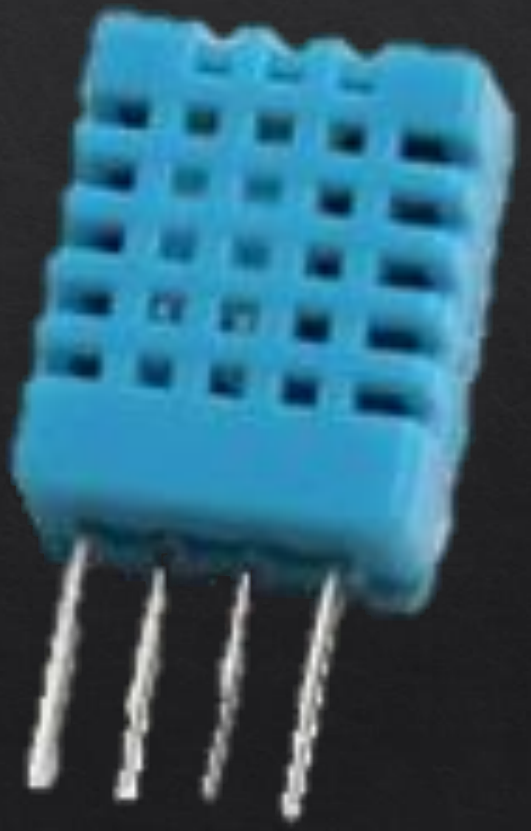
主題前準備 – 下載程式庫

bit.ly/ncc-arduino-dht

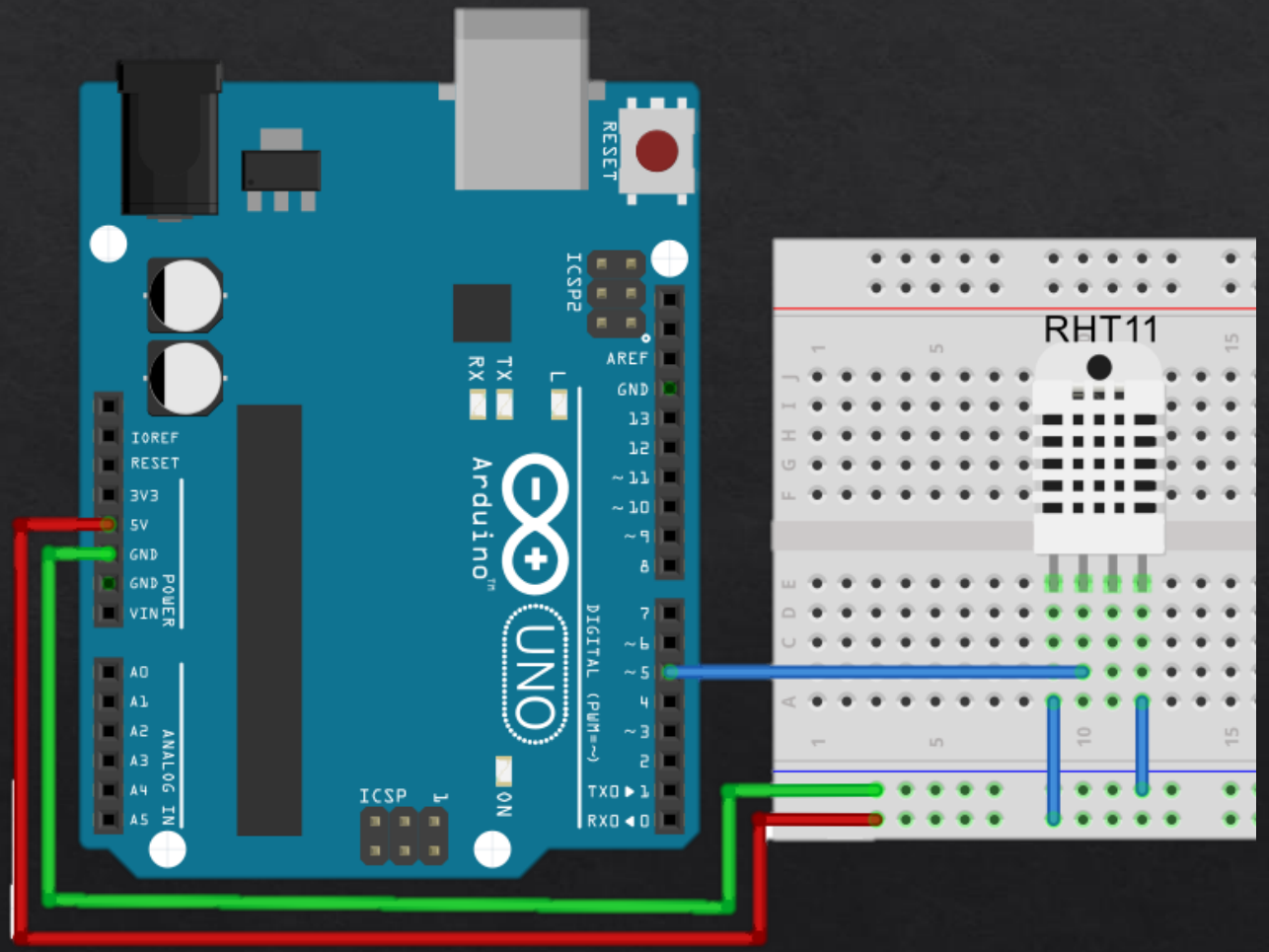
下雨警報器

溫溼度感測器 - DHT11

