

창의 공학



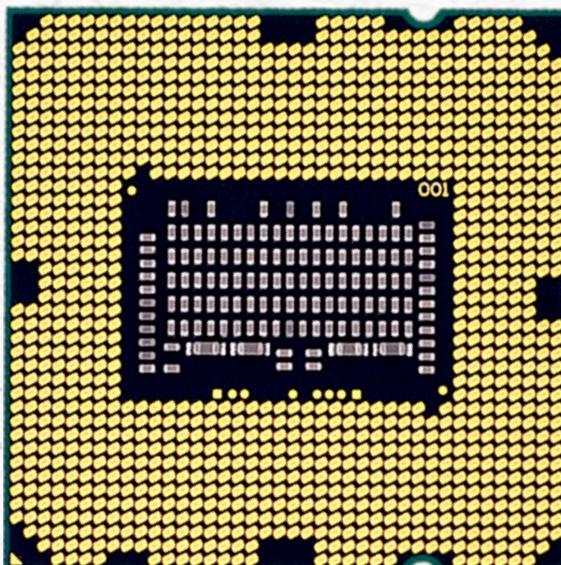
양 세훈

코스 학습 및 실습 내용

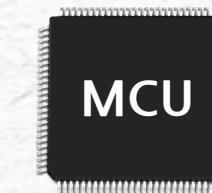
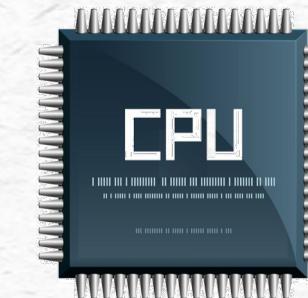
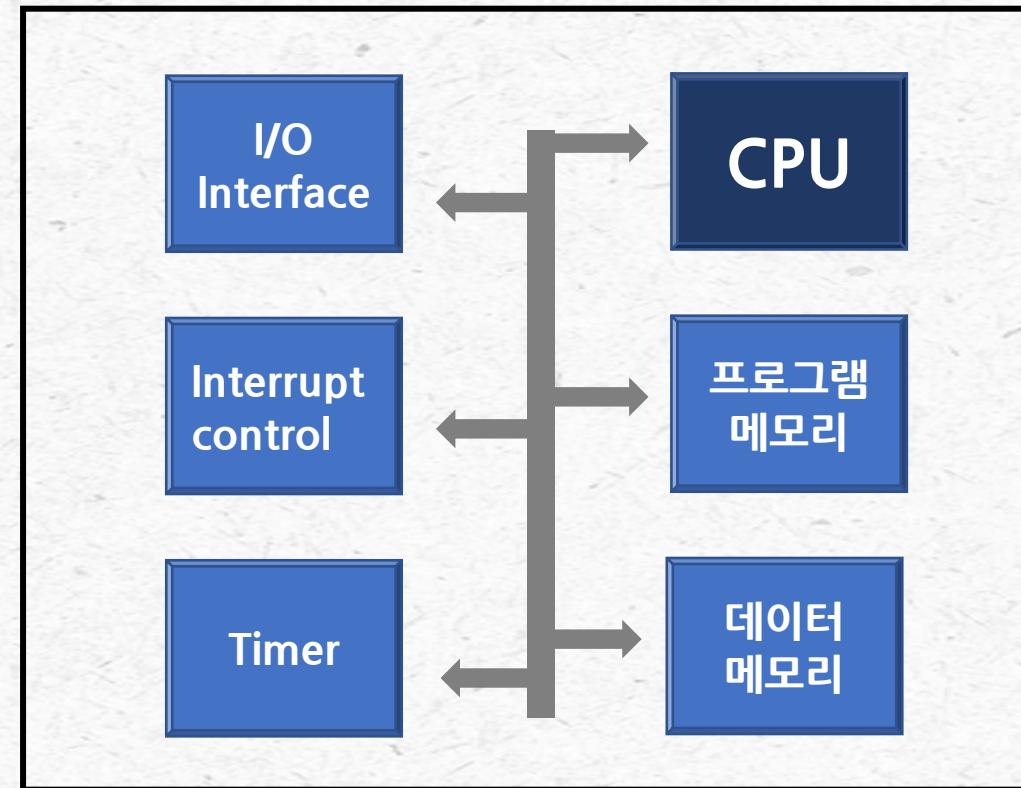
1. 디지털 : 출력, 입력
2. 아날로그 : 입력, 출력
3. 센서 ,기기 연결 및 컨트롤
4. 무선 컨트롤 (RFID, 블루투스, 와이파이)
5. 앱 제작

