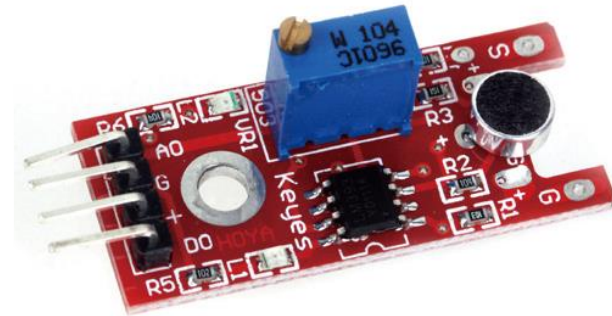
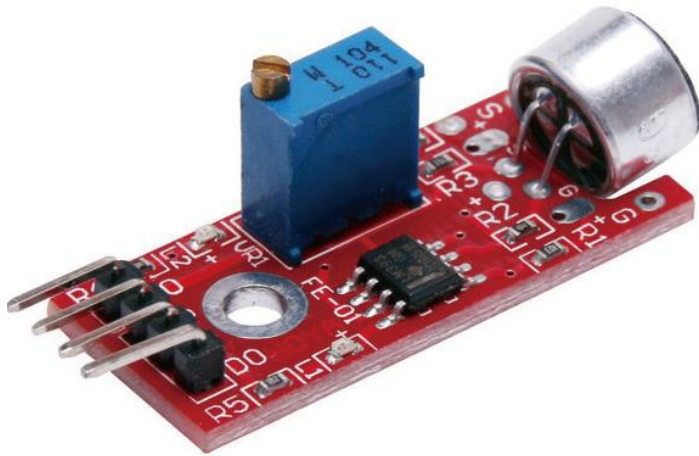


