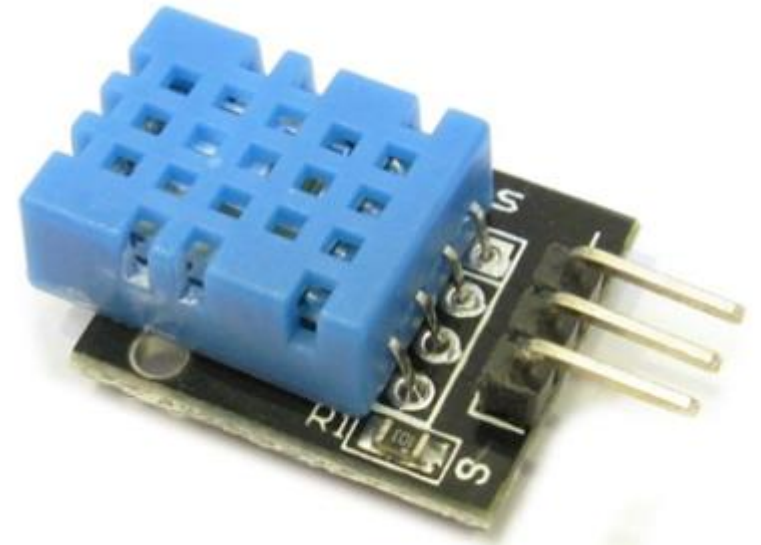


온습도 센서 실험

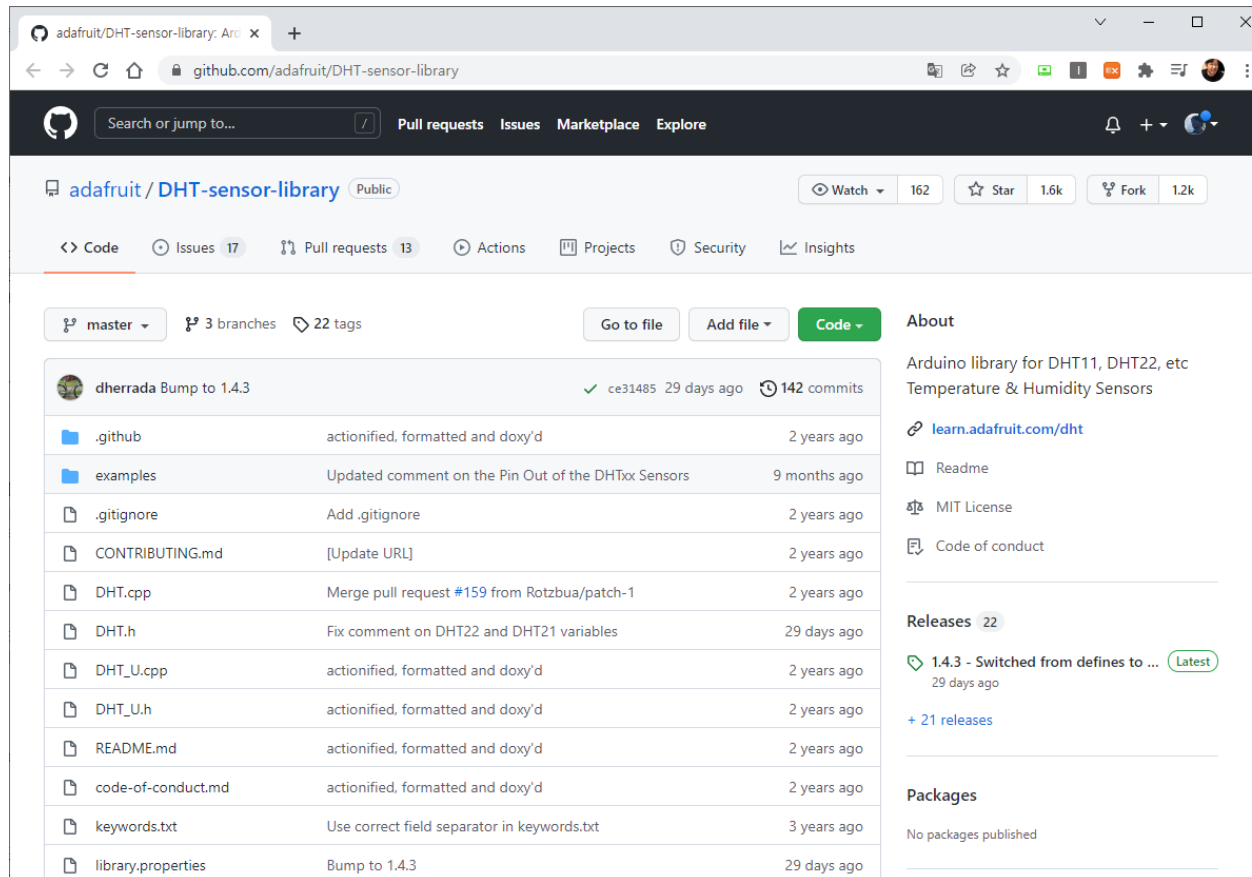
DHT11

- 동작 전압 (Power) 3~5 V