@ Concurrent Learning

CPU vs. MCU. vs. FPGA



CPU vs MCU



FPGA

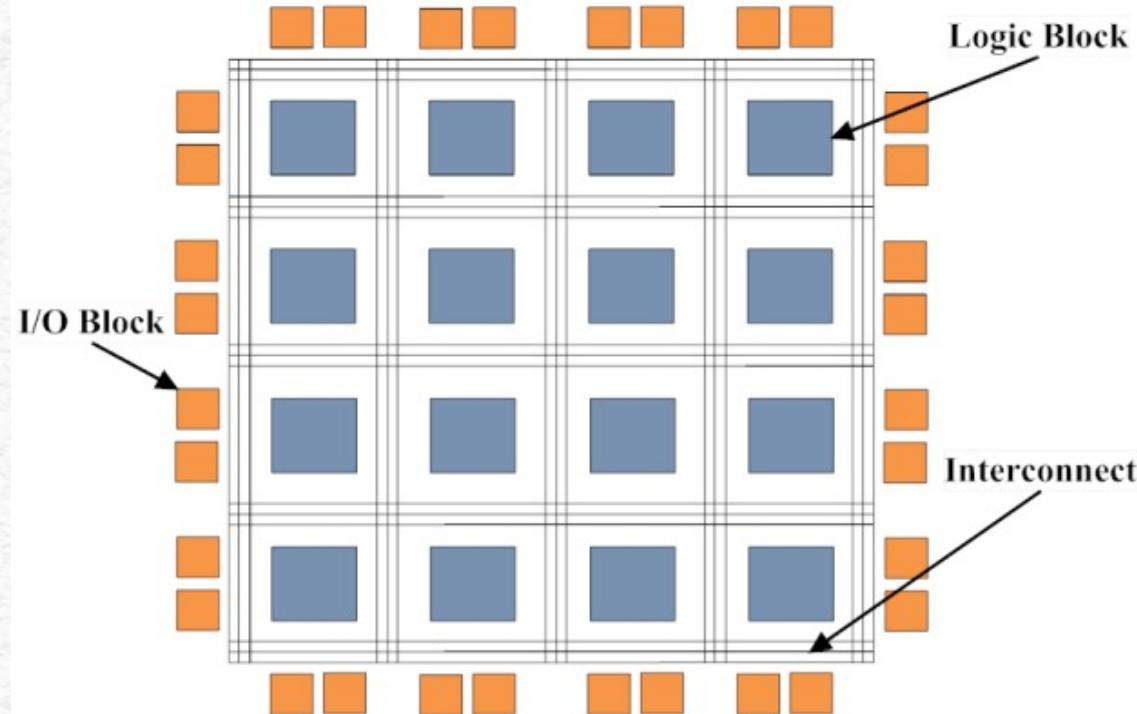


image : Univ. of California, Riverside

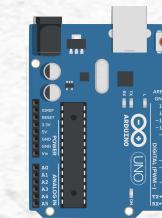
Power consumption and price



PC
60W~
₩ 1,000,000 ~

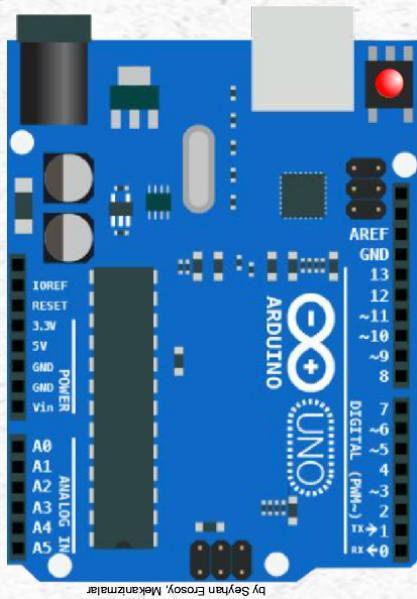


CPU
5W~
