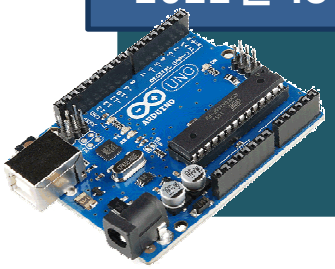
2022년 IoT기반 스마트 솔루션 개발자 양성과정



Firmware [펌웨어]

10-DHT11 Sensor

담당 교수 : 유근택

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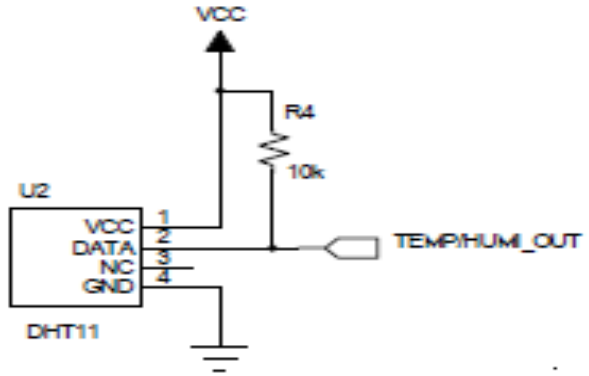
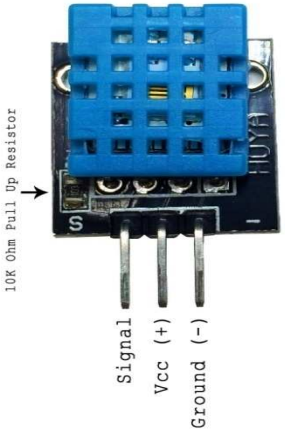
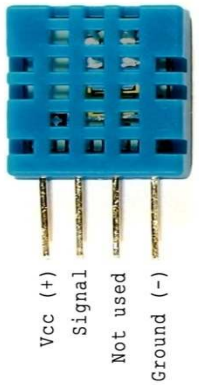
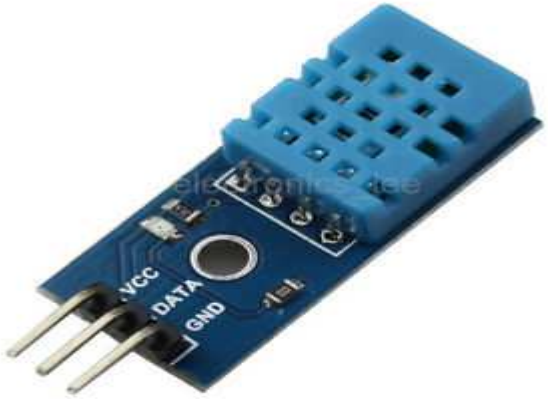
DHT-11

- 상대 습도와 온도를 측정해 주는 센서
- 동작전압: 3.5~5 V
- 온도 범위 :0-50 °C ± 2 °C
- 습도 범위 :20-90% RH ± 5%
- 보드 제작사 별로 핀 번호가 다름





