



HARDWARE

SOFTWARE

CLOUD

DOCUMENTATION

COMMUNITY ▾

BLOG

ABOUT

Downloads



Arduino IDE 2.3.2

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code completion, and even a live debugger.

Please download and install two things:

1. Arduino IDE
2. CH340 Drivers

SOURCE CODE

The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

DOWNLOAD OPTIONS

Windows Win 10 and newer, 64 bits

Windows MSI installer

Windows ZIP file

Linux AppImage 64 bits (X86-64)

Linux ZIP file 64 bits (X86-64)

CH340 Drivers for Windows, Mac and Linux

Gogo:Tronics Hobby Electronic Parts

Did you know you automatically get \$5 off for every \$50 added to your cart? Well, now you know.

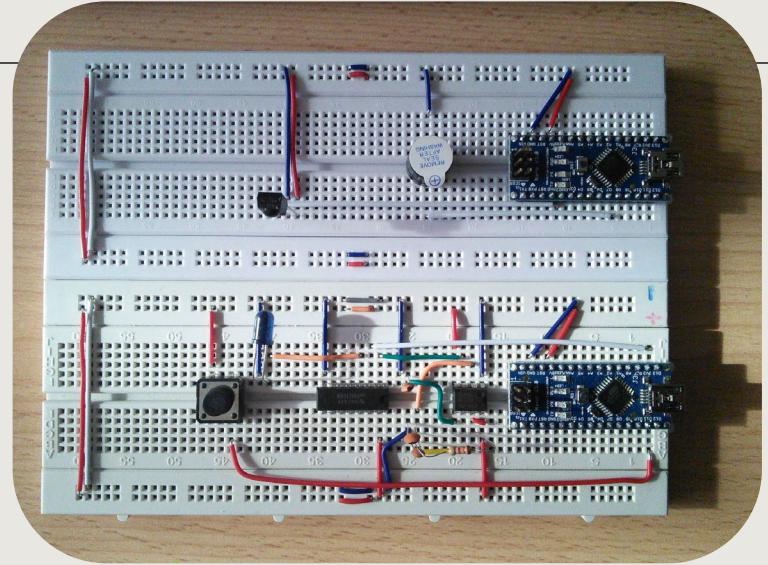
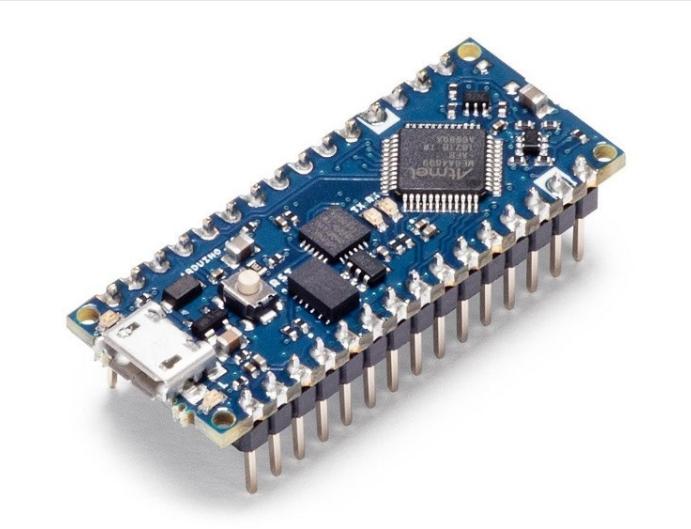
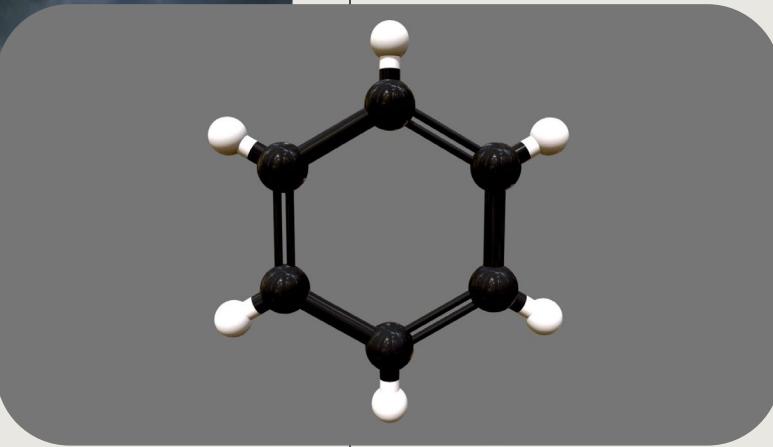
(Excludes shipping/handling & sale items, not in conjunction with any other voucher/discount/promo code.)

The CH340 chip is used by a number of Arduino compatible boards to provide USB connectivity, you may need to install a driver, don't panic, it's easier than falling off a log, and much less painful.

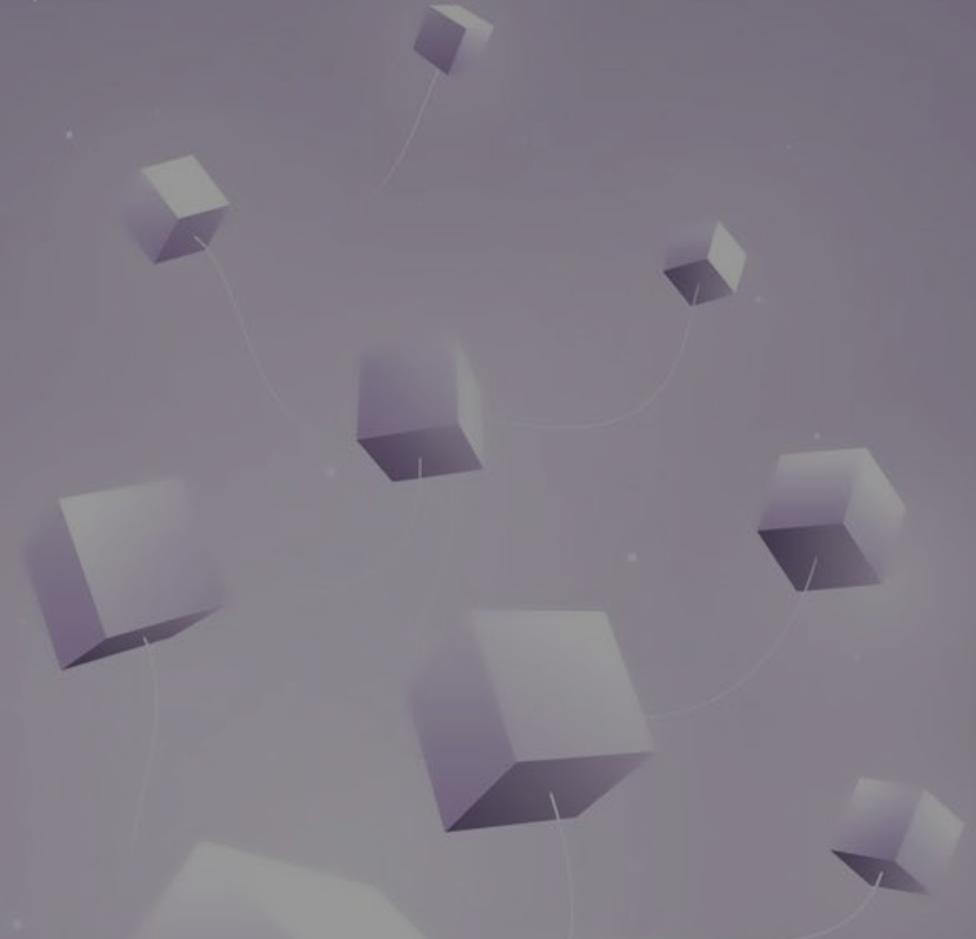
Windows

可持續生活： 空氣監測裝置工作坊

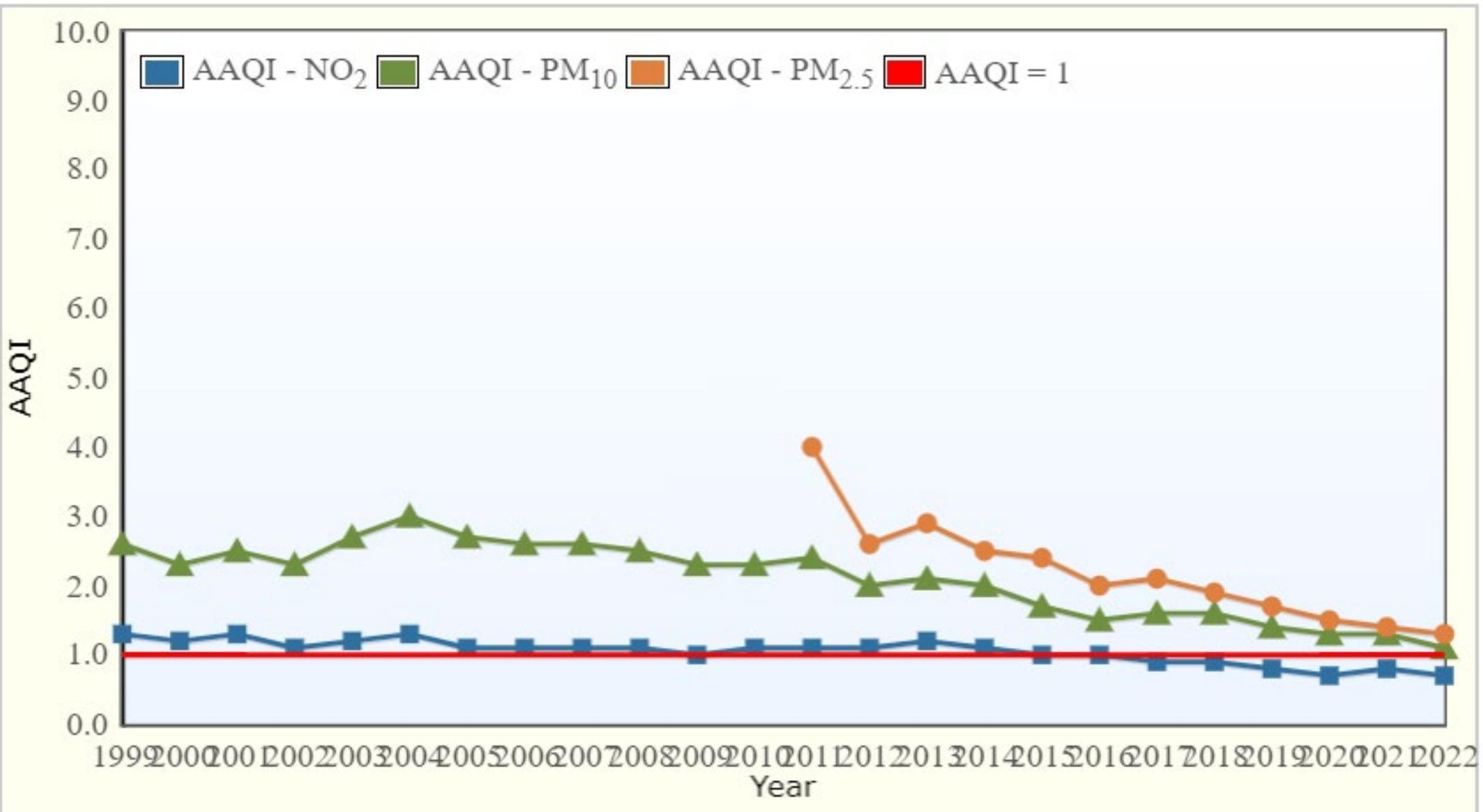
1. Introduction 簡介

A dark, atmospheric image showing a hand interacting with a glowing interface. The interface displays lines of Python-like code, including variables like 'mirror_mod', 'modifier_obj', and 'operation', and functions like 'mirror_object_to_mirror_object'. The code is highlighted in bright orange and yellow against a dark background.