₩ 100,000 ~



MCU
0.02W~
₩ 5,000 ~

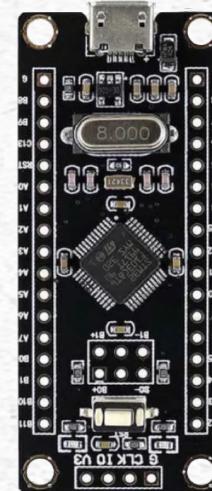
MCU 개발 보드 예



아두이노 우노



ESP32



STM32F4



PICO

CPU 개발 보드 예



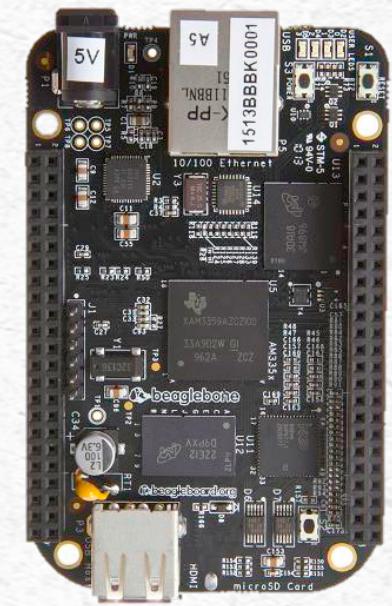
라즈베리파이



젯슨 나노



구글 코랄



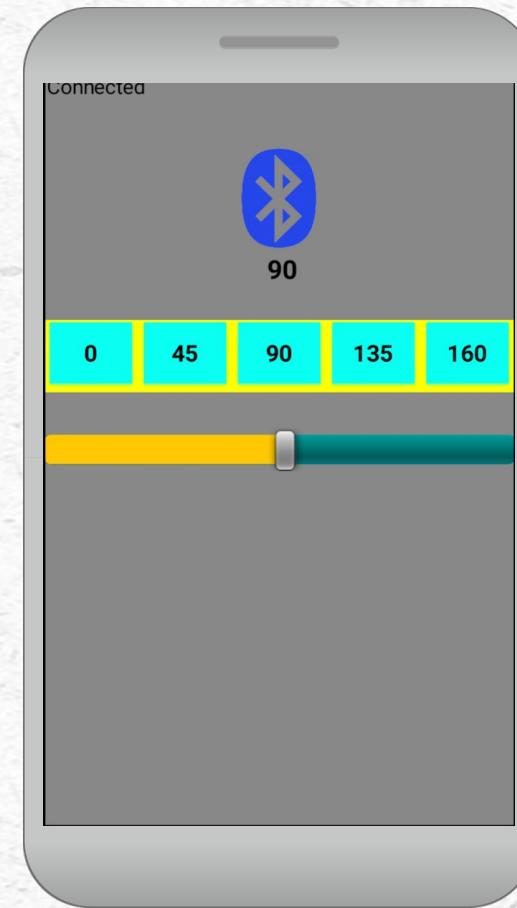
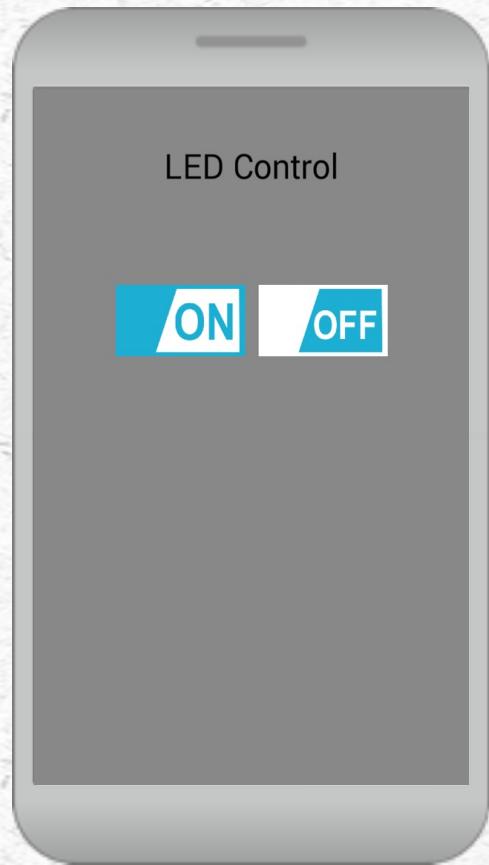
비글본 블랙