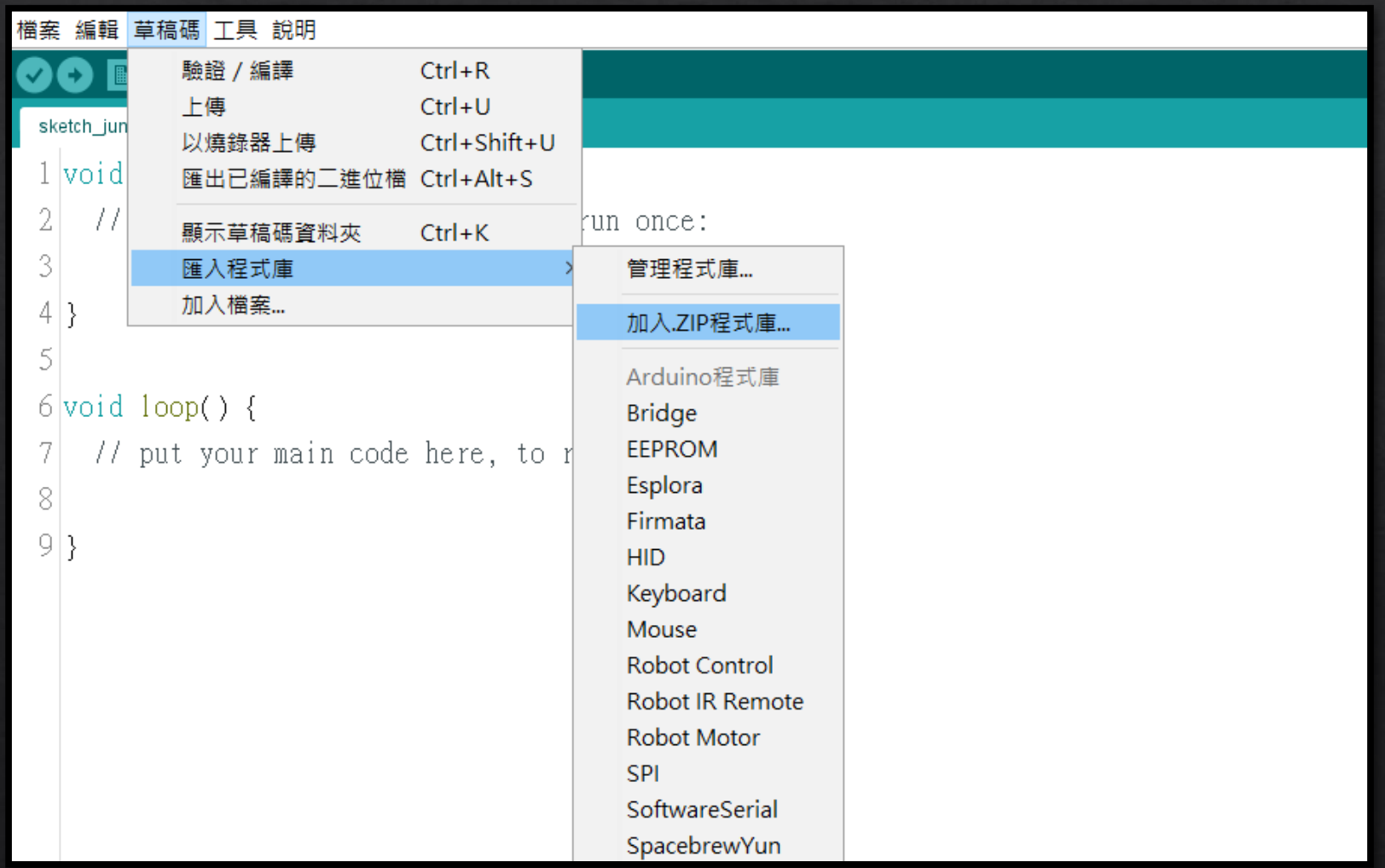
濕度測量範圍：20~90%RH;
濕度測量精度：±5%RH;
溫度測量範圍：0~50℃
溫度測量精度：±2℃
電源供應範圍： 3~5V
頻率不可超過：0.5Hz (每2秒一次)



