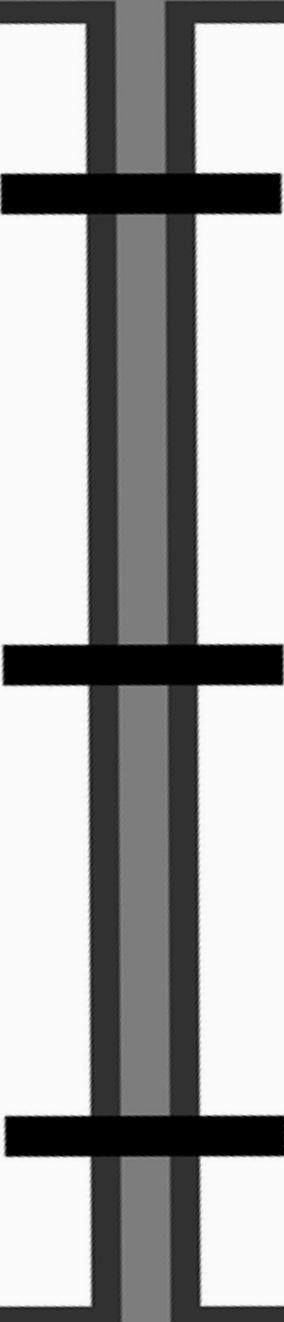
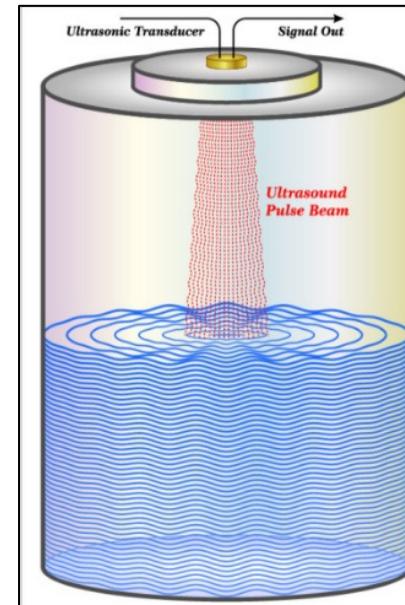
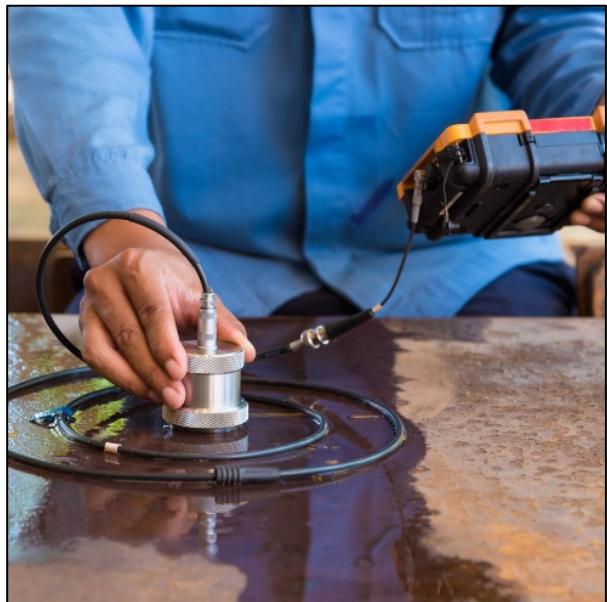
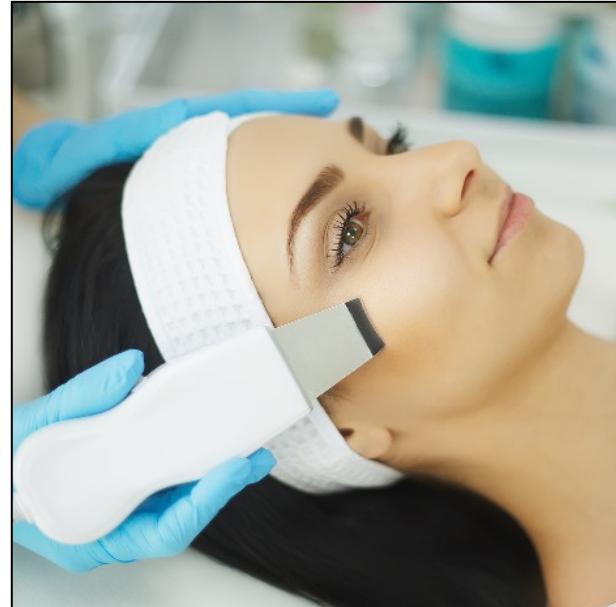
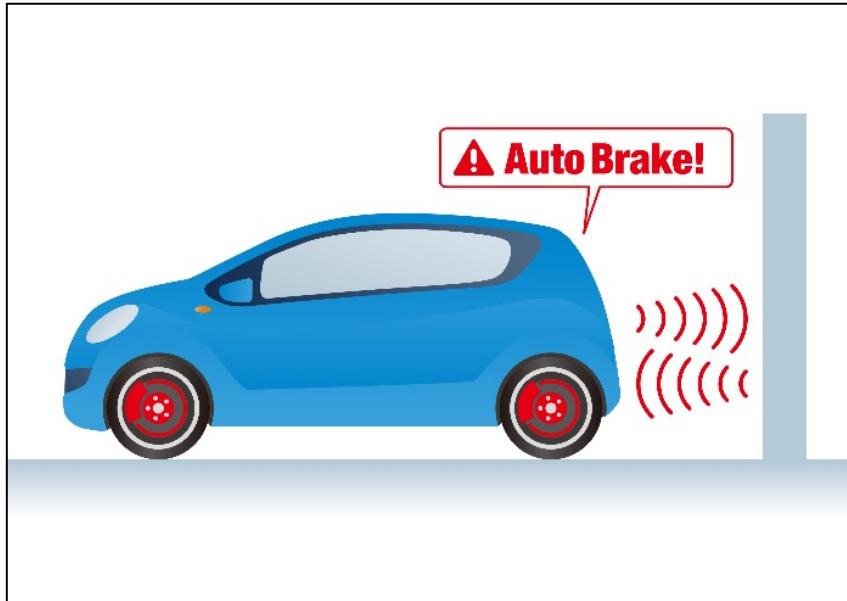


Ch.5 Library 활용

- 1) 초음파 센서
- 2) 온도/습도 센서

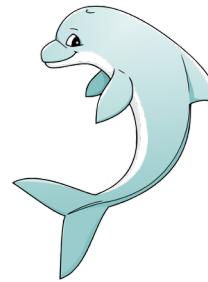


1) 초음파 센서



1) 초음파 활용

초음파 센서



Library import to IDE

준비물 :