마이크 센서 실험

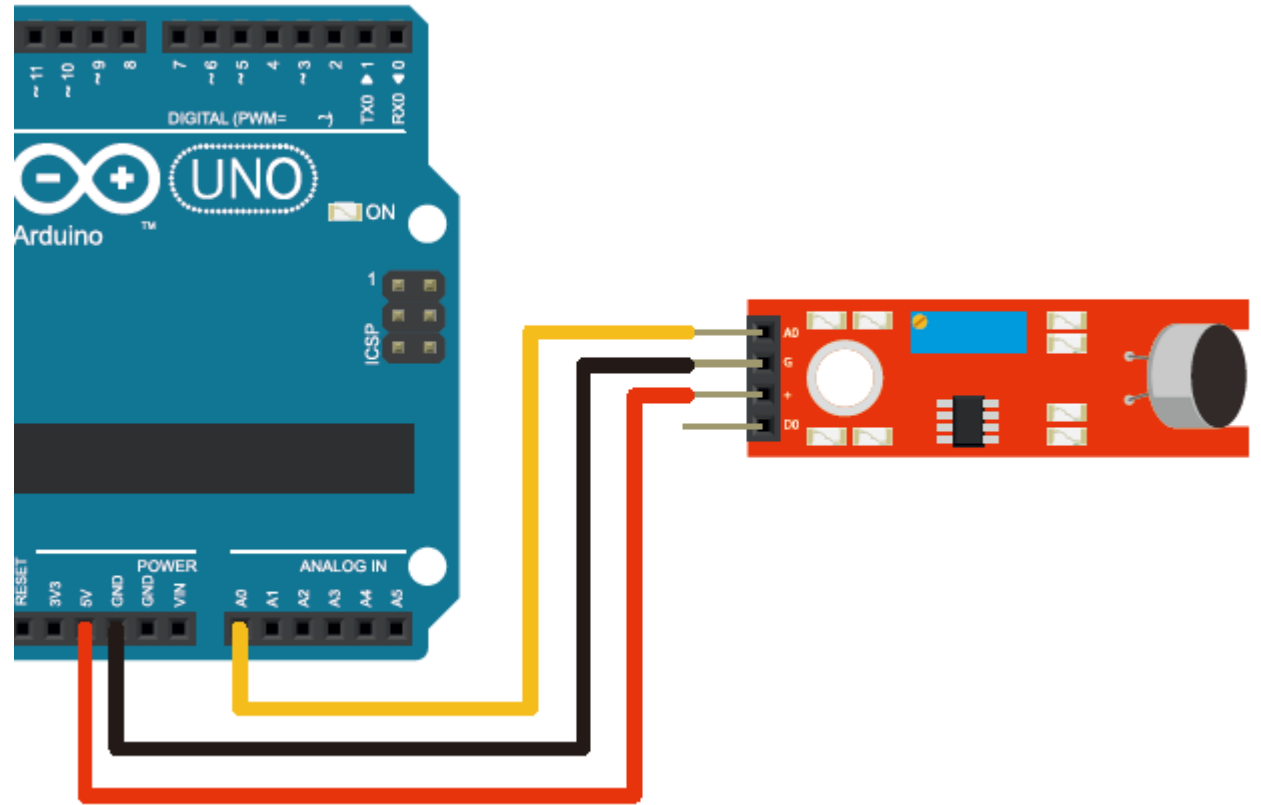
MIC(마이크) 센서

- 주변 소리의 크기를 감지할 수 있는 센서
- 소리의 크기에 따라 아날로그 전압을 출력

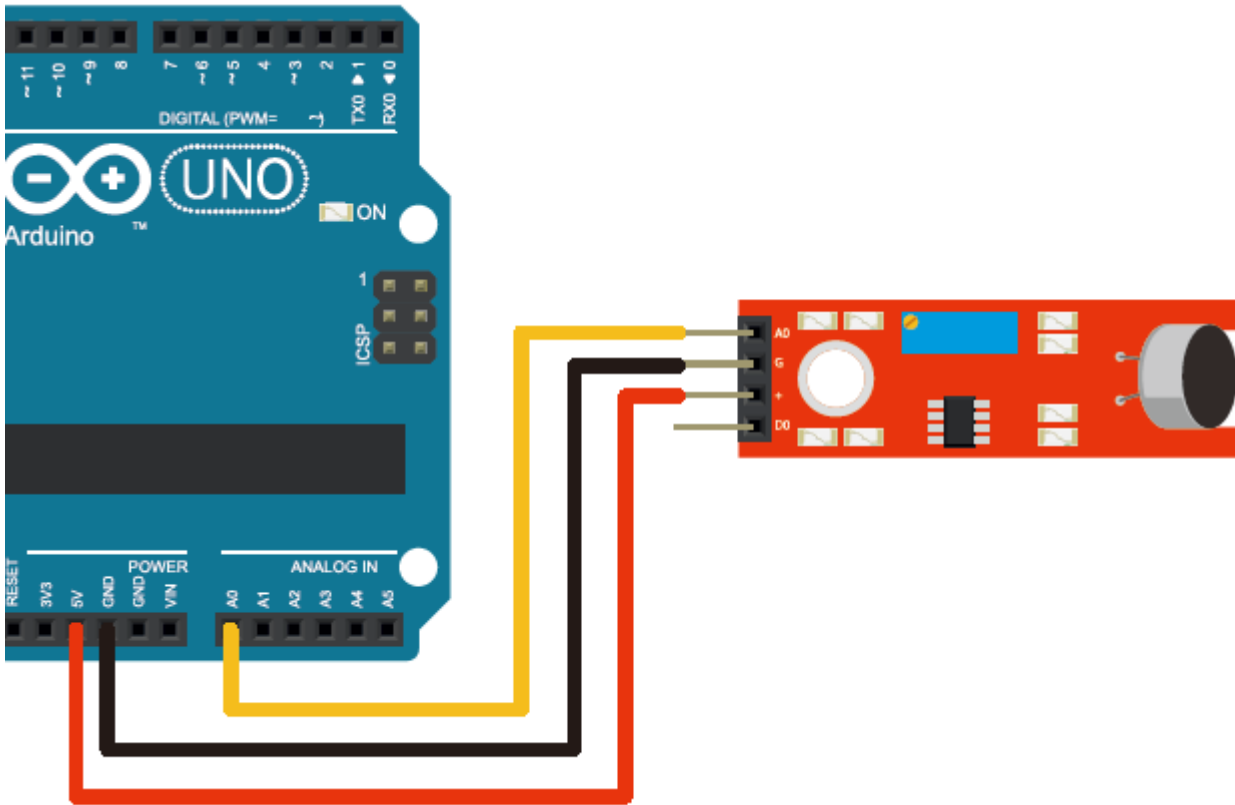


마이크 센서 실험

- G : GND(0V)
- + : VCC(5V)
- A0 : A0



마이크 센서 실험

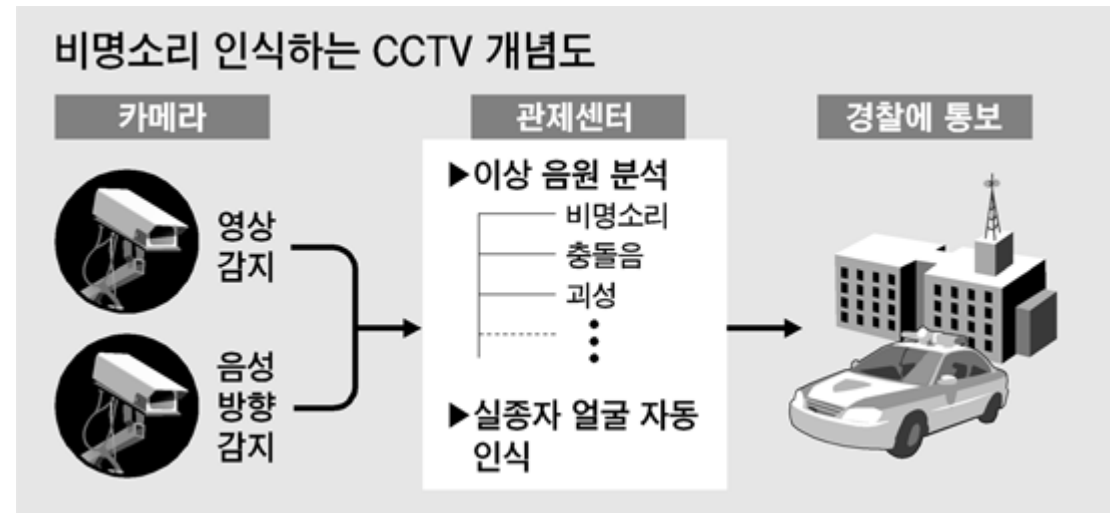


예제 : 7-0_mic

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

void loop()
{
  int val = analogRead(A0) ;
