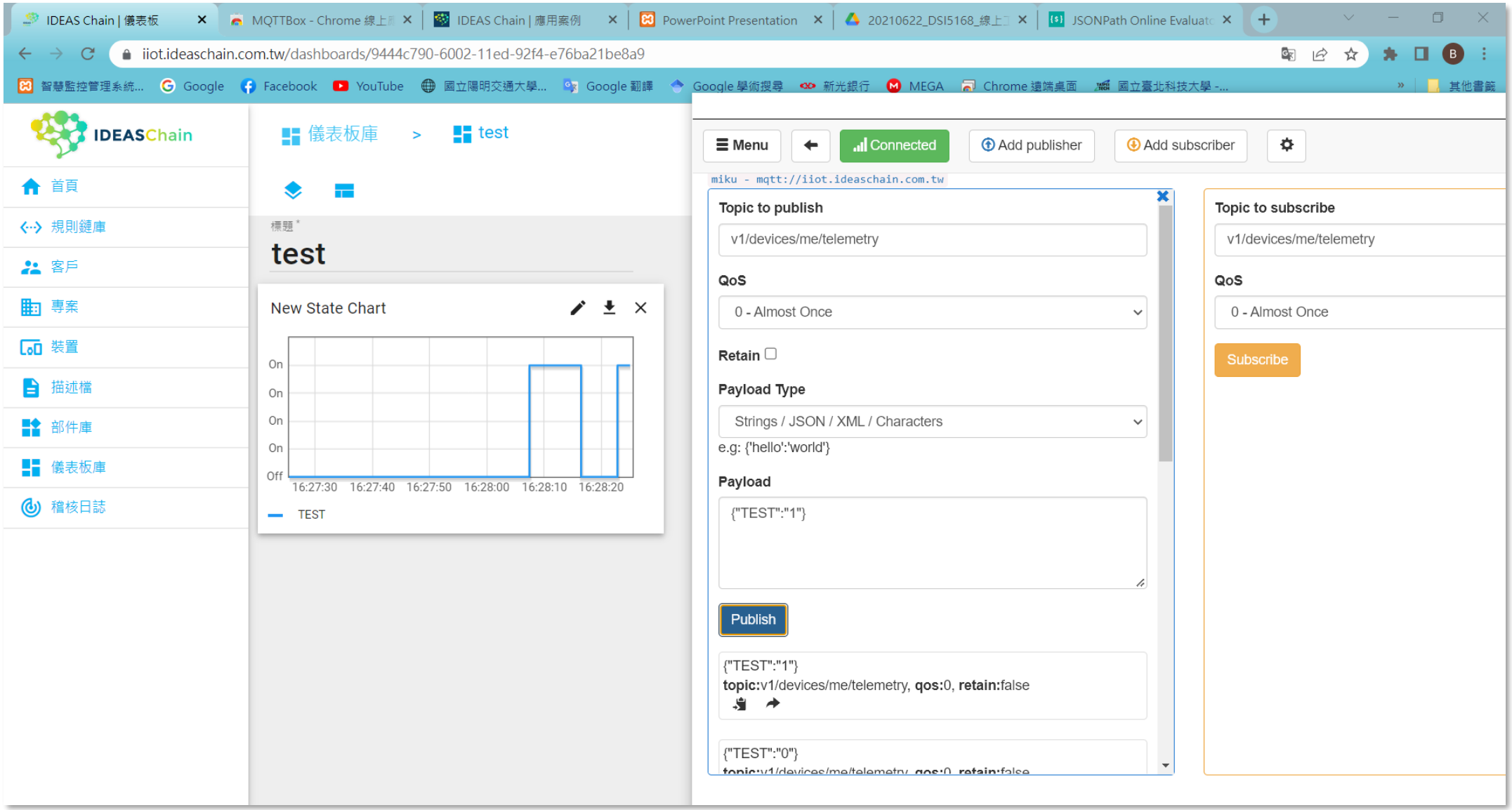


先使用MQTTBox連線測試,
再換5168。



Step.8

5168 串接 Coremaker01 再上IDEASChain



程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_MQTT

5168 串接 LineNotify

https://notify-bot.line.me/zh_TW/

透過LINE接收其他網站服務通知

程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_line

5168 串接 LineNotify

5168_line | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

5168_line

Step.5

```
/*
 IDEASCHAIN MQTT example for DSI5168
*/
#include <SoftwareSerial.h>
// software serial #1: RX = digital pin 10, TX = digital pin 11
SoftwareSerial SoftwareSerial2(10, 11);

#include <WiFi.h>
// WPA/WPA2 SSID and password
char ssid[] = "您的WiFi帳號";     // your network SSID (name)
char pass[] = "您的WiFi密碼";     // your network password
String Linetoken = "您的權杖";
//至
int status  = WL_IDLE_STATUS;    // the Wifi radio's status
char host[] = "notify-api.line.me";

WiFiSSLClient client;

void setup()
{
  Serial.begin(9600);
  SoftwareSerial2.begin(115200);
```

儲存完畢

5168_line | Arduino 1.8.18

檔案 編輯 草稿碼 工具 說明

5168_line

Step.6

每5秒會發送文字,
可再串接Coremaker-01

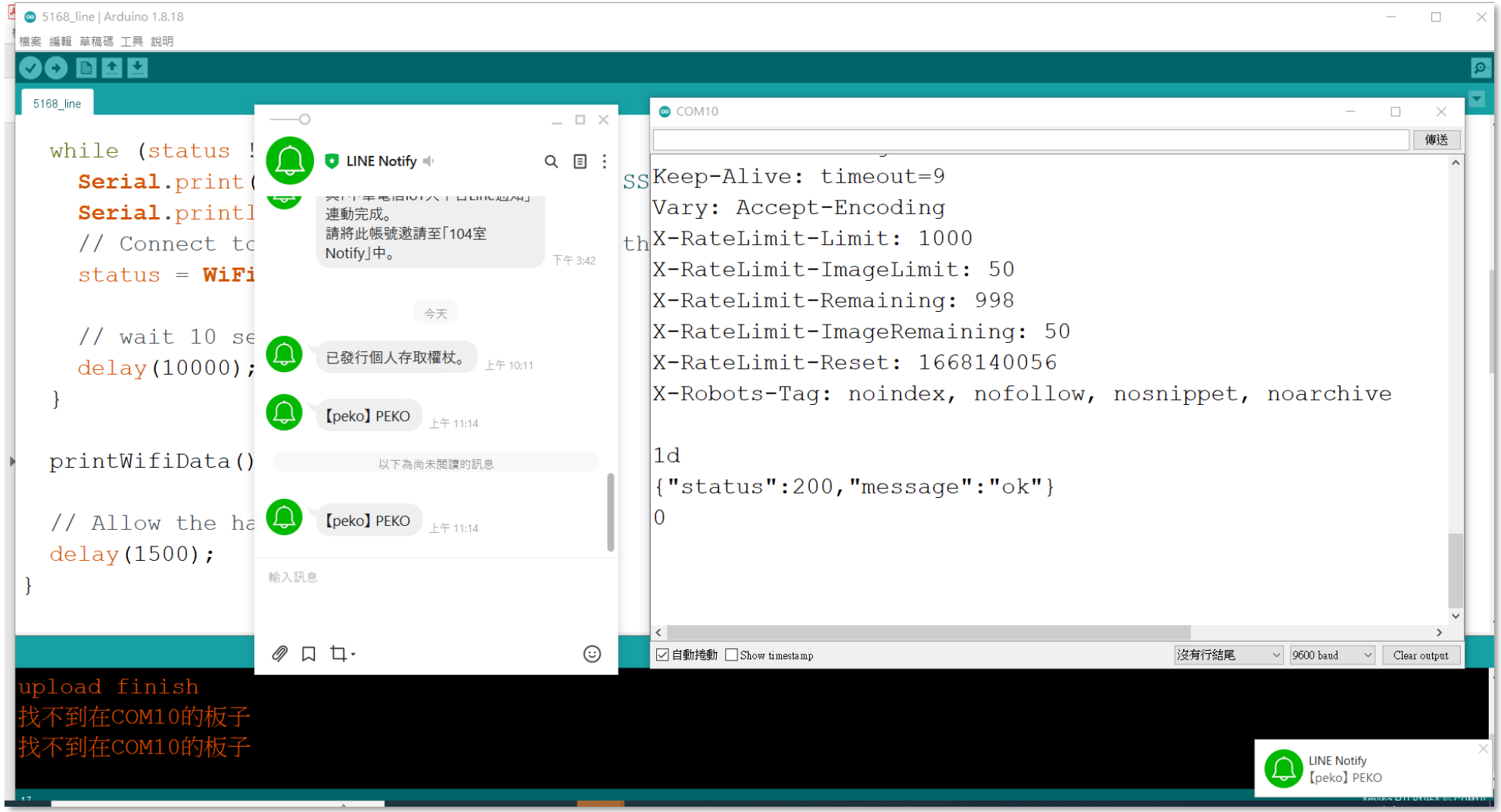
```
void loop()
{
  String message="PEKO";
  if (client.connect(host, 443)) {
  int LEN = message.length();
  //1.傳遞網站
  String url = "/api/notify"; //Line API網址
  client.println("POST " + url + " HTTP/1.1");
  client.print("Host: "); client.println(host);//Line API網站
  //2.資料表頭
  client.print("Authorization: Bearer "); client.println(Linetoken);
  //3.內容格式
  client.println("Content-Type: application/x-www-form-urlencoded");
  //4.資料內容
  client.print("Content-Length: "); client.println( String((LEN + 8)) ); //訊息長度
  client.println();
  client.print("message="); client.println(message); //訊息內容
  //等候回應
  delay(2000);
  String response = client.readString();
  //顯示傳遞結果
  Serial.println(response);
  client.stop();//斷線
  }
  else {
  //傳送失敗
  Serial.println("connected fail");
  }
  delay(5000);
```