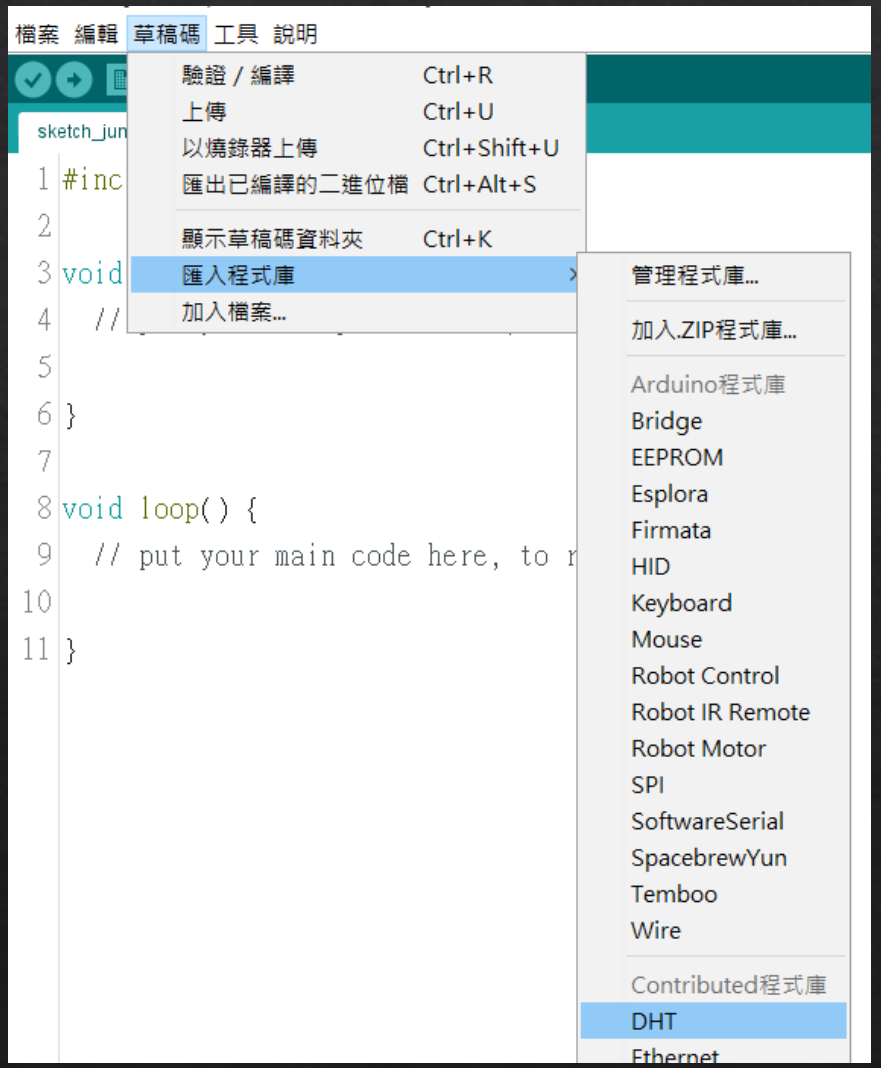
線如何接


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM=~)
TX
RX
L
Arduino™
UNO
ON
ICSP
1
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
RHT11

新增程式庫


檔案 編輯 草稿碼 工具 說明
驗證 / 編譯 Ctrl+R
上傳 Ctrl+U
以燒錄器上傳 Ctrl+Shift+U
匯出已編譯的二進位檔 Ctrl+Alt+S
顯示草稿碼資料夾 Ctrl+K
匯入程式庫
加入檔案...
管理程式庫...
加入.ZIP程式庫...
Arduino程式庫
Bridge
EEPROM
Esplora
Firmata
HID
Keyboard
Mouse
Robot Control
Robot IR Remote
Robot Motor
SPI
SoftwareSerial
SpacebrewYun
void loop() {
// put your main code here, to r
}

匯入程式庫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匯入程式庫
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Bridge
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Esplora
Firmata
HID
Keyboard
Mouse
Robot Control
Robot IR Remote
Robot Motor
SPI
SoftwareSerial
SpacebrewYun
Temboo
Wire
Contributed程式庫
DHT
Ethernet
sketch_jun
#inc
void
//
}
void loop() {
// put your main code here, to r
}

匯入程式庫

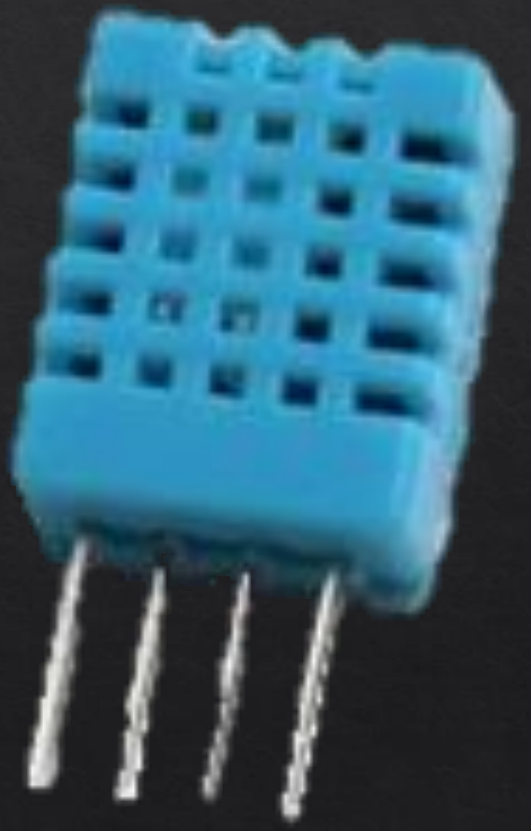
```
1 #include <dht.h>
2
3 void setup() {
4   // put your setup code here, to run once:
5 }
6
7 void loop() {
8   // put your main code here, to run repeatedly:
9 }
10
```

初始設定

```
1 #include <dht.h>
2 #define dht_pin 5
3 dht DHT;
4
5 void setup(){
6   Serial.begin(9600);
7   delay(1000);
8 }
```

溫溼度感測器 - DHT11

濕度測量範圍：20~90%RH;
濕度測量精度：±5%RH;
溫度測量範圍：0~50℃
溫度測量精度：±2℃
電源供應範圍： 3~5V
頻率不可超過：0.5Hz (每2秒一次)



```
#define dht_pin 5

dht DHT;
```

```
DHT.readl1(dht_pin);
```