  Serial.println(val) ;
  delay(100) ;
}
```

마이크 센서 실험



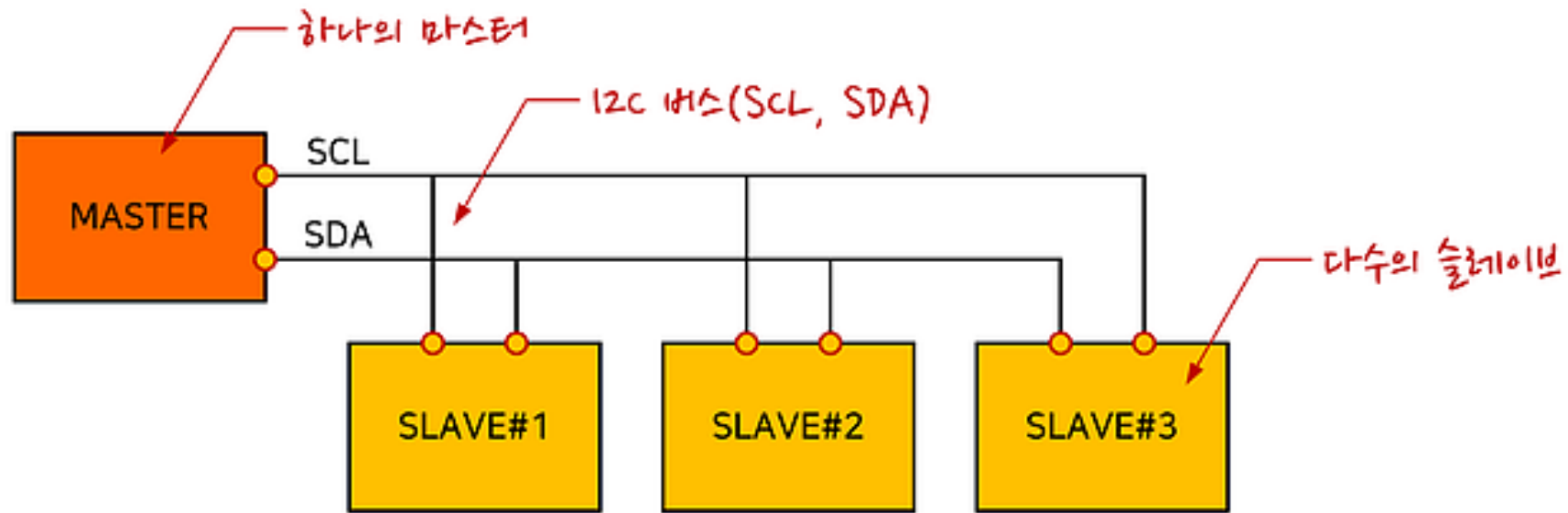
비접촉식 온도센서 실험

MLX90614

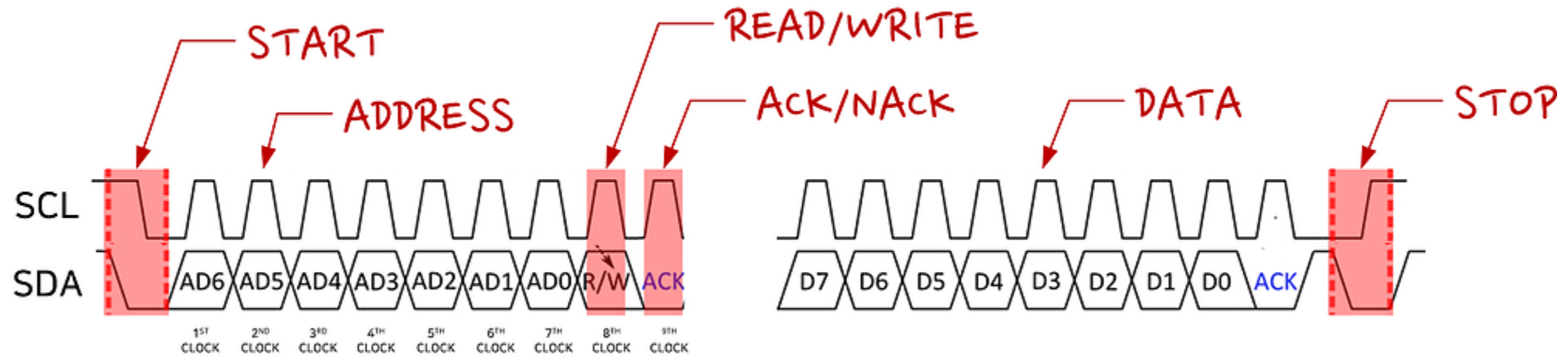
- 비접촉식 온도센서 모듈
- FOV 90°
- 측정범위 : -70°C ~ 380°C
- 인터페이스 : I2C



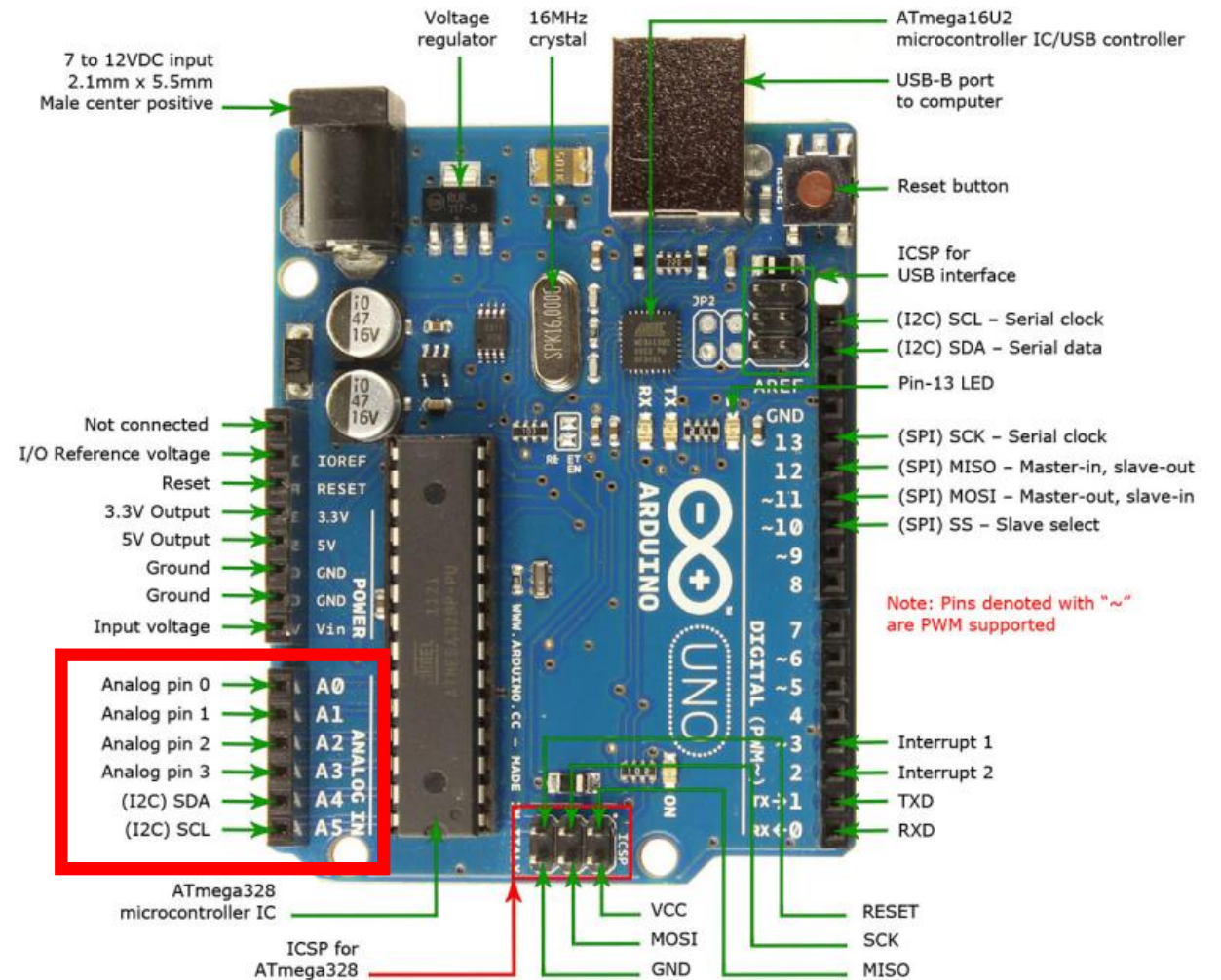
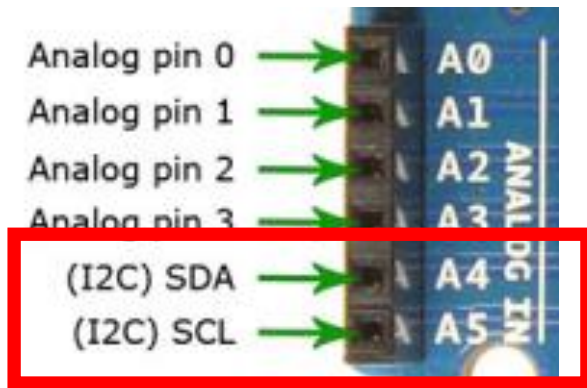
I2C 통신



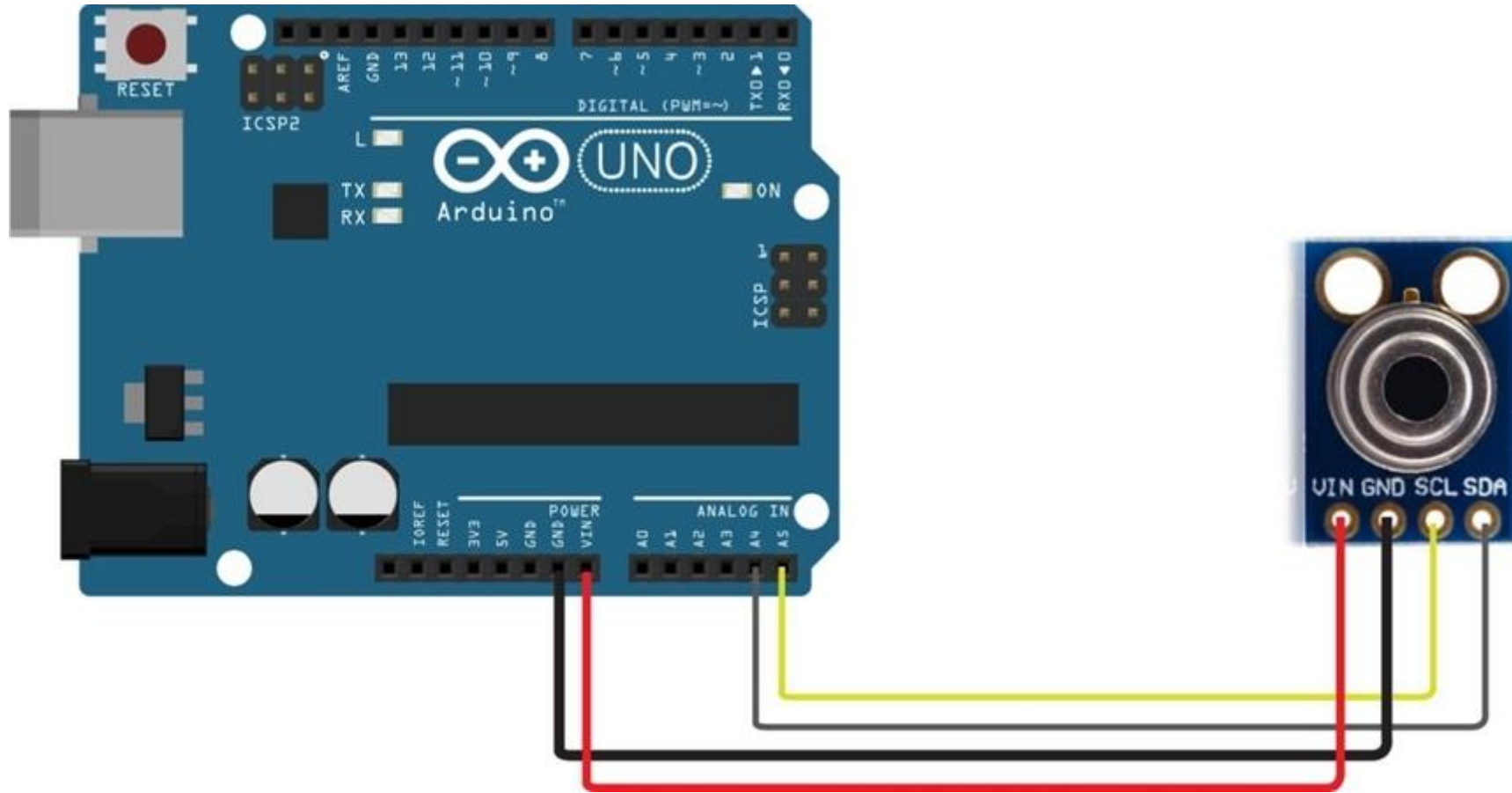