儲存完畢

程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_line

5168 串接 Coremaker-01 及LineNotify



程式位置:

https://github.com/wildman8606/Coremaker01withIoT/tree/main/5168/5168_line

補充資料

需安裝軟體

20分鐘

	Arduino	Notepad++	Python	Tera Term
				
必需性:	必要	可替換	必要	可替換
說　明:	國產晶片用 Arduino IDE 燒入、編譯 方便上手	慣用程式編輯器都可，這較小、輕量、好用。	晶片編譯需要	UART顯示結果，可擇自己喜歡。

軟體安裝引導(Arduino)

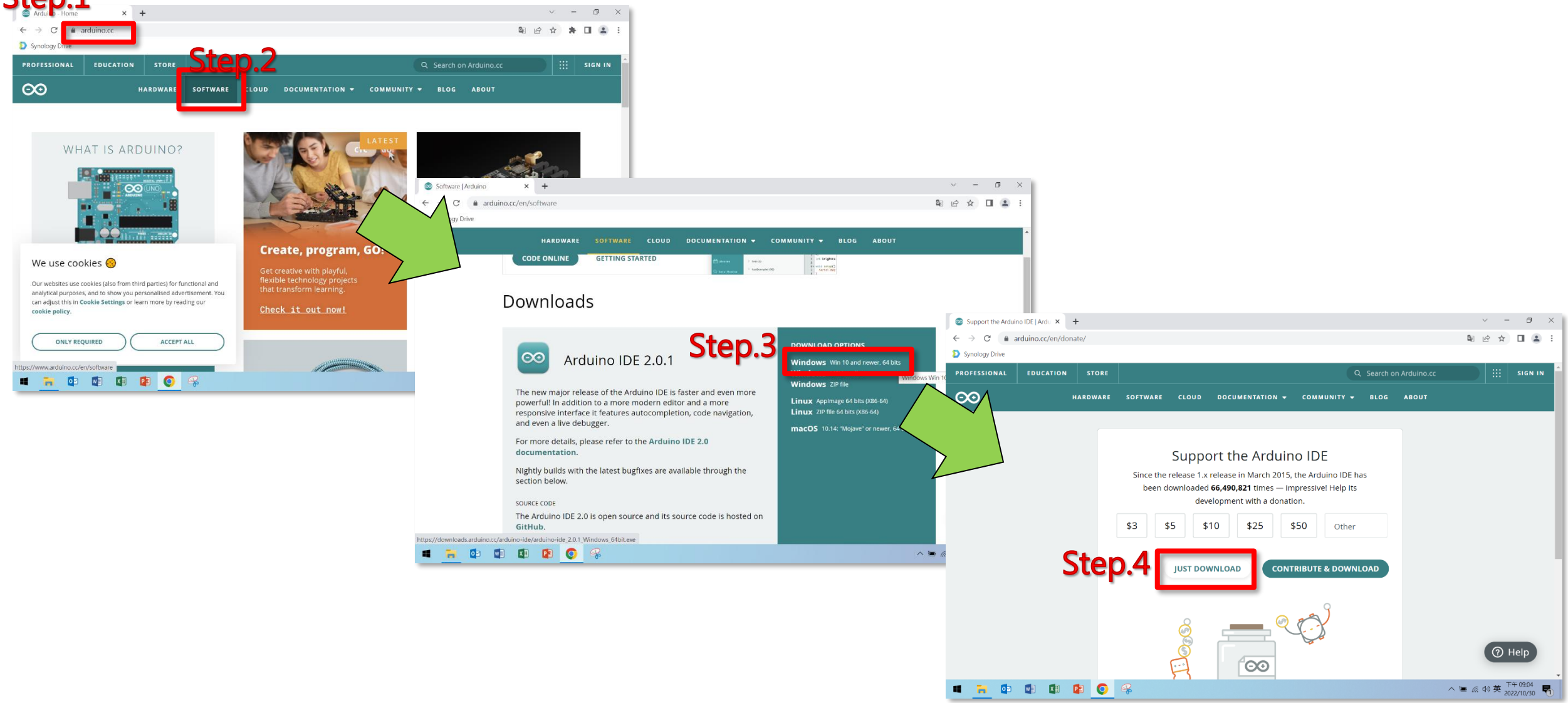
https://www.arduino.cc/

Step.1

Step.2

Step.3

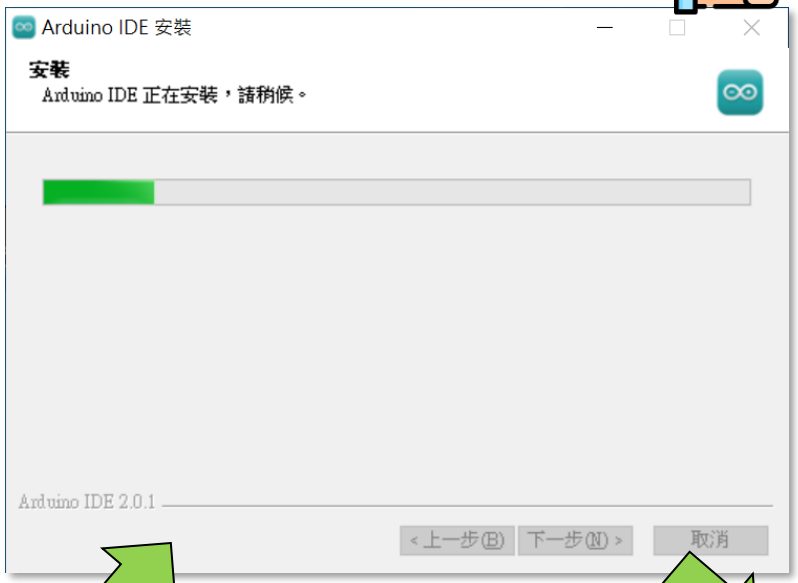
Step.4



軟體安裝引導(Arduino)