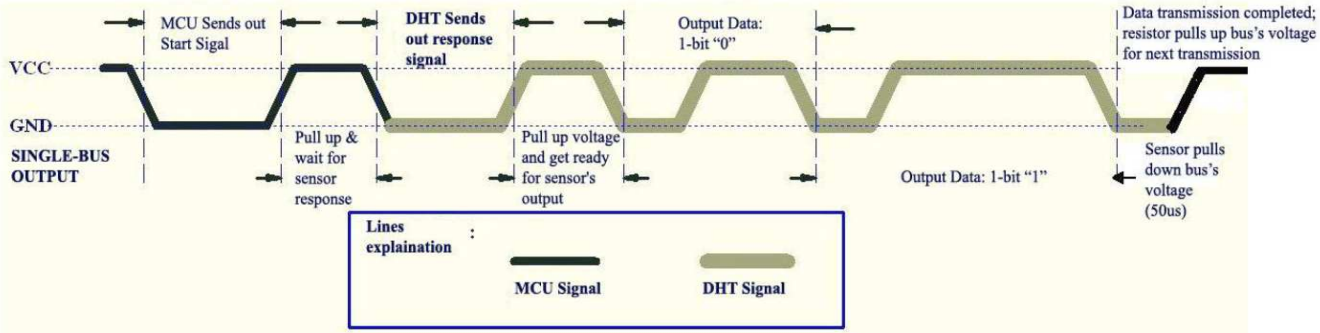




통신 방식

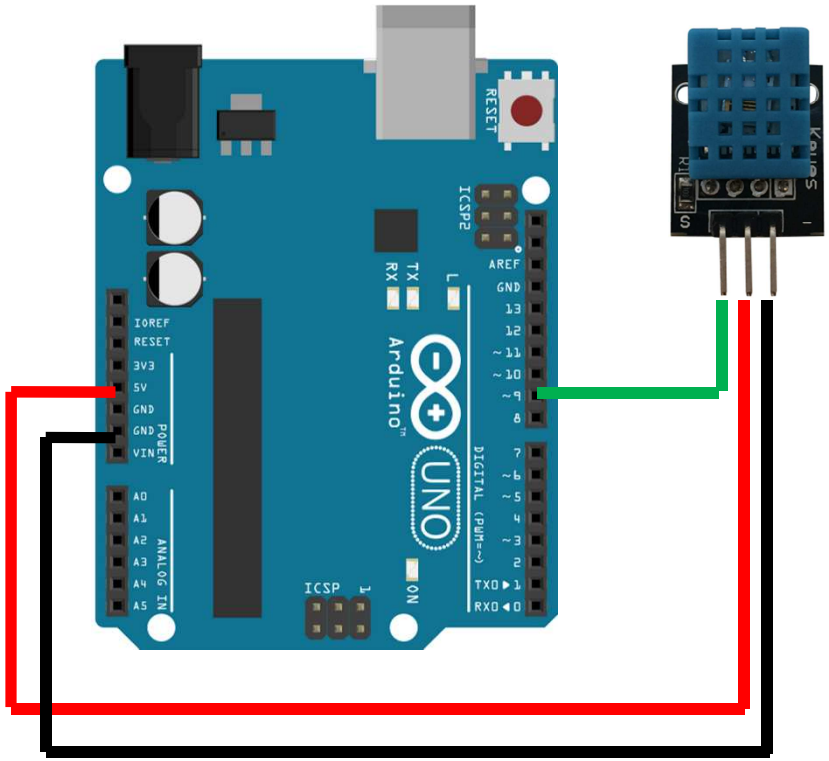
- Single Bus Communication
  - 하나의 연결선으로 양방향 직렬 통신
- Data Format(각 데이터는 8비트)