2. Air Pollution in Hong Kong 香港的空氣污染情況



年均空氣質素指數長期趨勢 - 沙田

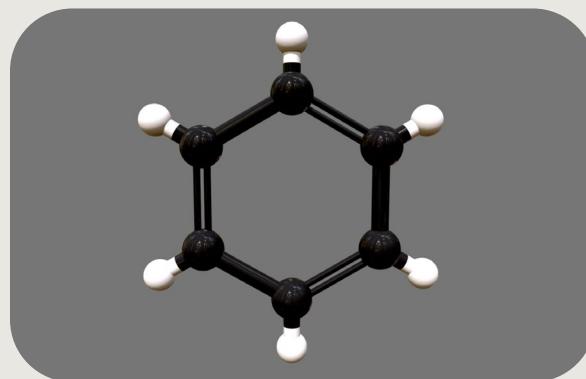




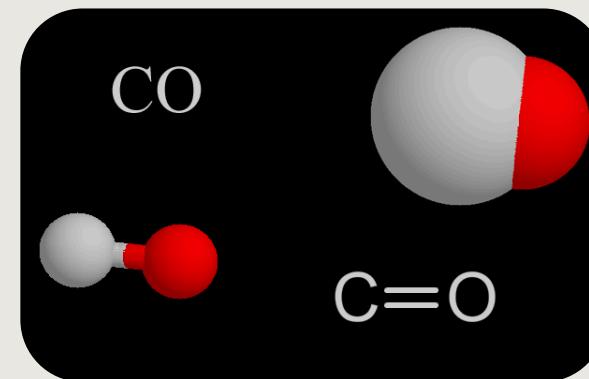
>800,000



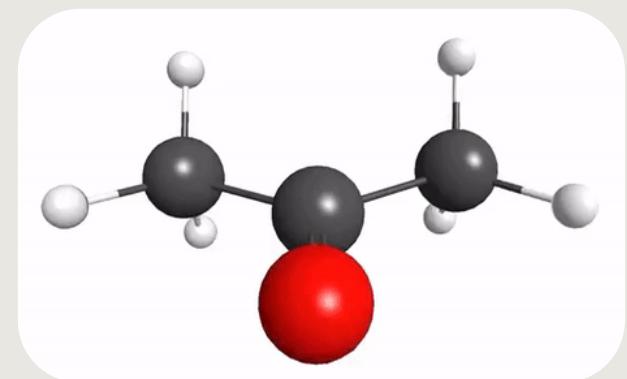
Common Pollutants 常見污染物



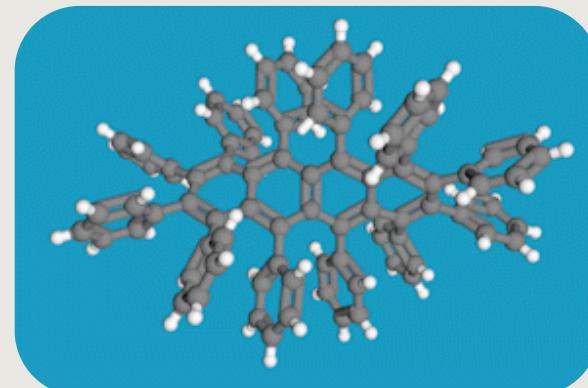
Benzene 苯 (-C₆H₆)



Carbon Monoxide—一氧化碳(CO)



Acetone (CH₃COCH₃)丙酮



Limited Oxygen

...



新宿中野SOD

A3

新宿中野SOD





沙田

日期時間	二氧化氮	臭氧	二氧化硫	一氧化碳	PM ₁₀	PM _{2.5}
2023-04-13 11:00	14.7	107.0	3.9	-	39.2	18.6
2023-04-13 10:00	13.7	106.7	3.7	-	39.9	20.1
2023-04-13 09:00	12.9	112.4	2.9	-	40.1	20.8
2023-04-13 08:00	16.0	111.2	2.3	-	40.8	22.2
2023-04-13 07:00	11.9	122.5	3.6	-	44.7	25.1
2023-04-13 06:00	8.3	129.8	1.3	-	41.8	24.2
2023-04-13 05:00	-	-	-	-	39.0	23.3
2023-04-13 04:00	-	-	-	-	31.7	18.9
2023-04-13 03:00	5.1	102.1	2.4	-	29.7	16.5
2023-04-13 02:00	5.3	96.6	2.7	-	29.8	16.6
2023-04-13 01:00	5.8	98.9	2.8	-	27.8	17.2
2023-04-13 00:00	10.4	90.4	2.7	-	19.6	10.2
2023-04-12 23:00	17.5	65.5	3.7	-	21.0	12.2
2023-04-12 22:00	26.1	62.7	2.9	-	19.8	11.4
2023-04-12 21:00	13.9	73.7	2.5	-	18.1	11.7
2023-04-12 20:00	23.7	70.4	1.5	-	17.9	11.7
2023-04-12 19:00	15.0	82.2	1.8	-	24.3	13.2
2023-04-12 18:00	64.3	39.0	4.1	-	33.4	15.9
2023-04-12 17:00	65.4	48.0	5.4	-	31.0	13.9
2023-04-12 16:00	65.9	49.1	6.1	-	29.8	13.1
2023-04-12 15:00	59.0	53.2	4.8	-	29.6	13.5
2023-04-12 14:00	52.7	59.1	5.5	-	32.8	15.6
2023-04-12 13:00	69.1	40.6	5.3	-	30.8	15.4
2023-04-12 12:00	37.4	69.1	4.3	-	26.5	13.7

備註：

- (1) 顯示的是香港時間。
- (2) PM₁₀ - 可吸入懸浮粒子
PM_{2.5} - 微細懸浮粒子
- (3) 顯示濃度為微克/立方米。
- (4) 污染物濃度資料是以環境保護署空氣質素監測網絡的實時數據計算。

PM10和PM2.5是空氣污染物的類型

PM10 and PM2.5 are types of air pollutants

它們指的是懸浮在空氣中的微小塵埃、灰塵和其他物質的微粒

They refer to tiny particles of dust, dirt, and other materials that are suspended in the air

PM10顆粒的直徑小於或等於10微米 (0.00001米)

PM10 particles have a diameter of 10 micrometers or less

PM2.5顆粒的直徑小於或等於2.5微米

PM2.5 particles have a diameter of 2.5 micrometers or less

這些微粒可能對人體健康和環境產生負面影響

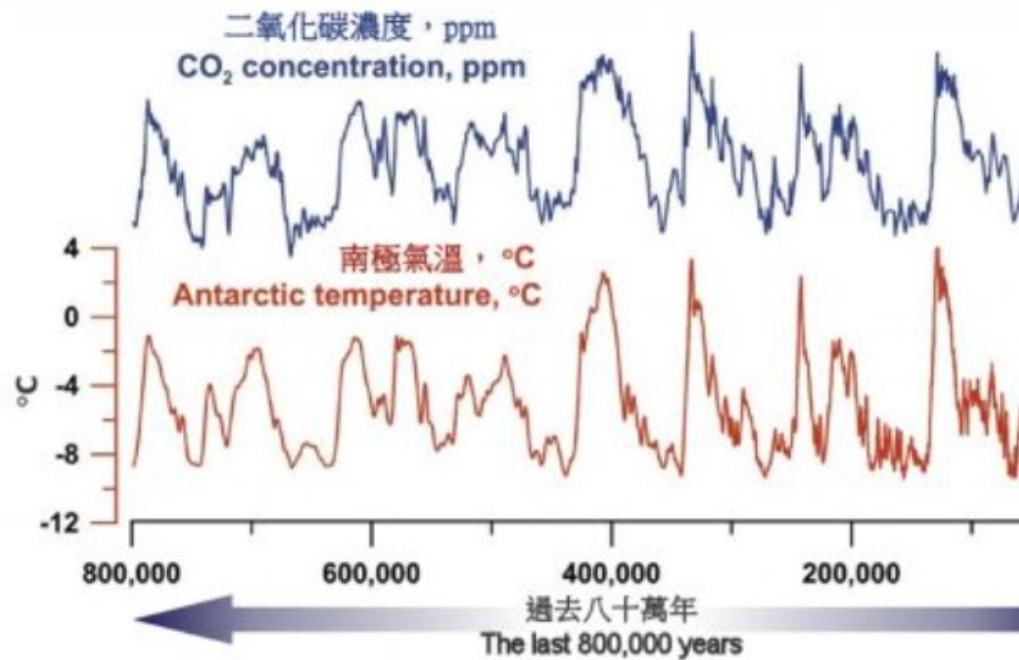
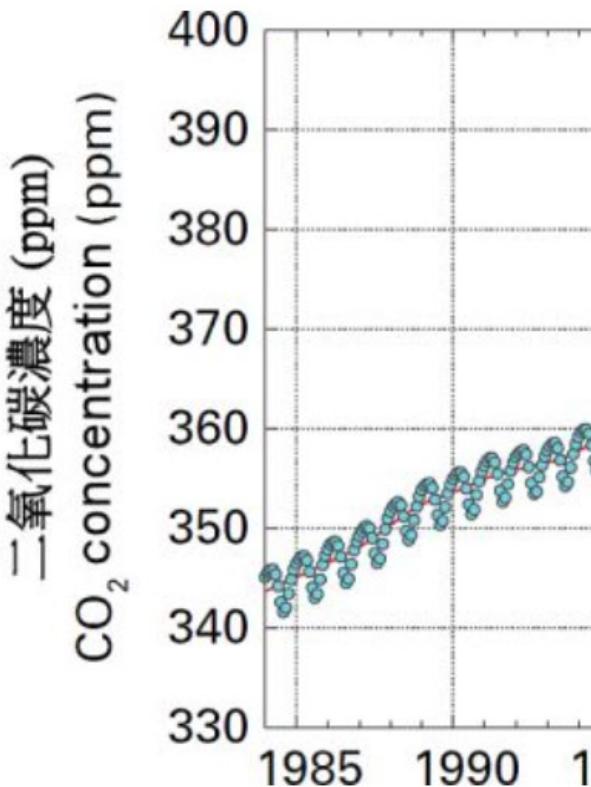
These particles can have negative impacts on human health and the environment

How about Carbon Dioxide?

二氣化碳呢？

Is CO₂ considered to be a harmful gas?

CO₂算是有害氣體嗎？



- 2013年大氣中二氧化碳濃度:396 ppm較工業革命前增加了42%。

勢，全球
天氣會在未
來幾十年內升
溫至4°C，即
CO₂濃度將
達到450 ppm。

(來源：美國國家科學院)



Land-use changes, especially deforestation, are a significant source of CO₂ emissions (about a tenth of the amount from fossil emissions). Indonesia, Brazil and the Democratic Republic of the Congo contribute 58% of global land-use change emissions.

Carbon removal via reforestation or new forests counterbalances half of the deforestation emissions, and the researchers say that stopping deforestation and increasing efforts to restore and expand forests constitutes a large opportunity to reduce emissions and increase removals in forests.

The Global Carbon Budget report projects that atmospheric CO₂ concentrations will reach an average of 417.2 parts per million in 2022, more than 50% above pre-industrial levels.

The projection of 40.6 GtCO₂ total emissions in 2022 is close to the 40.9 GtCO₂ in 2019, which is the highest annual total ever.

The Global Carbon Budget report, produced by an international team of more than 100 scientists, examines both carbon sources and sinks. It provides an annual, peer-reviewed update, building on established methodologies in a fully transparent manner. Once published, the 2022 edition (the 17th annual report) will be online here:

<https://doi.org/10.5194/essd-14-4811-2022>

Date: 9 November 2022





Yes, carbon dioxide (CO₂) can be considered harmful if there is too much of it in the air.

是的，如果空氣中二氧化碳 (CO₂) 太多，它就會被視為有害物質。

If there is too much carbon dioxide in the air, it can trap heat from the sun and make the Earth's temperature warmer. This is called global warming, and it can cause problems like melting ice caps, rising sea levels, and changes in weather patterns.

如果空氣中二氧化碳太多，它會困到太陽的熱量，使地球的溫度變暖。這就是所謂的全球暖化，它可能會引起融冰、海平面上升和天氣模式的變化等問題。

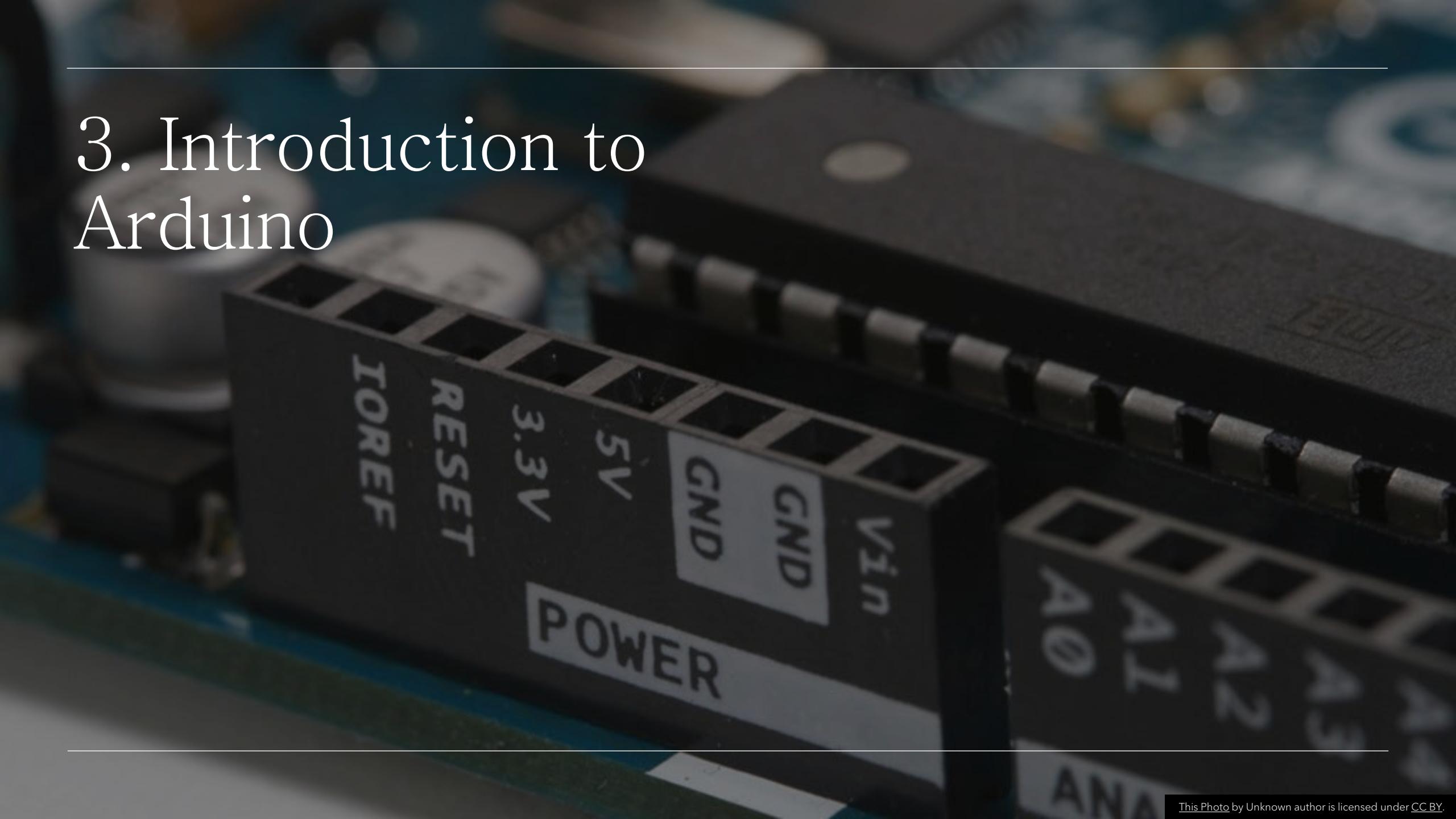




So, it's important to try to reduce the amount of carbon dioxide that we release into the air by using cleaner sources of energy like solar power, wind power, and hydropower, and by using less energy in general.