https://www.arduino.cc/

Step.5

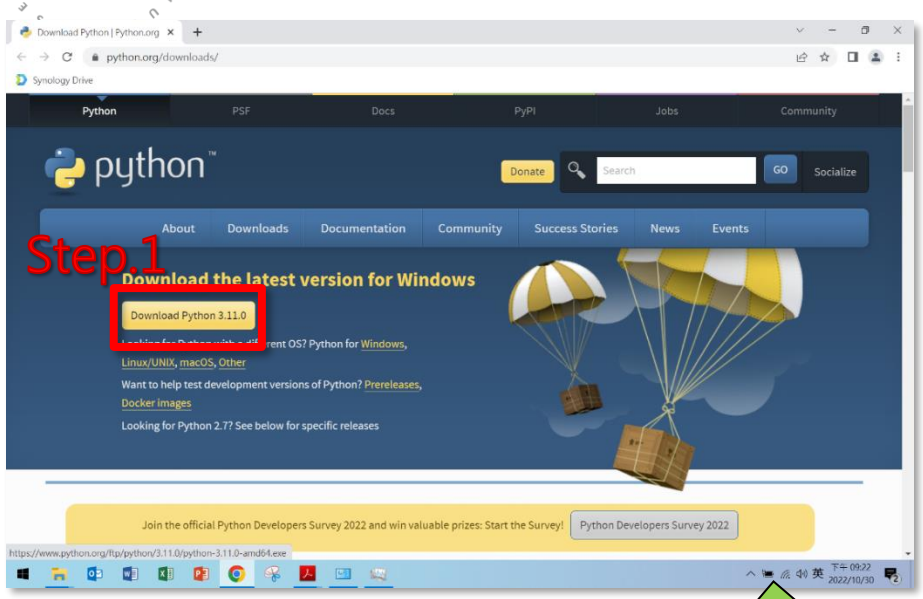


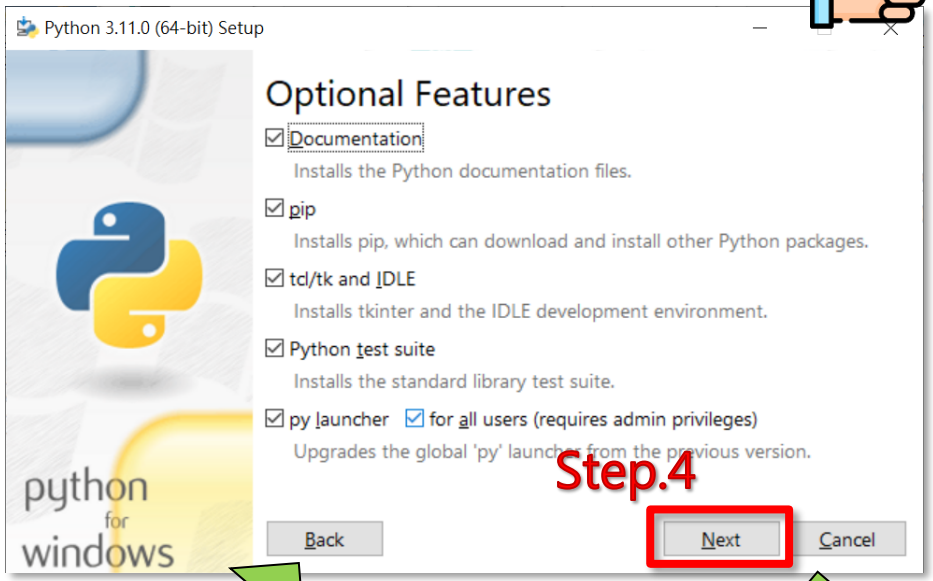
Step.6

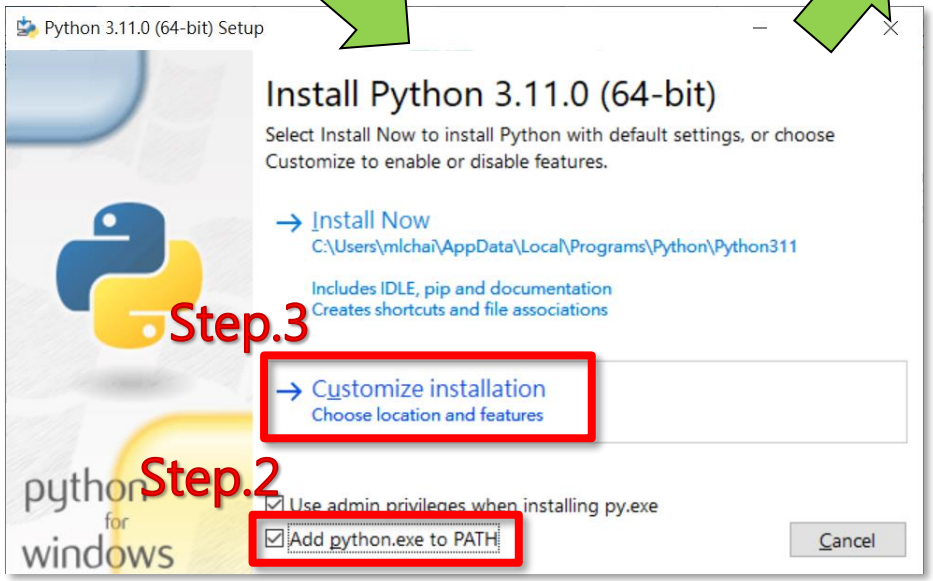
Step.7

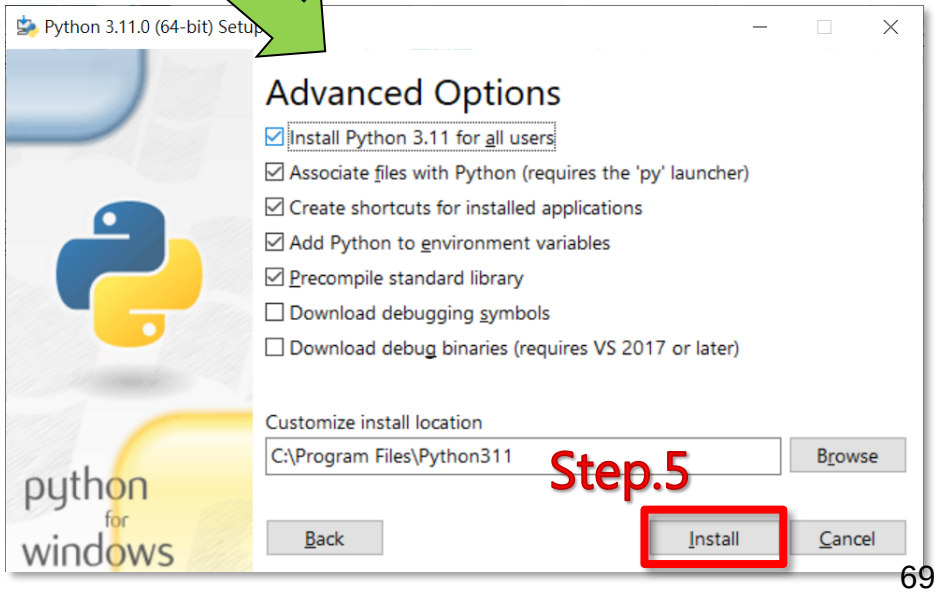
軟體安裝引導(Python)

https://www.python.org/



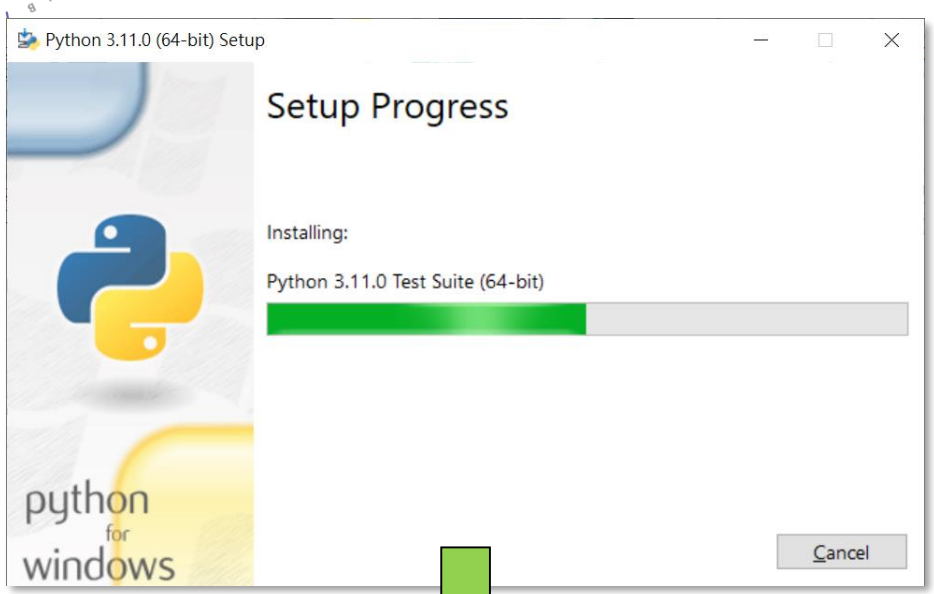






軟體安裝引導(Python)