  습도(정수)+습도(소수)+온도(정수)+온도(소수)+체크섬
- Data Processing



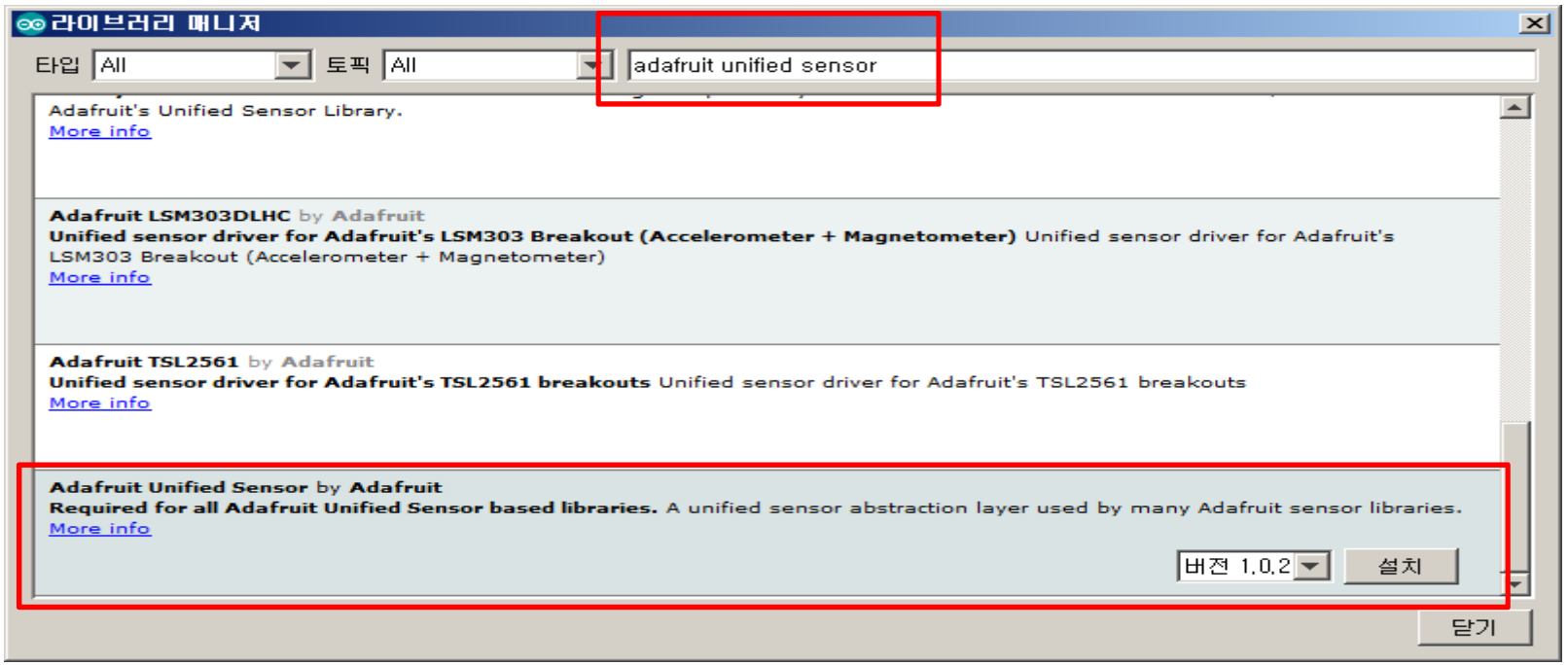
Wiring

- Vcc : 5V
- Gnd
- Data : 9 Pin



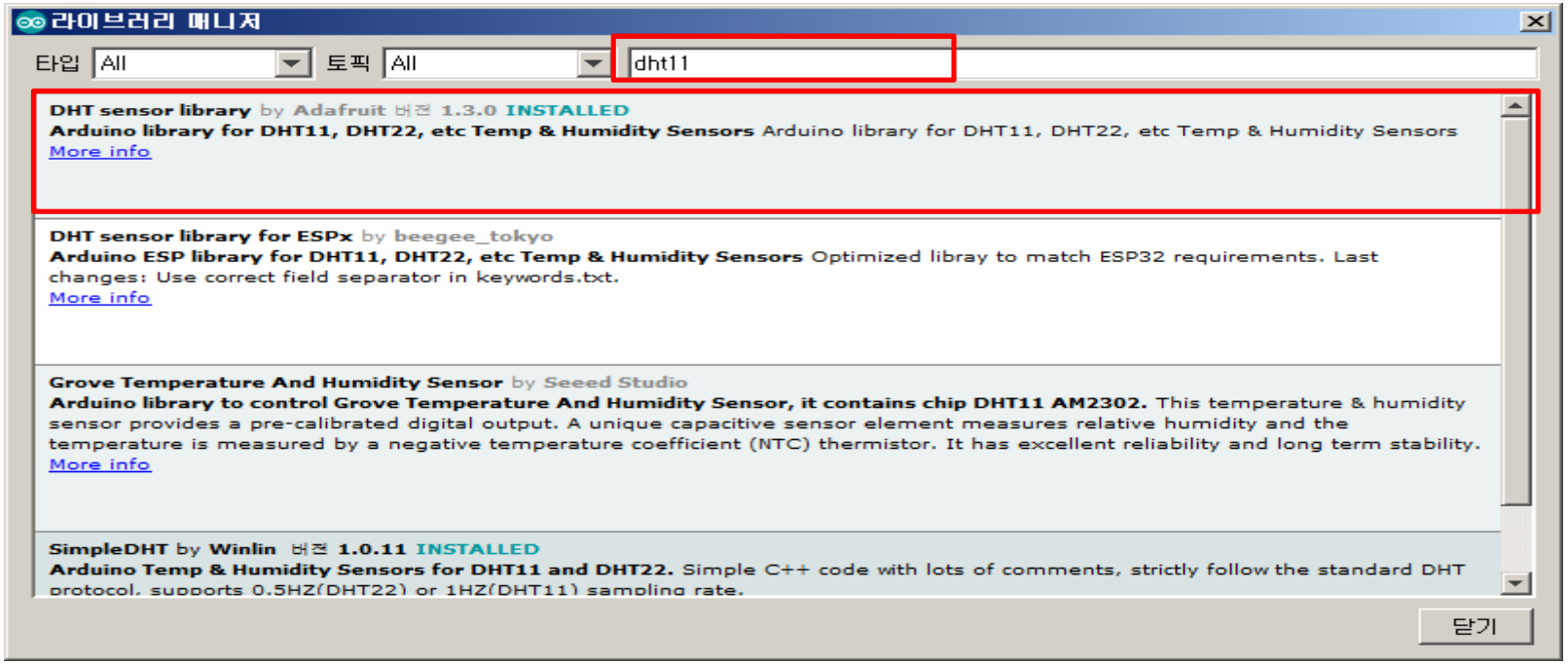
Adafruit unified sensor

- [스케치] [라이브러리 포함하기] [라이브러리 관리]



Adafruit DHT Sensor Library