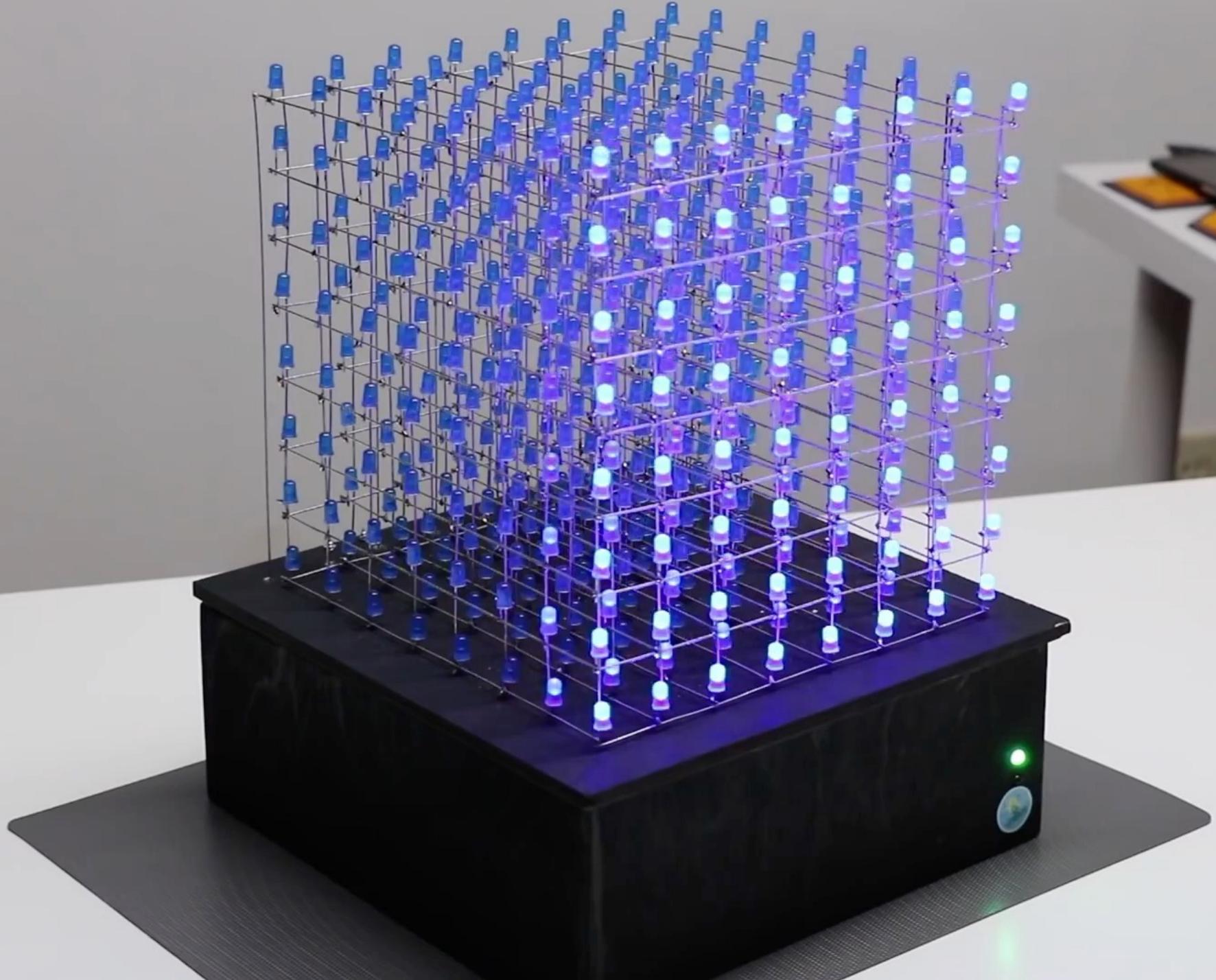
마이크로 컨트롤러 예시

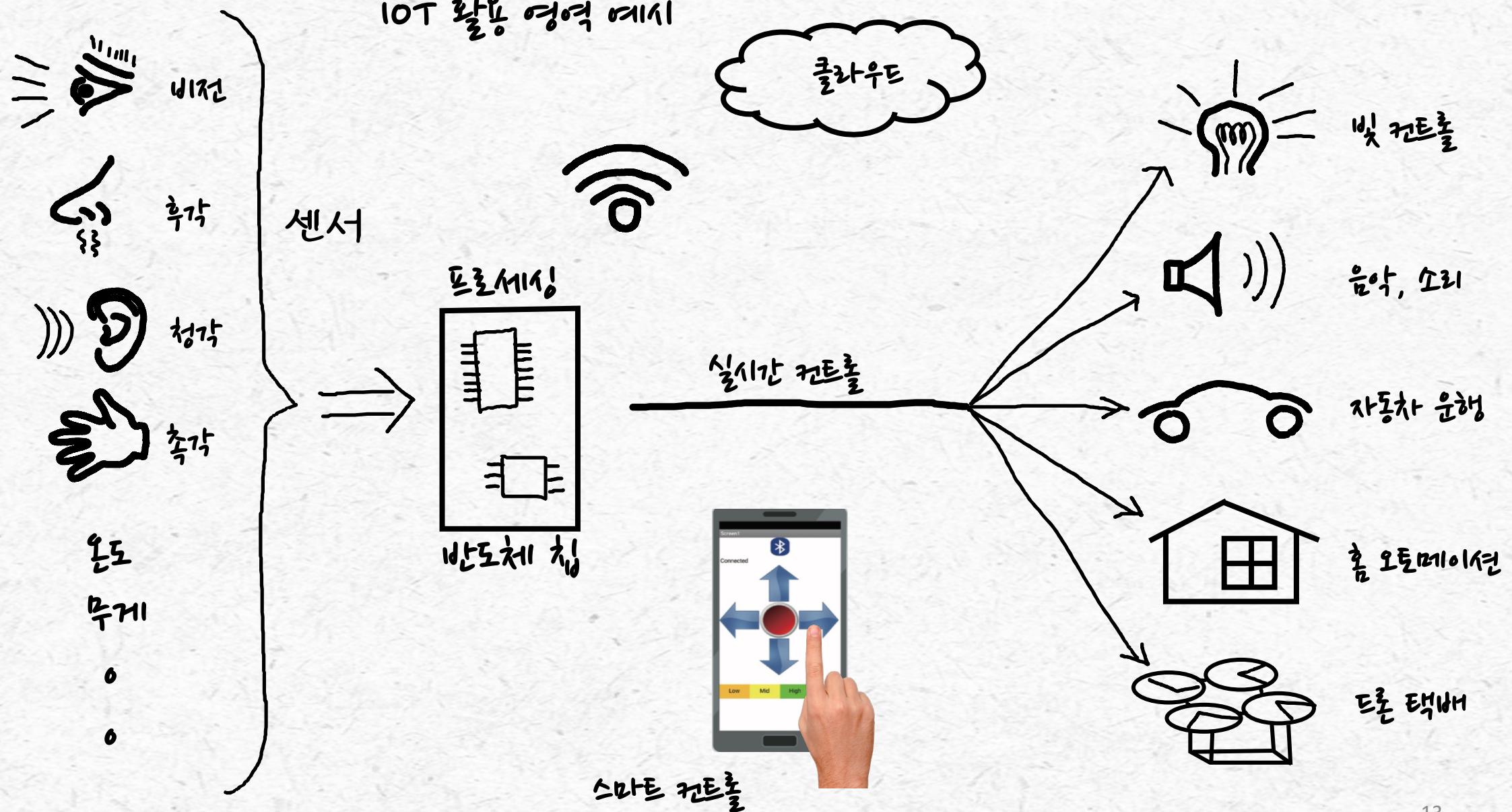