I2C 통신



아두이노의 I2C통신

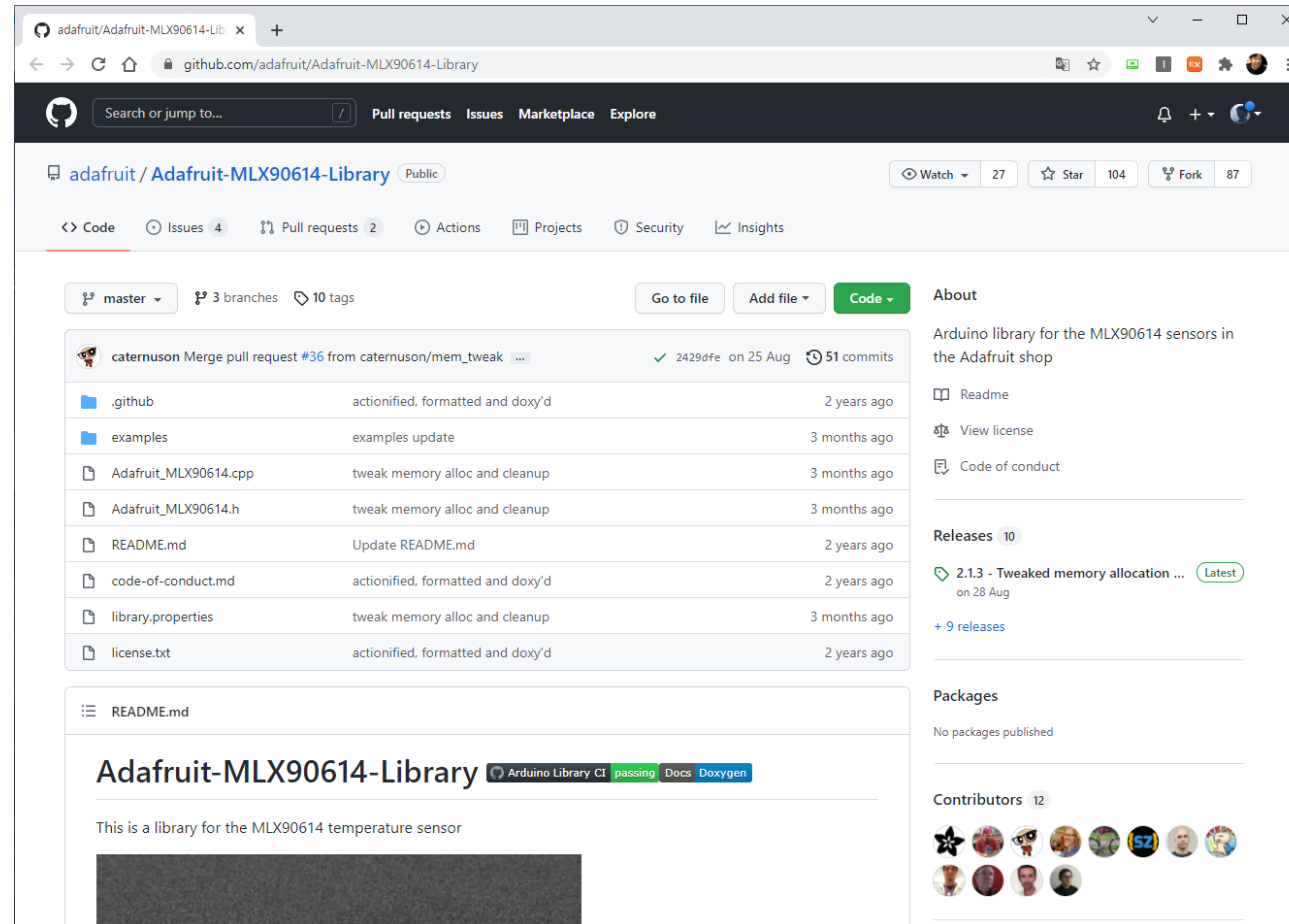


MLX90614 테스트



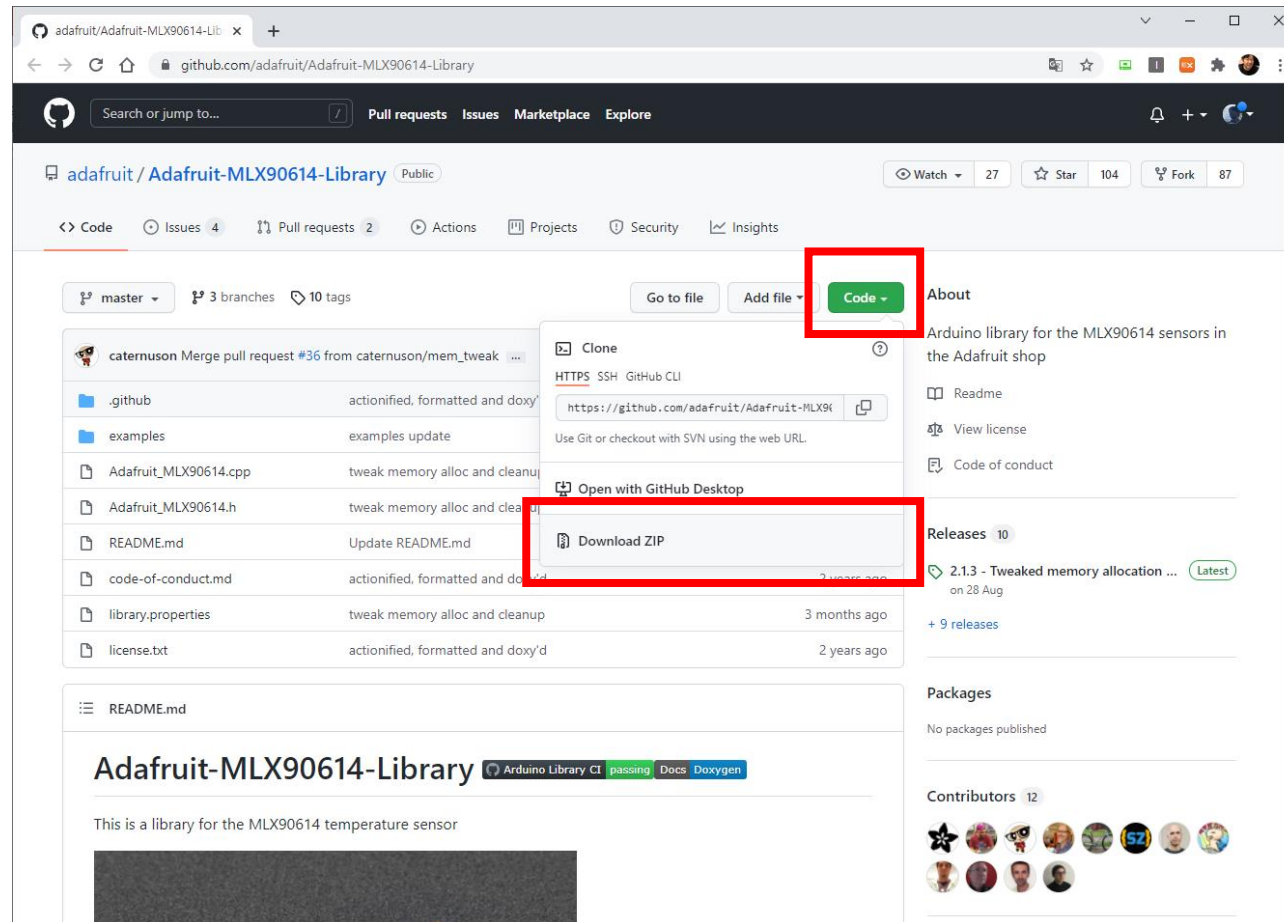
MLX90614 라이브러리 사용

- <https://github.com/adafruit/Adafruit-MLX90614-Library>

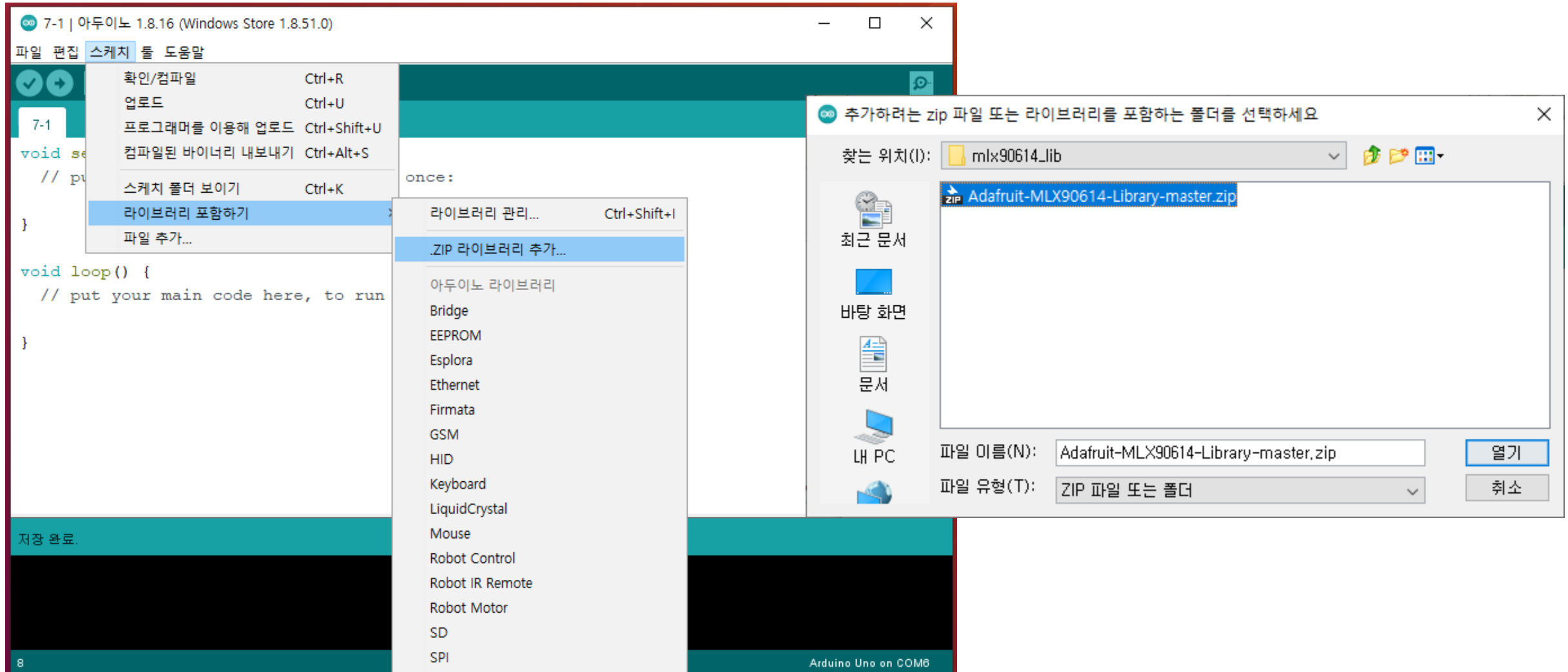


MLX90614 라이브러리 사용

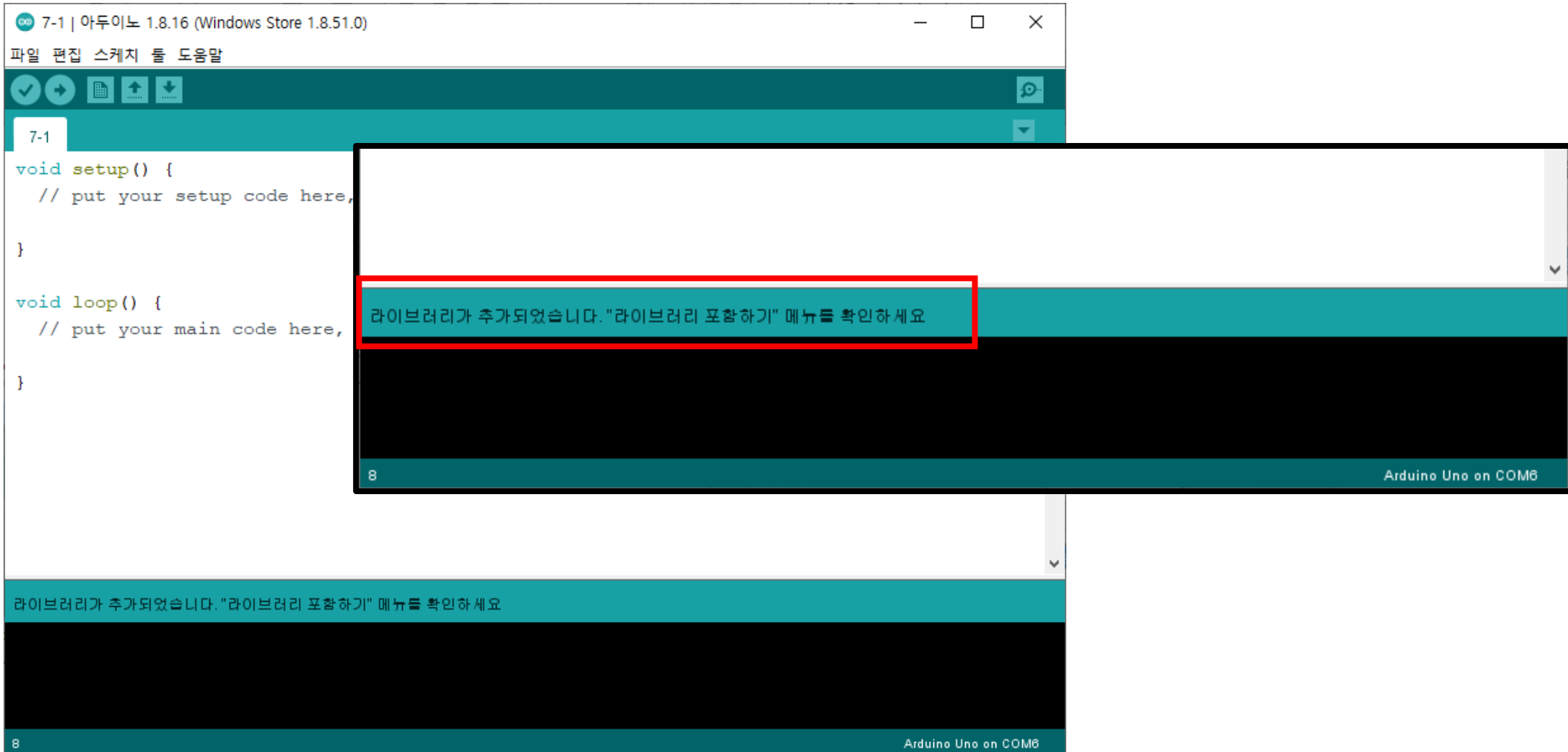
- <https://github.com/adafruit/Adafruit-MLX90614-Library>