- [스케치] [라이브러리 포함하기] [라이브러리 관리]

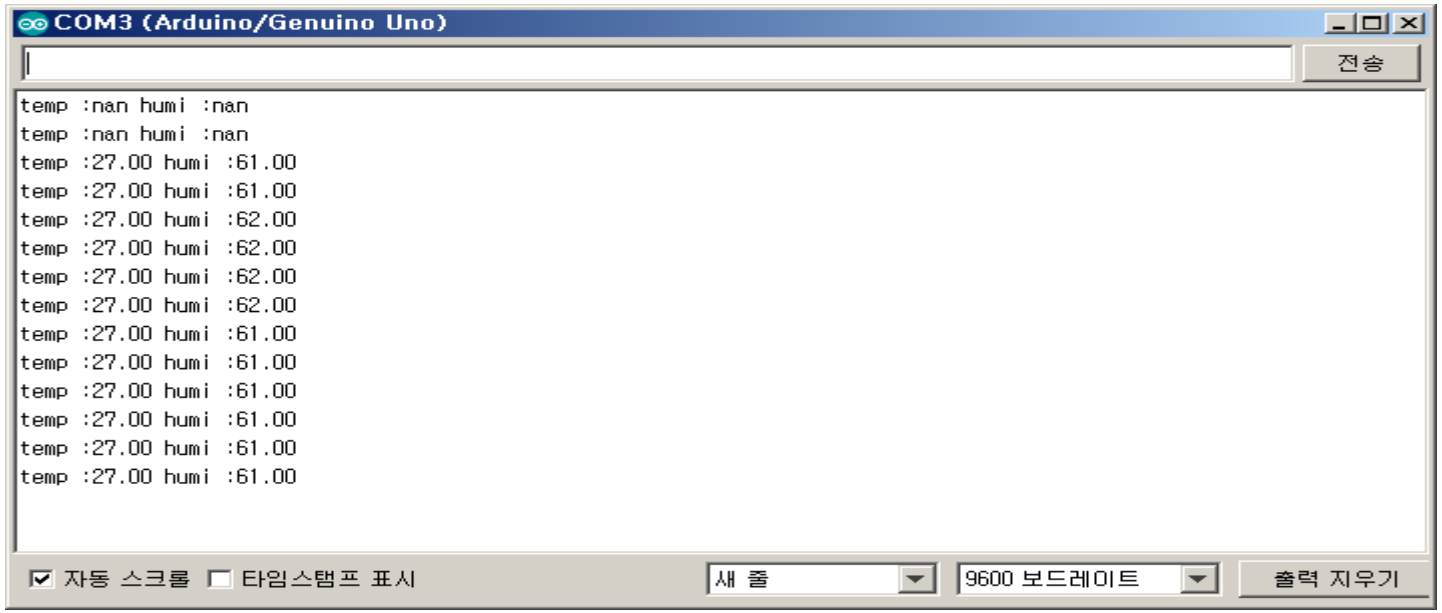


A10-1 : Adafruit DHT Sensor Lib

```
#include <DHT.h>

#define DHT_pin 9
#define DHTTYPE DHT11
DHT dht11(DHT_pin,DHTTYPE);

void setup( ) {
   Serial.begin(9600);
}
```