取得【指定腳位】接收的資料值

```
1  #include <dht.h>
2  #define dht_pin 5
3  dht DHT;
4
5  void setup(){
6    Serial.begin(9600);
7    delay(1000);
8  }
9
10 void loop(){
11   DHT.read11(dht_pin);
12   delay(1000);
13 }
```

如何取得感測值

```
DHT.readl1(dht_pin);
```

`DHT.humidity` 濕度 (%)

`DHT.temperature` 溫度(。C)

實作 – 印出感測值

```
11 void loop(){
12   DHT.readl1(dht_pin);
13   Serial.print("Humidity = ");
14   Serial.print(DHT.humidity);
15   Serial.print("% ");
16   Serial.print("temperature = ");
17   Serial.print(DHT.temperature);
18   Serial.println("C ");
19   delay(1000);
20 }
```

實作 – 印出感測值

```
11 void loop(){
12   DHT.read11(dht_pin);
13   print_HT();
14   delay(1000);
15 }
```

```
22 void print_HT(){
23   Serial.print("Humidity = ");
24   Serial.print(DHT.humidity);
25   Serial.print("% ");
26   Serial.print("temperature = ");
27   Serial.print(DHT.temperature);
28   Serial.println("C ");
29 }
```

何時警報

- 感測到的資料超過**某值**：
  - 濕度：OO %
  - ~~溫度：XX。C~~

實作 – 警報訊息

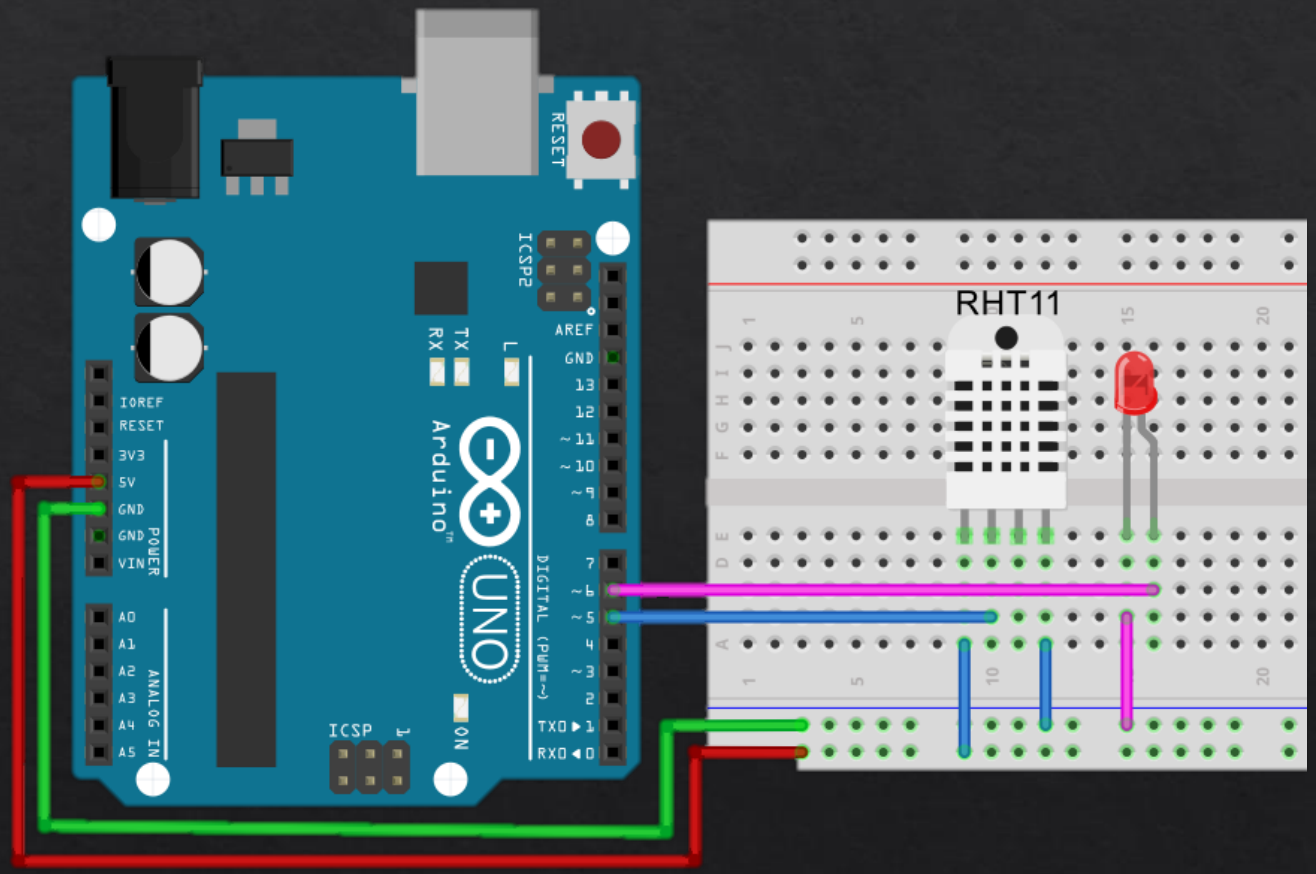
```
5 int Alert_Value = 60;
```

```
14 void loop(){
15   DHT.read11(dht_pin);
16   print_HT();
17   if(DHT.humidity > Alert_Value){
18     Serial.println("Warning! It's going to rain\n");
19   }
20   delay(1000);
21 }
```

警告閃爍燈

新增led的使用

線如何接


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TXD 1
RXD 0
DIGITAL (PWM~)
TX
RX
L
Arduino
UNO
ON
ICSP
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
RHT11

初始設定

```
3  #define led_pin 6
```

```
9  void setup(){
10   Serial.begin(9600);
11   pinMode(led_pin,OUTPUT);
12   delay(1000);
13 }
```

警告閃爍燈實作

```
14 void loop(){
15   DHT.read11(dht_pin);
16   print_HT();
17   if(DHT.humidity > Alert_Value){
18     digitalWrite(led_pin,HIGH);
19     delay(100);
20     digitalWrite(led_pin,LOW);
21     delay(100);
22   }
23   delay(1000);
24 }
```

一點都不緊急嗎?