수업 제작 앱 : 예시





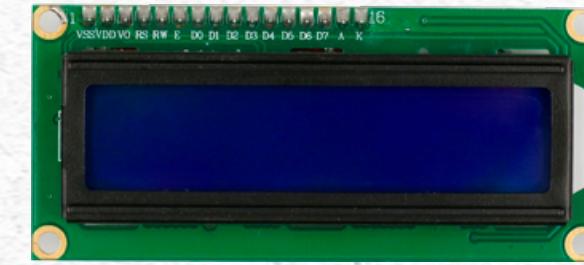
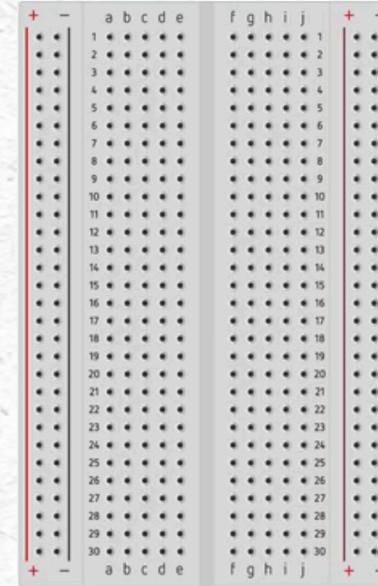
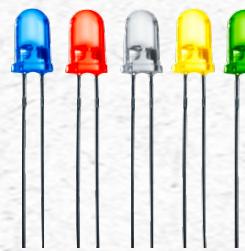
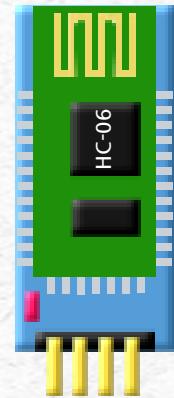
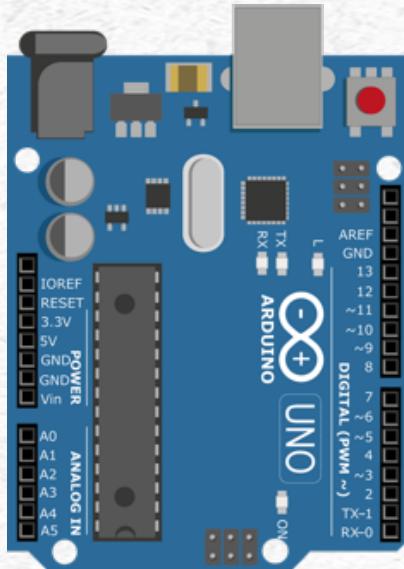