- 온도 측정 범위 (Temperature range) 0 ~ 50 °C (± 2 °C)
- 습도 측정 범위 (Humidity range) 20 ~ 80 % (± 5 %)
- 최대소비전력 (Max. current) 2.5 mA
- 데이터 주기 (sampling rate) 1 Hz

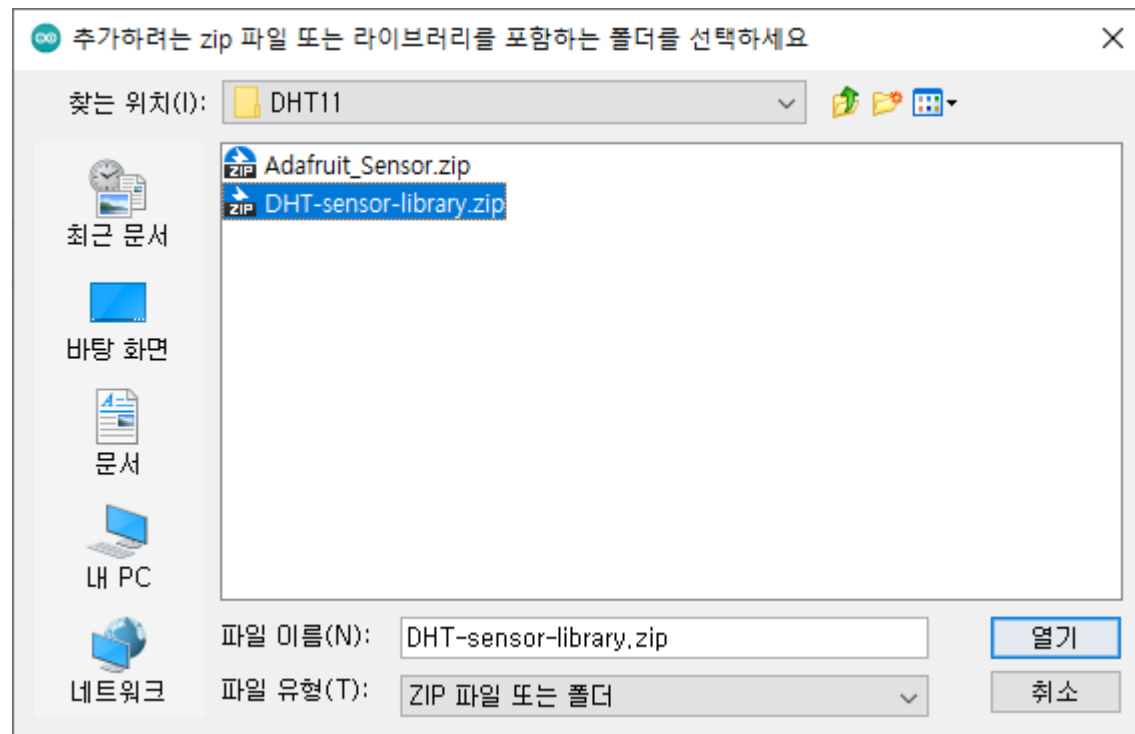
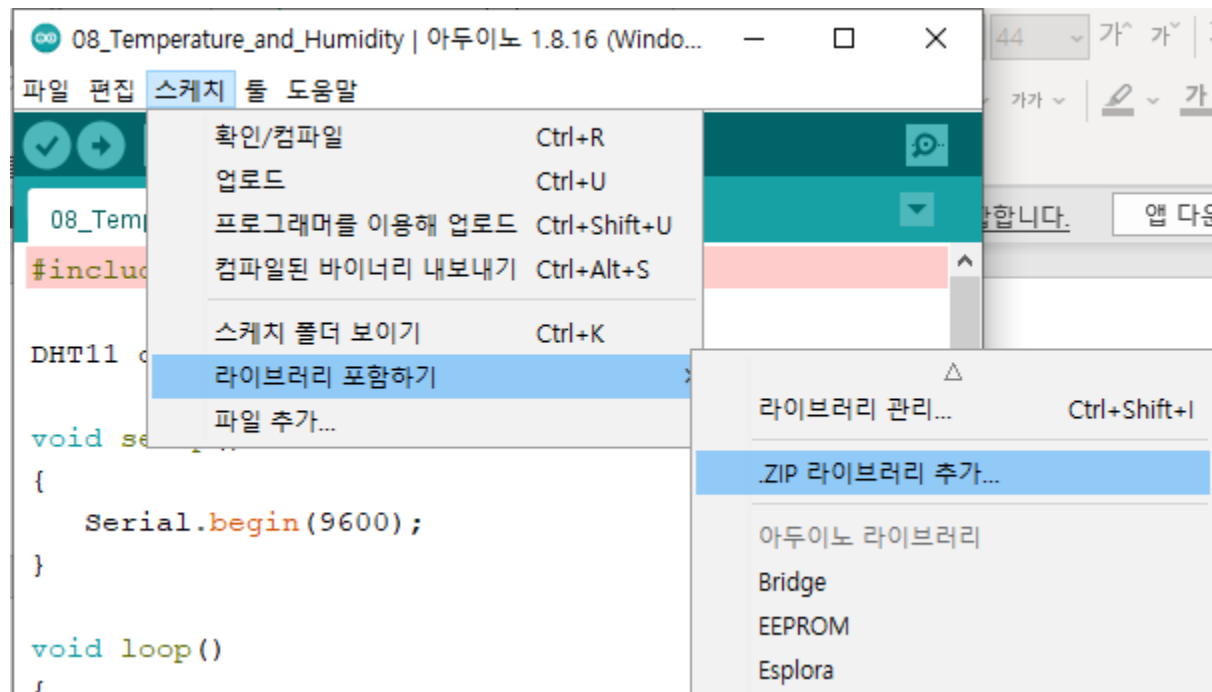