https://www.python.org/



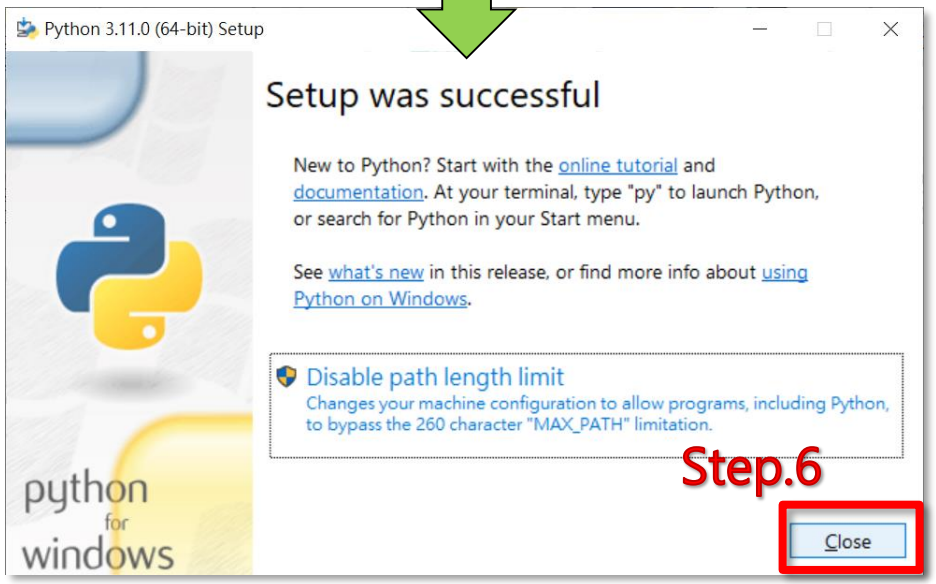


圖3 輸入'CMD'或用其他方法打開命令提示字元

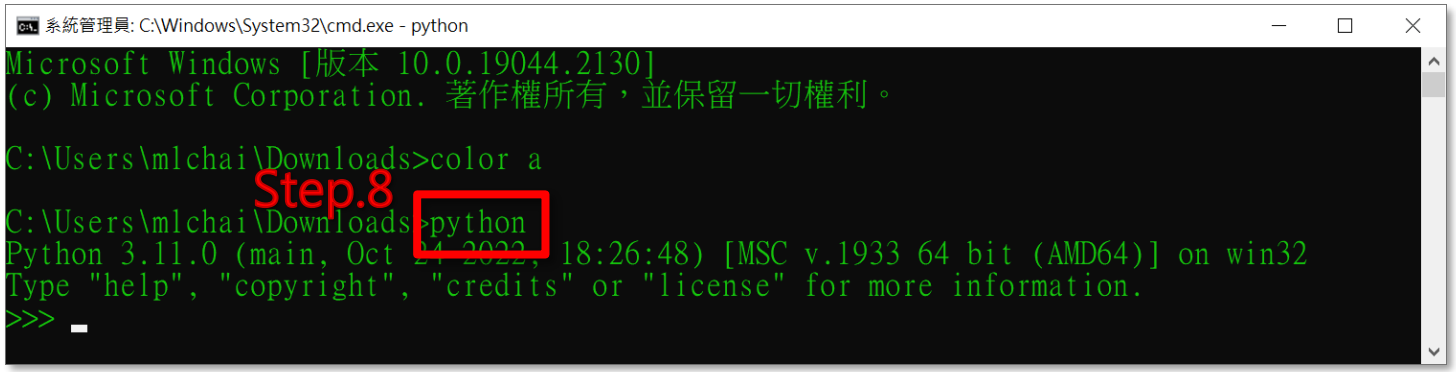


圖4 輸入'python'確認環境變數有成定成功

需安裝軟體二

25分鐘

CMake

git

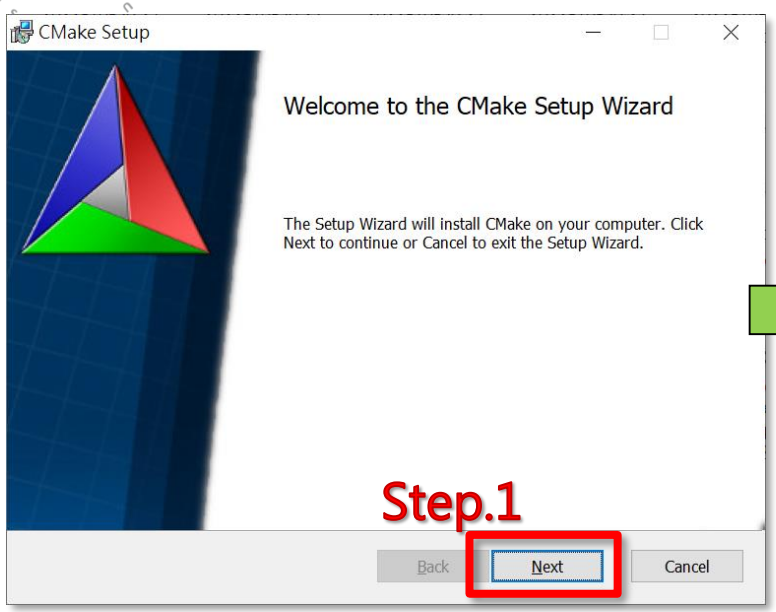
GNU Arm Embedded Toolchain

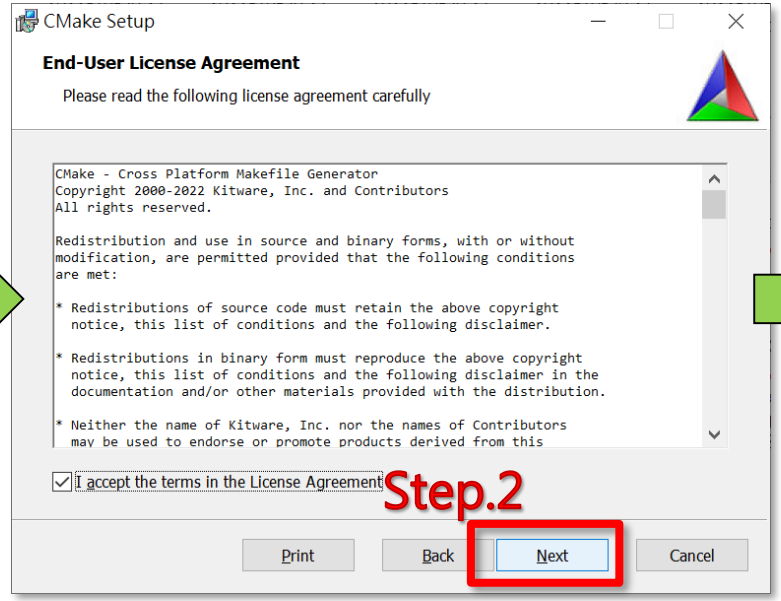
GNU Arm
Embedded
Toolchain

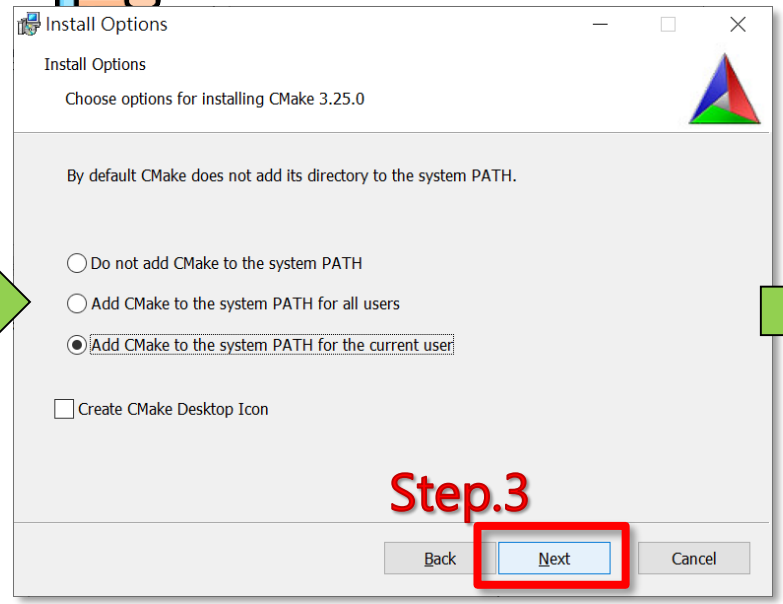
SensiML Data Capture Lab

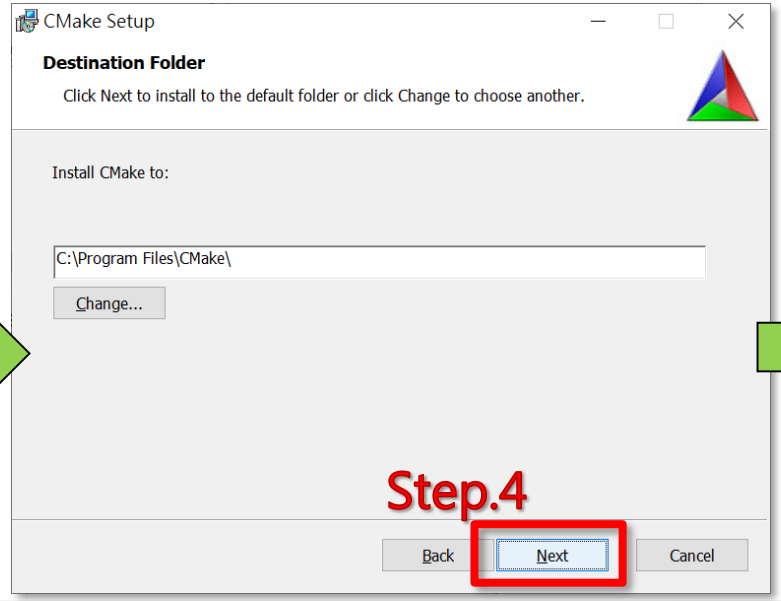
軟體安裝引導(CMake)