因此，通過使用更清潔的能源，如太陽能、風能和水力發電，並在一般情況下使用更少的能源，可以減少我們釋放到空氣中的二氧化碳量，這一點非常重要。

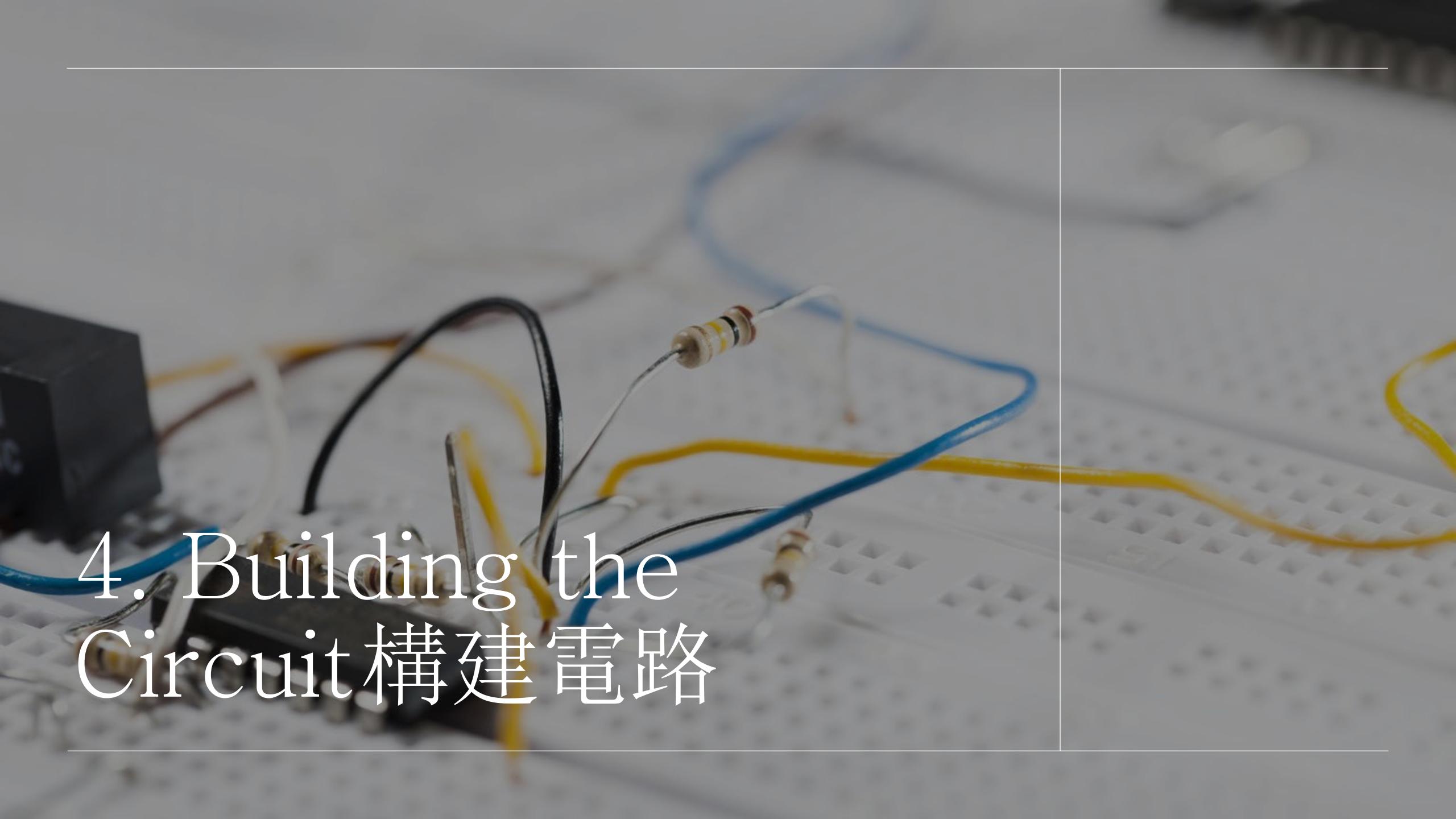
3. Introduction to Arduino



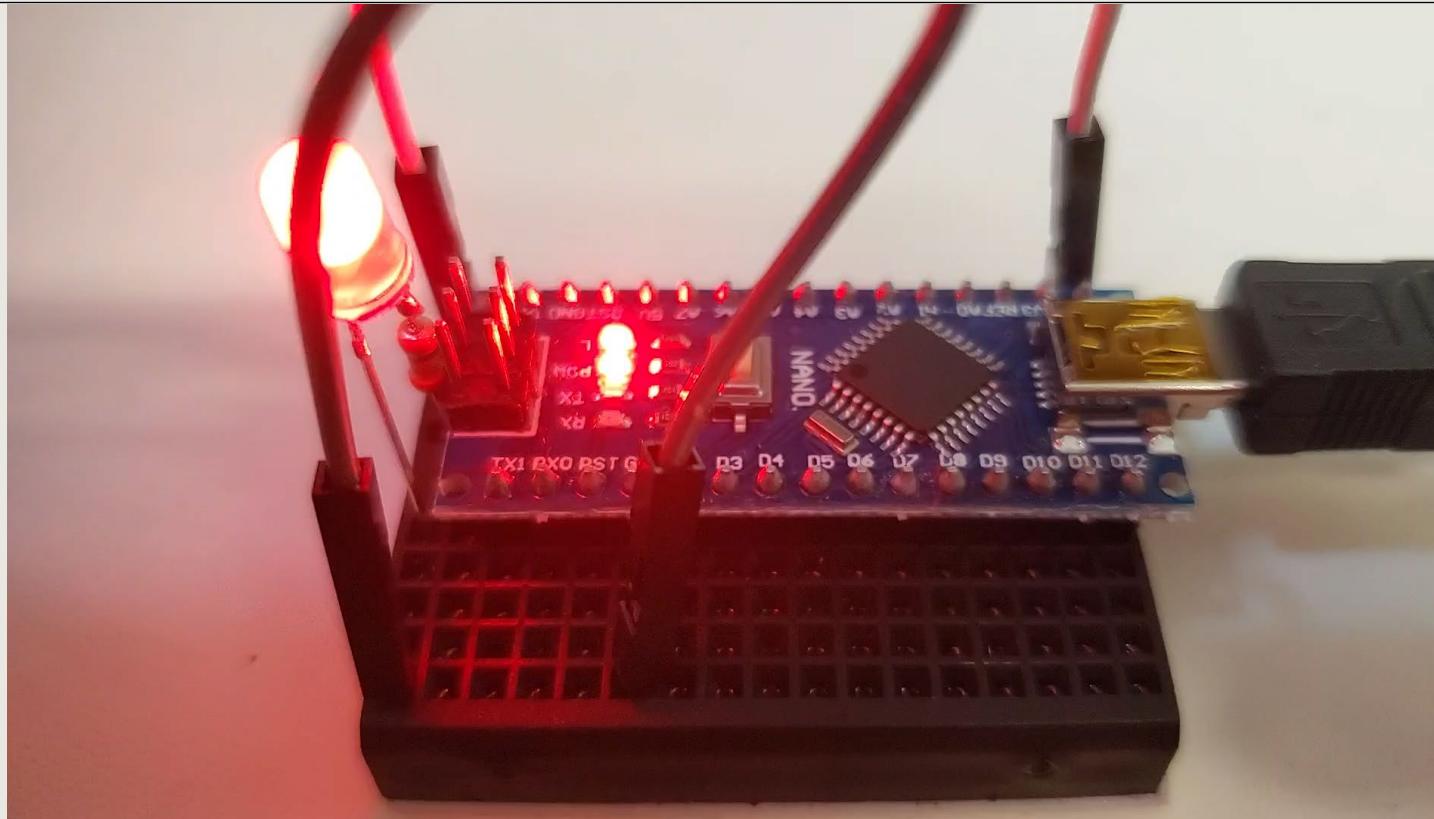
Introduction to Arduino

- an open-source electronics platform based on easy-to-use hardware and software Arduino
一個基於易於使用的硬體和軟體的開放原始碼電子平台。
 - consists of a microcontroller board and a software development environment for writing and uploading code to the board
包括一個微控制器板和一個軟體開發環境，用於編寫和上傳程式碼到板子上。
 - can be programmed to control various electronic components such as LEDs, motors, sensors...
板子可以編程控制各種電子元件，如 LED、馬達、感測器等。
 - The programming language used for Arduino is based on C/C++ but simplified for beginners
用於 Arduino 的編程語言基於 C/C++，但簡化了初學者的學習難度。
-

4. Building the Circuit 構建電路

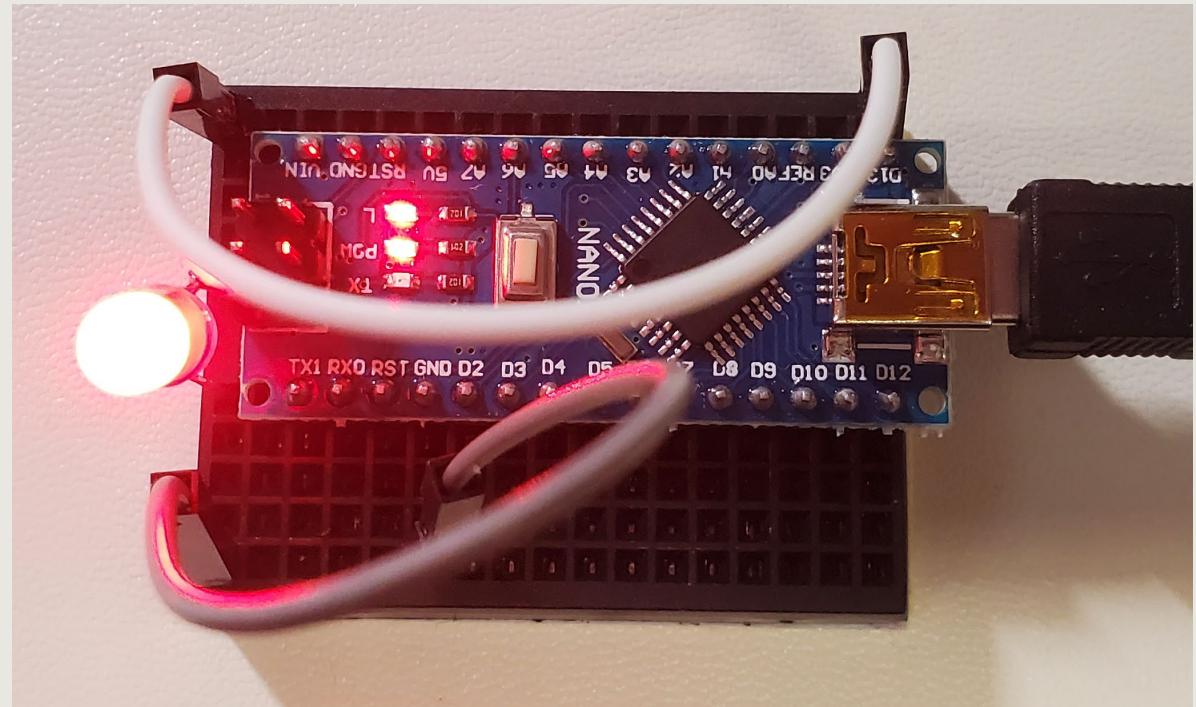


Part 1 – Blinking LED 閃爍 LED



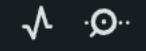
Part 1 – Blinking LED 閃爍 LED

LED	Arduino Nano
+ (with resistor) (帶電阻)	D13
-	GND



5. Coding

```
17 string sInput;
18 int iLength, iN;
19 double dblTemp;
20 bool again = true;
21
22 while (again) {
23     iN = -1;
24     again = false;
25     getline(cin, sInput);
26     system("cls");
27     stringstream(sInput) >> dblTemp;
28     iLength = sInput.length();
29     if (iLength < 4) {
30         again = true;
31         continue;
32     } else if (sInput[iLength - 3] != '.') {
33         again = true;
34         continue;
35     } while (++iN < iLength) {
36         if (isdigit(sInput[iN])) {
37             continue;
38         } else if (iN == (iLength - 3)) {
39             continue;
40         }
41     }
42 }
```