DHT11 라이브러리 사용

- <https://github.com/adafruit/DHT-sensor-library>

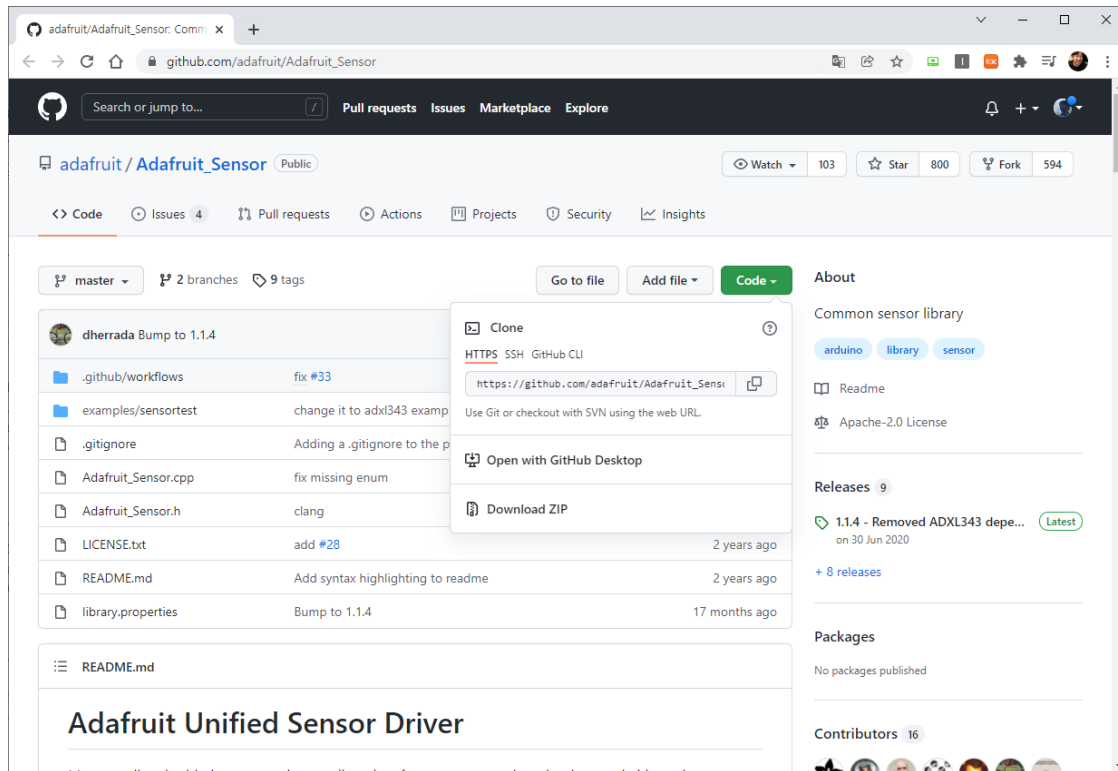