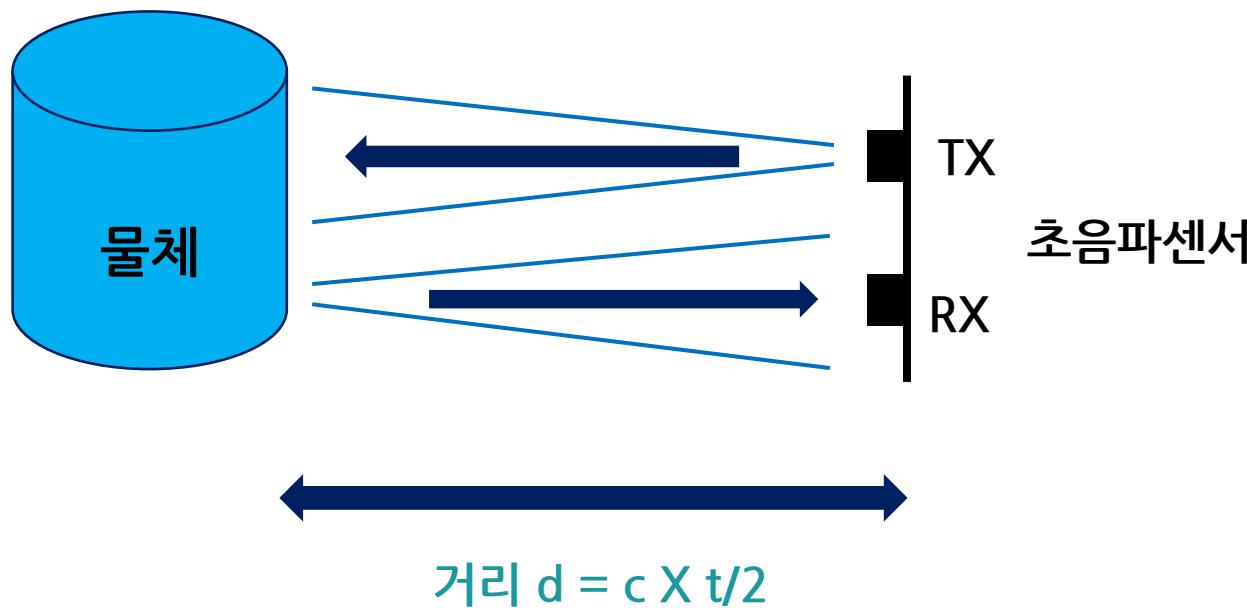
아두이노 우노 1개

초음파 센서 HC-SR04 1개

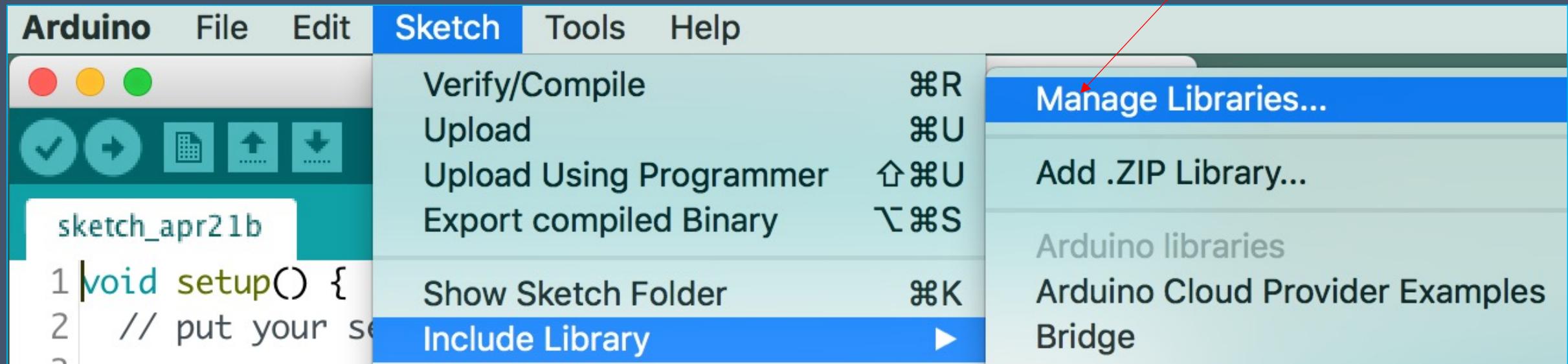
점퍼 케이블

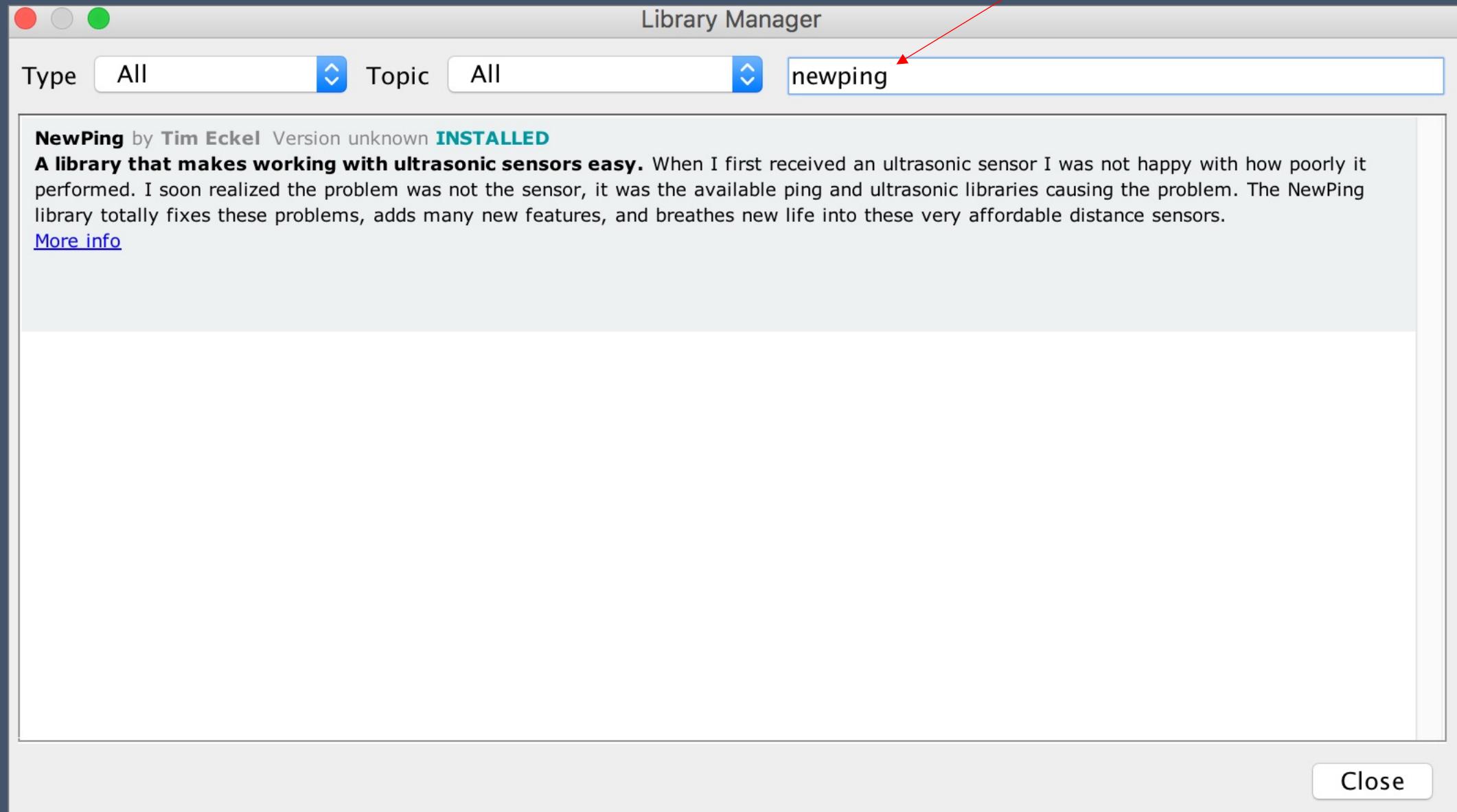
1) 초음파 센서

Working Principle



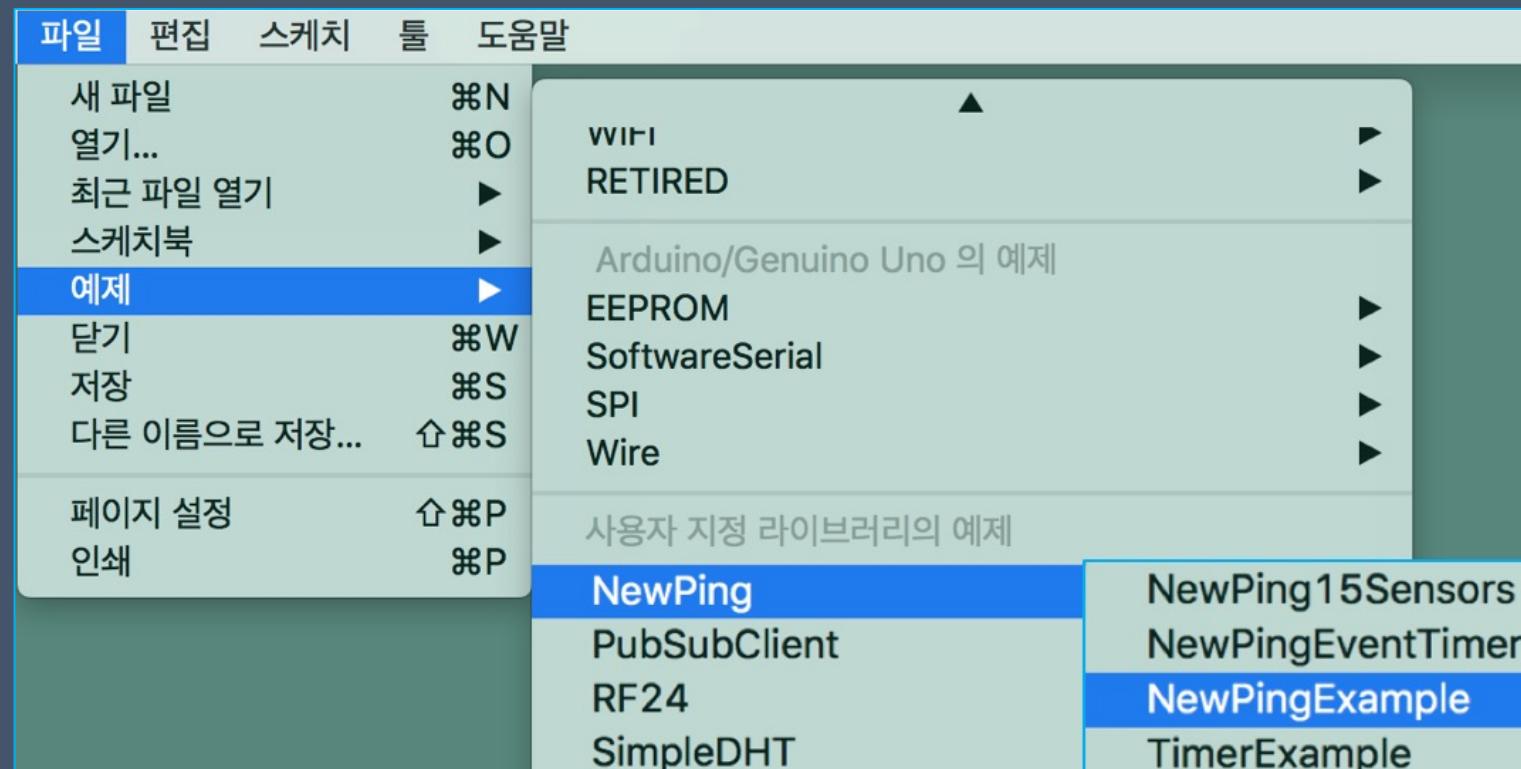
2) Newping 라이브러리 install





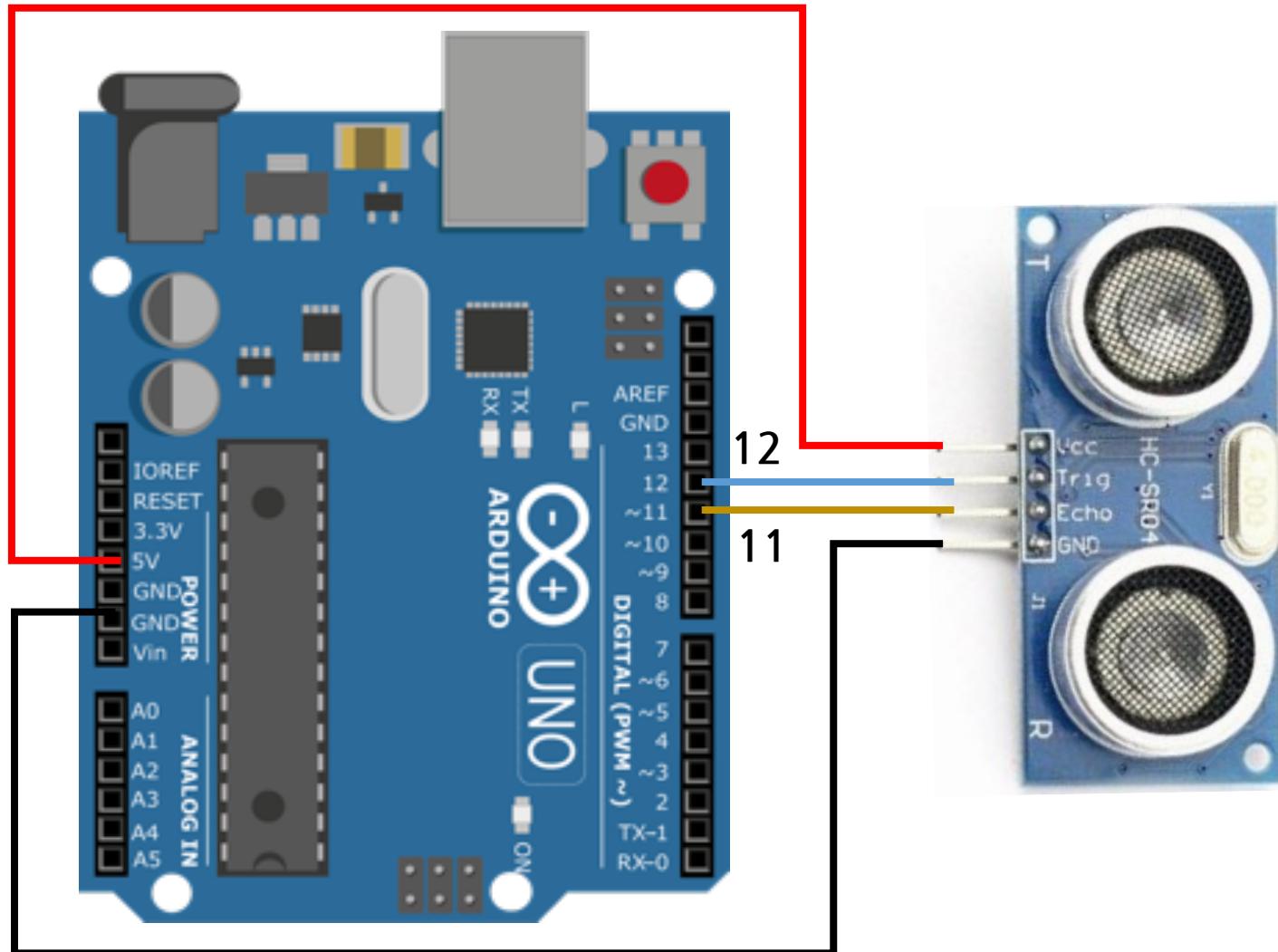
3) 초음파 센서 회로 및 스케치

Open NewPingExample Sketch



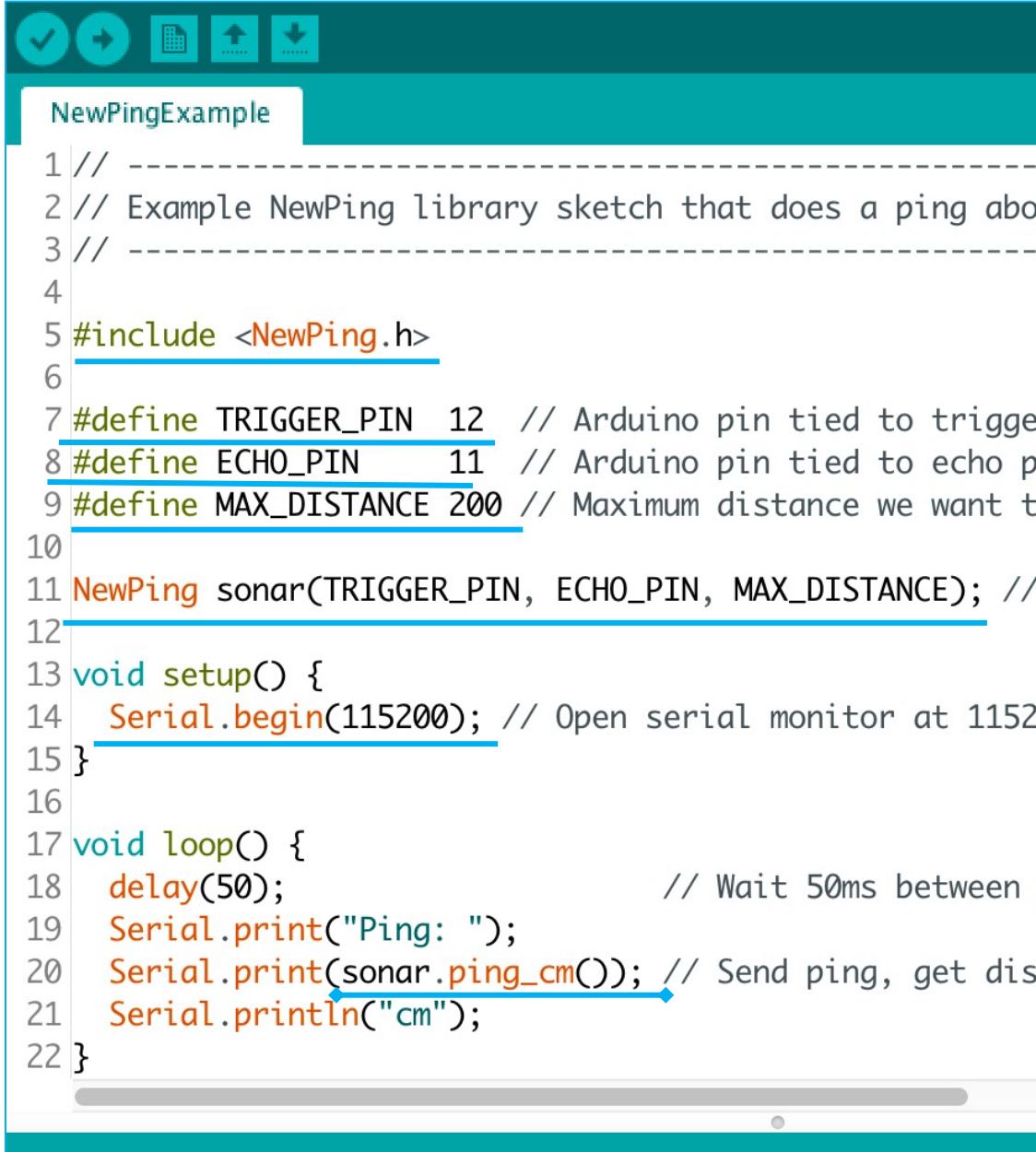
3) 초음파 센서 회로 및 스케치

Circuit



VCC
Trig
Echo
GND

3) 초음파 센서 회로 및 스케치



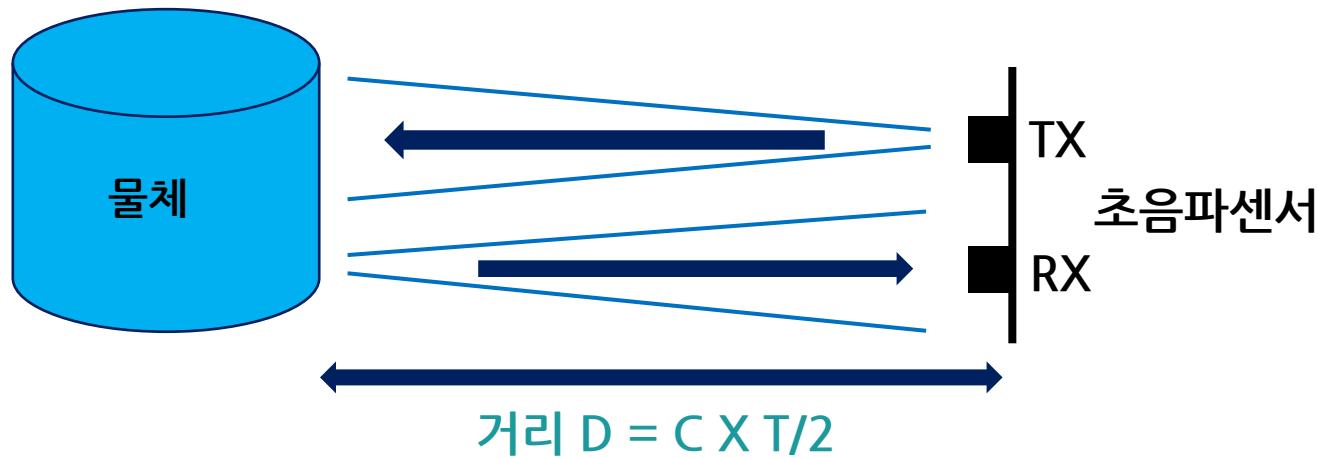
The screenshot shows the Arduino IDE interface with the title bar "NewPingExample". The code editor contains the following C++ code:

```
1 // -----
2 // Example NewPing library sketch that does a ping about every 50ms
3 //
4
5 #include <NewPing.h>
6
7 #define TRIGGER_PIN 12 // Arduino pin tied to trigger
8 #define ECHO_PIN 11 // Arduino pin tied to echo pin
9 #define MAX_DISTANCE 200 // Maximum distance we want to measure
10
11 NewPing sonar(TRIGGER_PIN, ECHO_PIN, MAX_DISTANCE); //
12
13 void setup() {
14     Serial.begin(115200); // Open serial monitor at 115200 bps
15 }
16
17 void loop() {
18     delay(50); // Wait 50ms between pings
19     Serial.print("Ping: ");
20     Serial.print(sonar.ping_cm()); // Send ping, get distance in cm
21     Serial.println("cm");
22 }
```

```
int TRIGGER_PIN = 12 ;
```