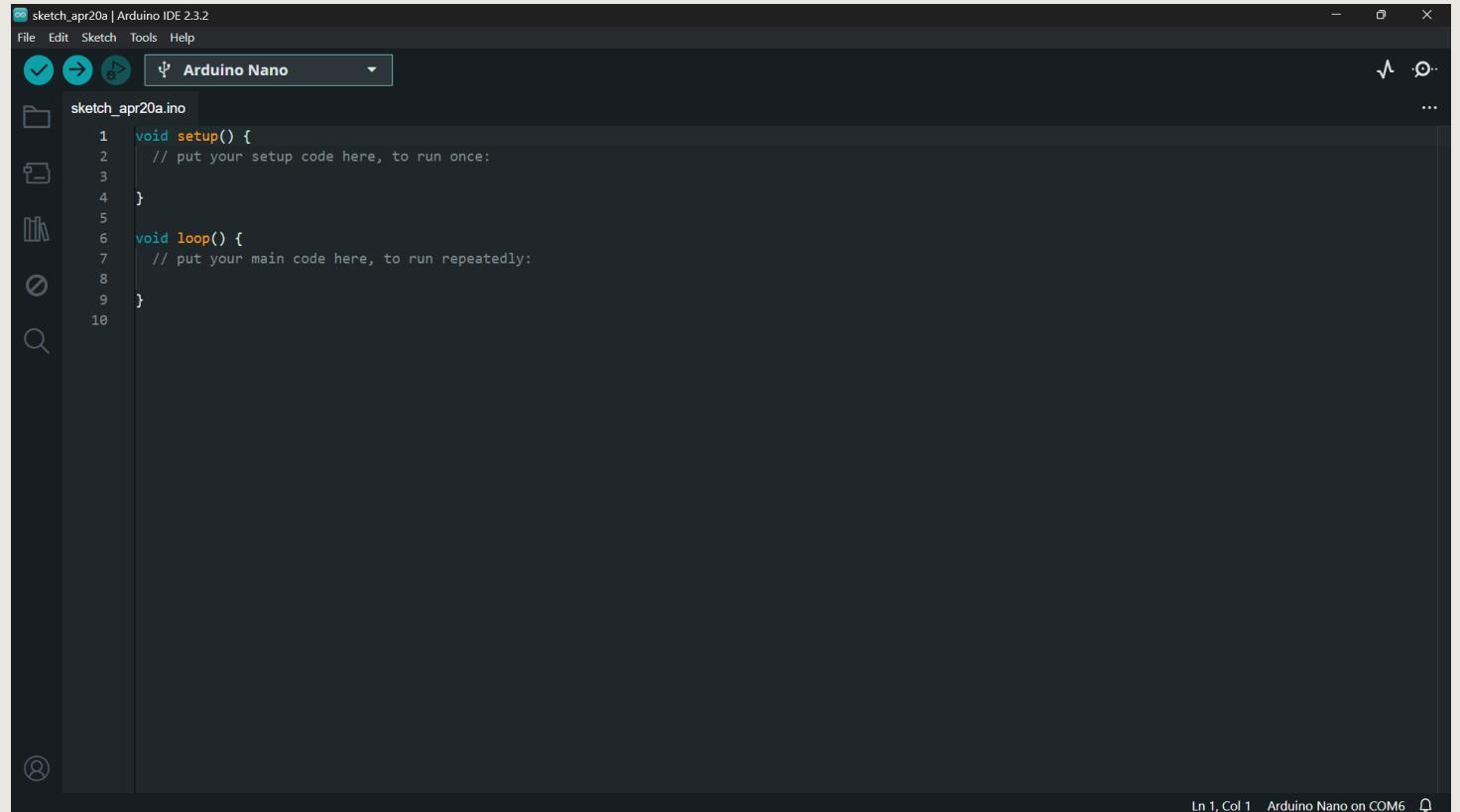


sketch_apr20a.ino

```
1 void setup() {  
2     // put your setup code here, to run once:  
3  
4 }  
5  
6 void loop() {  
7     // put your main code here, to run repeatedly:  
8 }  
9  
10
```

⑧ 5a. Default Code 預設程式碼

Type
something!
打D嚟！



The screenshot shows the Arduino IDE interface with a dark theme. The title bar reads "sketch_apr20a | Arduino IDE 2.3.2". The central code editor window displays the following C++ code:

```
1 void setup() {
2     // put your setup code here, to run once:
3 }
4
5 void loop() {
6     // put your main code here, to run repeatedly:
7 }
8
9 }
10
```

The status bar at the bottom right indicates "Ln 1, Col 1" and "Arduino Nano on COM6".

- The code is here!

led | Arduino IDE 2.3.2

File Edit Sketch Tools Help

Arduino Nano

SKETCHBOOK

mycode

Code

led

trial1

...

led.ino

```
1 int led_pin=13;
2
3 void setup()
4 {
5 pinMode(led_pin,OUTPUT);
6 }
7
8 void loop()
9 {
10 digitalWrite(led_pin,HIGH);
11 delay(500);
12 digitalWrite(led_pin,LOW);
13 delay(500);
14 }
15 }
16 }
```

Output

NEW SKETCH

Ln 16, Col 1 Arduino Nano on COM6 3



Arduino Nano



SKETCHBOOK



mycode



Code



trial1



led.ino

```
1 int led_pin=13;  
2  
3 void setup()  
4 {  
5     pinMode(led_pin,OUTPUT);  
6 }  
7  
8 void loop()  
9 {  
10    digitalWrite(led_pin,HIGH);  
11    delay(500);  
12    digitalWrite(led_pin,LOW);  
13    delay(500);  
14  
15 }  
16
```

led | Arduino IDE 2.3.2

File Edit Sketch Tools Help

Arduino Nano Every

SKETCHBOOK

mycode

Code

led

trial1

...

NEW SKETCH

COPY ERROR MESSAGES

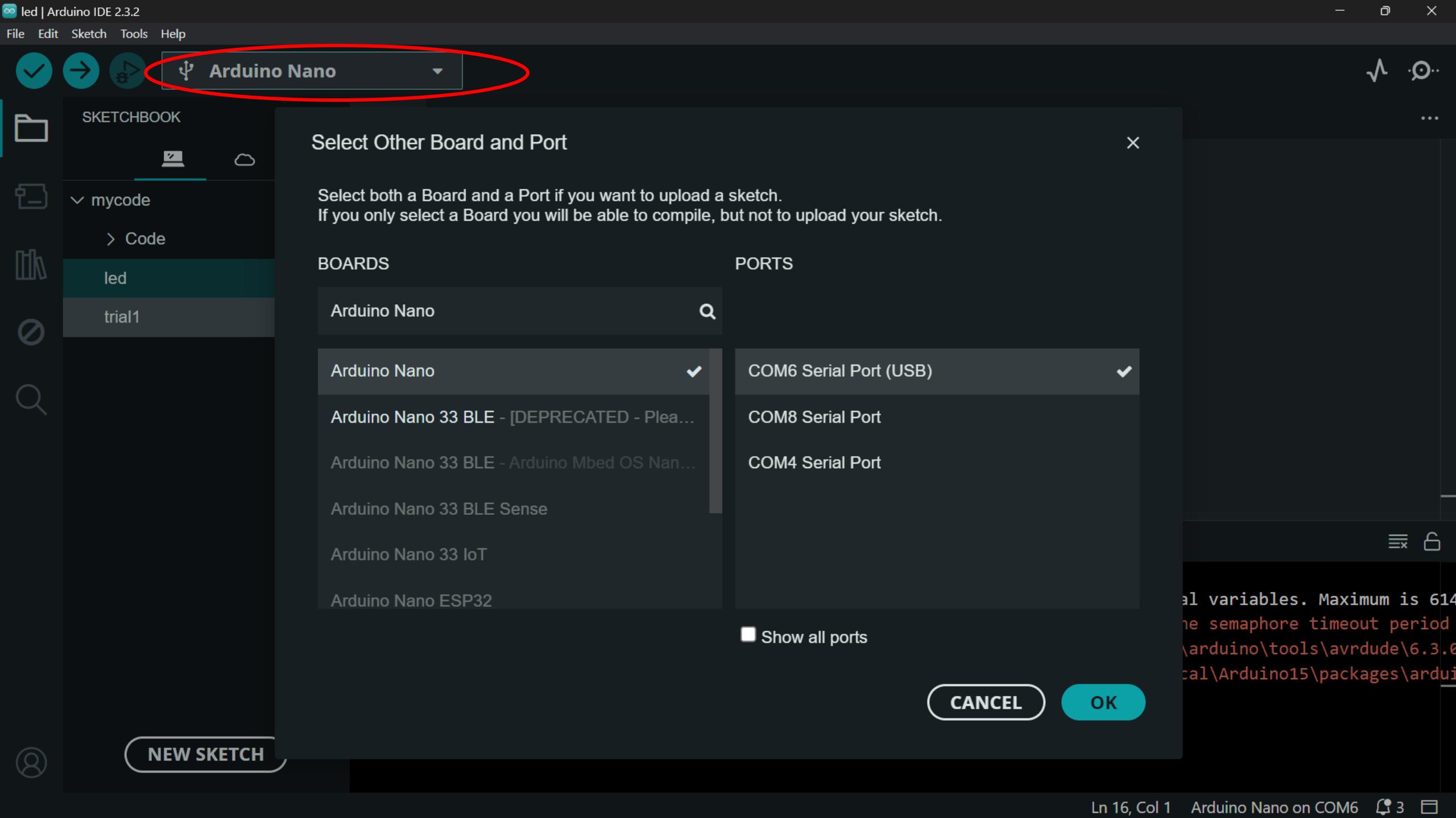
led.ino

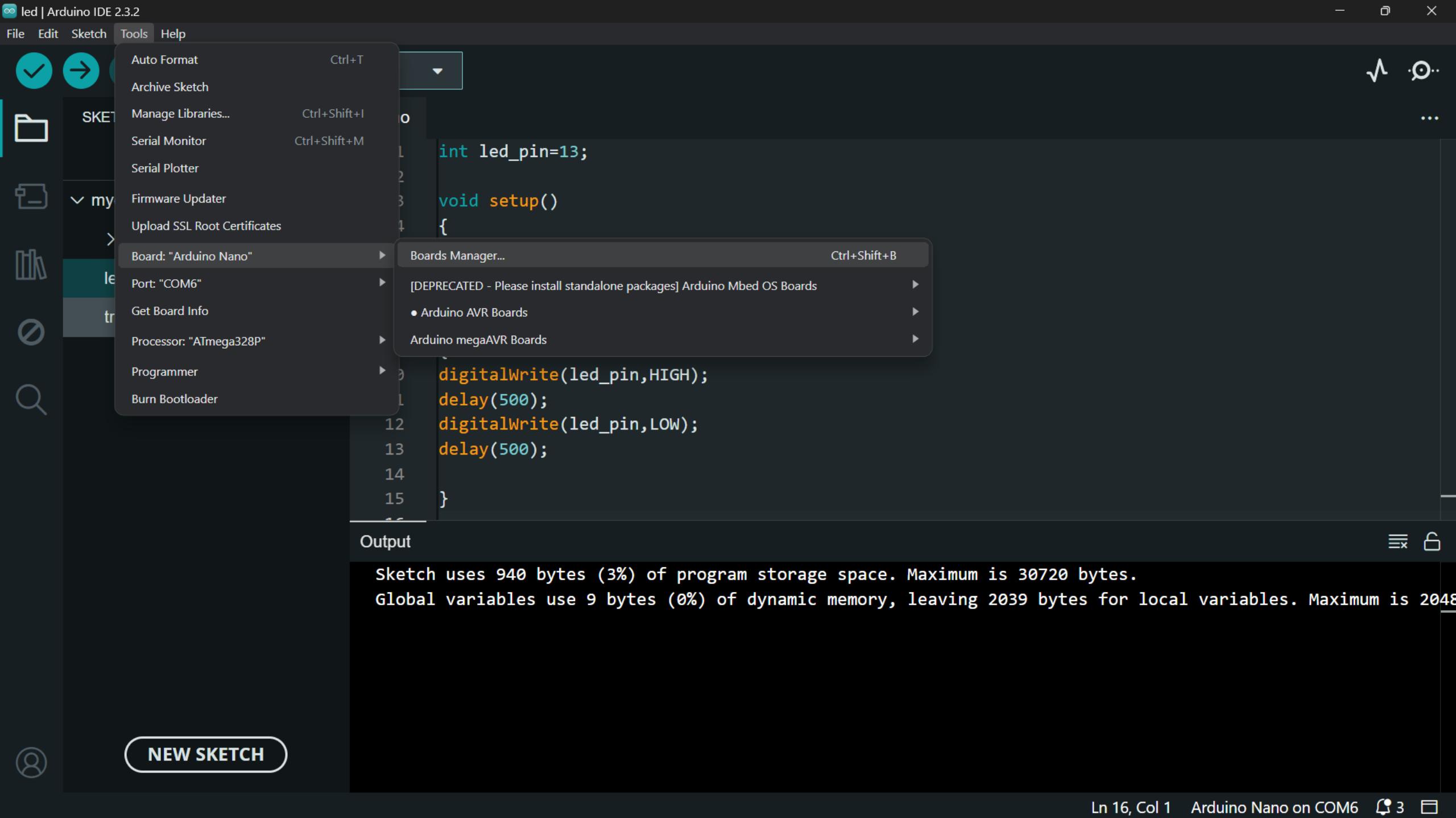
```
1 int led_pin=13;
2
3 void setup()
4 {
5   pinMode(led_pin,OUTPUT);
6 }
7
8 void loop()
9 {
10   digitalWrite(led_pin,HIGH);
11   delay(500);
12   digitalWrite(led_pin,LOW);
13   delay(500);
14 }
15 }
```