警報閃爍燈 好像閃的間隔好像太長了

為什麼閃爍不快?

```
14 void loop(){
15   DHT.read11(dht_pin);
16   print_HT();
17   if(DHT.humidity > Alert_Value){
18     digitalWrite(led_pin,HIGH);
19     delay(100);
20     digitalWrite(led_pin,LOW);
21     delay(100);
22   }
23   delay(1000);
24 }
```

警告閃爍燈實作(快速閃爍)

```
13 int count = 10;
```

```
15 void loop(){
16   if(count == 0){
17     DHT.read11(dht_pin);
18     print_HT();
19     count = 10;
20   }
```

```
29   count--;
30   delay(100);
31 }
```

```
if(DHT.humidity > Alert_Value){
  digitalWrite(led_pin,HIGH);
  delay(100);
  digitalWrite(led_pin,LOW);
  delay(100);
```

警告閃爍燈實作(快速閃爍)

```
14 void loop(){
15   DHT.read11(dht_pin);
16   print_HT();
17   if(DHT.humidity > Alert_Value){
18     digitalWrite(led_pin,HIGH);
19     delay(100);
20     digitalWrite(led_pin,LOW);
21     delay(100);
22   }
23   delay(1000);
24 }
```

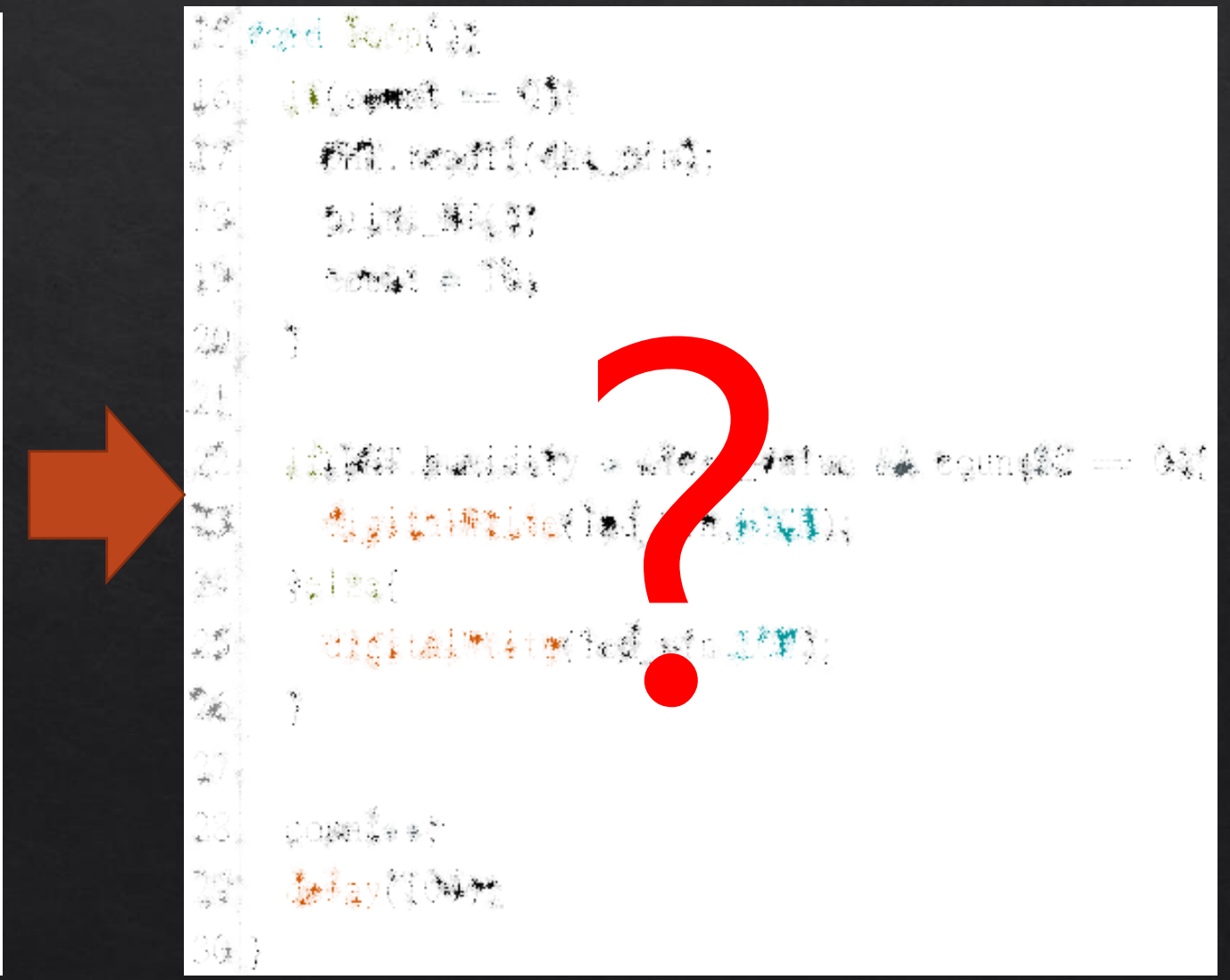
```
15 void loop(){
16   if(count == 0){
17     DHT.read11(dht_pin);
18     print_HT();
19     count = 10;
20   }
21
22   if(DHT.humidity > Alert_Value){
23     digitalWrite(led_pin,HIGH);
24     delay(100);
25     digitalWrite(led_pin,LOW);
26     delay(100);
27   }
28
29   count--;
30   delay(100);
31 }
```