3) 초음파 센서 회로 및 스케치

Sketch without library



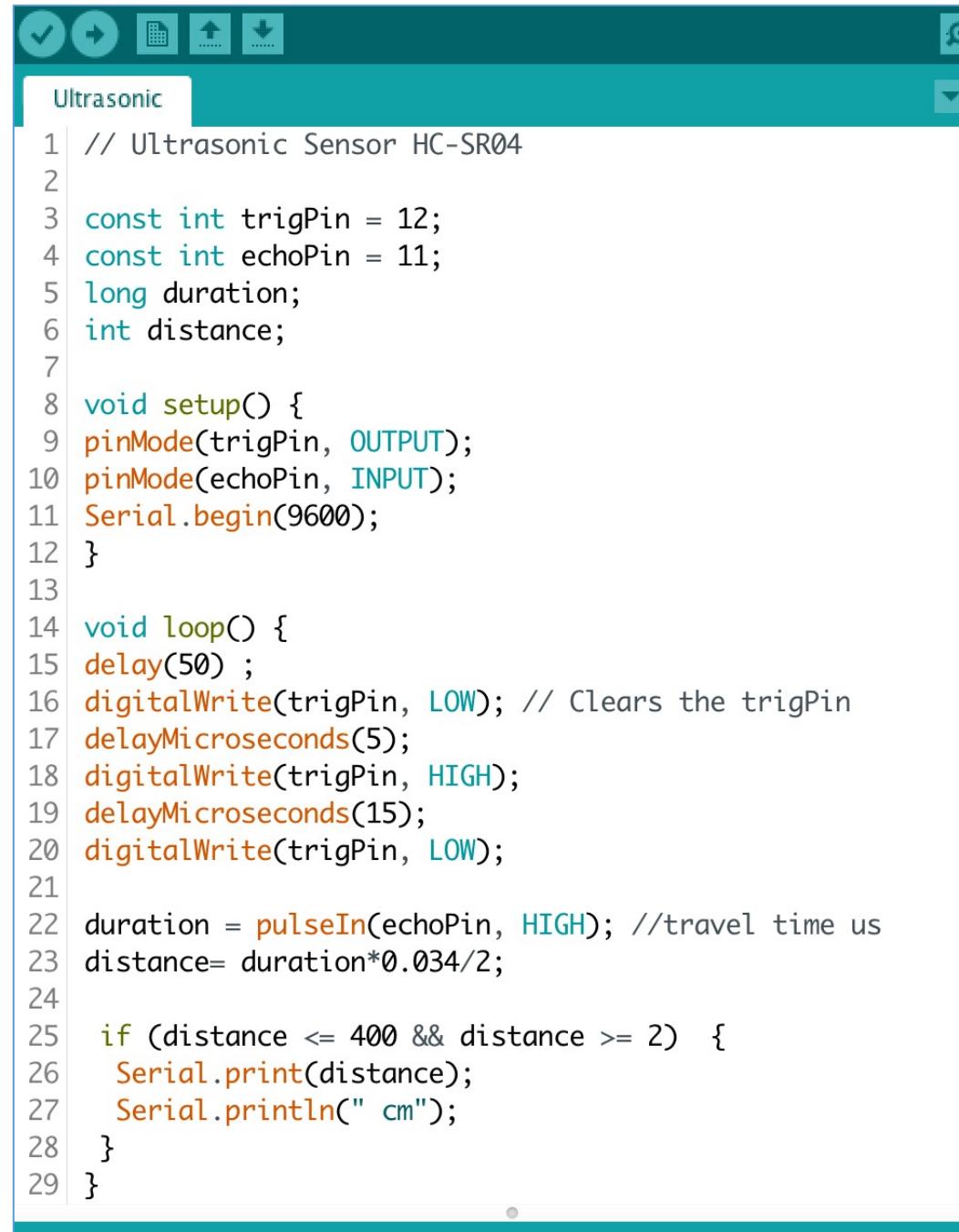
소리 속도 $v=340 \text{ m/s}=0.034 \text{ cm}/\mu\text{s}$

시간(t)=왕복거리(D)/속도(v)

$$d = t / 2 \times 0.034$$

3) 초음파 센서 회로 및 스케치

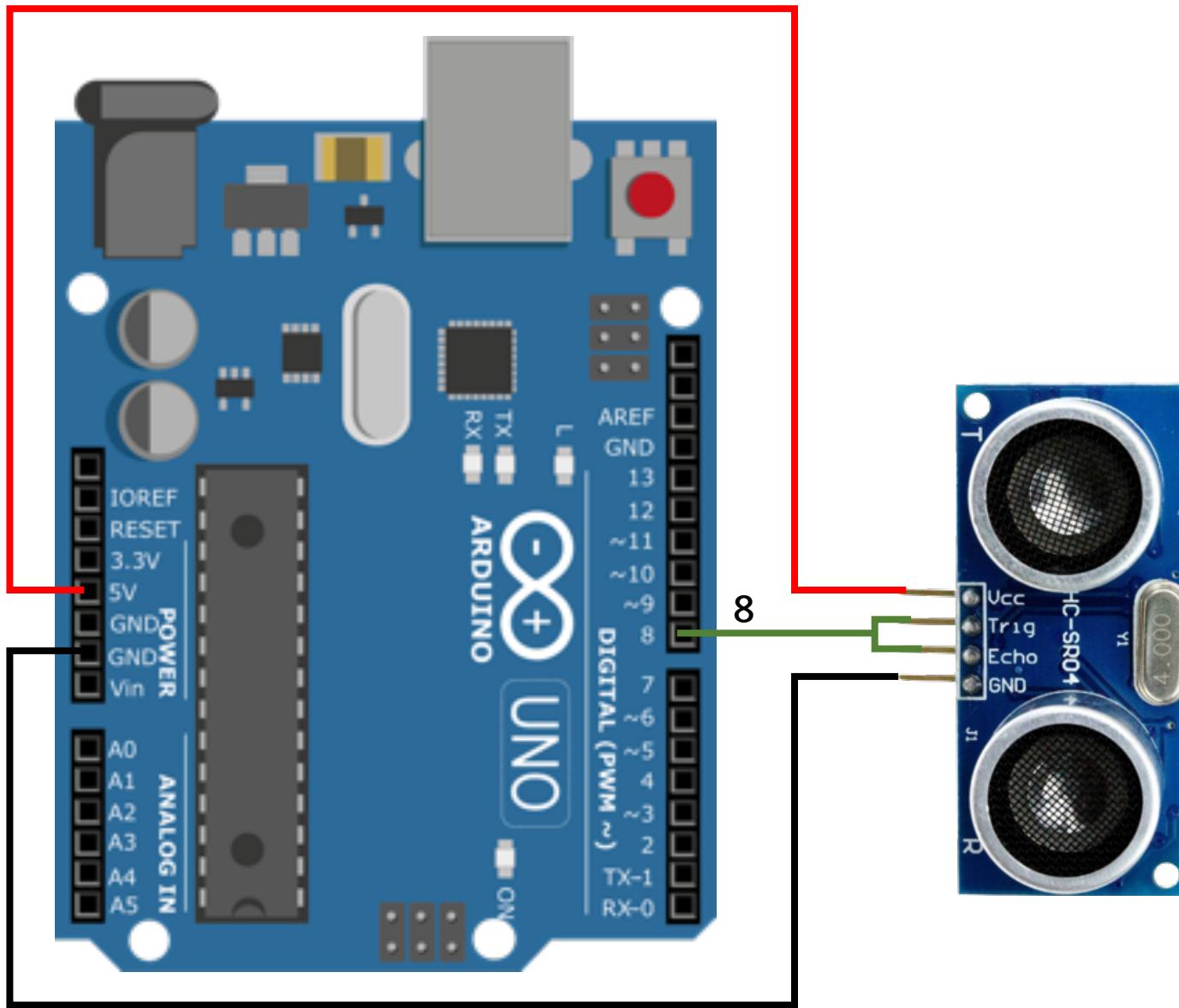
Sketch
without
library



The screenshot shows the Arduino IDE interface with the title bar 'Ultrasonic'. The code editor contains the following C++ code for an ultrasonic sensor:

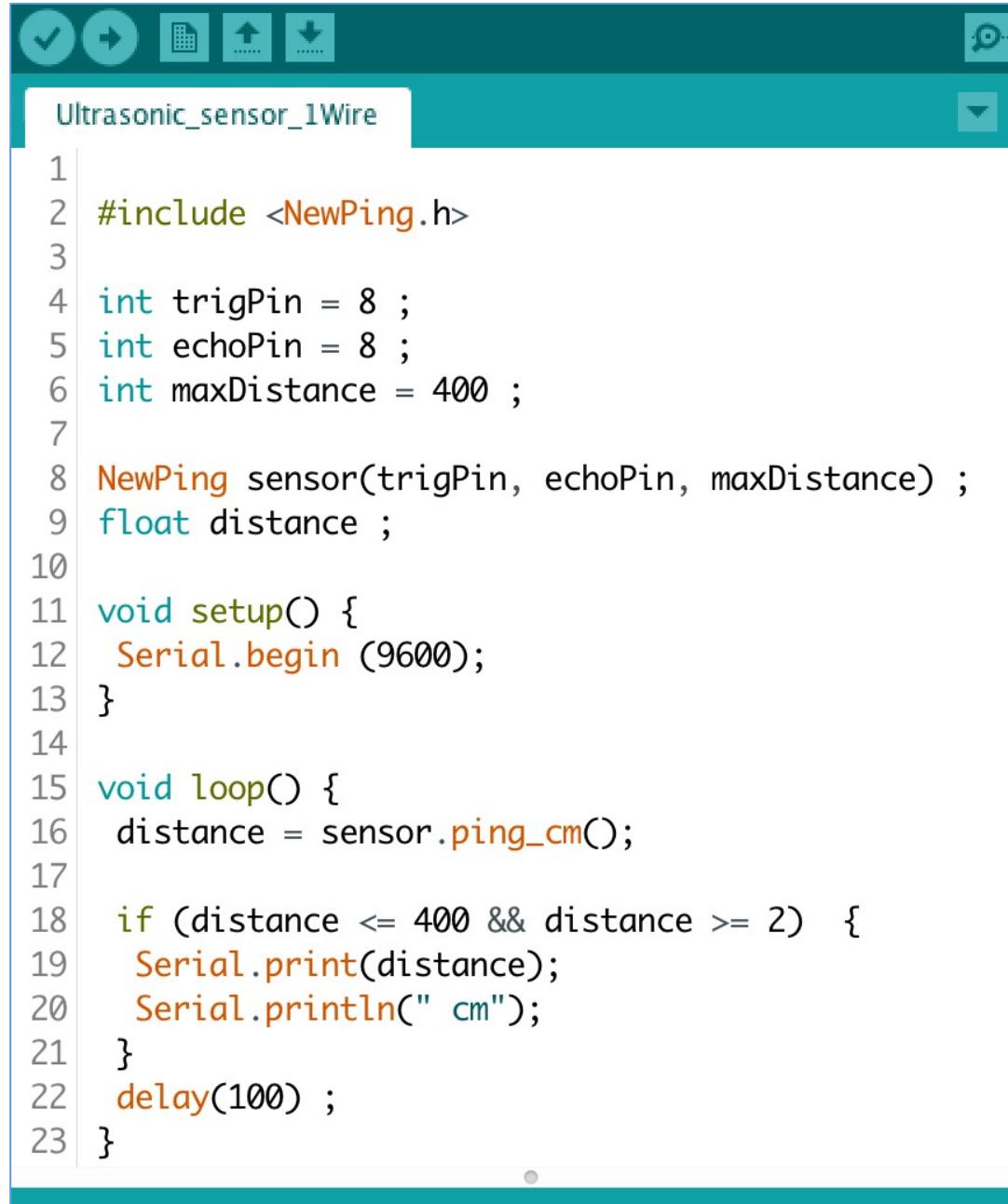
```
1 // Ultrasonic Sensor HC-SR04
2
3 const int trigPin = 12;
4 const int echoPin = 11;
5 long duration;
6 int distance;
7
8 void setup() {
9 pinMode(trigPin, OUTPUT);
10 pinMode(echoPin, INPUT);
11 Serial.begin(9600);
12 }
13
14 void loop() {
15 delay(50) ;
16 digitalWrite(trigPin, LOW); // Clears the trigPin
17 delayMicroseconds(5);
18 digitalWrite(trigPin, HIGH);
19 delayMicroseconds(15);
20 digitalWrite(trigPin, LOW);
21
22 duration = pulseIn(echoPin, HIGH); //travel time us
23 distance= duration*0.034/2;
24
25 if (distance <= 400 && distance >= 2)  {
26   Serial.print(distance);
27   Serial.println(" cm");
28 }
29 }
```