Output

Sketch uses 1354 bytes (2%) of program storage space. Maximum is 49152 bytes.
Global variables use 22 bytes (0%) of dynamic memory, leaving 6122 bytes for local variables. Maximum is 6144 bytes.
Cannot perform port reset: TOUCH: error during reset: opening port at 1200bps: The semaphore timeout period has expired.
avrduude: can't open config file "C:\Users\googl\AppData\Local\Arduino15\packages\arduino\tools\avrduude\6.3.0\etc\avrdude.conf": No such file or directory
avrduude: error reading system wide config
Failed uploading: uploading error: exit status 1

Ln 16, Col 1 Arduino Nano Every on COM4





led | Arduino IDE 2.3.2

File Edit Sketch Tools Help

Arduino Nano

BOARDS MANAGER

Filter your search...

Type: All

Arduino AVR Boards ... by Arduino 1.6.20 installed

Boards included in this package:
Arduino Leonardo, Arduino Esplora, Arduino Robot Control...
More info

1.8.6 UPDATE

Arduino Mbed OS

Edge Boards by Arduino

Boards included in this package:
Arduino Edge Control
More info

4.1.1 INSTALL

led.ino

```
1 int led_pin=13;
2
3 void setup()
4 {
5     pinMode(led_pin,OUTPUT);
6 }
7
8 void loop()
9 {
10    digitalWrite(led_pin,HIGH);
11    delay(500);
12    digitalWrite(led_pin,LOW);
13    delay(500);
14 }
15 }
```

Output

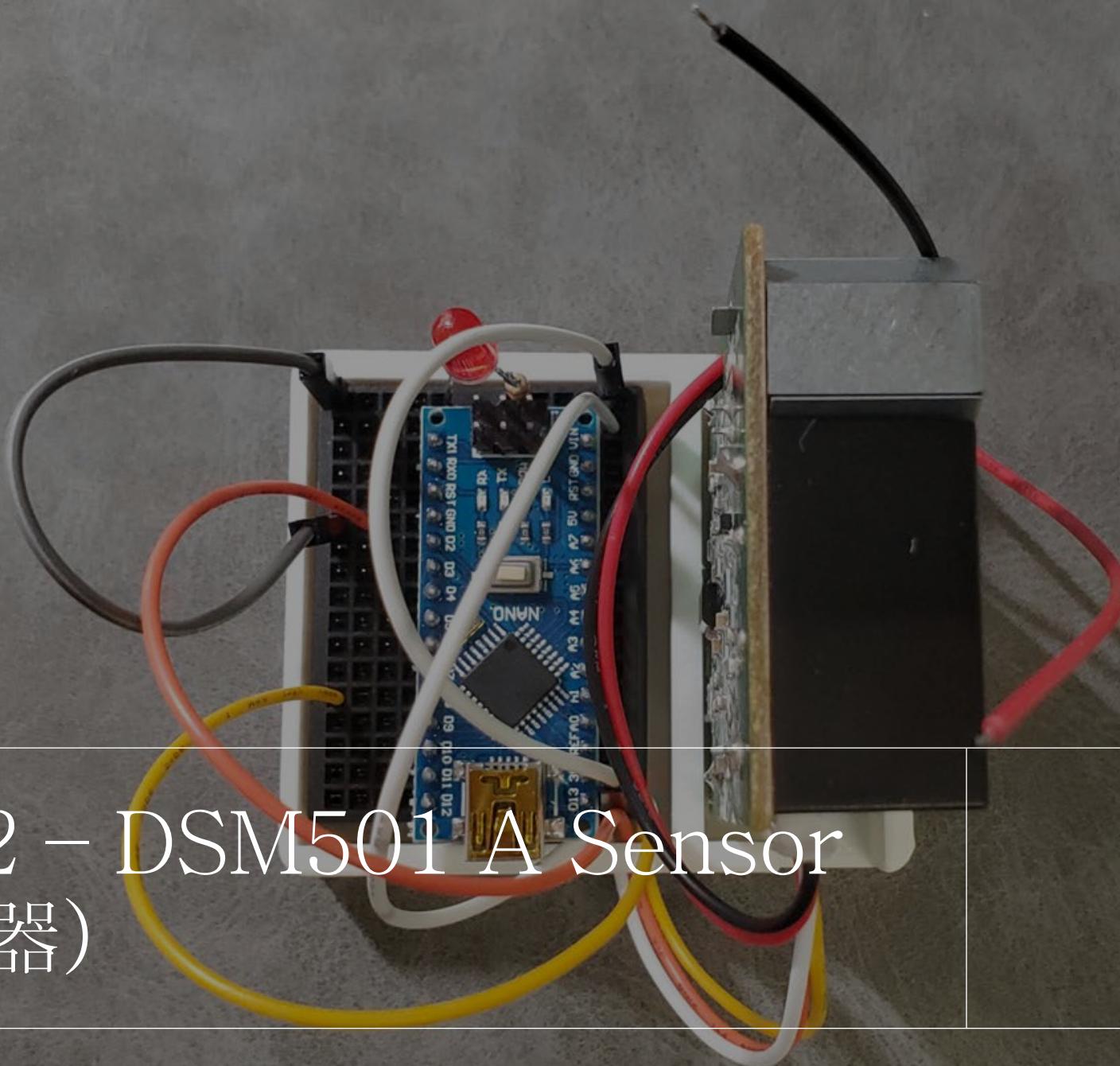
Sketch uses 940 bytes (3%) of program storage space. Maximum is 30720 bytes.
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for local variables. Maximum is 2048 bytes.

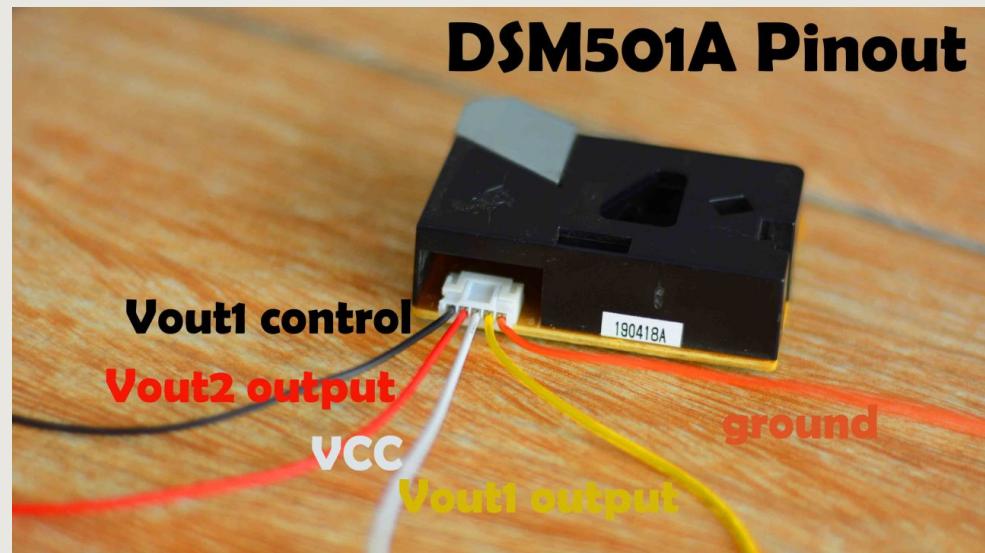
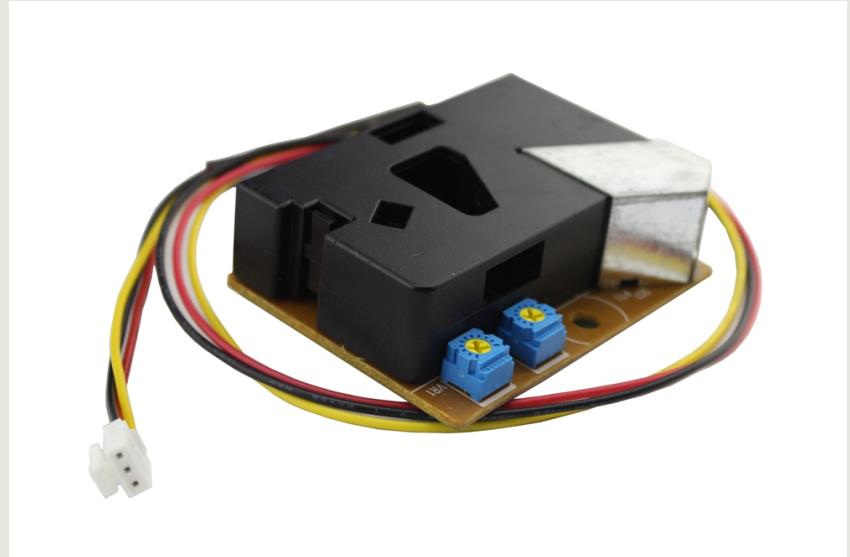
Ln 16, Col 1 Arduino Nano on COM6





Part 2 – DSM501 A Sensor (傳感器)





DSM501 Port 接口

VCC

GND

Vout1 control

Vout

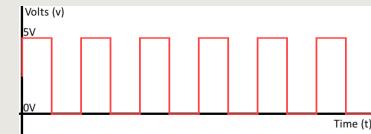
Function 功能

Voltage Common
Collector 共集電極
電壓

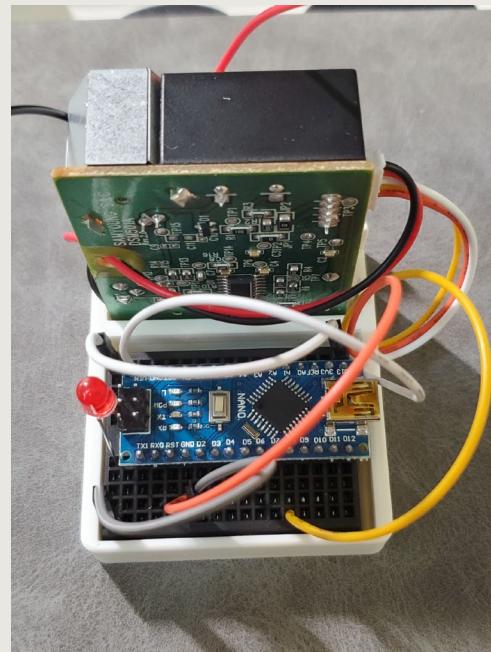
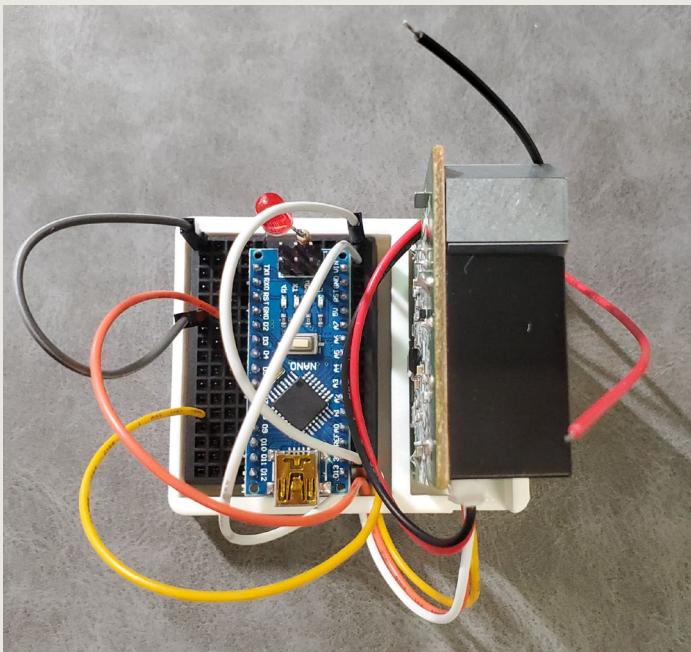
Ground 接地