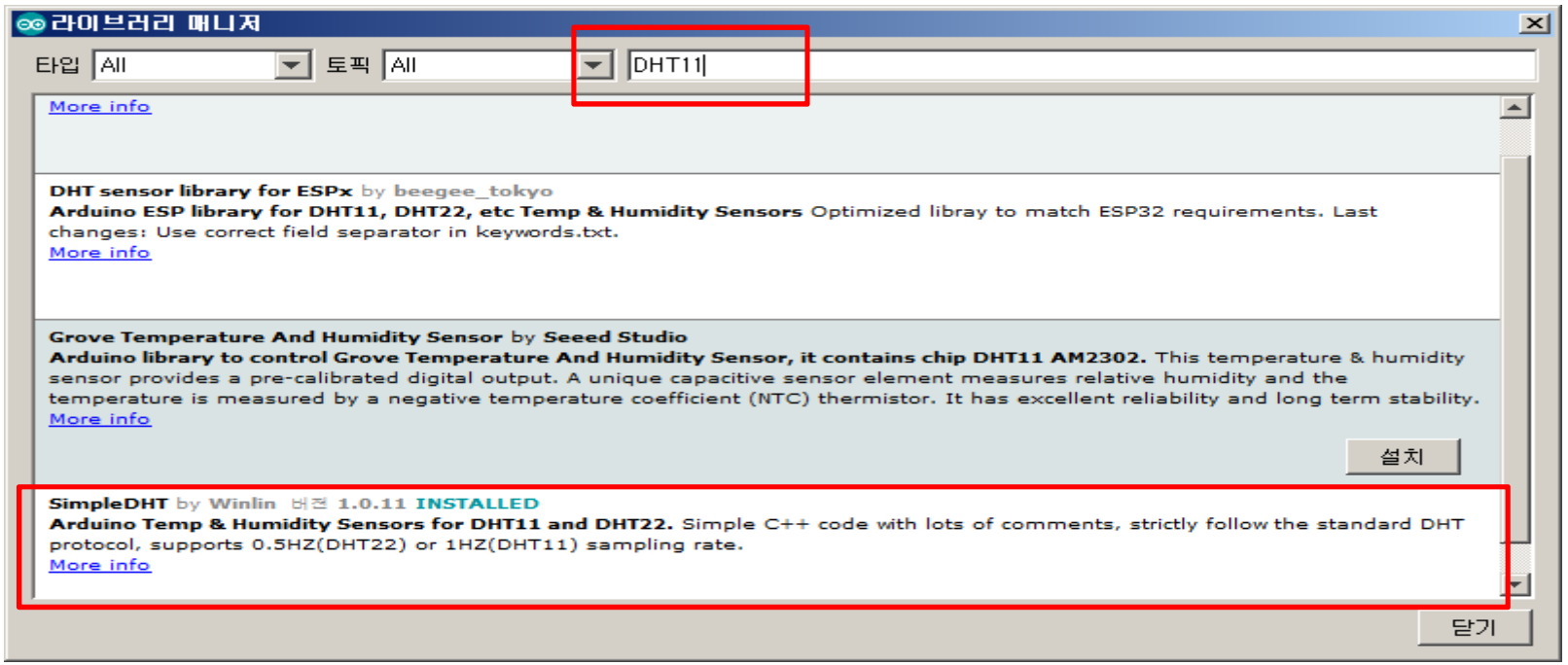
```
void loop( ){
  delay(1000);  //Wait a few seconds

  float temp = dht11.readTemperature();
  float humi = dht11.readHumidity();

  Serial.print("temp :");
  Serial.print(temp);
  Serial.print(" humi :");
  Serial.println(humi);
}
```