One wire



VCC
Trig
Echo
GND

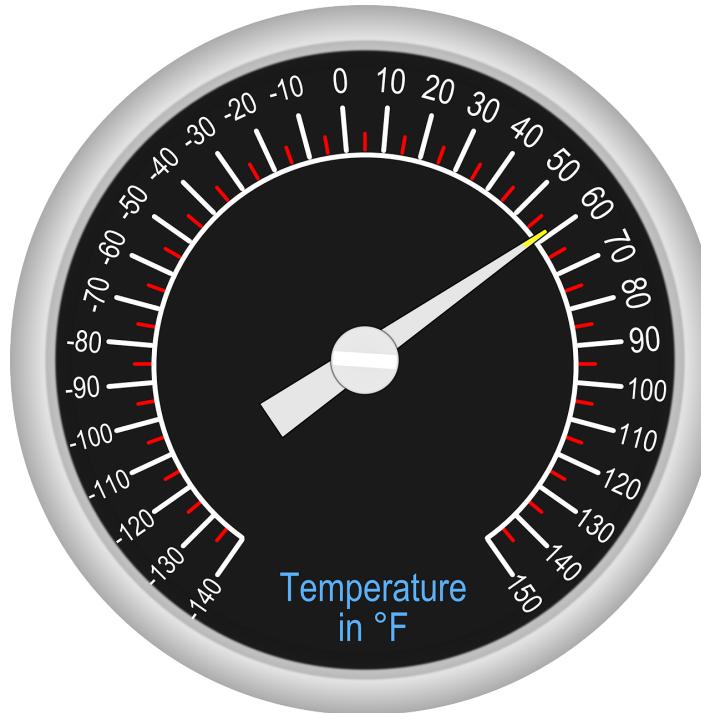
One wire



The screenshot shows the Arduino IDE interface with a sketch titled "Ultrasonic_sensor_1Wire". The code uses the NewPing library to measure distance from an ultrasonic sensor connected via one-wire. It prints the distance in centimeters to the Serial monitor.

```
1 #include <NewPing.h>
2
3 int trigPin = 8 ;
4 int echoPin = 8 ;
5 int maxDistance = 400 ;
6
7 NewPing sensor(trigPin, echoPin, maxDistance) ;
8 float distance ;
9
10 void setup() {
11   Serial.begin (9600);
12 }
13
14 void loop() {
15   distance = sensor.ping_cm();
16
17   if (distance <= 400 && distance >= 2)  {
18     Serial.print(distance);
19     Serial.println(" cm");
20   }
21   delay(100) ;
22 }
23 }
```

2) 온도/습도 센서



2) 온도/습도 센서

Temperature/Humidity sensor

프로젝트 : Temperature/Humidity sensor

목적 : 온/습도 측정방법, 데이터 팩케지

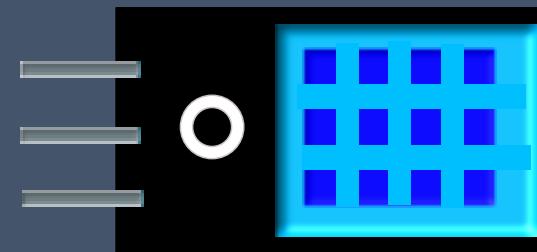
준비물 :

아두이노 우노 1 개

브래드보드 1개

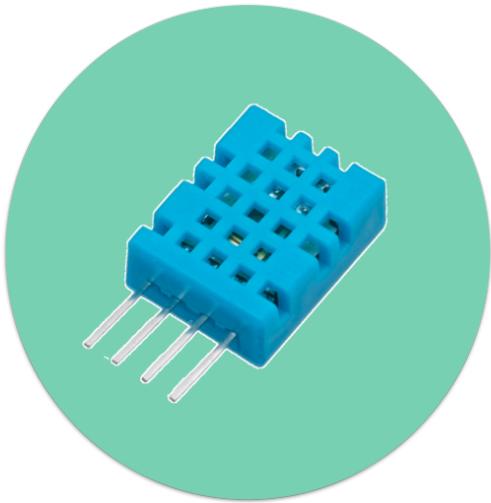
DHT 11 온도/습도 센서

점퍼케이블

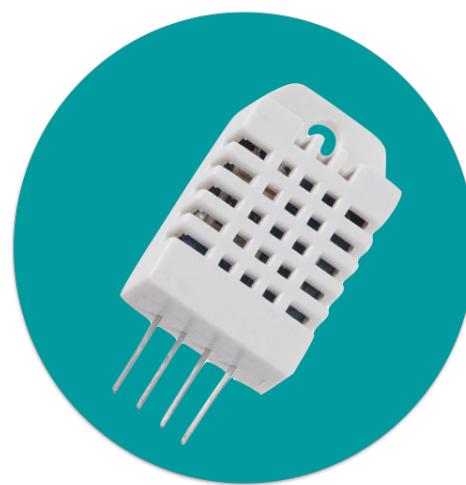


2) 온도/습도 센서

The DHT family of humidity sensors consist of a **capacitive humidity sensor** and a **thermistor**.



DHT 11



DHT 22

DHT 11

0~50°C/ $\pm 2^\circ\text{C}$

20~80%/ $\pm 2\%$

1Hz

Temp. range

Humid. range

Sampling rate

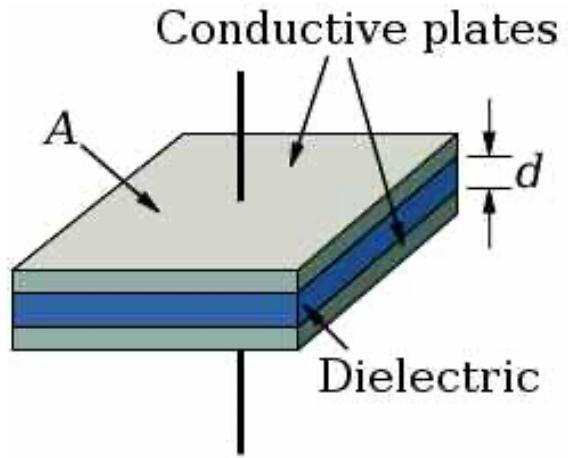
DHT 22

-40~125°C/ $\pm 0.52^\circ\text{C}$

0~100%/ $\pm 2.5\%$

0.5Hz

Capacitance vs. Relative Humidity



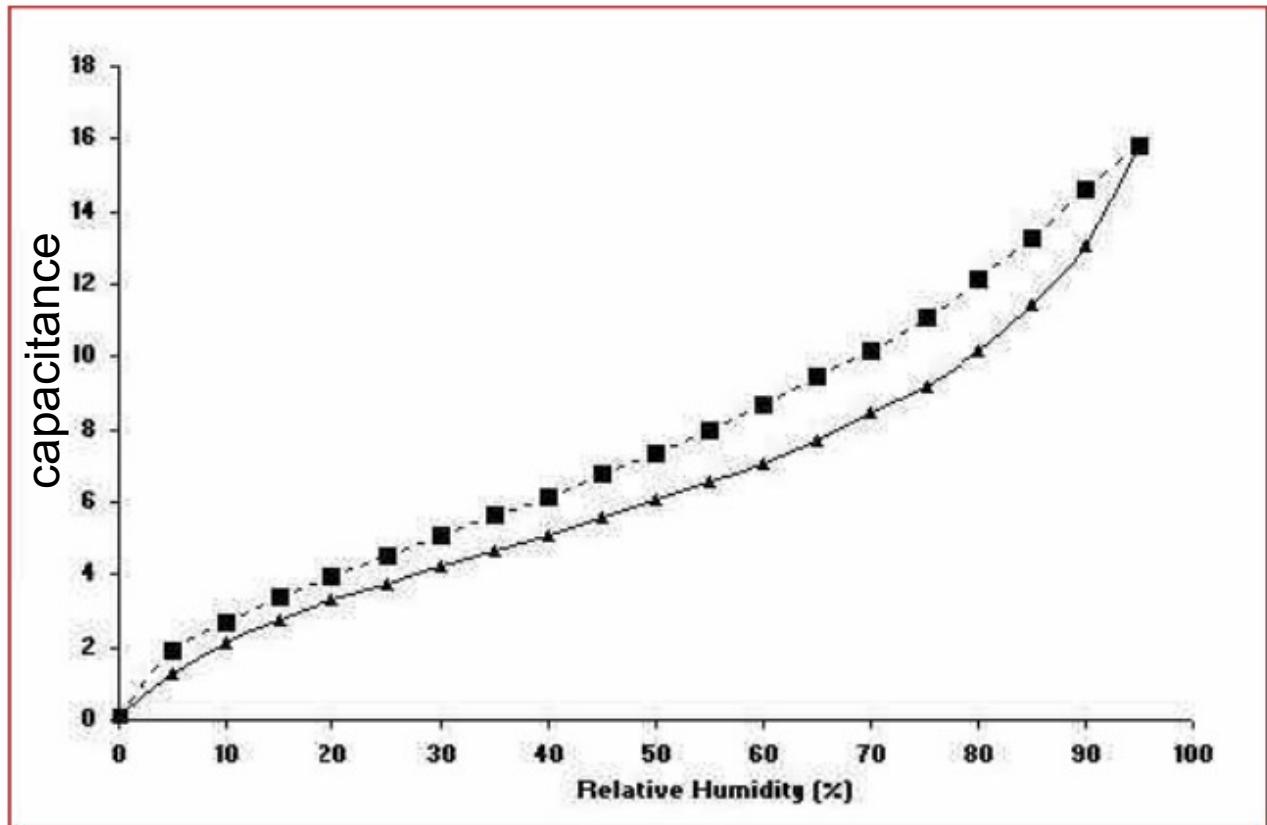
The formula to calculate relative humidity is:

$$RH = \left(\frac{\rho_w}{\rho_s} \right) \times 100\%$$

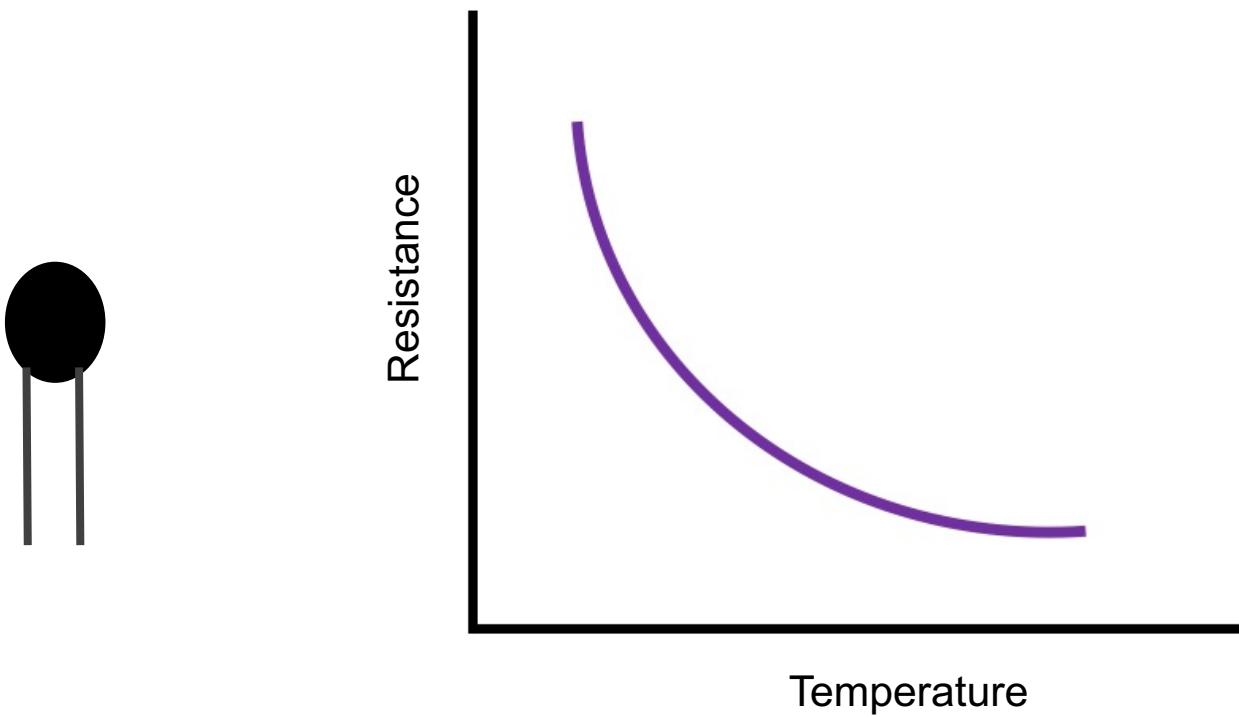
RH : Relative Humidity

ρ_w : Density of water vapor

ρ_s : Density of water vapor at saturation

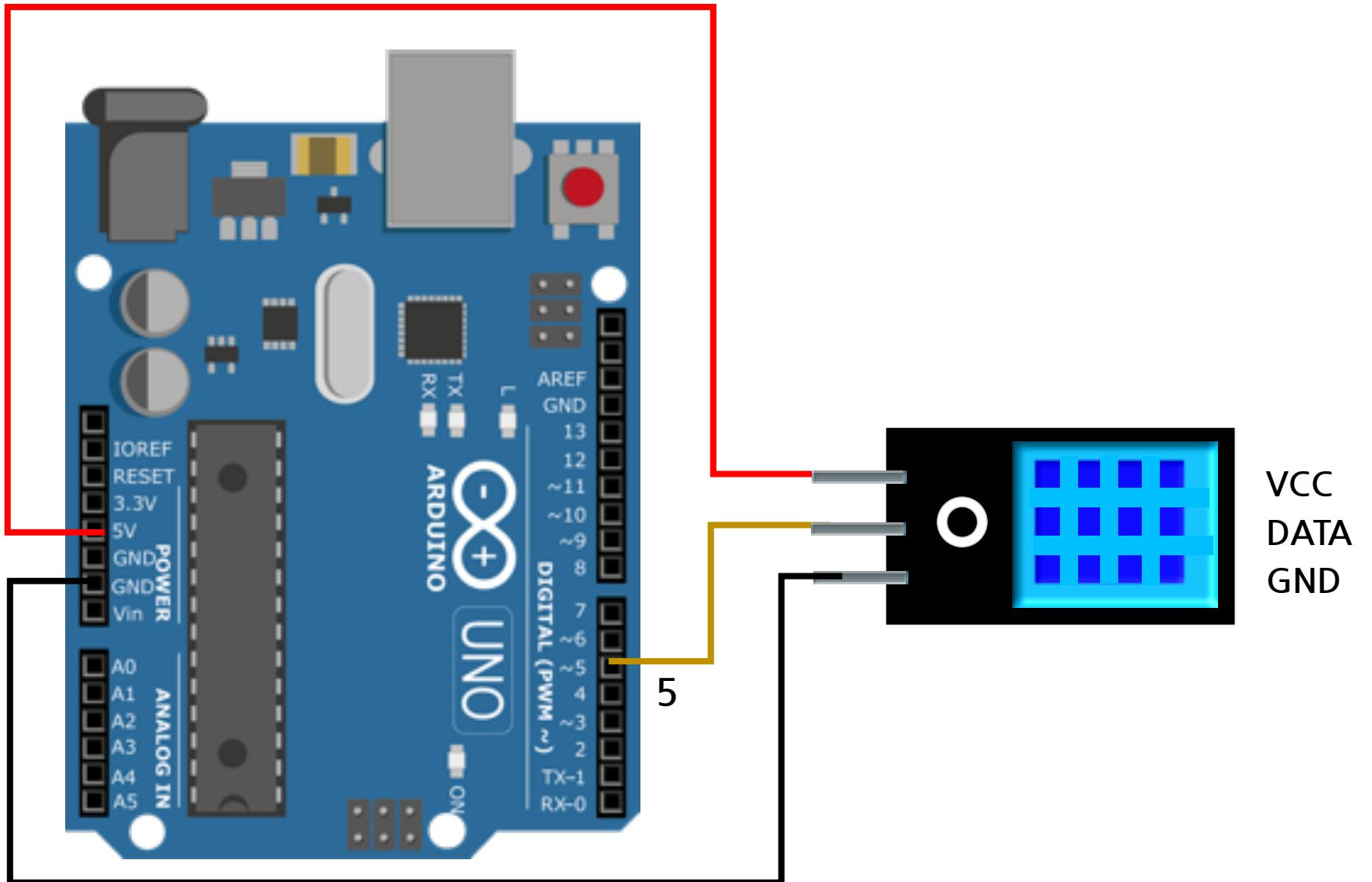


NTC Thermistor : Resistance vs. Temperature



2-2) 회로 및 스케치

DHT11 circuit



2) 온도/습도 센서

○ Parity bit data definition

"8bit humidity integer data + 8bit humidity decimal data + 8bit temperature integer data + 8bit temperature fractional data" 8bit checksum is equal to the results of the last eight.

Data format

Example 1: 40 data is received:

<u>0011 0101</u>	<u>0000 0000</u>	<u>0001 1000</u>	<u>0000 0000</u>	<u>0100 1101</u>
High humidity 8	Low humidity 8	High temp. 8	Low temp. 8	Parity bit

Calculate:

$$\underline{0011\ 0101+0000\ 0000+0001\ 1000+0000\ 0000= 0100\ 1101}$$

=

Received data is correct:

Humidity: 0011 0101=35H=53%RH

Temperature: 0001 1000=18H=24°C

Example 2: 40 data is received:

<u>0011 0101</u>	<u>0000 0000</u>	<u>0001 1000</u>	<u>0000 0000</u>	<u>0100 1001</u>
High humidity 8	Low humidity 8	High temp. 8	Low temp. 8	Parity bit

Calculate:

$$0011\ 0101+0000\ 0000+0001\ 1000+0000\ 0000= \underline{0100\ 1101}$$

≠

$01001101 \neq 0100\ 1001$

The received data is not correct, give up, to re-receive data.



dht arduino library rob



전체

이미지

동영상

지도

뉴스

더보기

설정

도구

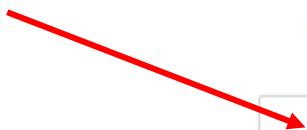
검색결과 약 44,700개 (0.53초)

Arduino Playground - DHTLib

<https://playground.arduino.cc/Main/DHTLib> ▾ 이 페이지 번역하기

2018. 2. 2. – Recently I wrote a **library** for the DHT11 only, see Rob Tillaart // VERSION: 0.1.07 //
PURPOSE: DHT Temperature & Humidity Sensor **library** ...

이 페이지를 18. 9. 15에 방문했습니다.



Arduino/libraries/DHTlib at master · RobTillaart/Arduino · GitHub

<https://github.com/RobTillaart/Arduino/tree/.../libraries/DHTlib> ▾ 이 페이지 번역하기

DHT Library. Description. The DHT11, 21, 22, 33 and 44 are relative inexpensive sensors for measuring temperature and humidity. This **library** can be used for ...