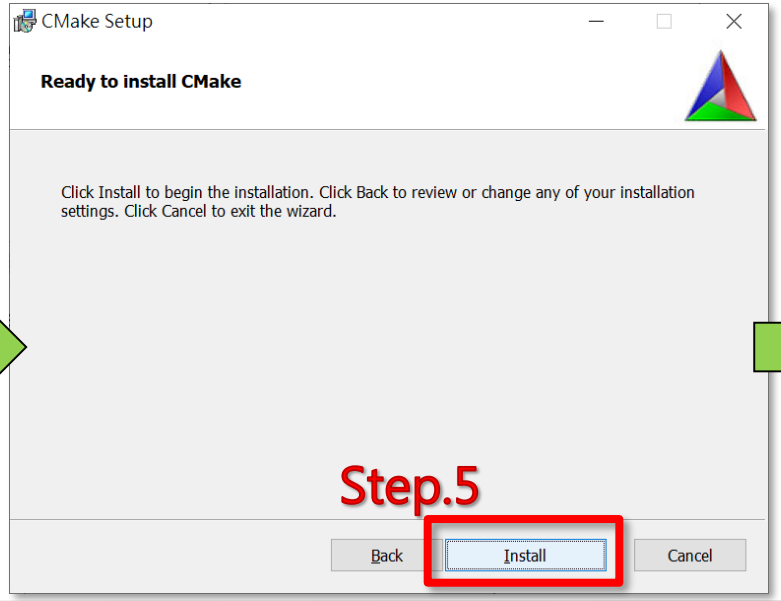
https://cmake.org/download/

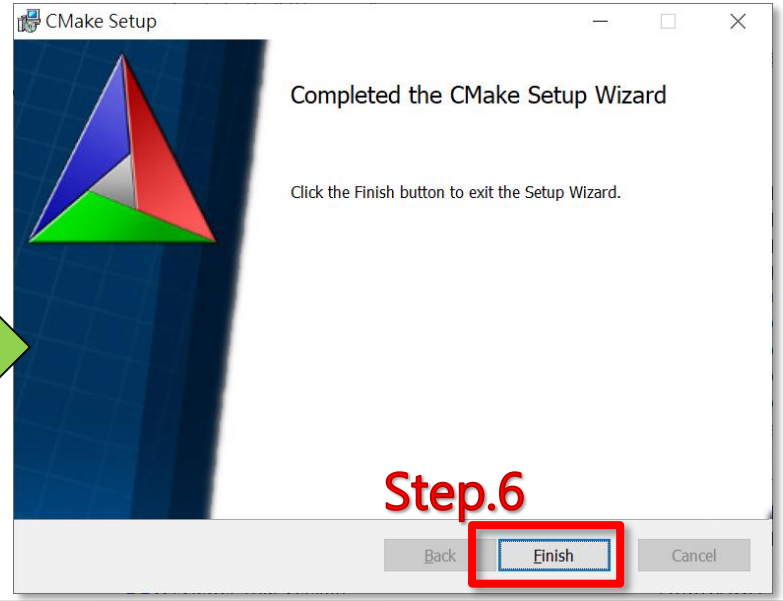






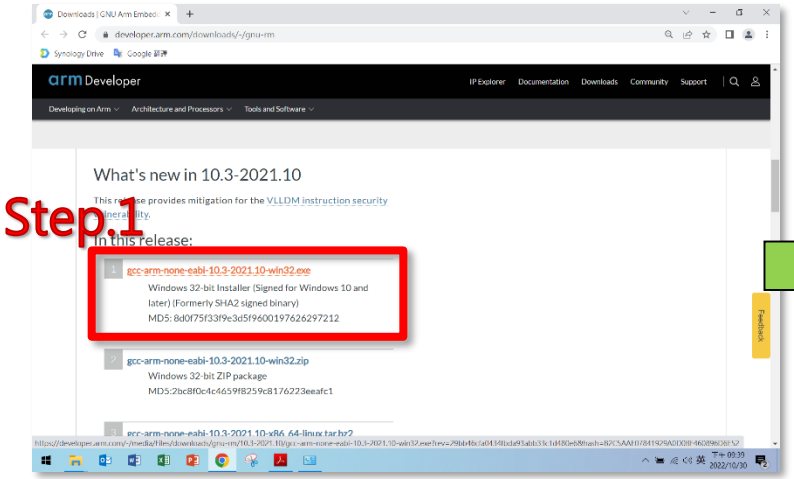


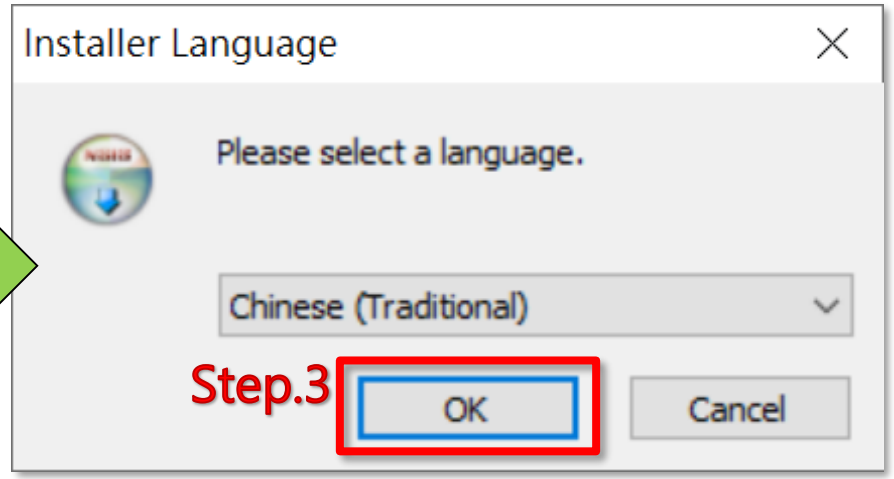


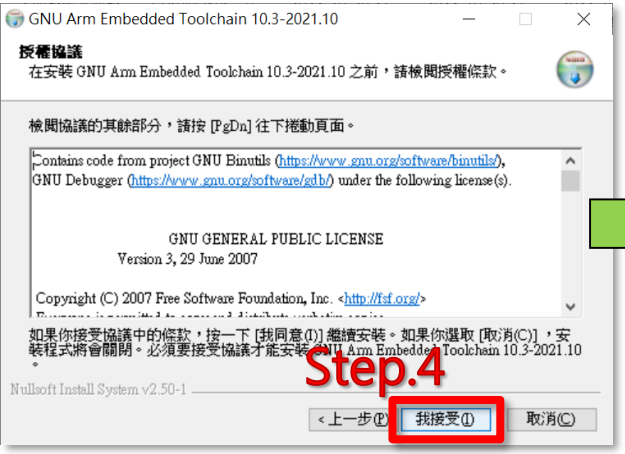


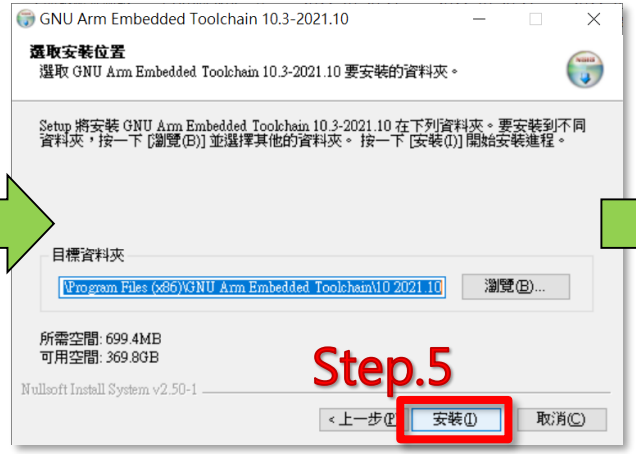
軟體安裝引導(GNU Arm Embedded Toolchain)

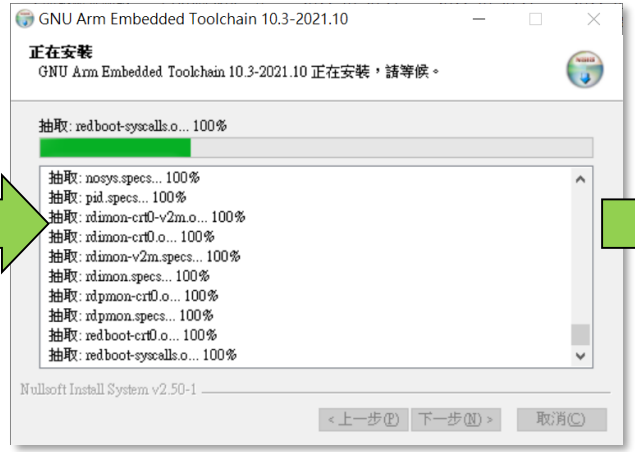
https://developer.arm.com/downloads/-/gnu-rm/









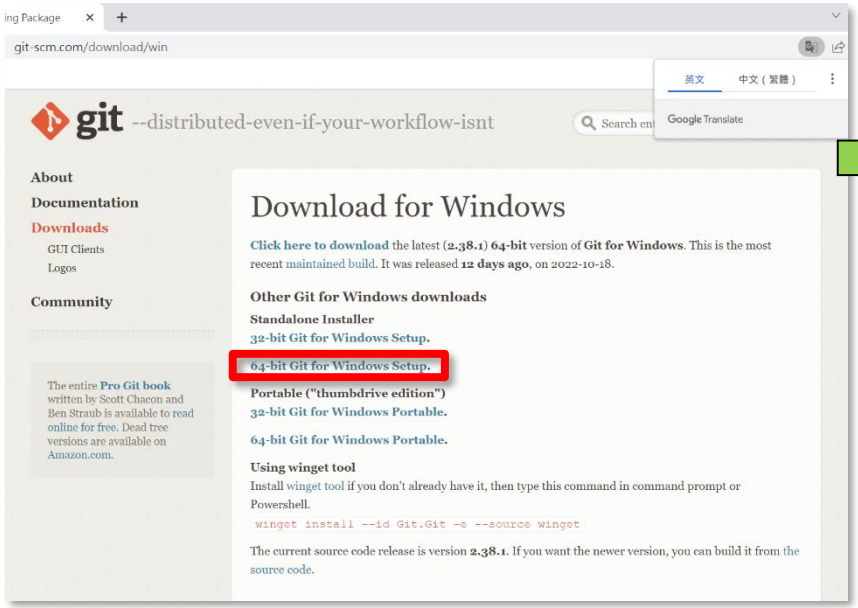


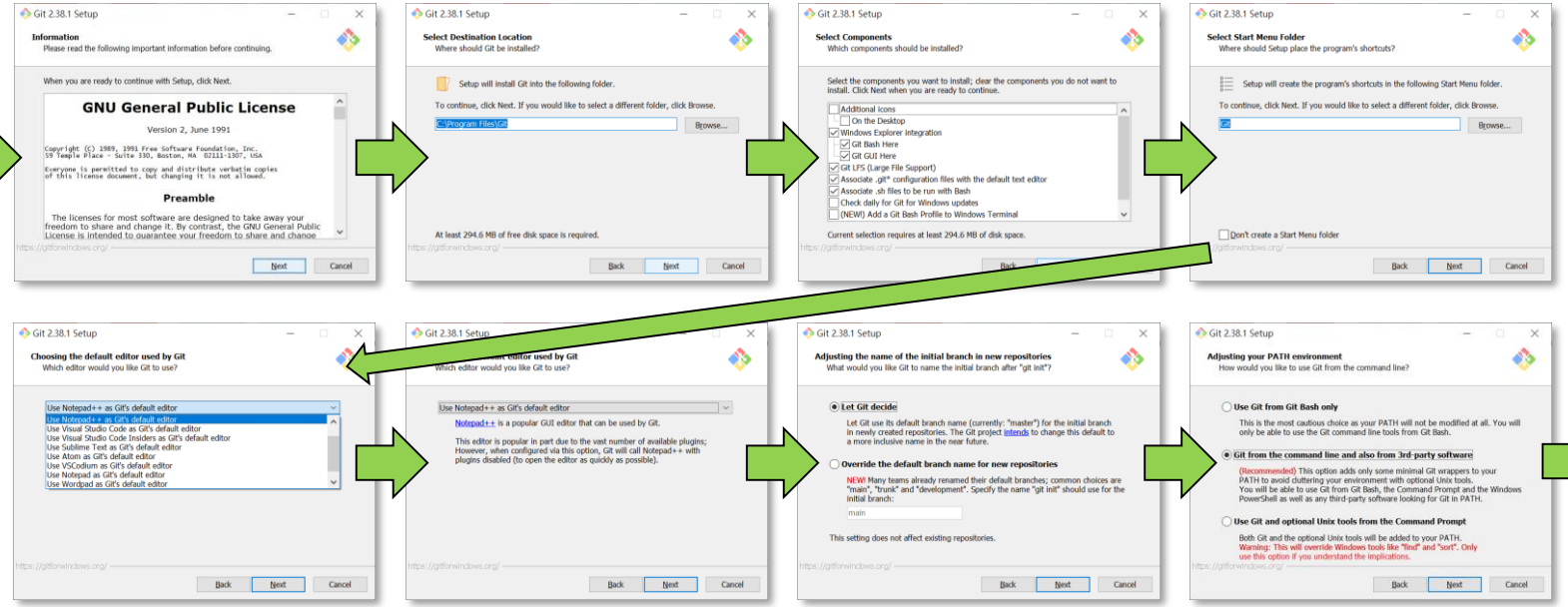
安裝完後需要重新啟動

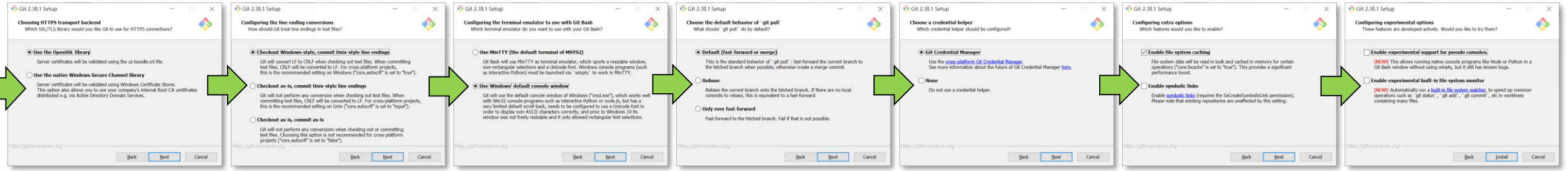
軟體安裝引導(git)