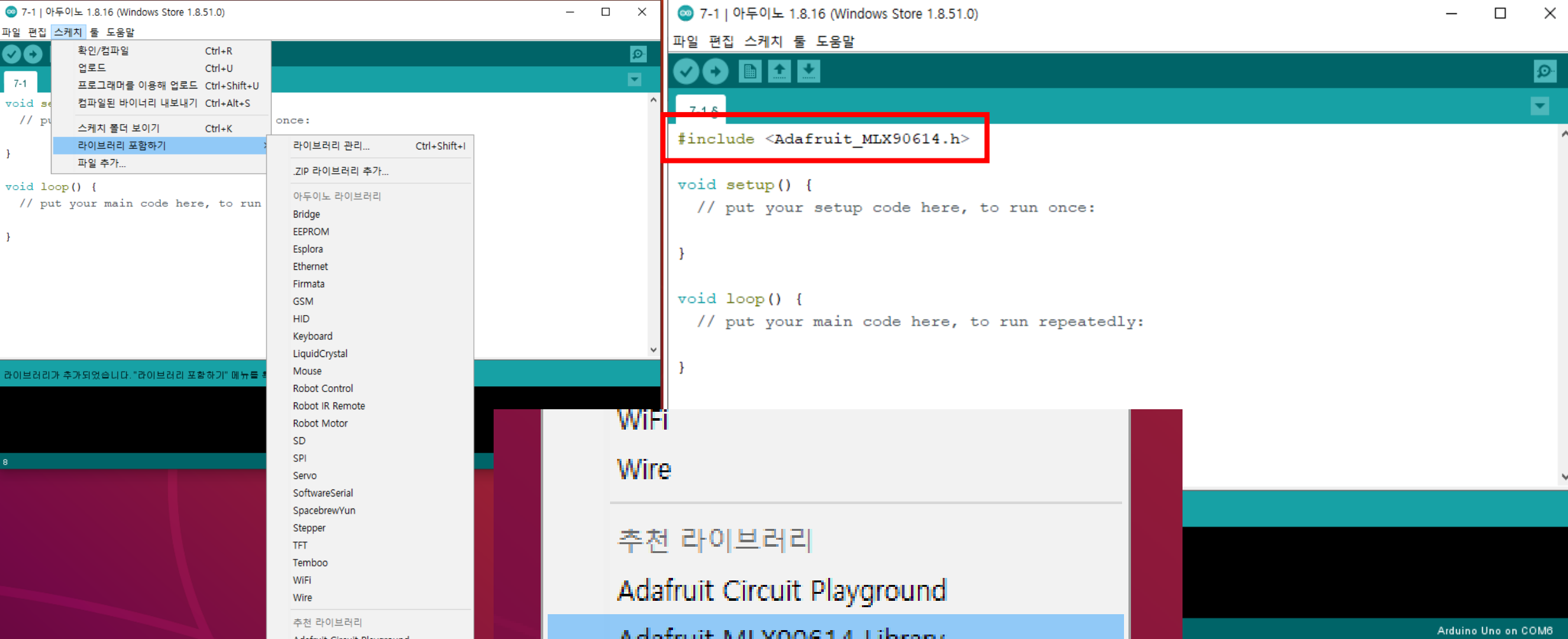
MLX90614 라이브러리 사용



MLX90614 라이브러리 사용



MLX90614 라이브러리 사용



The image shows the Arduino IDE interface with the 'Sketch' menu open. The 'Include Library' option is selected, and a list of libraries is displayed. The 'Adafruit MLX90614 Library' is highlighted. The code editor shows the following code:

```
#include <Adafruit_MLX90614.h>

void setup() {
  // put your setup code here, to run once:
}

void loop() {
  // put your main code here, to run repeatedly:
}
```

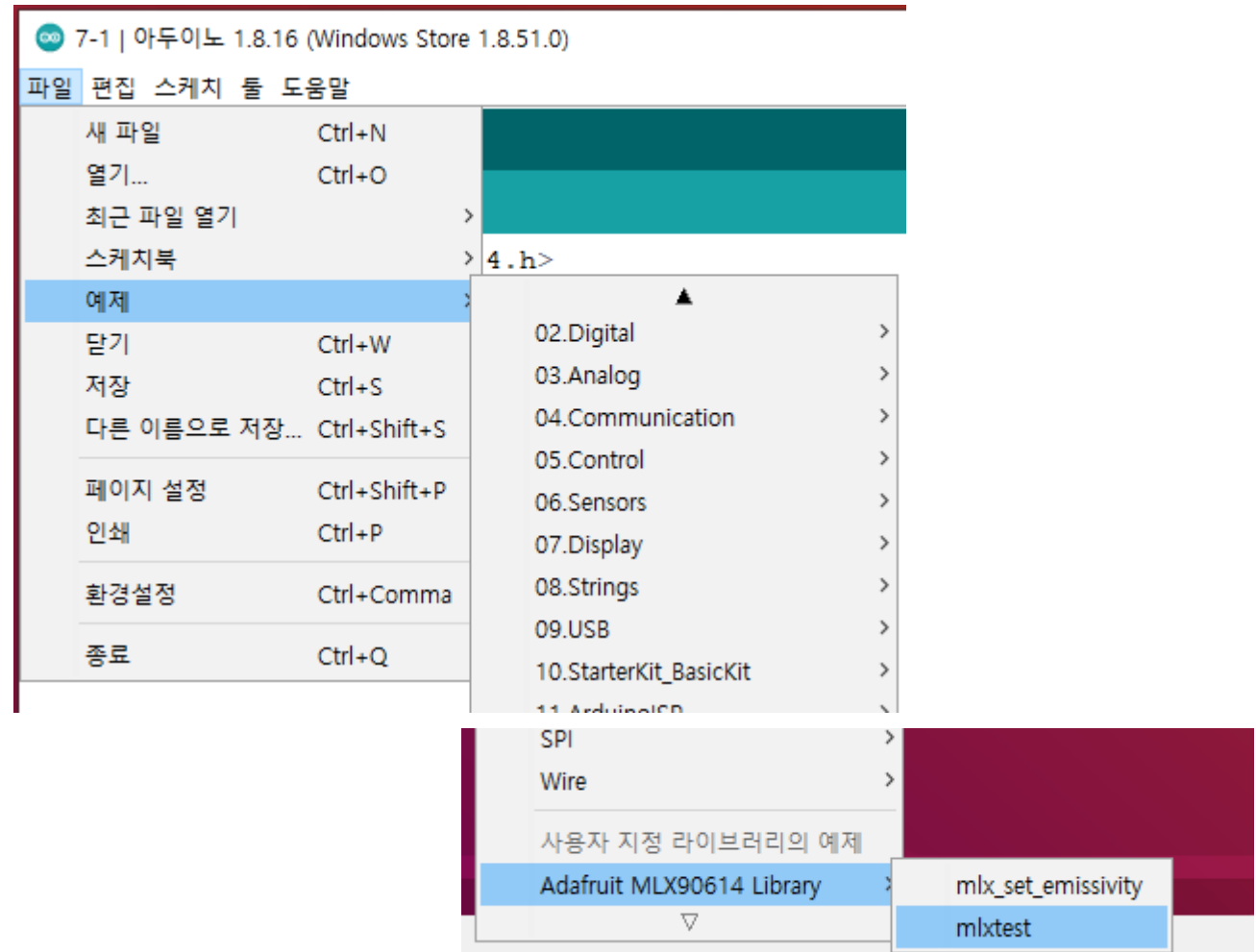
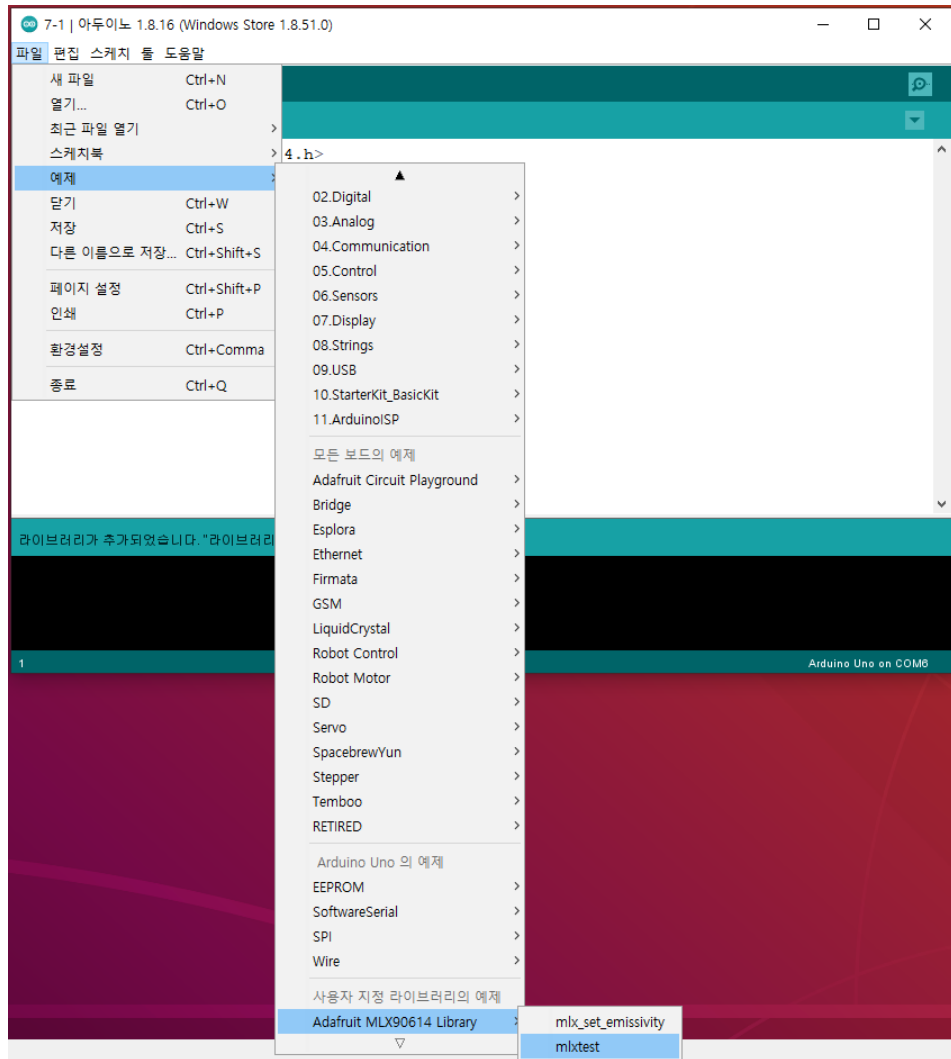
Below the code editor, there is a section titled '추천 라이브러리' (Recommended Libraries) with the following text:

WIFI
Wire

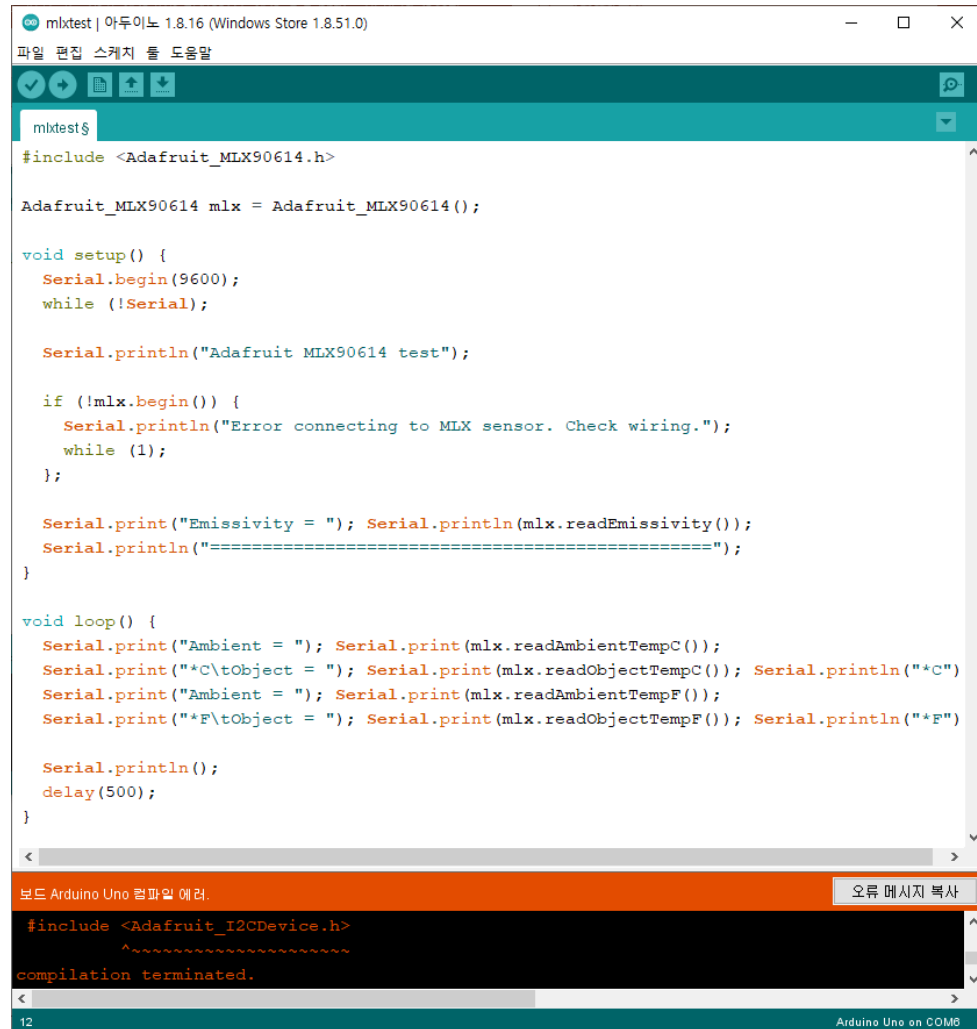
추천 라이브러리
Adafruit Circuit Playground
Adafruit MLX90614 Library

The bottom right corner of the IDE window shows 'Arduino Uno on COM8'.

MLX90614 라이브러리 예제 테스트



MLX90614 라이브러리 예제 테스트