還可以再修改嗎?

警報閃爍燈 好像閃的間隔好像太長了

警告閃爍燈實作(急速閃爍)

```
15 void loop(){
16   if(count == 0){
17     DHT.readl1(dht_pin);
18     print_HT();
19     count = 10;
20   }
21
22   if(DHT.humidity > Alert_Value){
23     digitalWrite(led_pin,HIGH);
24     delay(100);
25     digitalWrite(led_pin,LOW);
26     delay(100);
27   }
28
29   count--;
30   delay(100);
31 }
```



警告閃爍燈實作(急速閃爍)

```
15 void loop(){
16   if(count == 0){
17     DHT.read11(dht_pin);
18     print_HT();
19     count = 10;
20   }
21
22   if(DHT.humidity > Alert_Value){
23     digitalWrite(led_pin,HIGH);
24     delay(100);
25     digitalWrite(led_pin,LOW);
26     delay(100);
27   }
28
29   count--;
30   delay(100);
31 }
```

```
15 void loop(){
16   if(count == 0){
17     DHT.read11(dht_pin);
18     print_HT();
19     count = 10;
20   }
21
22   if(DHT.humidity > Alert_Value && count%2 == 0){
23     digitalWrite(led_pin,HIGH);
24   }else{
25     digitalWrite(led_pin,LOW);
26   }
27
28   count--;
29   delay(100);
30 }
```

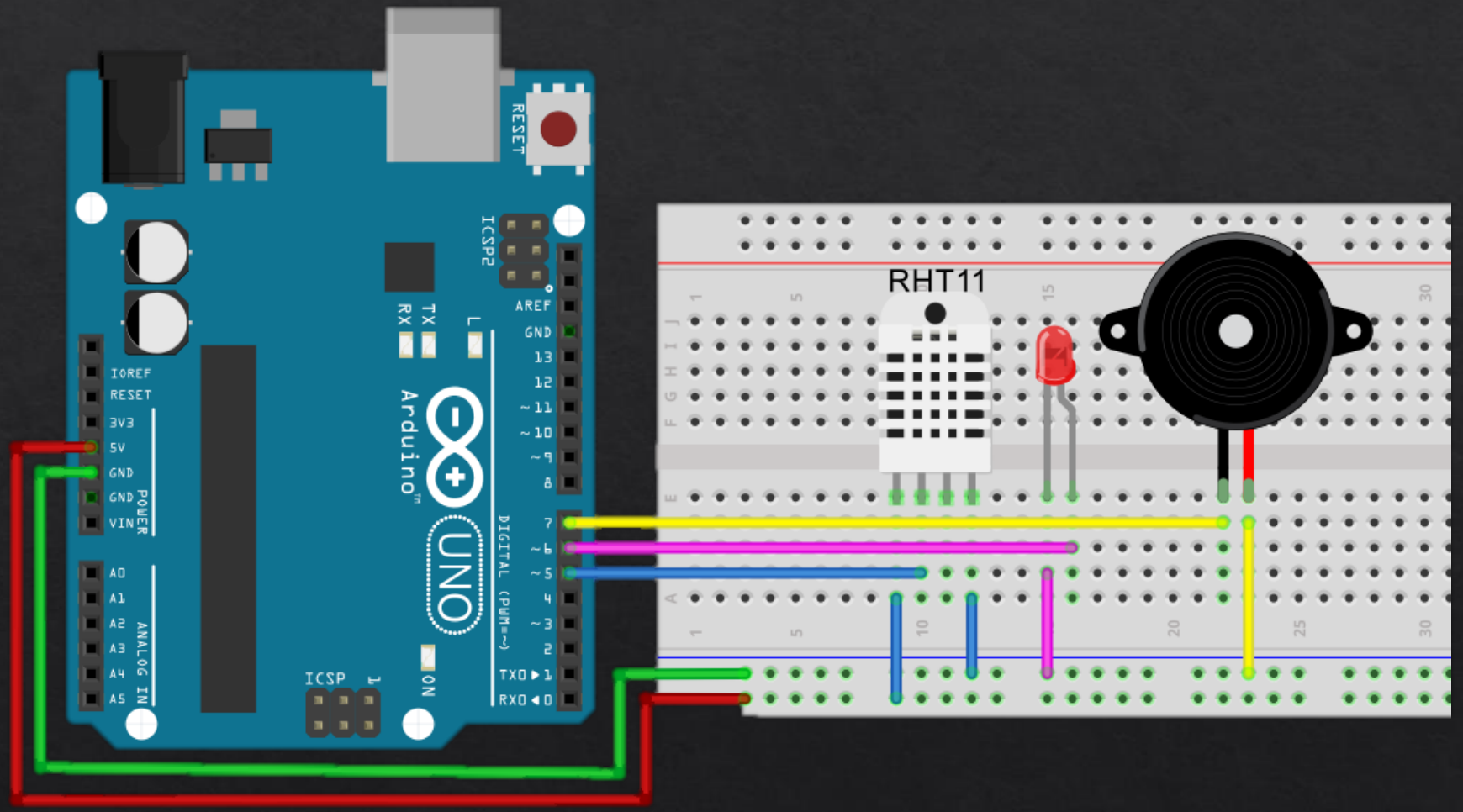
警告閃爍燈實作(急速閃爍)

```
7  int count = 20;
15 void loop(){
16   if(count == 0){
17     DHT.readl1(dht_pin);
18     print_HT();
19     count = 20;
20   }
21
22   if(DHT.humidity > Alert_Value && count%2 == 0){
23     digitalWrite(led_pin,HIGH);
24   }else{
25     digitalWrite(led_pin,LOW);
26   }
27
28   count--;
29   delay(50);
30 }
```