如有其他慣用git下載方法可以免安裝這個

https://git-scm.com/downloads

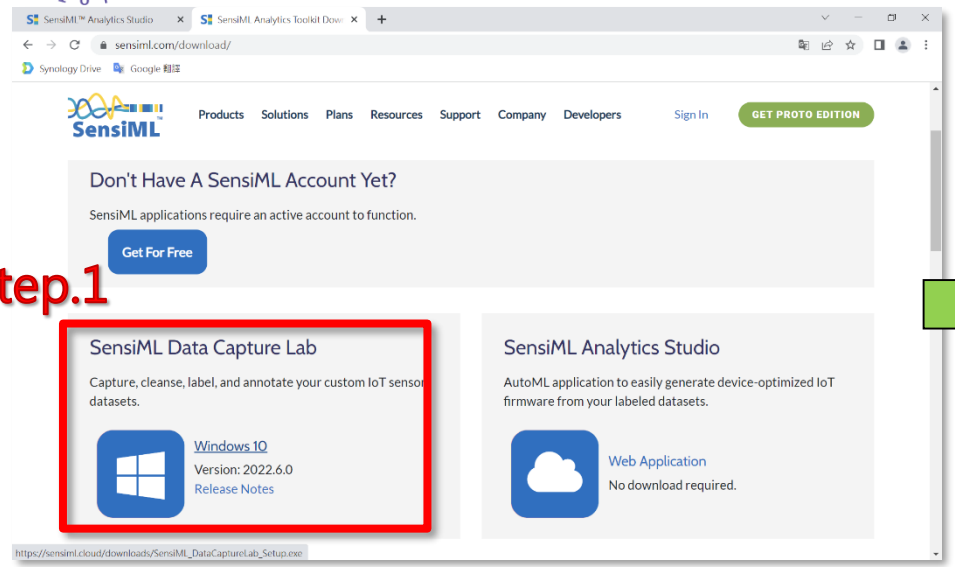


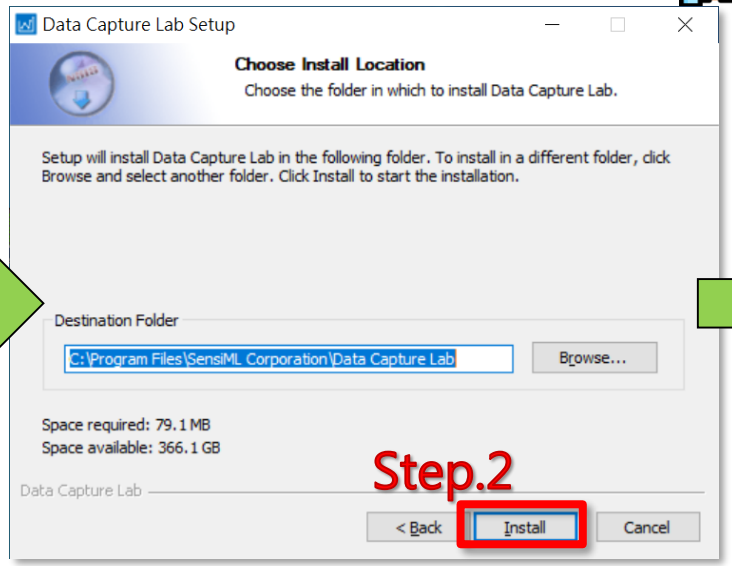


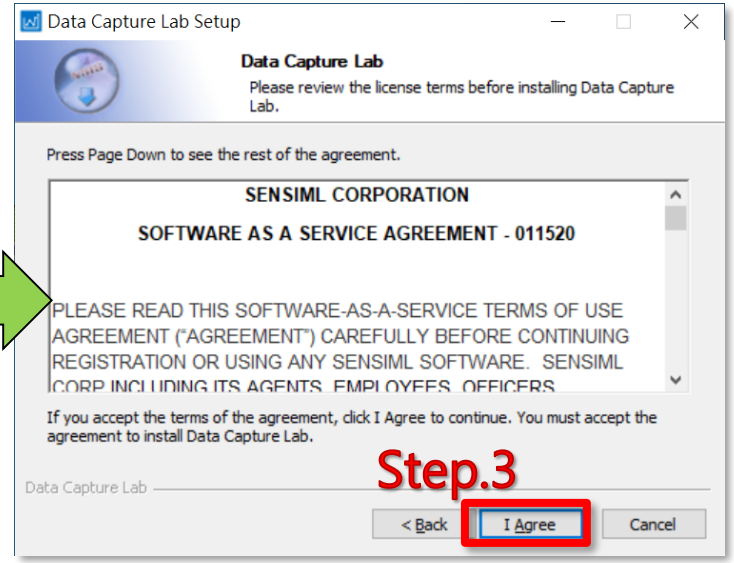


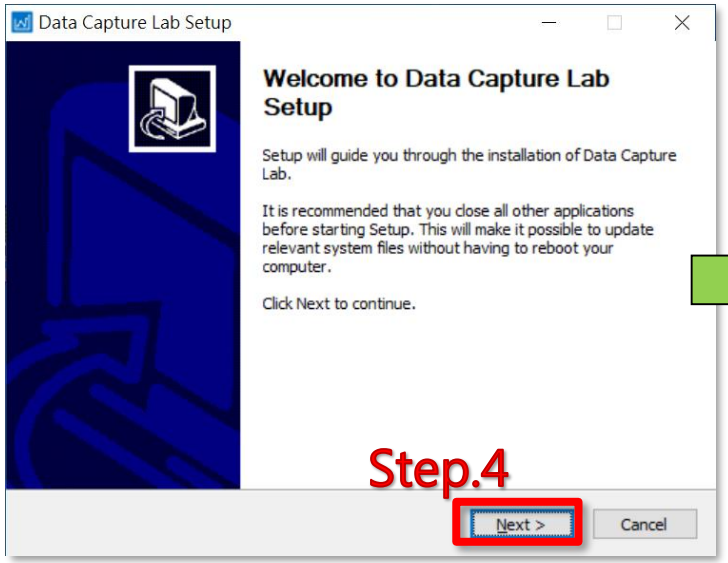
軟體安裝引導(SensiML Data Capture Lab)