DHT11 라이브러리 사용

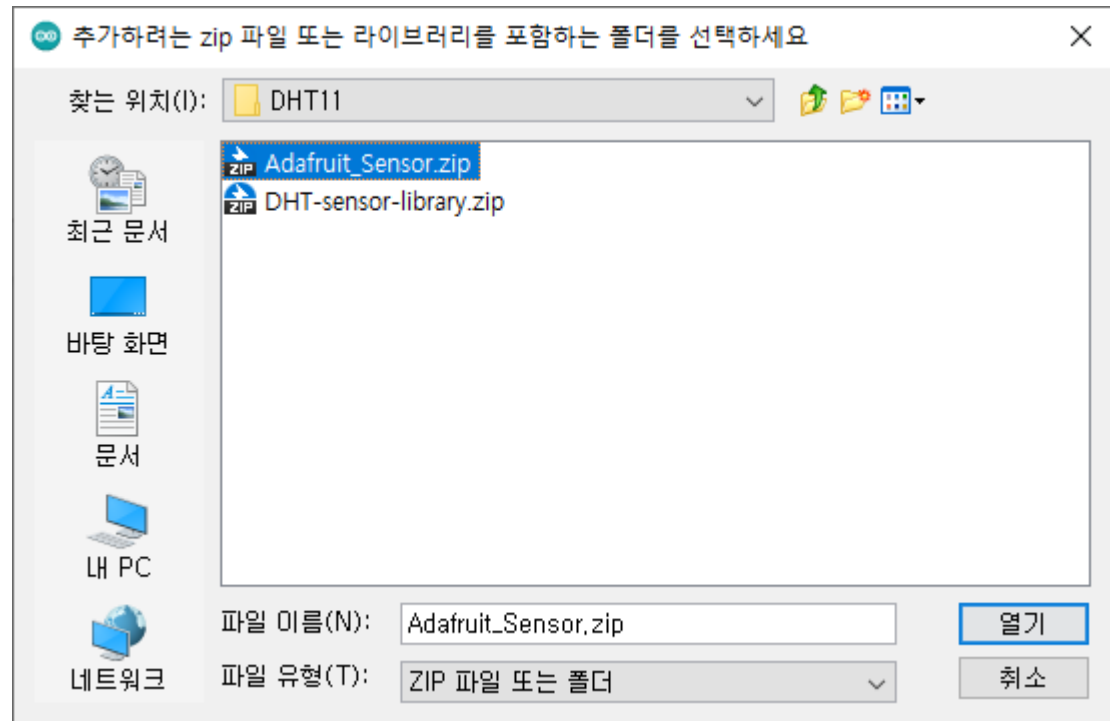
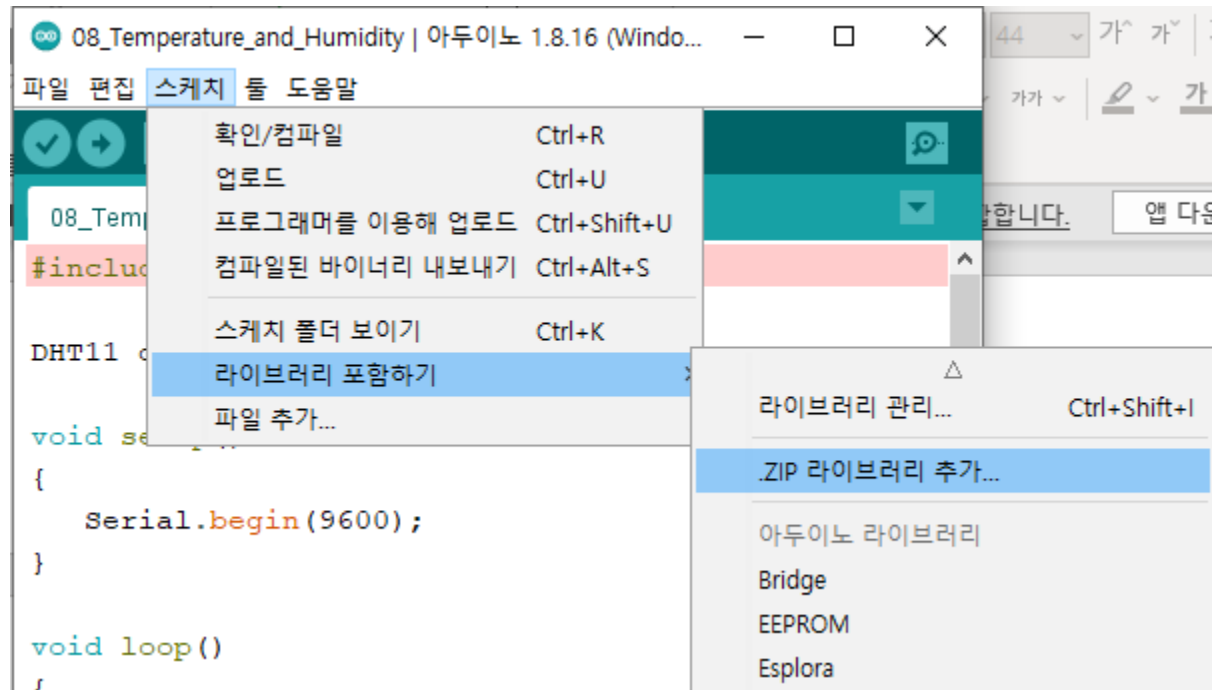