Tuning the
sensitivity
用於調整靈敏度

Digital Out 數位輸
出



Circuit Diagram 電路圖



DSM501A	Arduino Nano
Pin 3	5V
Pin 4	D8
Pin 5	GND



Pin 1 - 5 From left to right
(從左到右)

✓ ➔ ⚡ Arduino Nano

SKETCHBOOK

trial1.ino MQ135.cpp mq135.h

```
1 #include <SoftwareSerial.h>
2 SoftwareSerial pmsSerial(2, 3);
3
4 void setup() {
5     // our debugging output
6     Serial.begin(115200);
7
8     // sensor baud rate is 9600
9     pmsSerial.begin(9600);
10 }
11
12 struct pms5003data {
13     uint16_t framelen;
14     uint16_t pm10_standard, pm25_standard, pm100_standard;
15     uint16_t pm10_env, pm25_env, pm100_env;
16     uint16_t particles_03um, particles_05um, particles_10um, particles_25um, particles_50um, particles_100um;
17     uint16_t unused;
18     uint16_t checksum;
19 };
20
21 struct pms5003data data;
22
23 void loop() {
24     if (readMSdata(&pmsSerial)) {
25         // reading data was successful!
26         Serial.println();
27         Serial.println("concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment");
28     }
29 }
```

5b. Code for the whole project 程式碼

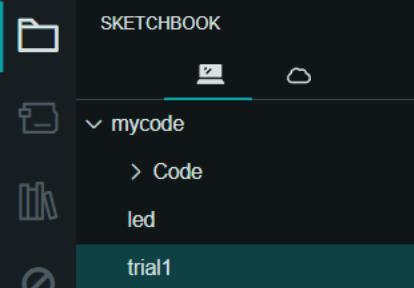
Message (Enter to send message to 'Arduino Nano' on 'COM6')

Carriage Return 9600 baud

NEW SKETCH



Arduino Nano



```
trial1.ino MQ135.cpp mq135.h
1 #include <SoftwareSerial.h>
2 SoftwareSerial pmsSerial(2, 3);
3
4 void setup() {
5     // our debugging output
6     Serial.begin(115200);
7
8     // sensor baud rate is 9600
9     pmsSerial.begin(9600);
10 }
11
12 struct pms5003data {
13     uint16_t framelen;
14     uint16_t pm10_standard, pm25_standard, pm100_standard;
15     uint16_t pm10_env, pm25_env, pm100_env;
16     uint16_t particles_03um, particles_05um, particles_10um, particles_25um, particles_50um, particles_100um;
17     uint16_t unused;
18     uint16_t checksum;
19 };
20
21 struct pms5003data data;
22
23 void loop() {
24     if (readPMSdata(&pmsSerial)) {
25         // reading data was successful!
26         Serial.println();
27         Serial.println("-----");
28         Serial.println("Concentration Units (standard)");
29         Serial.print("PM 1.0: "); Serial.print(data.pm10_standard);
30         Serial.print("\t\tPM 2.5: "); Serial.print(data.pm25_standard);
31         Serial.print("\t\tPM 10: "); Serial.println(data.pm100_standard);
32         Serial.println("-----");
33         Serial.println("Concentration Units (environmental)");
34         Serial.print("PM 1.0: "); Serial.print(data.pm10_env);
```

Output Serial Monitor X

Message (Enter to send message to 'Arduino Nano' on 'COM6')

concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment







Land-use changes, especially deforestation, are a significant source of CO₂ emissions (about a tenth of the amount from fossil emissions). Indonesia, Brazil and the Democratic Republic of the Congo contribute 58% of global land-use change emissions.

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<https://doi.org/10.5194/essd-14-4811-2022>

Date: 9 November 2022



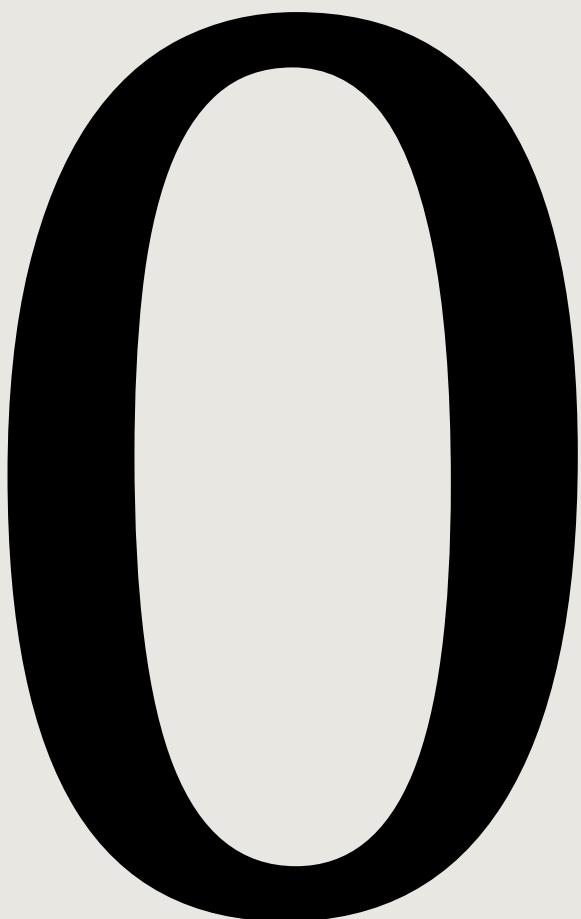
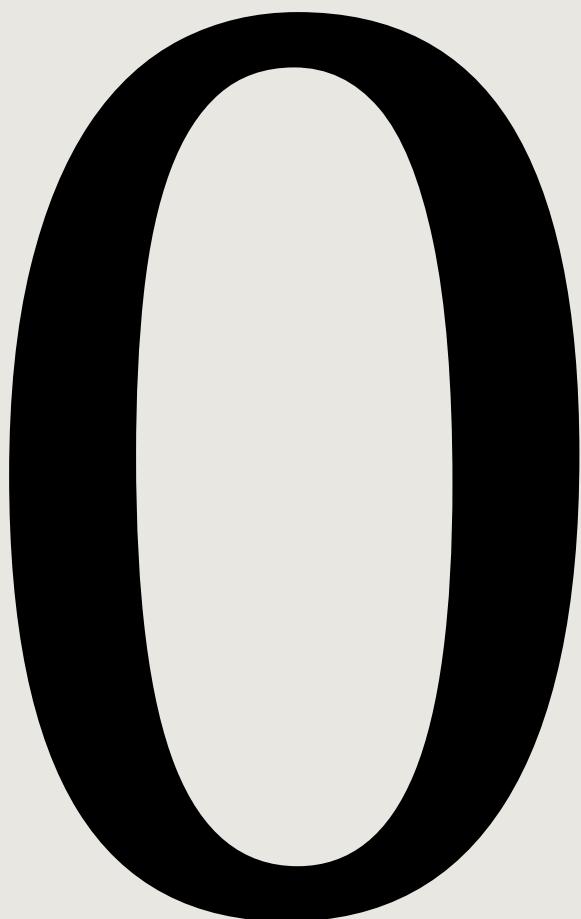
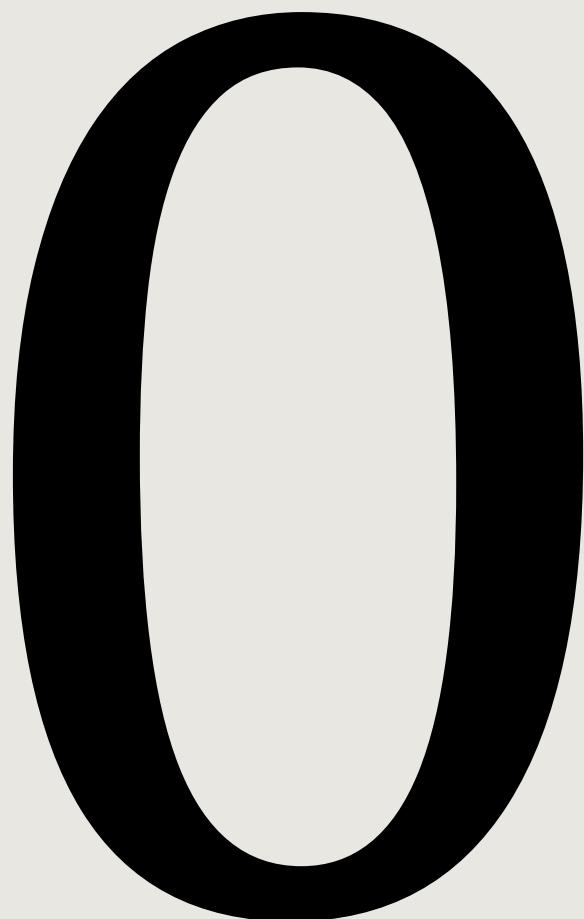
PPM?

- PPM代表百萬分之一，用於表示溶液或混合物中物質的濃度的單位。一個PPM表示每一百萬個溶液或混合物中有一個物質單位。這在環境監測、工業過程和科學研究中常被使用。
- PPM stands for parts per million, which is a unit of measurement used to express the concentration of a substance in a solution or mixture. One ppm indicates that there is one unit of the substance for every one million units of the solution or mixture. It is commonly used in environmental monitoring, industrial processes, and scientific research.