Adafruit DHT Sensor Lib



simpleDHT

- [스케치] [라이브러리 포함하기] [라이브러리 관리]

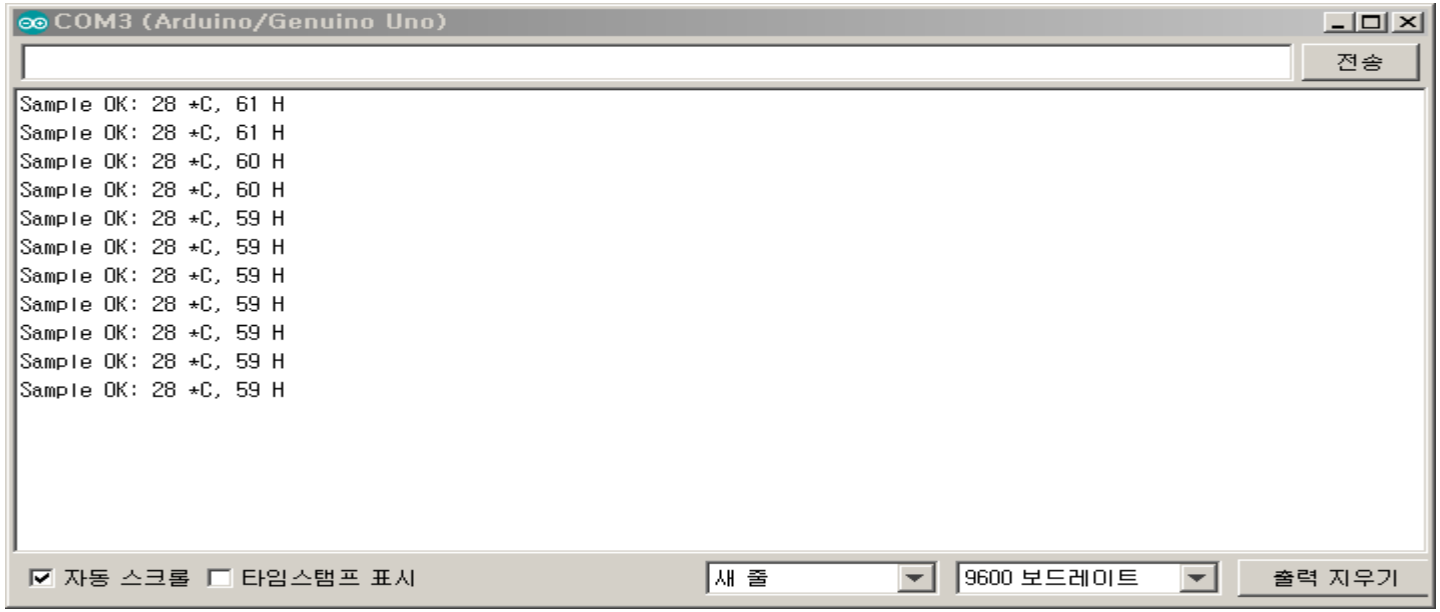


A10-2 : simpleDHT

```
#include <SimpleDHT.h>

int DHT_pin=9;
SimpleDHT11 dht11(DHT_pin);

byte temp = 0;
byte humi = 0;

void setup( ) {
   Serial.begin(9600);
}
```

```
void loop( ){
  int err = dht11.read(&temp, &humi, NULL);
  if (err != SimpleDHTErrSuccess) {
    Serial.print("Read DHT11 failed, err=");
    Serial.println(err);
    delay(1000);
    return;
  }

  Serial.print("Sample OK: ");
  Serial.print((int)temperature); Serial.print(" *C, ");
  Serial.print((int)humidity); Serial.println(" H");

  // DHT11 sampling rate is 1HZ.
  delay(2000);
}
```

simpleDHT


COM3 (Arduino/Genuino Uno)
전송
Sample OK: 28 *C, 61 H
Sample OK: 28 *C, 61 H
Sample OK: 28 *C, 60 H
Sample OK: 28 *C, 60 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
Sample OK: 28 *C, 59 H
자동 스크롤
타임스탬프 표시
새 줄
9600 보드레이트
출력 지우기