DHT11 라이브러리 사용

- adafruit_sensor.h no such file 에러 발생
- https://github.com/adafruit/Adafruit_Sensor 라이브러리 추가

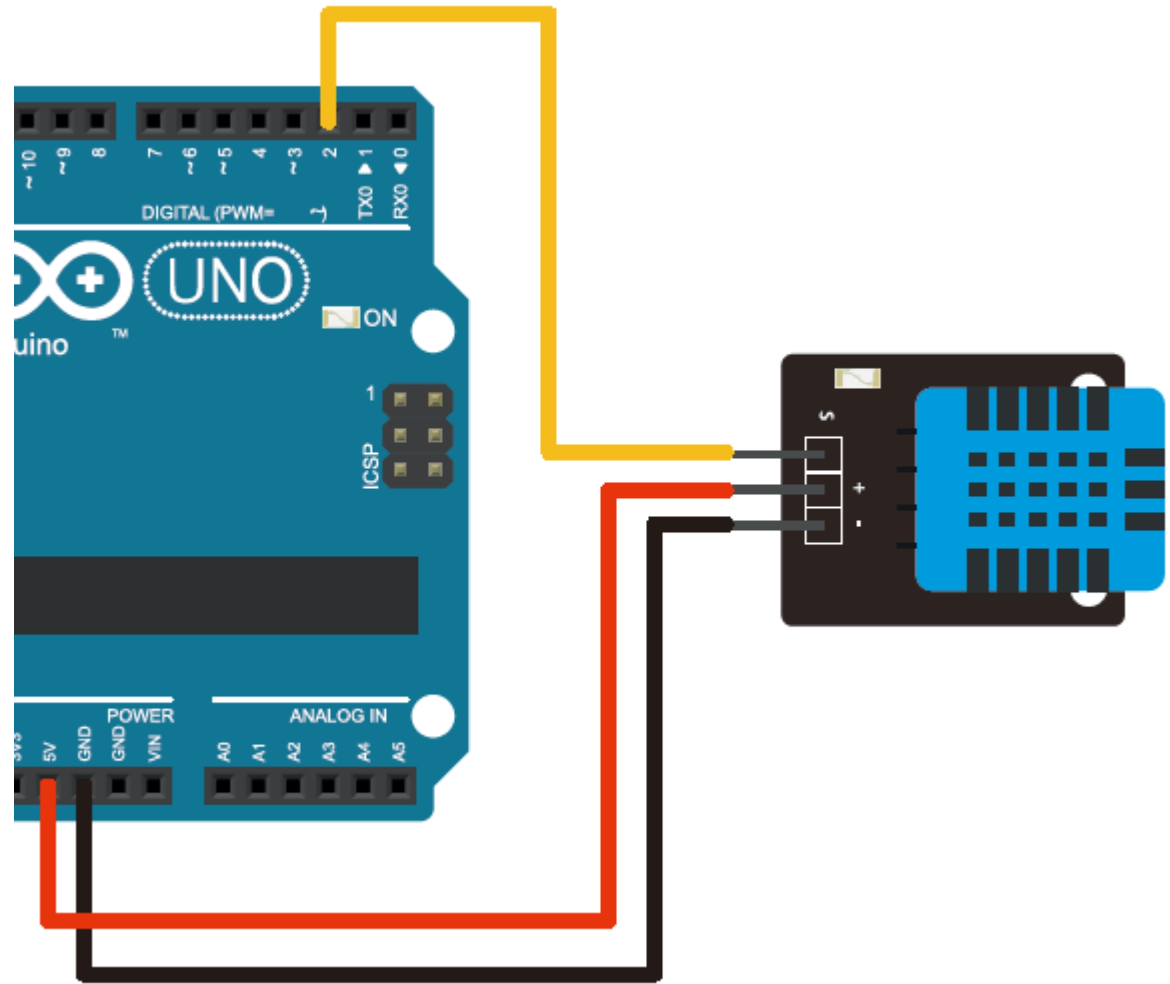


DHT11 라이브러리 사용



DHT11 아두이노 테스트

- S(signal) : 아두이노 2번핀
- + : VCC(5V)
- - : GND(0V)