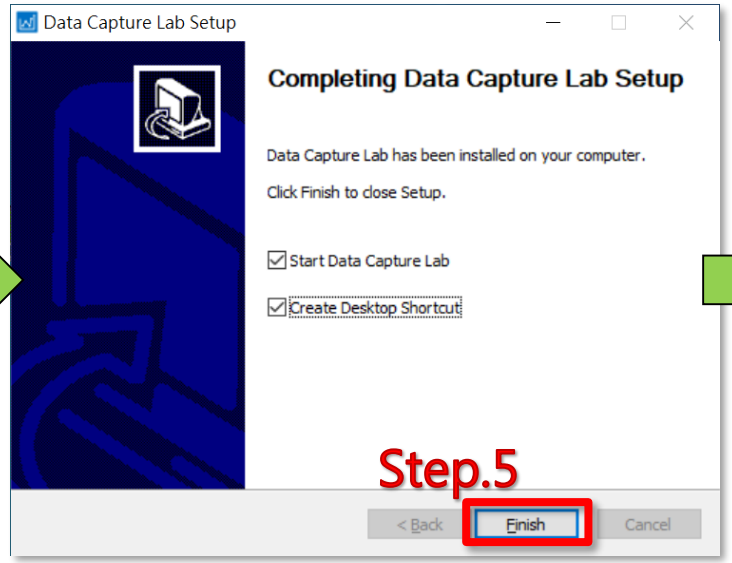
https://sensiml.com/download/

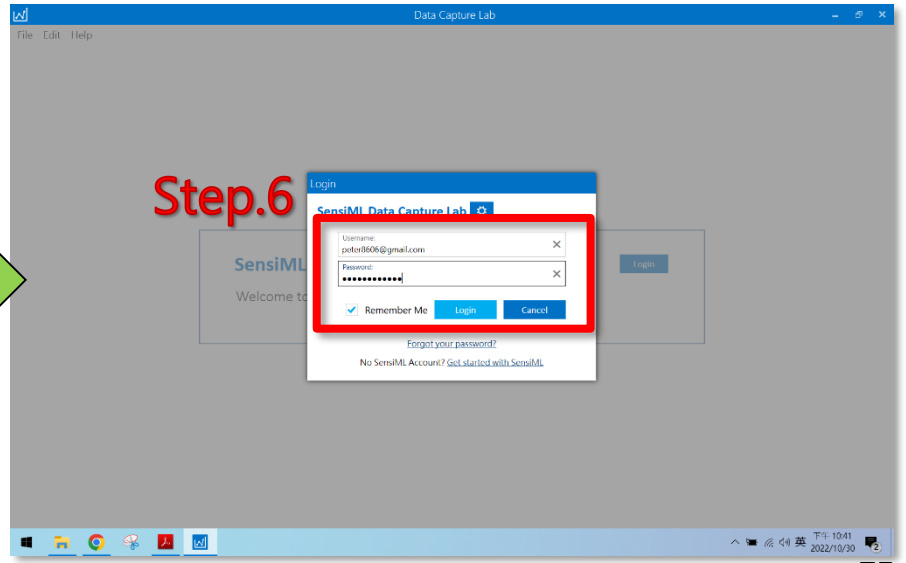












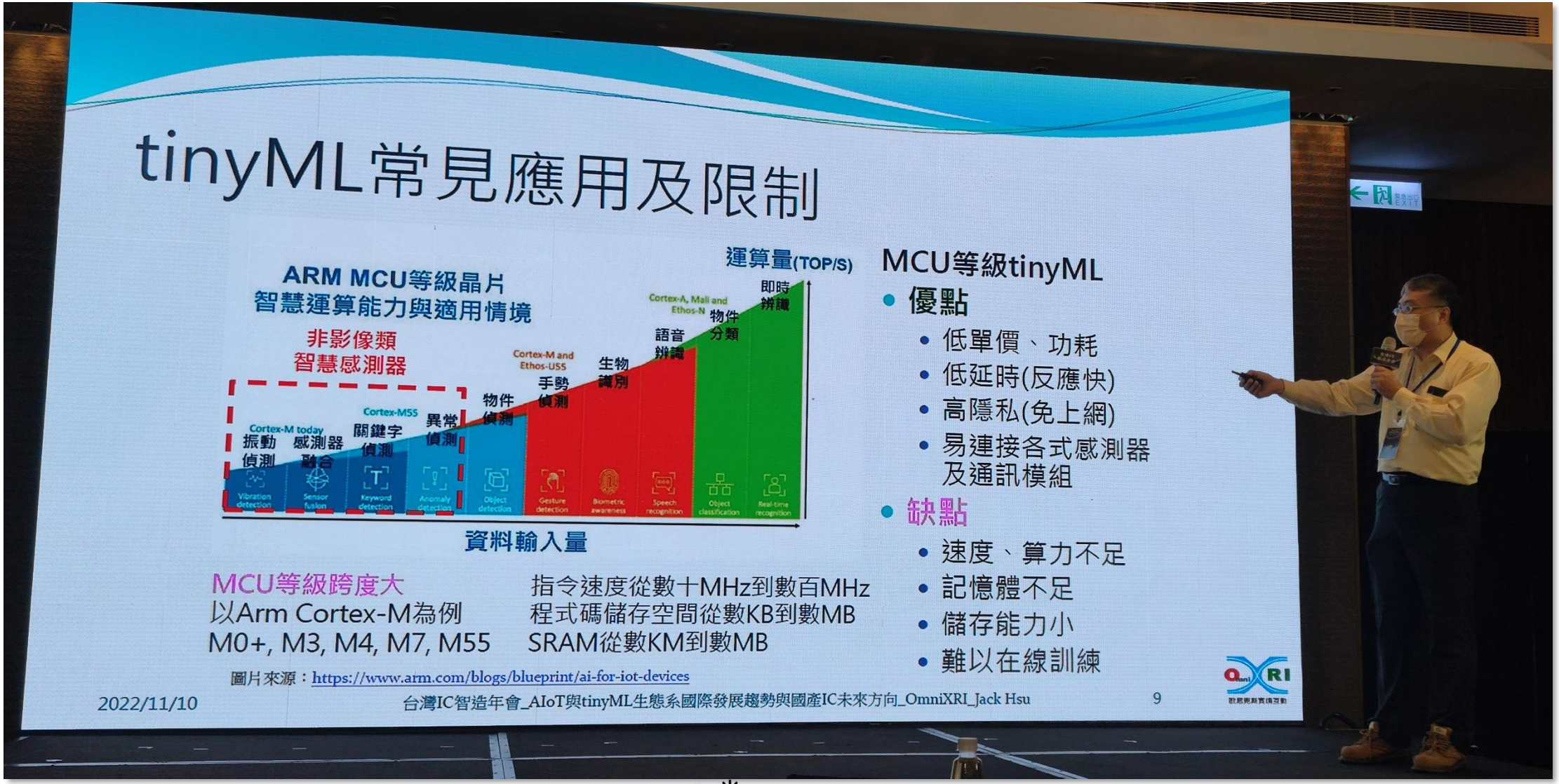
tinyML 運用案例

歐尼克斯實境互動工作室(OmniXRI)

https://www.youtube.com/watch?t=1049&v=S3UudNBkZyo

tinyML 運用案例

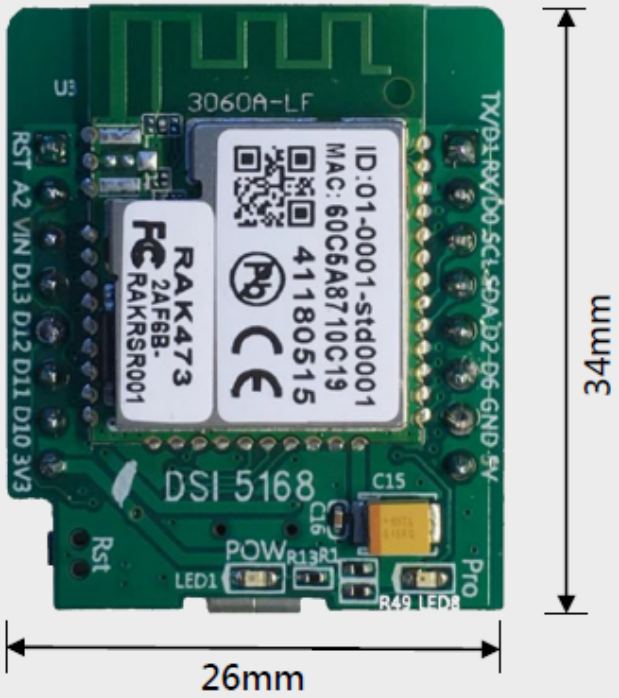
歐尼克斯實境互動工作室(OmniXRI)



https://www.youtube.com/watch?t=1049&v=S3UudNBkZyo

DSI5168 晶片介紹

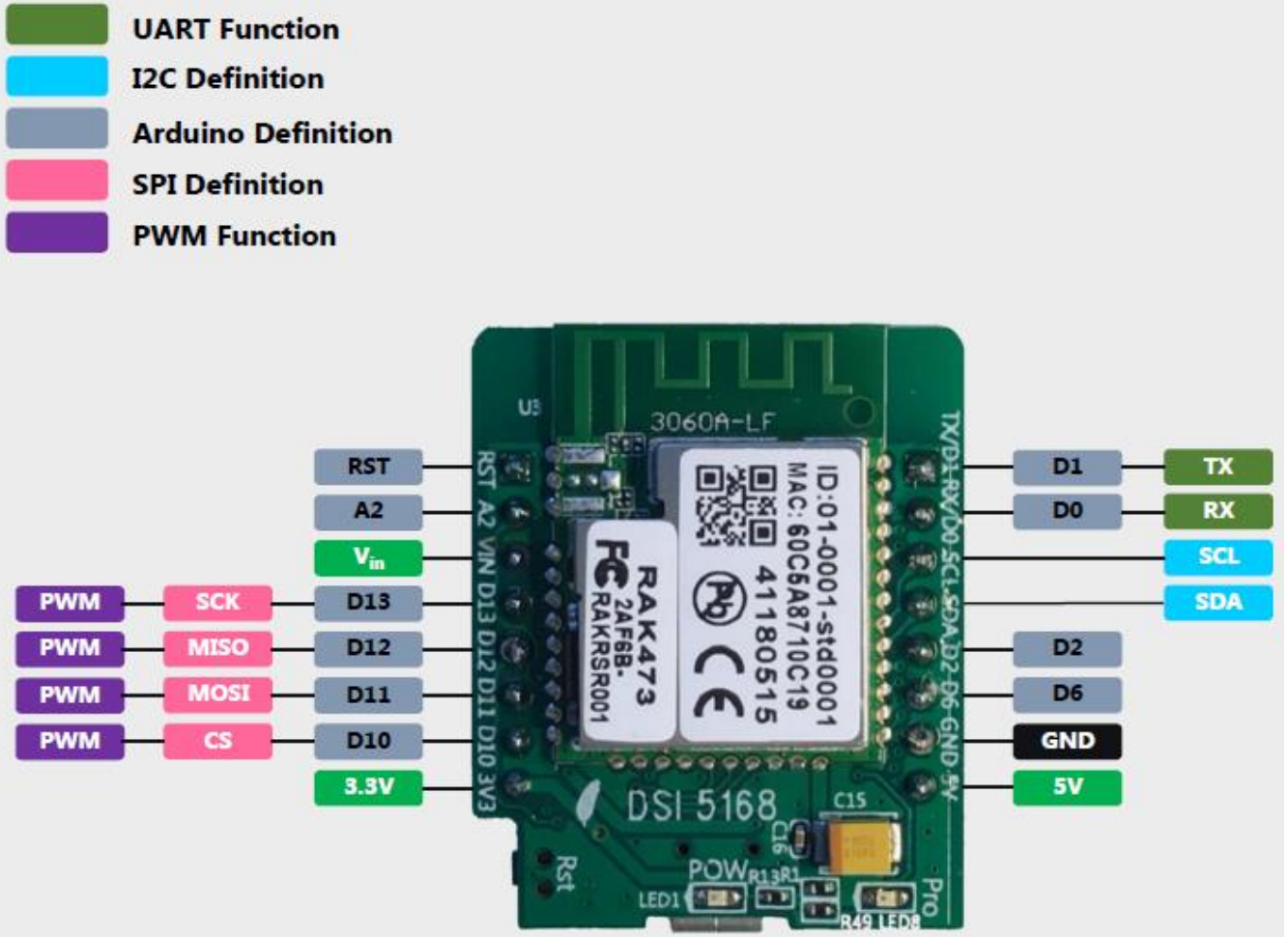
- 採用Realtek Ameba RTL8711AM晶片
- 以ARM架構Cortex M3為核心
- 支援Arduino、IAR、mbed等開發環境
- 擁有2MB Flash 並具 Wi-Fi 功能
- 支援UART、SPI、I2C、PWM等功能
- 擁有8個GPIO腳位



REALTEK

DSI5168 晶片介紹

硬體功能	規格
Chipset	RTL8711AM
MCU	ARM M3/166MHz
I/O	12
ROM	1MB
SRAM	512KB
Internal Flash	N/A
External Flash	2MB
ADC	1
SPI	1
UART	1
I2C	1
I2S	N/A
PWM	4
SSL	Support



DSI5168 晶片介紹

- **CPU**
  - •ARM®Cortex™-M3 (up to 166MHz)
- **Memory**
  - •1MB embedded ROM
  - •2.5MB embedded RAM
- **Wi-Fi**
  - •2.4GHz 1T1R 802.11b/g/n up to 150Mbps
- **Security**
  - •Wi-Fi WEP, WPA, WPA2, WPS
- **Peripheral Interface**
  - •NFC tag (read/write)
  - •Maximum two PCM with 8/16KHz sample rate
  - •UART x 2 (HS-UART x 1, log UART x 1)
  - •SPI interface x 1
  - •Maximum I2S interface x 1
  - •Maximum I2C interface x 3
  - •ADC x 1
  - •PWM x 4
  - •Maximum 19 GPIOs

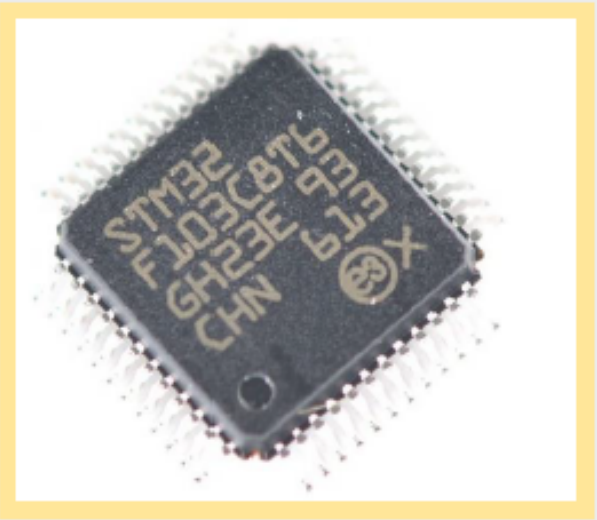
RTL8711AM

DSI2598+ 晶片介紹

- NB-IoT使用MTK MT2625晶片
- STM32　F103 32 bit核心
- 相容Arduino IDE開發環境
- Keil C / STM32Cube 開發環境
- 多種韌體燒錄方式
- 更多功能腳位，12 bit ADC解析度
- 郵票式電路板設計