직접 Library 추가

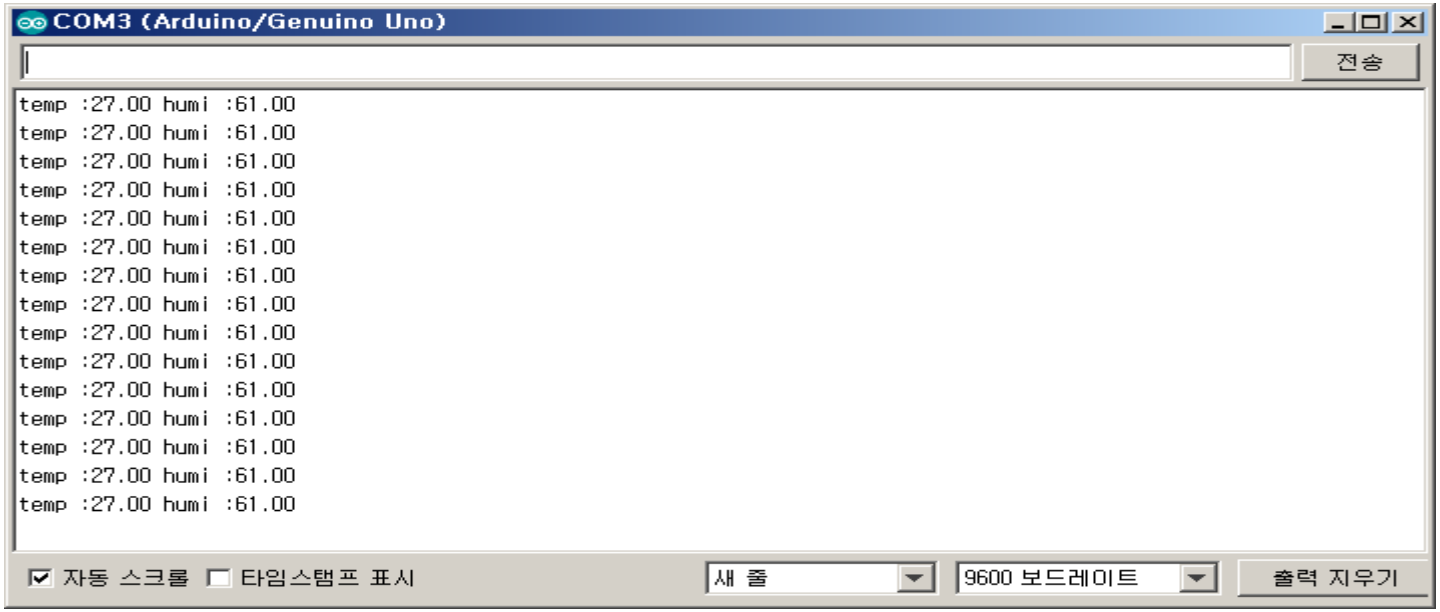
- Library Source를 다운받아 Sketch 폴더에 복사
- Sketch 프로그램을 다시 시작하면 Sketch 폴더에 탭에 삽입됨
- 주의
  - #include "DHT11.h"

A10-3 : DHT11

A7-3 | DHT11.cpp | DHT11.h

```
#include "DHT11.h"

#define DHT11_pin 9
DHT11 dht11(DHT11_pin);
float temp, humi;
int err;

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

void loop(){
  if((err=dht11.read(humi, temp))==0)  {
    Serial.print("temp :");
    Serial.print(temp);
    Serial.print(" humi :");
    Serial.print(humi);
    Serial.println();
  } else {
    Serial.println();
    Serial.print("Error No :");
    Serial.print(err);
    Serial.println();
  }
  delay(1000);    //1초마다 측정
}
```

DHT11


COM3 (Arduino/Genuino Uno)
전송
temp :27.00 humi :61.00
temp :27.00 humi :61.00
temp :27.00 humi :61.00
temp :27.00 humi :61.00
temp :27.00 humi :61.00
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자동 스크롤
타임스탬프 표시
새 줄
9600 보드레이트
출력 지우기