Dht.h · Dht.cpp · Examples

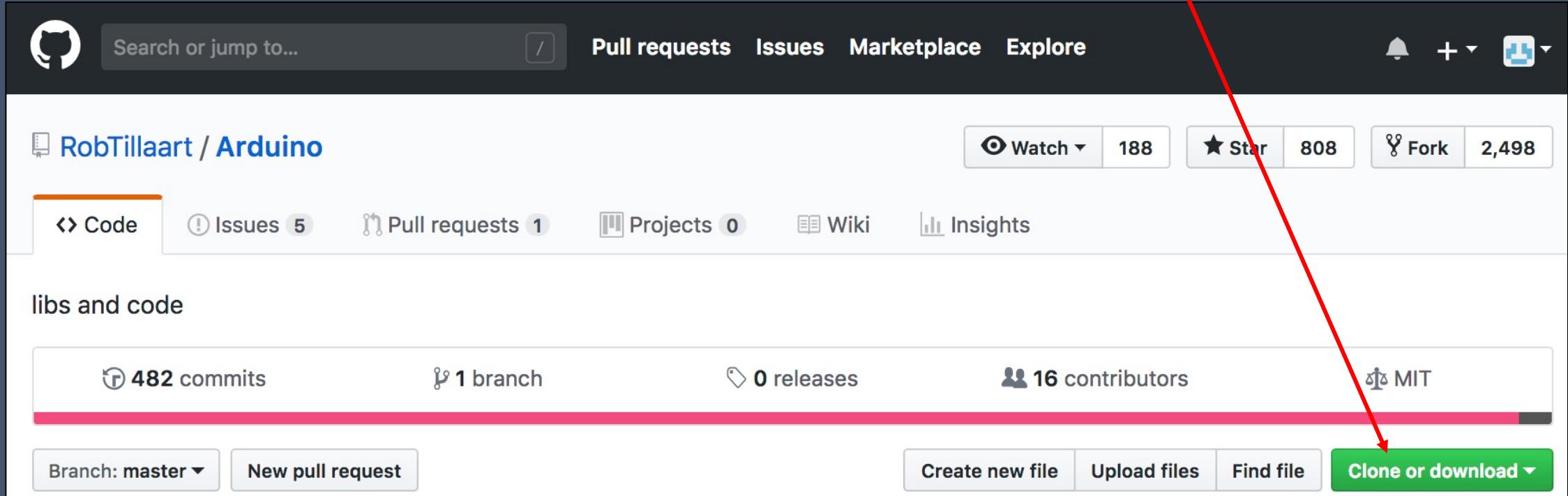
Search or jump to... / Pull requests Issues Marketplace Explore

RobTillaart / Arduino Watch 188 Star 808 Fork 2,498

Code Issues 5 Pull requests 1 Projects 0 Wiki Insights

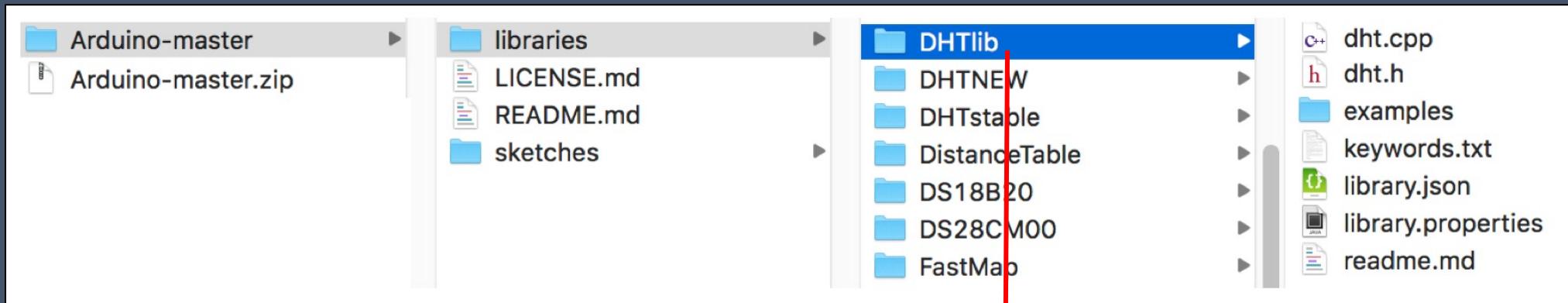
Branch: master ▾ Arduino / libraries / DHTlib / Create new file Upload files Find file History

		Latest commit dee30a3 14 days ago
RobTillaart	Fix issue #111 - DHT12 negative temperature	
..		
examples	0.1.27 added get + setDisableIRQ	6 months ago
dht.cpp	Fix issue #111 - DHT12 negative temperature	14 days ago
dht.h	Fix issue #111 - DHT12 negative temperature	14 days ago