警報聲響

蜂鳴器使用

線如何接


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TXO▶1
RXO◀0
DIGITAL (PWM=~)
TX
RX
L
ON
ICSP
Arduino™
UNO
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
RHT11

基礎設定

```
1 #include <dht.h>
2 #define dht_pin 5
3 #define led_pin 6
4 #define buzzer 7
```

```
11 void setup(){
12   Serial.begin(9600);
13   pinMode(led_pin,OUTPUT);
14   pinMode(buzzer,OUTPUT);
15   delay(1000);
16 }
```

警告聲實作

```
31  if(DHT.humidity > Alert_Value){
32    for(int i=0;i<10;i++){
33      tone(buzzer,1000);
34      delay(50);
35      noTone(buzzer);
36      delay(50);
37      tone(buzzer,500);
38      delay(50);
39      noTone(buzzer);
40      delay(50);
41    }
```

警報鈴 + 警告聲

```
25  if(DHT.humidity > Alert_Value && count%2 == 0){
26    digitalWrite(led_pin,HIGH);
27  }else{
28    digitalWrite(led_pin,LOW);
29  }
```

```
31  if(DHT.humidity > Alert_Value){
32    for(int i=0;i<10;i++){
33      tone(buzzer,1000);
34      delay(50);
35      noTone(buzzer);
36      delay(50);
37      tone(buzzer,500);
38      delay(50);
39      noTone(buzzer);
40      delay(50);
41    }
```

為甚麼警告燈閃爍又變慢了...

```
25  if(DHT.humidity > Alert_Value && count%2 == 0){
26    digitalWrite(led_pin,HIGH);
27  }else{
28    digitalWrite(led_pin,LOW);
29  }
```

自設口白：我等你等的好苦啊

```
31  if(DHT.humidity > Alert_Value){
32    for(int i=0;i<10;i++){
33      tone(buzzer,1000);
34      delay(50);
35      noTone(buzzer);
36      delay(50);
37      tone(buzzer,500);
38      delay(50);
39      noTone(buzzer);
40      delay(50);
41    }
```

警報鈴 + 警告聲

```
31  if(DHT.humidity > Alert_Value){
32    for(int i=0;i<10;i++){
33      tone(buzzer,1000);
34      delay(50);
35      noTone(buzzer);
36      delay(50);
37      tone(buzzer,500);
38      delay(50);
39      noTone(buzzer);
40      delay(50);
41    }
```

```
7  int count = 20;
```

```
31  if(DHT.humidity > Alert_Value){
32    if(count % 4 ==0){
33      tone(buzzer,1000);
34    }else if(count % 4 == 2){
35      tone(buzzer,500);
36    }else{
37      noTone(buzzer);
38    }
39  }else{
40    noTone(buzzer);
41  }
```

```
28    count--;
29    delay(50);
30  }
```

警報鈴 + 警告聲

```
31  if(DHT.humidity > Alert_Value){
32    for(int i=0;i<10;i++){
33      tone(buzzer,1000);
34      delay(50);
35      noTone(buzzer);
36      delay(50);
37      tone(buzzer,500);
38      delay(50);
39      noTone(buzzer);
40      delay(50);
41    }
```

```
7  int count = 20;
```