불쾌지수계(Discomfort Index)

- 불쾌지수
  - 0.72(건구온도+습구온도)+40.6
  - (9/5)T – 0.55(1-Rh)((9/5)T-26)+32 ;Rh상대습도

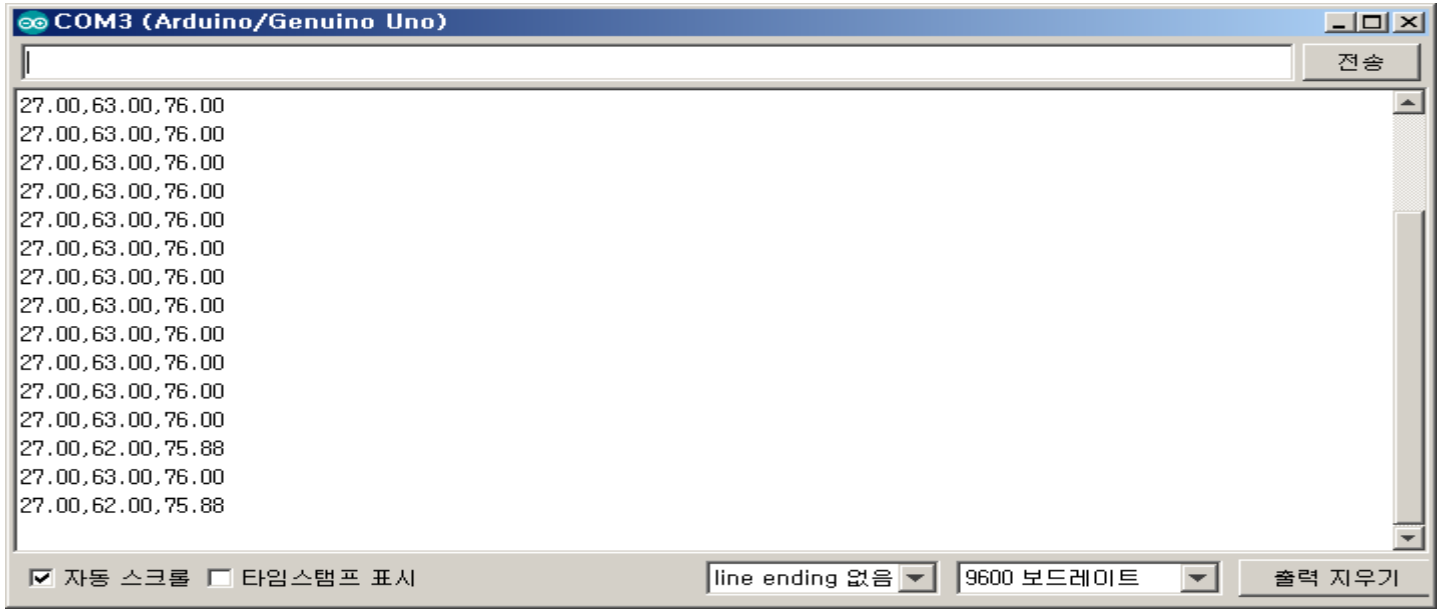
단계	지수범위	설명 및 주의사항
매우 높음	80 이상	전원 불쾌감을 느낌
높음	75~80 미만	50% 정도 불쾌감을 느낌
보통	68~75 미만	불쾌감을 나타내기 시작함
낮음	68 미만	전원 쾌적함을 느낌

A10-4 : Discomfort Index

```
#include "DHT11.h"

#define DHT11_pin 9
DHT11 dht11(DHT11_pin);
float temp, humi;
int err;
float dIndex;

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

float DIndex(float t, float h) {
  return (1.8f*t)-(0.55*(1-h/100.0f)*(1.8f*t-26))+32;
}
```

```
void loop( ){
  delay(1000);
  err=dht11.read(humi, temp);

  if(err)  {
    Serial.print("Error");
  } else {
    dIndex=DIndex(temp,humi);
    Serial.print(temp);
    Serial.print(",");
    Serial.print(humi);
    Serial.print(",");
    Serial.println(dIndex);
  }
}
```

Serial monitor



Serial Plotter