1000

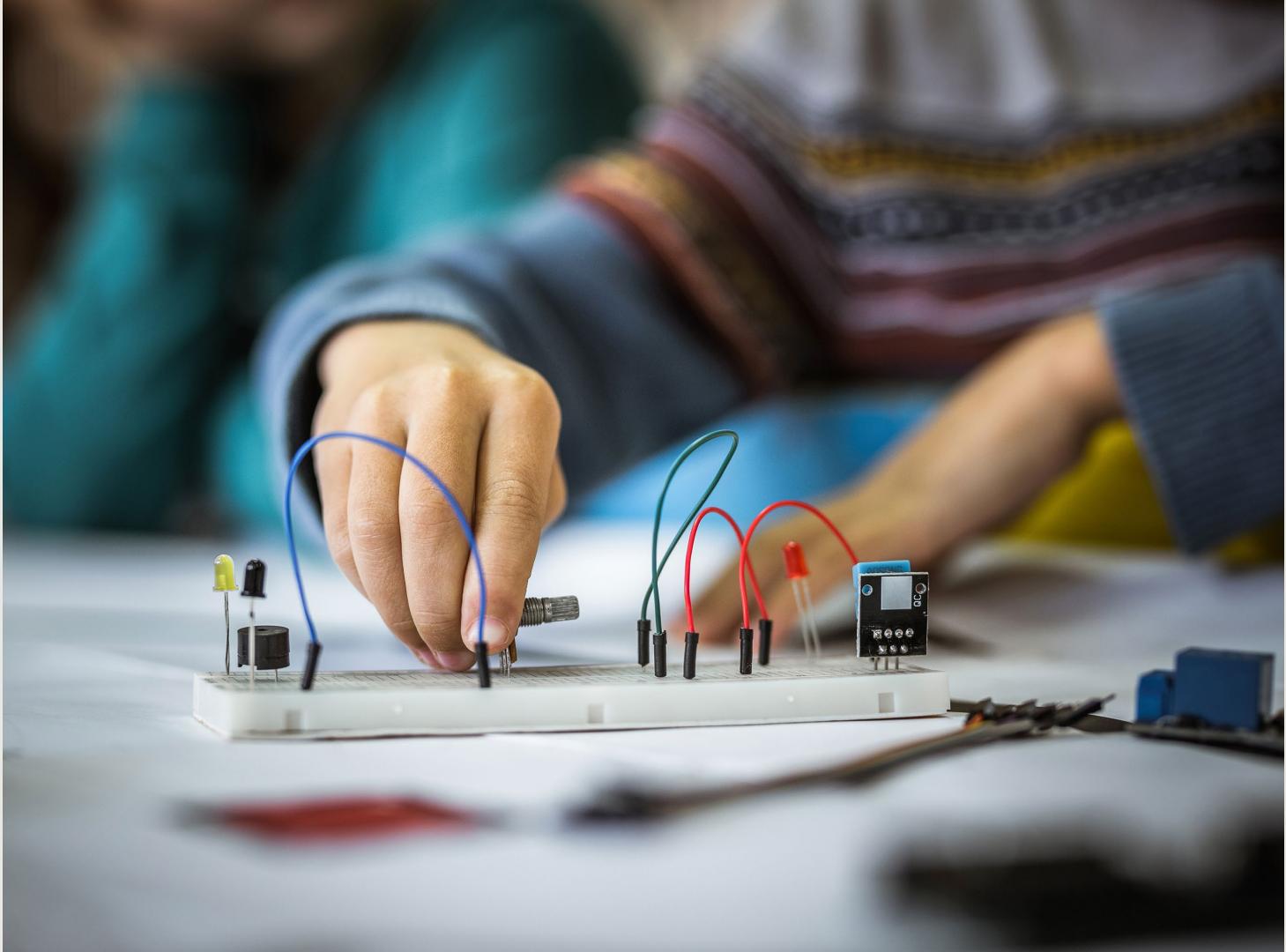


1

1000000

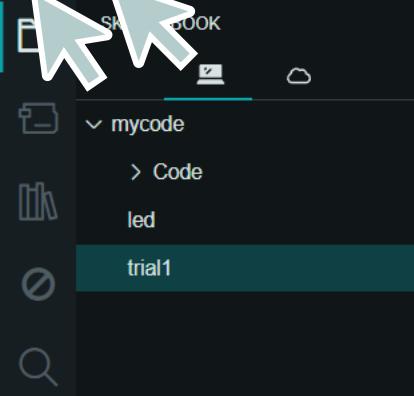
6. Testing

測試





Arduino Nano



```
trial1.ino MQ135.cpp mq135.h
1 #include <SoftwareSerial.h>
2 SoftwareSerial pmsSerial(2, 3);
3
4 void setup() {
5     // our debugging output
6     Serial.begin(115200);
7
8     // sensor baud rate is 9600
9     pmsSerial.begin(9600);
10 }
11
12 struct pms5003data {
13     uint16_t framelen;
14     uint16_t pm10_standard, pm25_standard, pm100_standard;
15     uint16_t pm10_env, pm25_env, pm100_env;
16     uint16_t particles_03um, particles_05um, particles_10um, particles_25um, particles_50um, particles_100um;
17     uint16_t unused;
18     uint16_t checksum;
19 };
20
21 struct pms5003data data;
22
23 void loop() {
24     if (readPMSdata(&pmsSerial)) {
25         // reading data was successful!
26         Serial.println();
27         Serial.println("-----");
28         Serial.println("Concentration Units (standard)");
29         Serial.print("PM 1.0: "); Serial.print(data.pm10_standard);
30         Serial.print("\t\tPM 2.5: "); Serial.print(data.pm25_standard);
31         Serial.print("\t\tPM 10: "); Serial.println(data.pm100_standard);
32         Serial.println("-----");
33         Serial.println("Concentration Units (environmental)");
34         Serial.print("PM 1.0: "); Serial.print(data.pm10_env);
```

Output Serial Monitor X

Message (Enter to send message to 'Arduino Nano' on 'COM6')

Carriage Return ▾ 9600 baud ▾

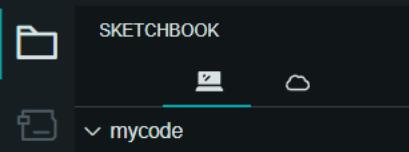
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment



NEW SKETCH

7. Measure the level of PM2.5
測量PM2.5的濃度

Particulate Matter
懸浮微粒



SKETCHBOOK trial1.ino MQ135.cpp mq135.h

```
1 #include <SoftwareSerial.h>
2 SoftwareSerial pmsSerial(2, 3);
3
4 void setup() {
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6     Serial.begin(115200);
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9     pmsSerial.begin(9600);
10 }
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12 struct pms5003data {
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16     uint16_t particles_03um, particles_05um, particles_10um, particles_25um, particles_50um, particles_100um;
17     uint16_t unused;
18     uint16_t checksum;
19 };
20
21 struct pms5003data data;
22
23 void loop() {
24     if (readPMSSdata(&pmsSerial)) {
25         // reading data was successful!
26         Serial.println();
27         Serial.println("-----");
28         Serial.println("Concentration Units (standard)");
29         Serial.print("PM 1.0: "); Serial.print(data.pm10_standard);
30         Serial.print("\t\tPM 2.5: "); Serial.print(data.pm25_standard);
31         Serial.print("\t\tPM 10: "); Serial.println(data.pm100_standard);
32         Serial.println("-----");
33         Serial.println("Concentration Units (environmental)");
34         Serial.print("PM 1.0: "); Serial.print(data.pm10_env);
```

Output Serial Monitor X

Message (Enter to send message to 'Arduino Nano' on 'COM6')

Carriage Return ▾ 9600 baud ▾

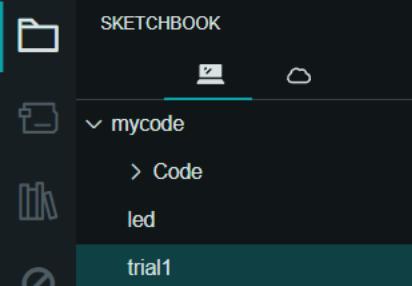
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment



NEW SKETCH



Arduino Nano



```
trial1.ino MQ135.cpp mq135.h
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12 struct pms5003data {
13     uint16_t framelen;
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15     uint16_t pm10_env, pm25_env, pm100_env;
16     uint16_t particles_03um, particles_05um, particles_10um, particles_25um, particles_50um, particles_100um;
17     uint16_t unused;
18     uint16_t checksum;
19 };
20
21 struct pms5003data data;
22
23 void loop() {
```

Output Serial Monitor ×

```
Message (Enter to send message to 'Arduino Nano' on 'COM6')
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 5495.70 pcs/0.01cf - It's probably only you blowing air to the sensor :)
concentration = 8668.78 pcs/0.01cf - It's probably only you blowing air to the sensor :)
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 5469.23 pcs/0.01cf - It's probably only you blowing air to the sensor :)
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 18128.36 pcs/0.01cf - It's probably only you blowing air to the sensor :)
concentration = 3156.42 pcs/0.01cf - It's probably only you blowing air to the sensor :)
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 263137.18 pcs/0.01cf - Smokes from matches detected!
```

Carriage Return ▾ 9600 baud ▾



NEW SKETCH

Carriage Return ▾

9600 baud ▾



Output Serial Monitor X

Message (Enter to send message to 'Arduino Nano' on 'COM6')

Carriage Return ▾

19200 baud ▾

```
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
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concentration = 0.62 pcs/0.01cf - It's a smokeless and dustless environment
```

```
????fx??`??f~????? ????xx ?????? ? ??x????~?????f????f????`xf????~????f?????x?f????f????`f????f~?????fx??`??f~??????
```



4. Electrical characteristics

4 - 1. Supply voltage	: DC5V±10%
4 – 2. Power consumption	: 90mA
4 - 3. Operating temperature range	: -10~ +65 °C
4 - 4. Operating humidity range	: 95%RH or less (without dew condensation)
4 – 5. Recommend storage condition	: -20~ +80 °C
4 - 6. Dimension	: W59 * H45 * D20 (mm)
4 – 7. Detectable particle size	: approx. 1 μm (minimum)
4 – 8. Detectable range of concentration	: 0 ~ 1.4 mg/m ³
4- 9. Output signal	: PWM (pulse width modulation)
4 -10. Time for stabilization	: 1 minute after power turned on
4-11. Sensor characteristics	: To be maintained in between the upper limit and lower limit of the standard dust sensor unit

4. Electrical characteristics

4 - 1. Supply voltage	: DC5V±10%
4 – 2. Power consumption	: 90mA
4 - 3. Operating temperature range	: -10~ +65 °C
4 - 4. Operating humidity range	: 95%RH or less (without de)
4 – 5. Recommend storage condition	: -20~ +80 °C
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4 – 7. Detectable particle size	: approx. 1 μm (minimum)
4 – 8. Detectable range of concentration	: 0 ~ 1.4 mg/m ³

天氣實況

● 分區天氣

分區天氣

相對濕度

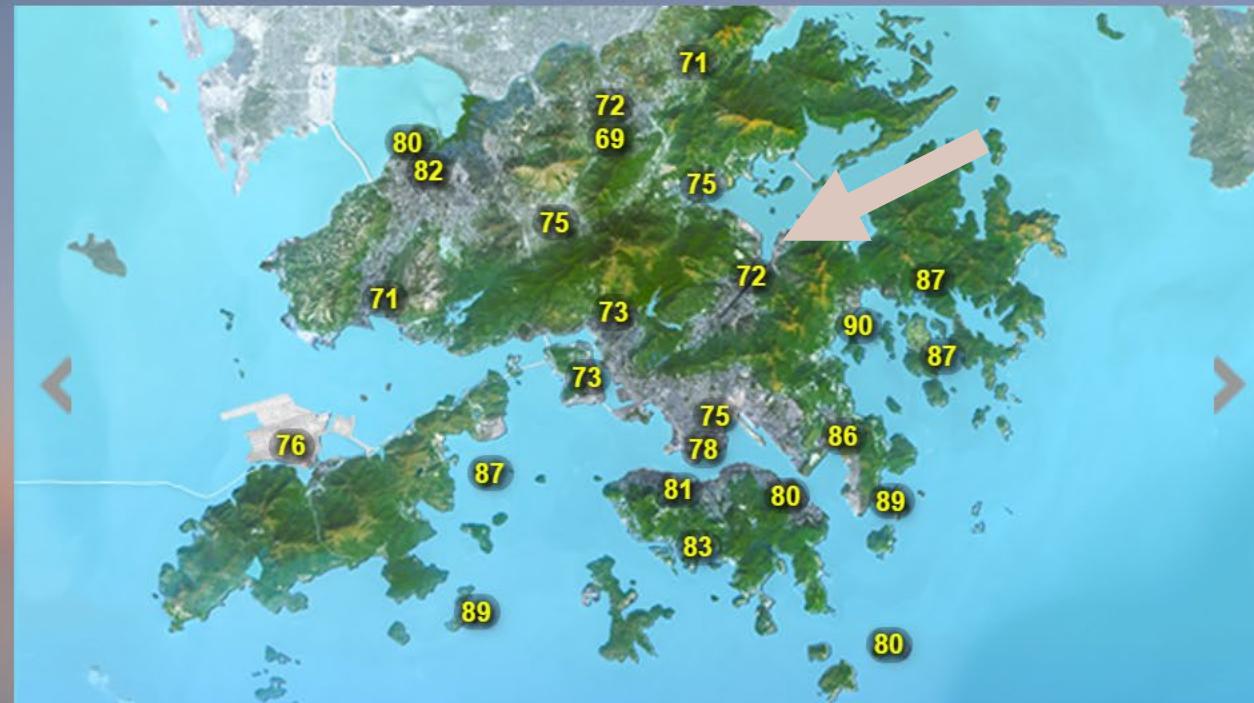
● 我的位置天氣

● 地球天氣

● 雷達

● 衛星

● 世界天氣



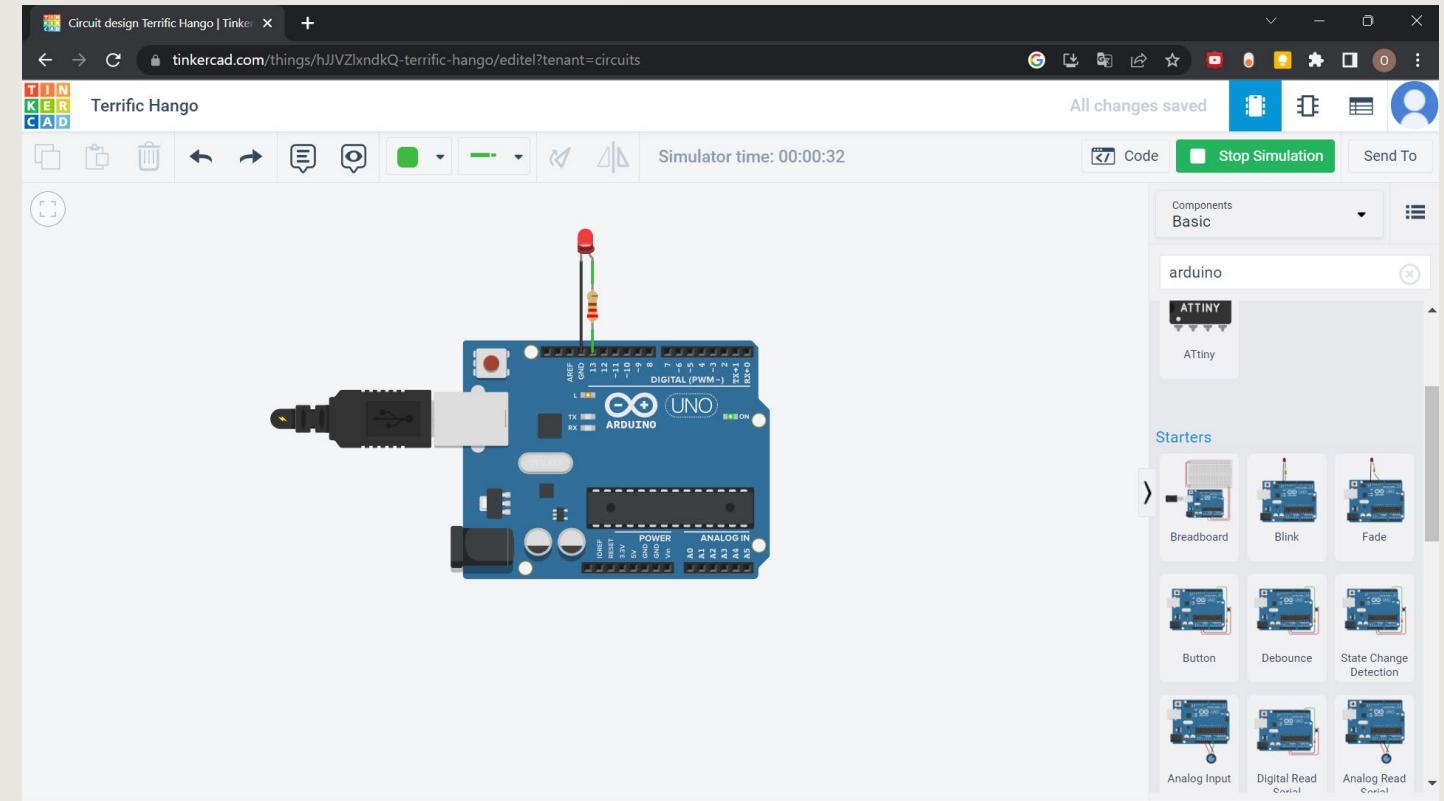
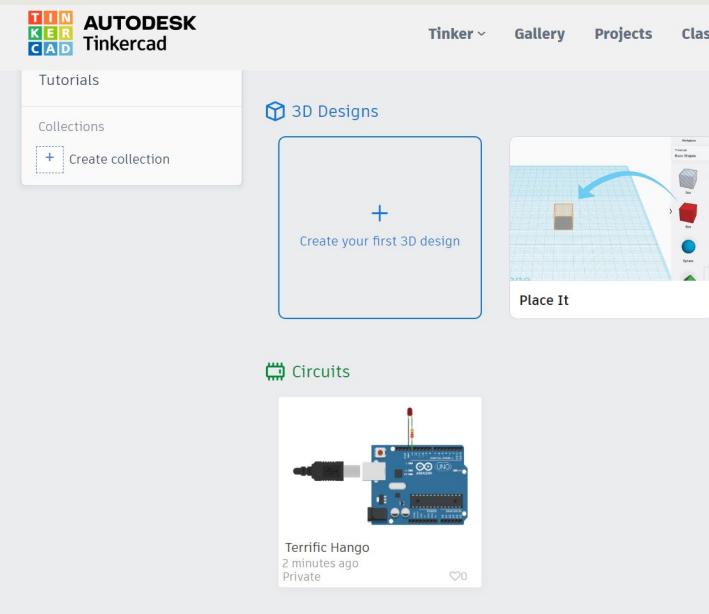
詳細資料