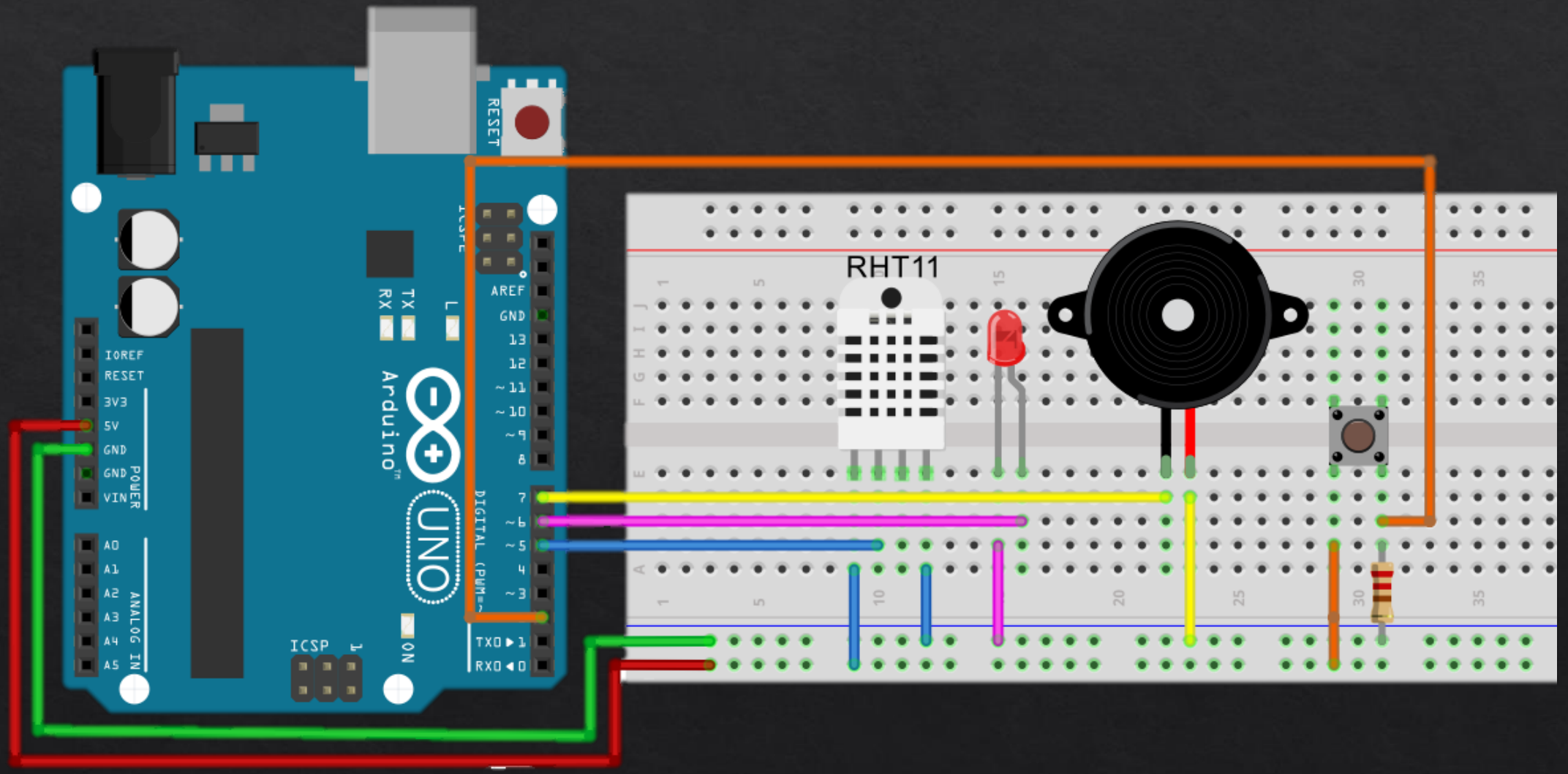
```
31  if(DHT.humidity > Alert_Value){
32    if(count % 4 ==0){
33      tone(buzzer,1000);
34    }else if(count % 4 == 2){
35      tone(buzzer,500);
36    }else{
37      noTone(buzzer);
38    }
39  }else{
40    noTone(buzzer);
41  }
```

```
28    count--;
29    delay(50);
30  }
```

警報關閉

按鈕 or 可樂罐 or 超音波感測

線如何接


RESET
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
TXD▶1
RXD◀0
DIGITAL (PWM~)
TX
RX
L
ICSP
ON
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
Arduino
UNO
RHT11

基礎設定

```
1 #include <dht.h>
2 #define dht_pin 5
3 #define led_pin 6
4 #define buzzer 7
5 #define Button 2
```

```
12 void setup(){
13   Serial.begin(9600);
14   pinMode(led_pin,OUTPUT);
15   pinMode(buzzer,OUTPUT);
16   pinMode(Button,INPUT);
17   delay(1000);
18 }
```

警報關閉按鈕 測試

```
44   if(digitalRead(Button)==HIGH){
45     Serial.println("Button is clicked");
46   }
```

警報關閉按鈕

```
48  if(digitalRead(Button)==HIGH && DHT.humidity > Alert_Value){
49    Serial.println("Turn off the alarm");
50    digitalWrite(led_pin,LOW);
51    noTone(buzzer);
52    delay(10000);
53  }
```

(補充)警報關閉按鈕 – 不暫停版

```
7  int count = 20;
```

```
11 bool click_button = false;
12 int delay_seconds = 10;
```

```
48   if(digitalRead(Button)==HIGH && DHT.humidity > Alert_Value && click_button ==false){
49     Serial.println("Turn off the alarm");
50     count = delay_seconds*20; // 等待時間(秒數) = 輸入值 * 20
51     click_button = true;
52   }
```

```
54     count--;
55     delay(50);
56 }
```

(補充)警報關閉按鈕 – 不暫停版

```
30  if(DHT.humidity > Alert_Value && count%2 == 0 && click_button ==false){
31    digitalWrite(led_pin,HIGH);
32  }else{
33    digitalWrite(led_pin,LOW);
34  }
```

(補充)警報關閉按鈕 – 不暫停版

```
36  if(DHT.humidity > Alert_Value && click_button ==false){
37    if(count % 4 ==0){
38      tone(buzzer,1000);
39    }else if(count % 4 == 2){
40      tone(buzzer,500);
41    }else{
42      noTone(buzzer);
43    }
44  }else{
45    noTone(buzzer);
46  }
```

End

完成下雨警報器了XD