DSI2598+ 晶片介紹

- STM32F103C8T6 ARM Cortex M3
- 72 MHz maximum frequency
- 64 Kbytes of Flash memory
- 20 Kbytes of SRAM
- 8 MHz system crystal
- 32.768 KHz RTC crystal
- 2x SPI, 3x USART, 2x I2C, 1x CAN
- USART1 for NB-IoT & firmware upload (with boot0 = 1, JP4 connect to 3.3V)



DSI2598+ 晶片介紹

本開發板設計，可提供多種程式燒錄方式，一般出廠設定為方便使用，免去外接燒錄設備，採用bootloader燒錄方式，如此一來只需接上開發板的USB即可透過Arduino IDE選擇STM32duino bootloader選項，直接燒錄。

另有使用FTDI工具的Serial燒錄方式與STLink工具的STLink燒錄方式

三種上傳方法

STM32duino bootloader	Serial	STLink
USB直接燒錄	FTDI工具	STLink工具

補充資料

Ideaschain應用案例分享(附程式碼):

https://iforum.ideaschain.com.tw/iforum/techmatch/list.do

SensiMl應用案例:

https://www.youtube.com/watch?v=4b_cMLDofO8

各類國產晶片資源:

https://www.ideas-hatch.com/mem_evb.jsp

如何焊好新購開發板

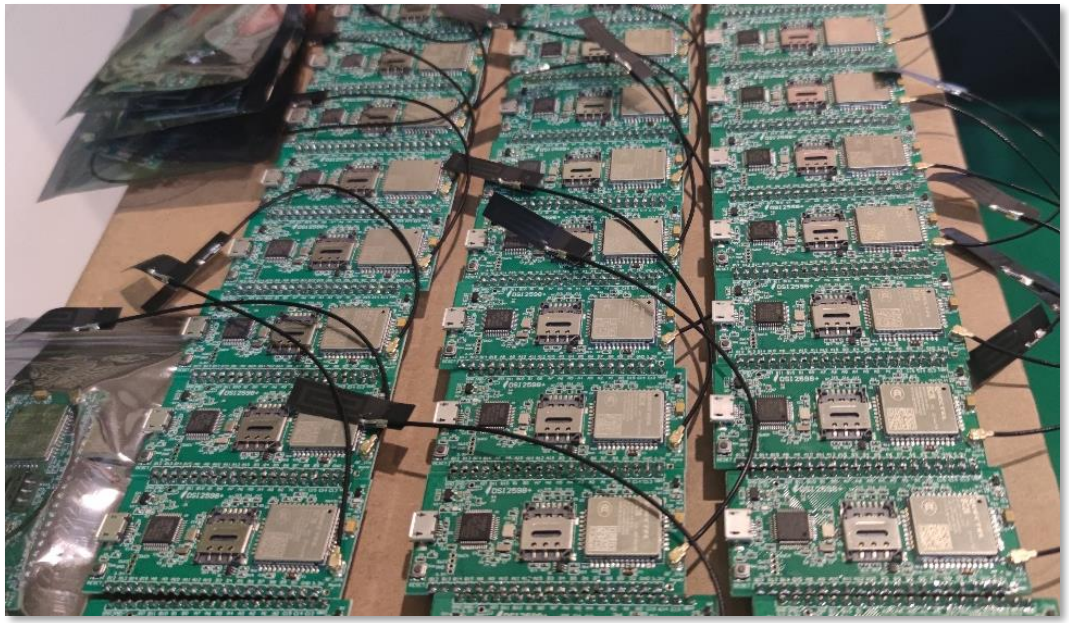


圖 1. 新買開發板排針與主板分開

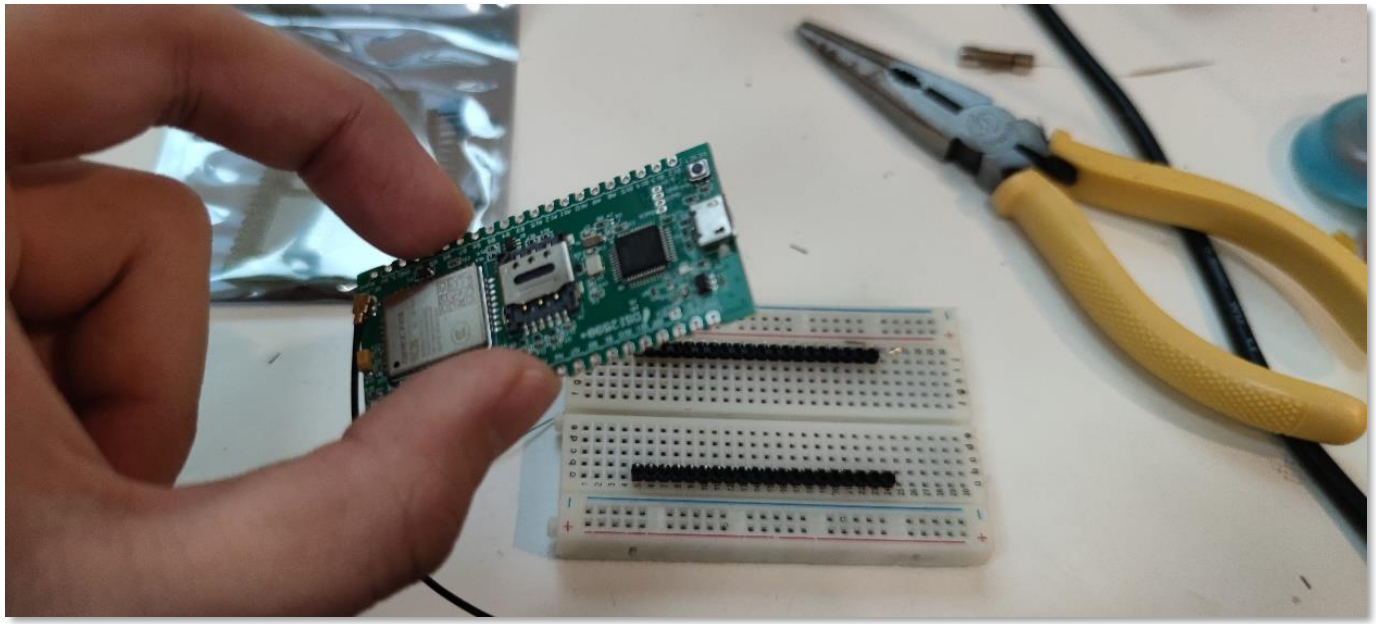
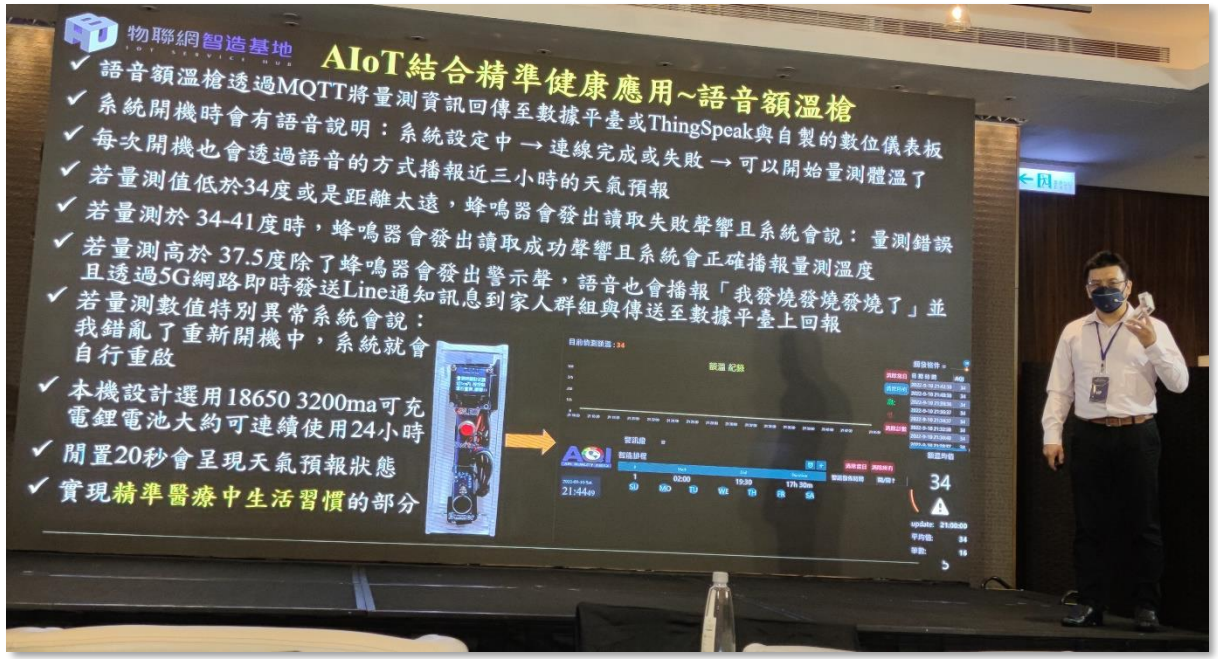


圖 2.使用麵包板固定後再焊

5168其他應用案例



https://iforum.ideaschain.com.tw/iforum/techmatch/list.do
https://www.youtube.com/watch?t=1049&v=S3UudNBkZyo

國產晶片相關消息

IDEAS Hatch:
https://www.ideas-hatch.com/
https://www.facebook.com/iiiideashatch
https://www.ideas-hatch.com/mem_evb.jsp

講師介紹

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交大電控博士休學中
... +10

專長: 自動化、系統整合、人工智慧...

Thank you

物聯網智造基地
IOT SERVICE HUB