```
mlxtest | 아두이노 1.8.16 (Windows Store 1.8.51.0)
파일 편집 스케치 툴 도움말
mlxtest$
#include <Adafruit_MLX90614.h>

Adafruit_MLX90614 mlx = Adafruit_MLX90614();

void setup() {
  Serial.begin(9600);
  while (!Serial);

  Serial.println("Adafruit MLX90614 test");

  if (!mlx.begin()) {
    Serial.println("Error connecting to MLX sensor. Check wiring.");
    while (1);
  };

  Serial.print("Emissivity = "); Serial.println(mlx.readEmissivity());
  Serial.println("=====");
}

void loop() {
  Serial.print("Ambient = "); Serial.print(mlx.readAmbientTempC());
  Serial.print("C\tObject = "); Serial.print(mlx.readObjectTempC()); Serial.println("C");
  Serial.print("Ambient = "); Serial.print(mlx.readAmbientTempF());
  Serial.print("F\tObject = "); Serial.print(mlx.readObjectTempF()); Serial.println("F");

  Serial.println();
  delay(500);
}
```

보드 Arduino Uno 컴파일 에러. 오류 메시지 복사

```
#include <Adafruit_I2CDevice.h>
^~~~~~
compilation terminated.
```

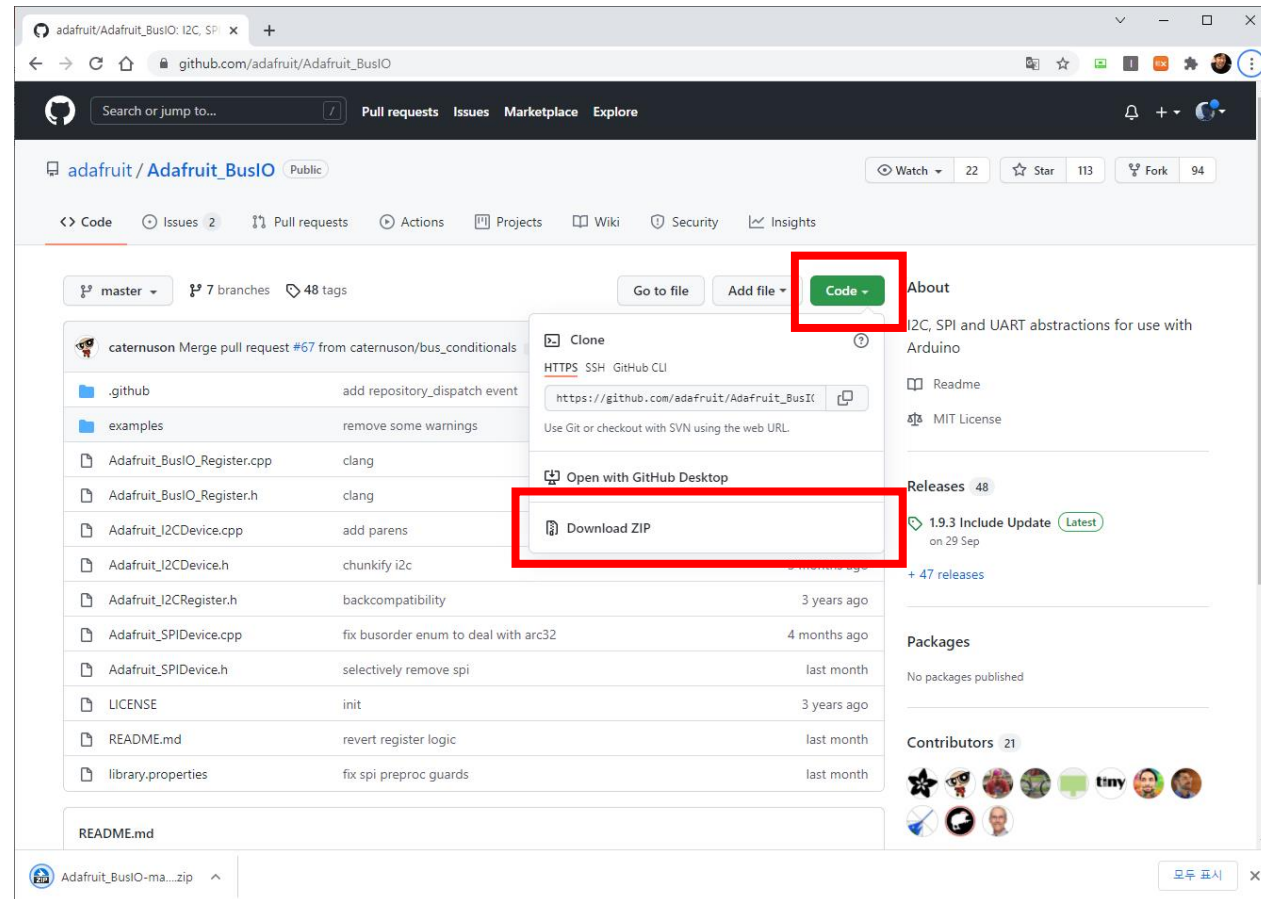
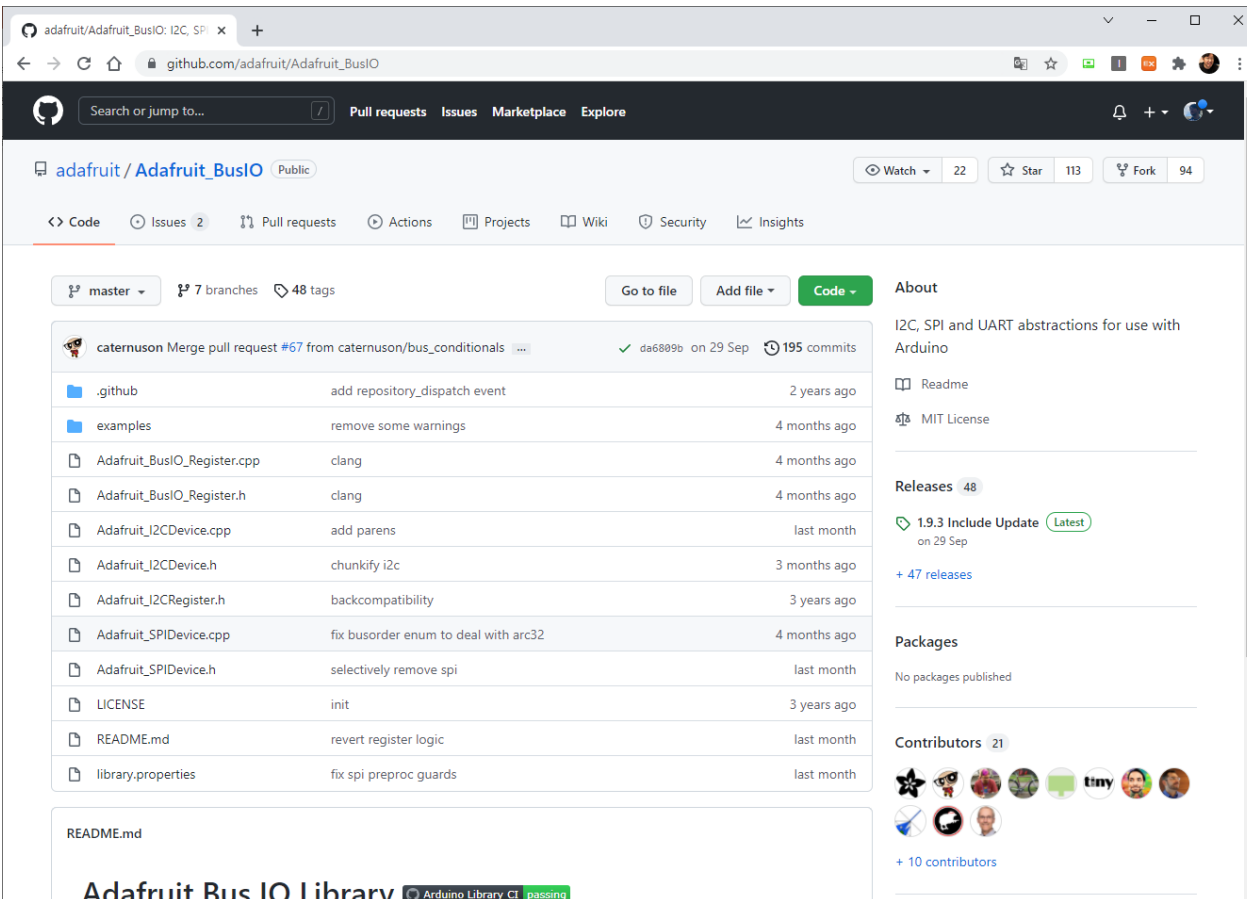
12 Arduino Uno on COM8

보드 Arduino Uno 컴파일 에러.