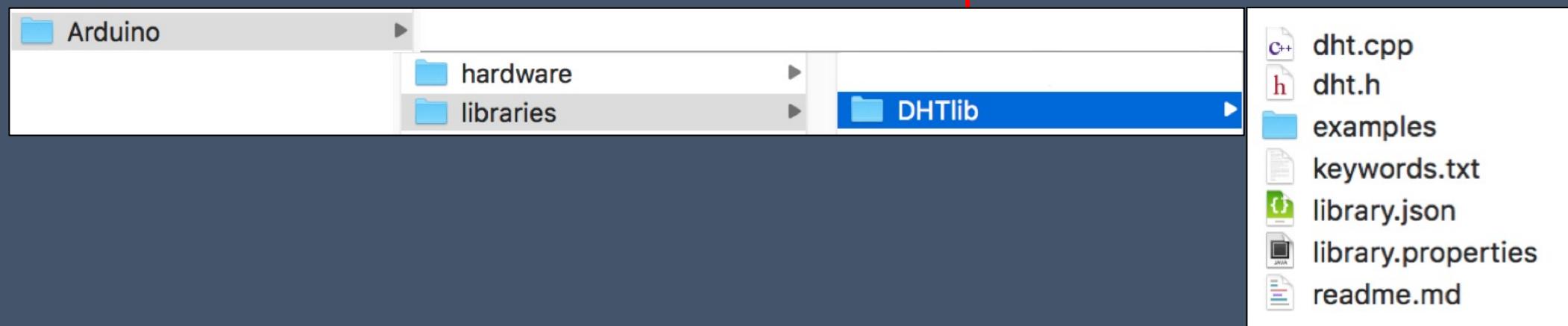


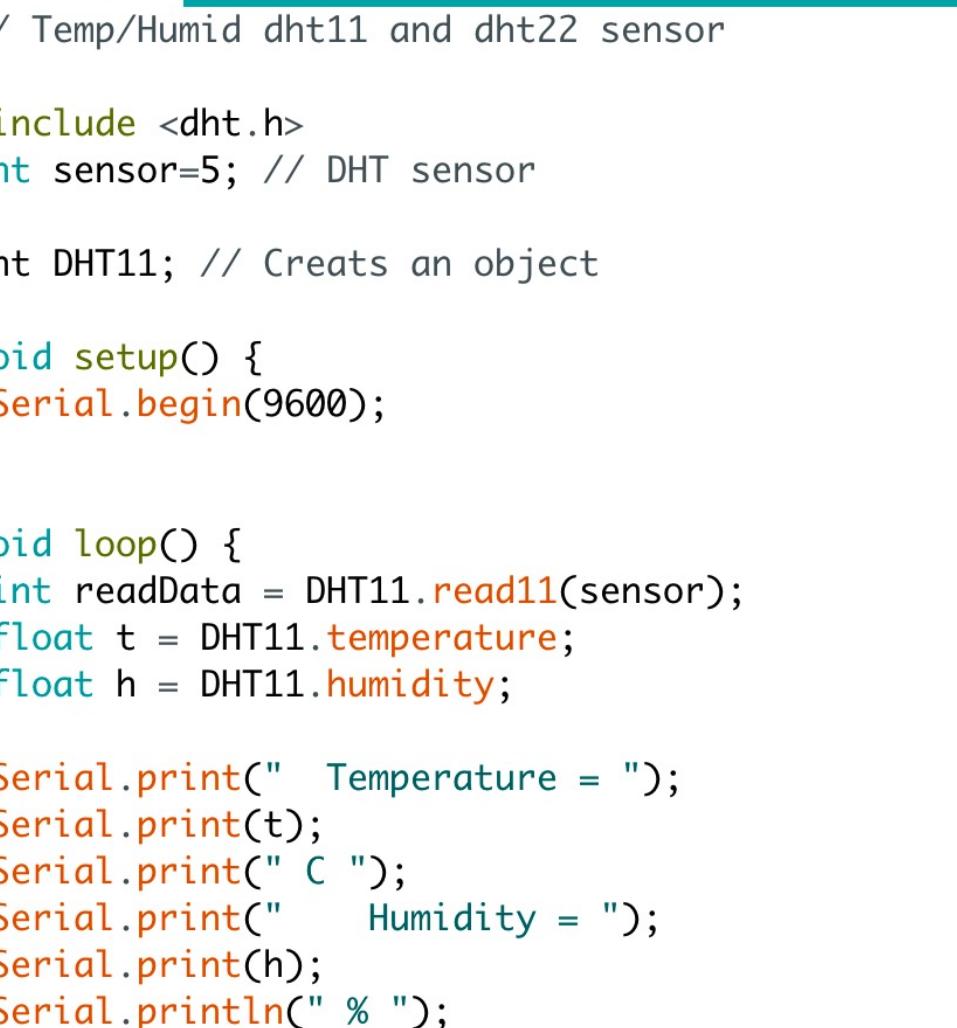
다운받은 ZIP 파일 압축 풀고 오픈

Download file



Arduino file

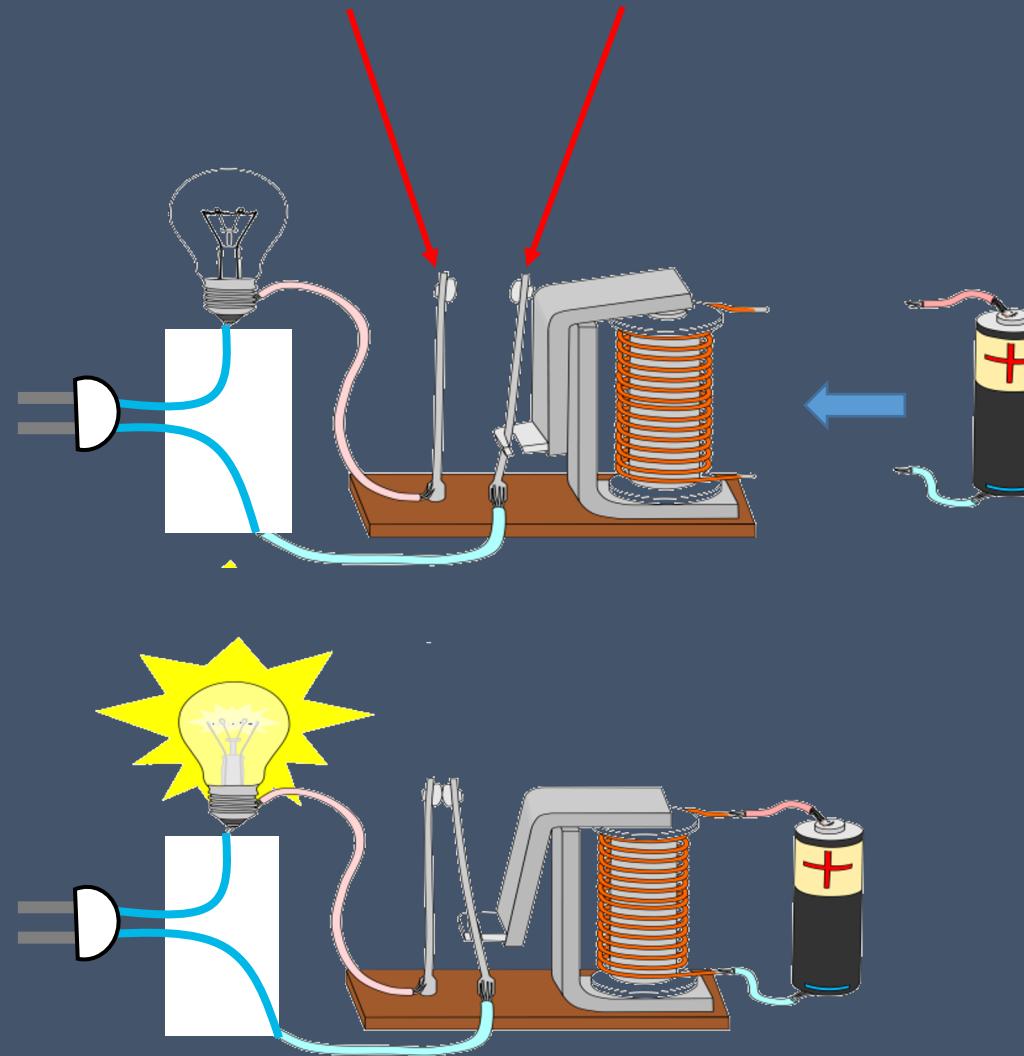


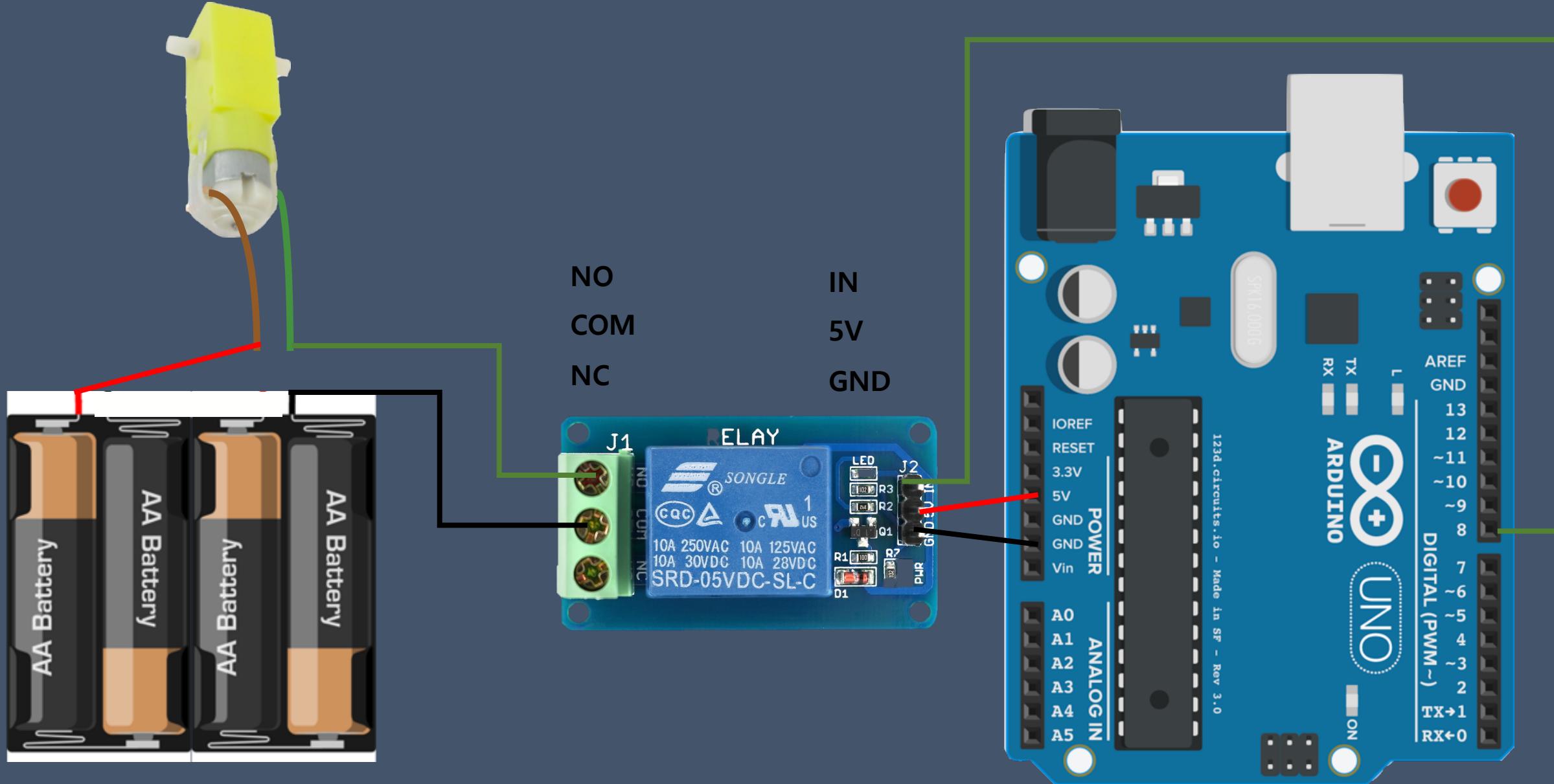


```
1 // Temp/Humid dht11 and dht22 sensor
2
3 #include <dht.h>
4 int sensor=5; // DHT sensor
5
6 dht DHT11; // Creates an object
7
8 void setup() {
9   Serial.begin(9600);
10 }
11
12 void loop() {
13   int readData = DHT11.read11(sensor);
14   float t = DHT11.temperature;
15   float h = DHT11.humidity;
16
17   Serial.print(" Temperature = ");
18   Serial.print(t);
19   Serial.print(" C ");
20   Serial.print(" Humidity = ");
21   Serial.print(h);
22   Serial.println(" % ");
23
24   delay(2000);
25 }
```

1) Relay for high power control

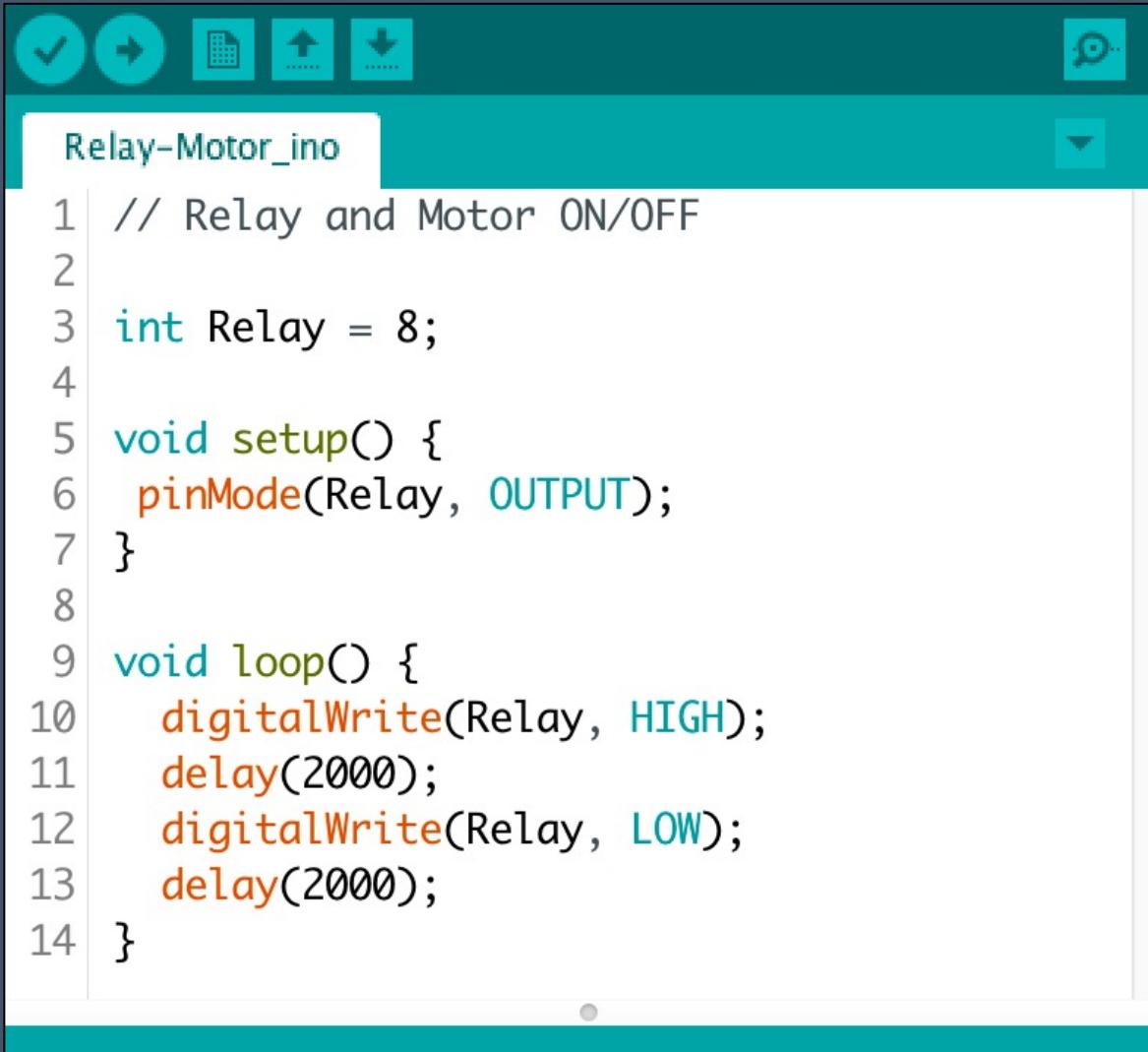
릴레이 구조 및 작동원리





1) Relay for high power control

Motor ON/OFF control through Relay Sketch



The screenshot shows the Arduino IDE interface with a sketch titled "Relay-Motor_ino". The code is as follows:

```
1 // Relay and Motor ON/OFF
2
3 int Relay = 8;
4
5 void setup() {
6     pinMode(Relay, OUTPUT);
7 }
8
9 void loop() {
10    digitalWrite(Relay, HIGH);
11    delay(2000);
12    digitalWrite(Relay, LOW);
13    delay(2000);
14 }
```