自動分區天氣預報

重點推介



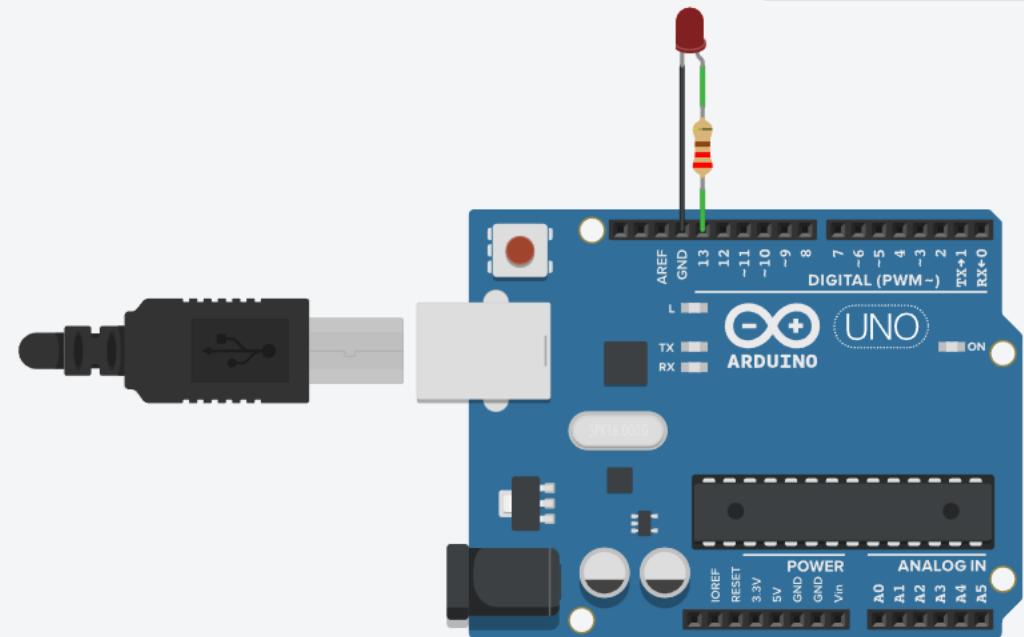
Online Arduino IDE – Tinkercad





Terrific Hango

All changes saved



Change the edit mode

Blocks

- Output
- Input
- Notation
- Control
- Math
- Variables



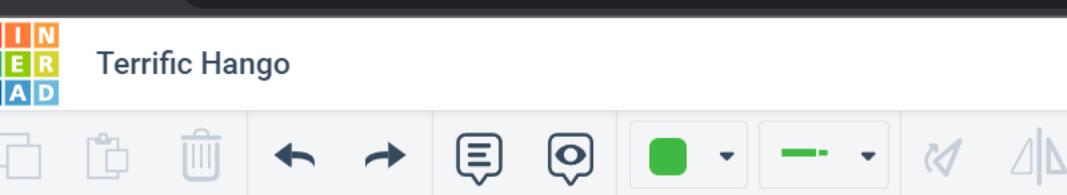
forever
comment turn the LED on (HIGH is the voltage level)
set built-in LED to HIGH
wait 1 secs
comment turn the LED off by making the voltage LOW
set built-in LED to LOW
wait 1 secs

Serial Monitor



Terrific Hango

All changes saved



Code

Start Simulation

Send To

1 (Arduino Uno R3)

Blocks + Text

Output Control
Input Math
Notation Variables

set built-in LED to HIGH ▾

set pin 0 ▾ to HIGH ▾

set pin 3 ▾ to 0

rotate servo on pin 0 ▾ to 0 deg

play speaker on pin 0 ▾ with tone 60

turn off speaker on pin 0

print to serial monitor hello world with

set RGB LED in pins 3 ▾ 6 ▾ 5

forever

comment turn the LED on (HIGH is the voltage level)

set built-in LED to HIGH ▾

wait 1 secs ▾

comment turn the LED off by making the voltage LOW

set built-in LED to LOW ▾

wait 1 secs ▾

```
1 // C++ code
2 //
3 /*
4   This program blinks pin 13 of the Arduino (the
5   built-in LED)
6 */
7
8 void setup()
9 {
10   pinMode(LED_BUILTIN, OUTPUT);
11 }
12
13 void loop()
14 {
15   // turn the LED on (HIGH is the voltage level)
16   digitalWrite(LED_BUILTIN, HIGH);
17   delay(1000); // Wait for 1000 millisecond(s)
18   // turn the LED off by making the voltage LOW
19   digitalWrite(LED_BUILTIN, LOW);
20   delay(1000); // Wait for 1000 millisecond(s)
21 }
```

Serial Monitor

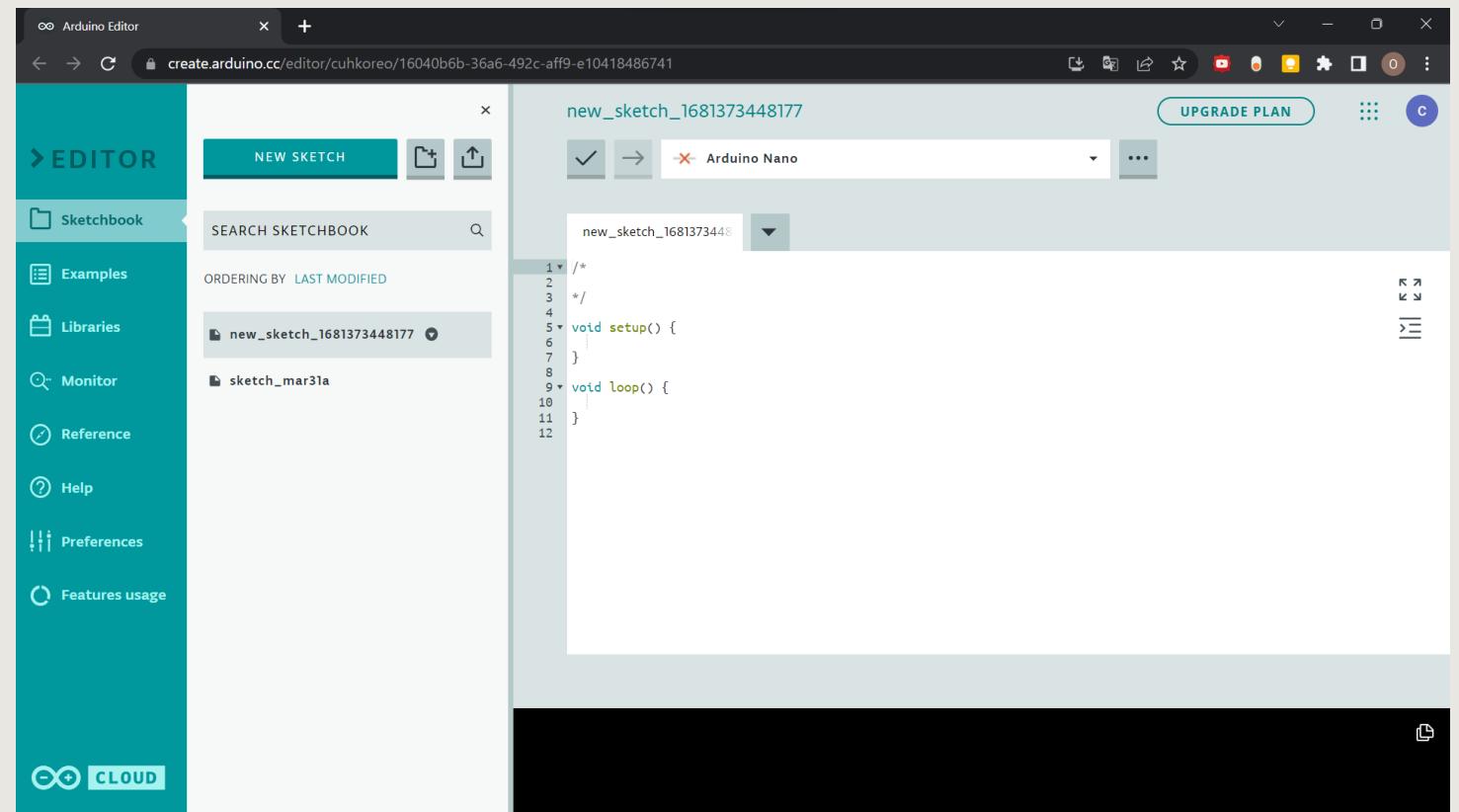
HIGH is the voltage level)

making the voltage LOW

```
2 //  
3 /*  
4     This program blinks pin 13 of the Arduino (the  
5     built-in LED)  
6 */  
7  
8 void setup()  
9 {  
10    pinMode(LED_BUILTIN, OUTPUT);  
11 }  
12  
13 void loop()  
14 {  
15    // turn the LED on (HIGH is the voltage level)  
16    digitalWrite(LED_BUILTIN, HIGH);  
17    delay(1000); // Wait for 1000 millisecond(s)  
18    // turn the LED off by making the voltage LOW  
19    digitalWrite(LED_BUILTIN, LOW);  
20    delay(1000); // Wait for 1000 millisecond(s)  
21 }
```



Online Arduino IDE – Arduino Cloud



x

new_sketch_1681373448177

UPGRADE PLAN



c



✖ Arduino Nano



new_sketch_1681373448



```
1 /*
2 *
3 */
4
5 void setup() {
6 ...
7 }
8
9 void loop() {
10 ...
11 }
```



Online CAD (Computer Aid Design) – Onshape

The image shows a split-screen view of the Onshape platform. On the left, a web browser window displays the 'Request a trial of Onshape Professional' page. This page features a large 'Request a trial of Onshape Professional' button at the top, followed by a list of benefits: 'Free 14 day trial of Onshape', 'Free built-in PDM', 'Free real-time team collaboration', 'No downloads', 'No credit card required', and 'Content and tutorials to get you started'. Below this is a checkbox for 'Ready to buy? [Talk to sales →](#)', a link for 'Student or Educator? [Visit the EDU Plan →](#)', and a link for 'Hobbyist? [Get Free Onshape for Makers →](#)'. A green oval highlights the 'Student or Educator?' link. At the bottom left of the browser window, there are 'Privacy - Terms' links. On the right, a separate window titled 'Trial | Part Studio 1' shows a 3D model of a blue tray with two compartments. The software interface includes a toolbar with various icons, a feature tree on the left listing 'Features (10)' like 'Default geometry' and 'Extrude 1', and a 3D view with coordinate axes (X, Y, Z) and orientation arrows.



Google Drive Link

All files: Code, PowerPoint and 3D print



機械人、科藝及綠色創意科普計劃
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