```
#include <Adafruit_I2CDevice.h>
^~~~~~
compilation terminated.
```

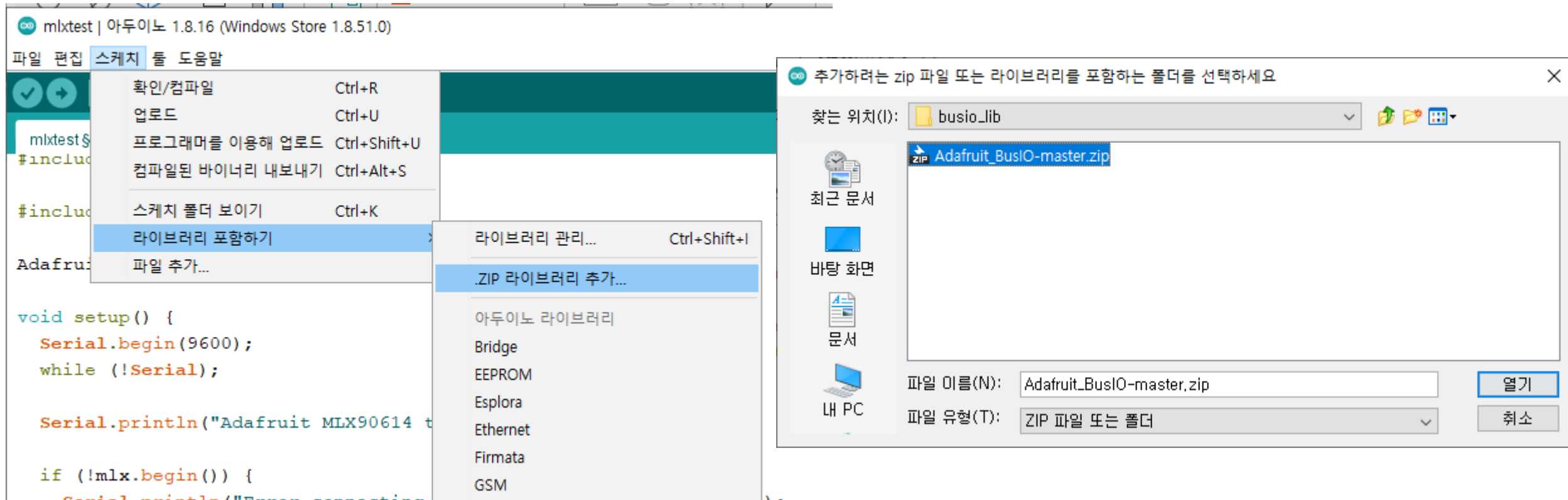
MLX90614 라이브러리 예제 테스트

- https://github.com/adafruit/Adafruit_BusIO 라이브러리 다운로드



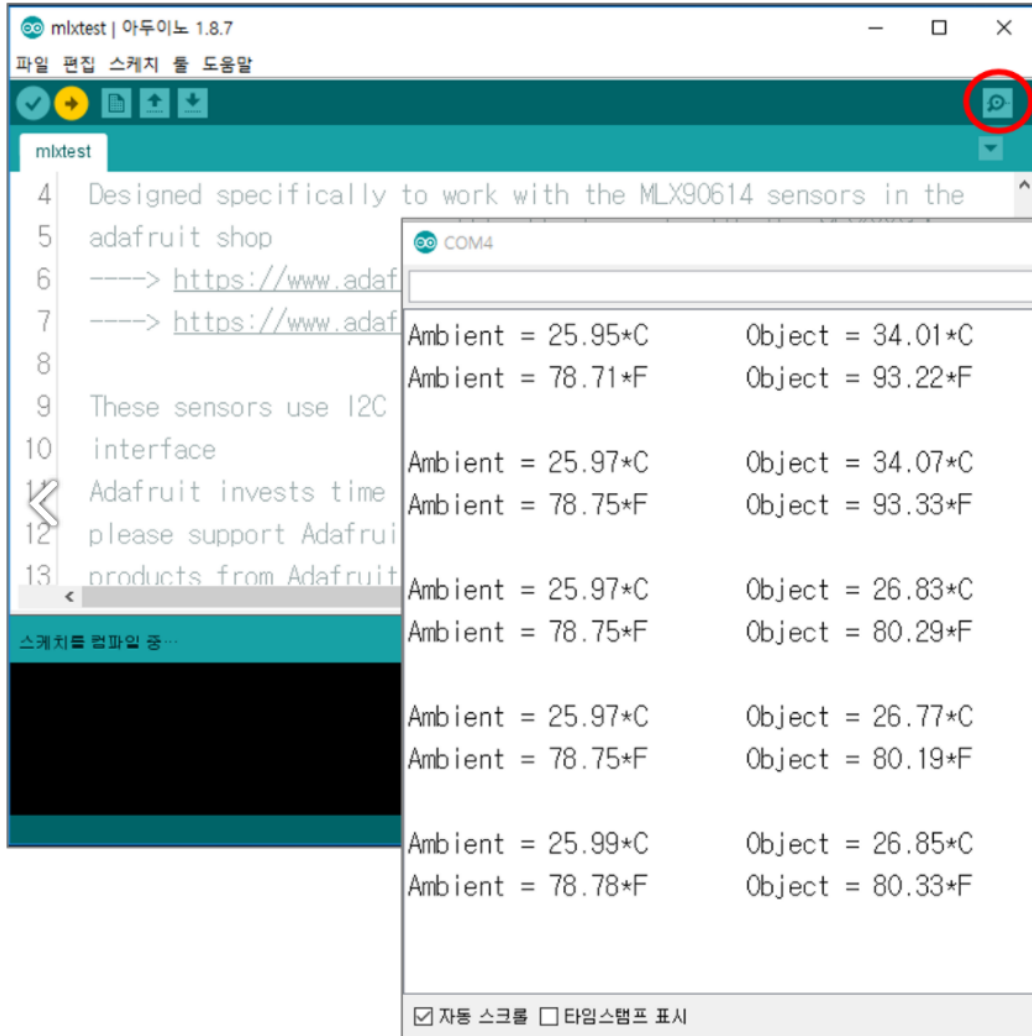
MLX90614 라이브러리 예제 테스트

- https://github.com/adafruit/Adafruit_BusIO 라이브러리 추가



MLX90614 라이브러리 예제 테스트

예제 7-1



The screenshot shows the Arduino IDE interface. The top window displays the 'mlxtest' sketch, which is a test program for the MLX90614 non-contact infrared thermometer. The code includes comments and two URLs for more information. The bottom window shows the serial monitor connected to COM4, displaying real-time temperature readings in both Celsius and Fahrenheit. A red circle highlights the serial monitor icon in the top right corner of the IDE window.

```
4 Designed specifically to work with the MLX90614 sensors in the
5 adafruit shop
6 ----> https://www.adafruit.com/product/251
7 ----> https://www.adafruit.com/product/251
8
9 These sensors use I2C
10 interface
11 Adafruit invests time and resources into developing and
12 please support Adafruit hardware by purchasing our
13 products from Adafruit
```

Ambient (C)	Object (C)	Ambient (F)	Object (F)
25.95	34.01	78.71	93.22
25.97	34.07	78.75	93.33
25.97	26.83	78.75	80.29
25.97	26.77	78.75	80.19
25.99	26.85	78.78	80.33



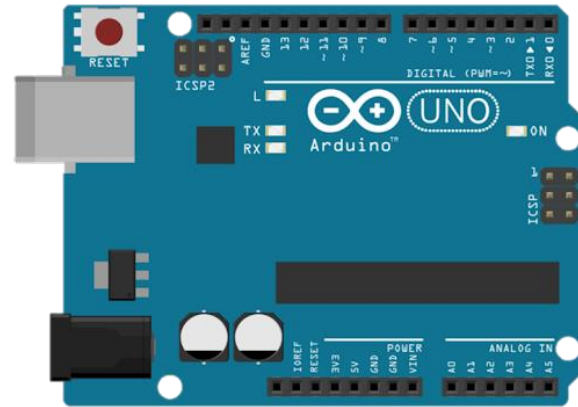
응용 : 체온 측정 출입 관리

전체 구성

손(물체) 유무 감지
(예제 6-1)



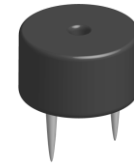
온도 측정
(예제 7-1)



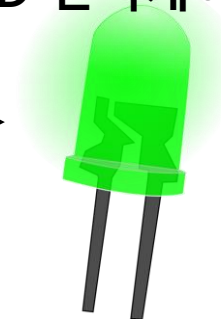
정보 출력(시리얼통신)



측정 완료 경고음 발생



LED 인디케이터



물체감지 + 온도체크

- 물체감지 체크 : 아두이노 5번핀



- 온도체크