DHT11 아두이노 테스트

예제 : 08_Temperature_and_Humidity

```
#include "DHT.h"

#define DHTPIN 2
#define DHTTYPE DHT22 // DHT 22 (AM2302), AM2321

DHT dht(DHTPIN, DHTTYPE);

void setup() {
  Serial.begin(9600);
  Serial.println(F("DHTxx test!"));

  dht.begin();
}

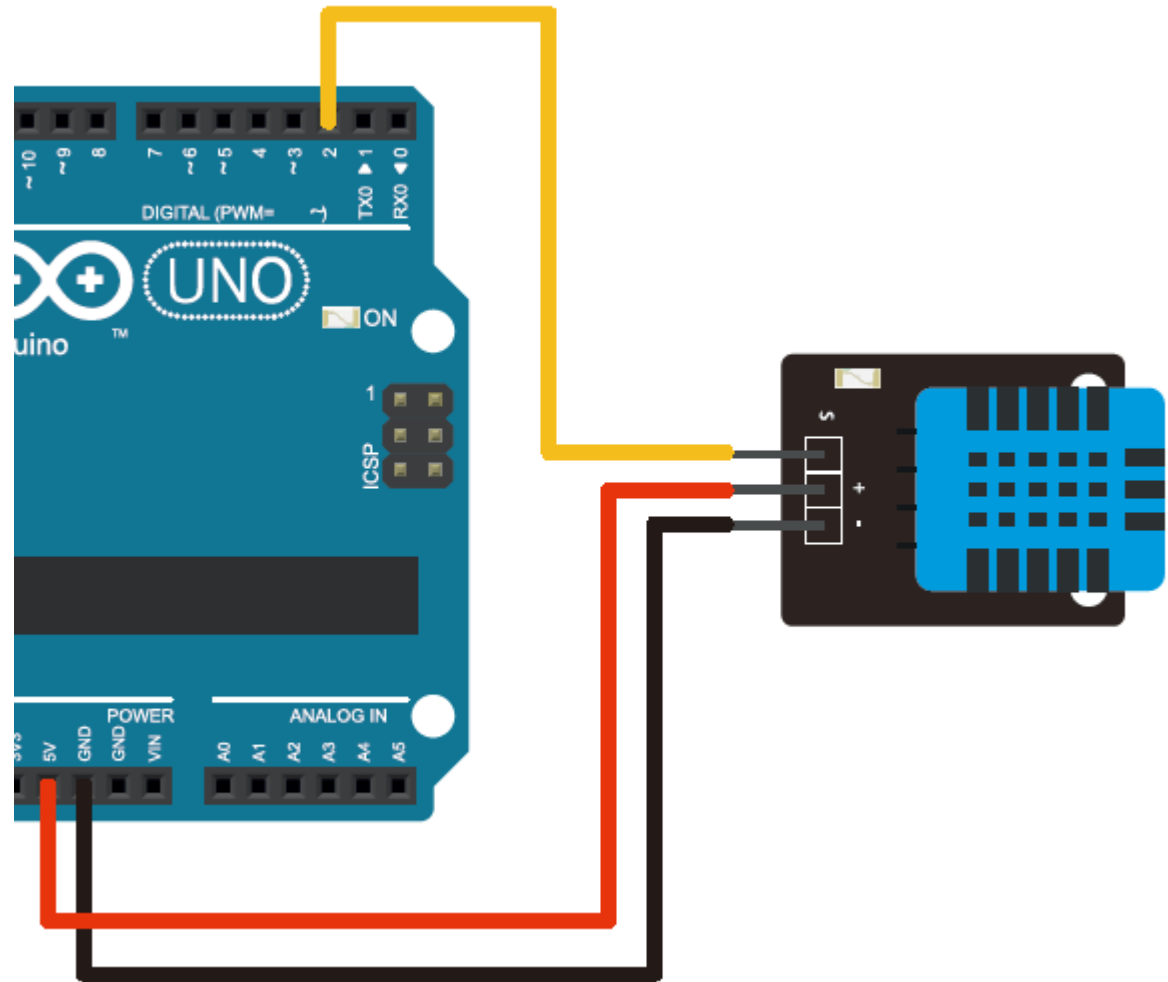
void loop() {
  delay(2000);

  // Reading temperature or humidity takes about 250 milliseconds!
  // Sensor readings may also be up to 2 seconds 'old' (its a very slow sensor)
  float h = dht.readHumidity();
  // Read temperature as Celsius (the default)
  float t = dht.readTemperature();
  // Read temperature as Fahrenheit (isFahrenheit = true)
  float f = dht.readTemperature(true);

  // Check if any reads failed and exit early (to try again).
  if (isnan(h) || isnan(t) || isnan(f)) {
    Serial.println(F("Failed to read from DHT sensor!"));
    return;
  }

  // Compute heat index in Fahrenheit (the default)
  float hif = dht.computeHeatIndex(f, h);
  // Compute heat index in Celsius (isFahreheit = false)
  float hic = dht.computeHeatIndex(t, h, false);

  Serial.print(F("Humidity: "));
  Serial.print(h);
  Serial.print(F("% Temperature: "));
  Serial.print(t);
  Serial.print(F("°C "));
  Serial.print(f);
  Serial.print(F("°F Heat index: "));
  Serial.print(hic);
  Serial.print(F("°C "));
  Serial.print(hif);
  Serial.println(F("°F"));
}
```



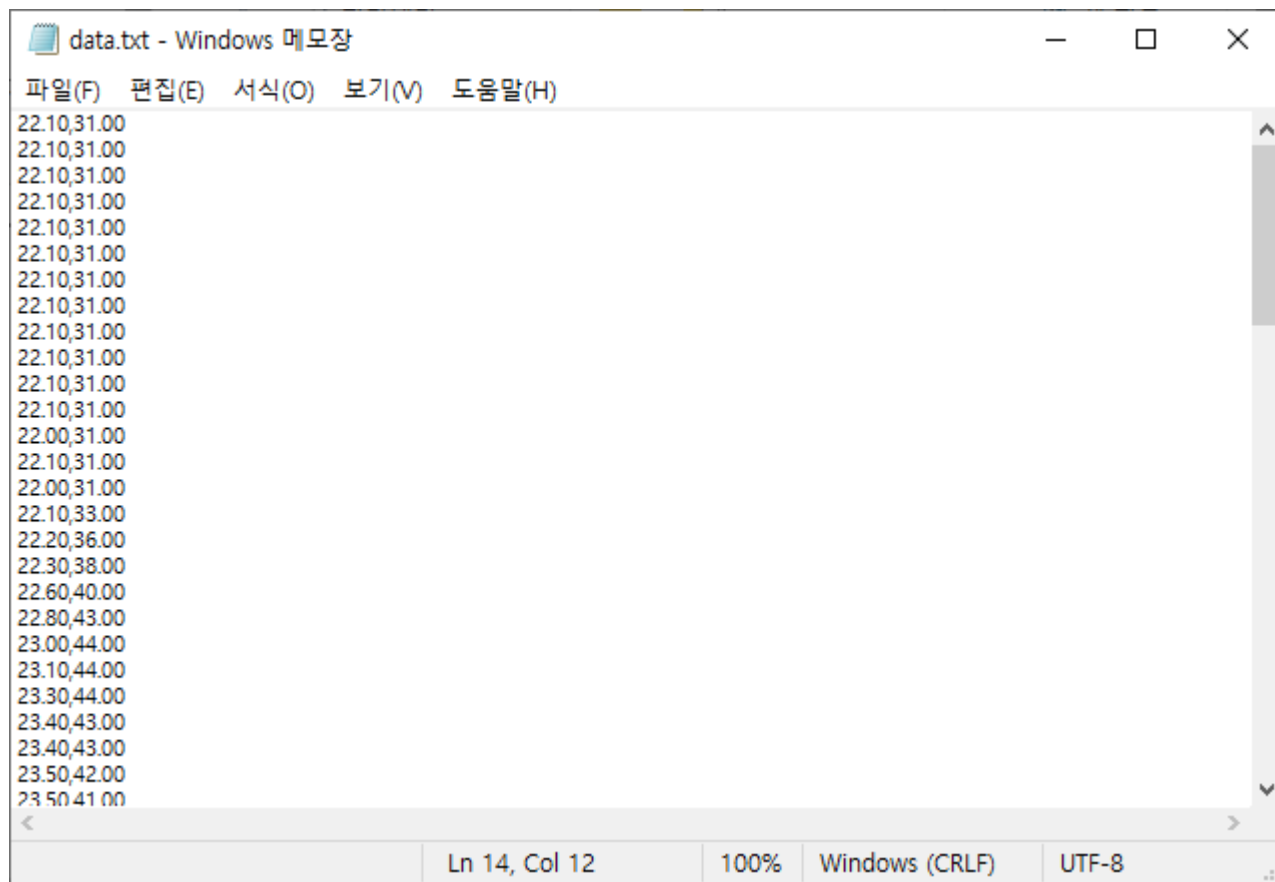
DHT11

시계열 데이터 분석(time series analysis)

- STEP1 : 출력 데이터 정리
 - 온도 RAW데이터, 습도 RAW데이터만 시리얼모니터에 출력

DHT11 시계열 데이터 분석(time series analysis)

- STEP2 : 출력 데이터 저장(data.txt)



```
data.txt - Windows 메모장
파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.10,31.00
22.00,31.00
22.10,31.00
22.00,31.00
22.10,33.00
22.20,36.00
22.30,38.00
22.60,40.00
22.80,43.00
23.00,44.00
23.10,44.00
23.30,44.00
23.40,43.00
23.40,43.00
23.50,42.00
23.50,41.00
Ln 14, Col 12 100% Windows (CRLF) UTF-8
```

DHT11 시계열 데이터 분석(time series analysis)

- STEP3 : 출력 데이터를 엑셀에서 읽기 & 그래프 분석