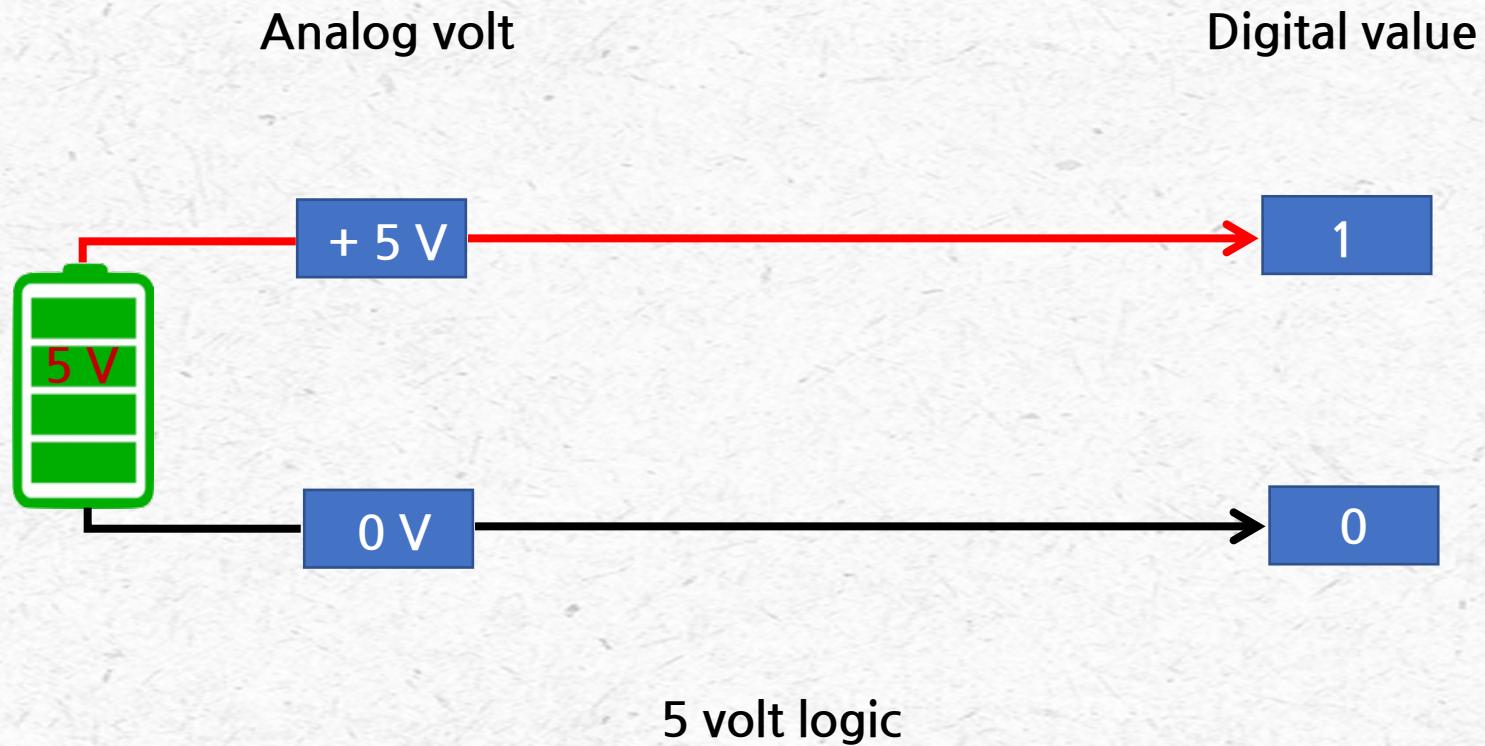
What is the Arduino

**Is it hardware ?
is it software ?**

수업 기자재 예



Digital and Analog signal



How many syntax ?

pinMode
HIGH, LOW
digitalWrite
digitalRead
analogRead
analogWrite
INPUT, OUTPUT
void
setup
loop
delay

21

for
if else
while
int
long
float
Serial.begin
Serial.print

#include
#define
const
char
String
pulseIn
attachInterrupt
tone, noTone
delayMicroseconds
millis
Serial.available
readStringUntil

12

==
!
!=
>
<
++
--
&&
||

9

Wire.begin
Wire.onReceive
Wire.onRequest
Wire.write
Wire.read
Wire.beginTransmission
Wire.endTransmission
Wire.available
SPI.begin

WiFiServer
WiFi.begin
WiFiClient
HTML
indexOf

9

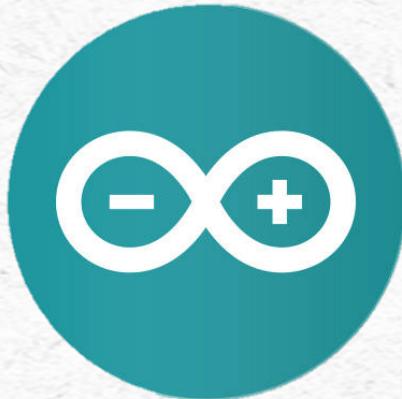
total = 56

5



Arduino IDE Download

Arduino= Hardware + Software



arduino download

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<https://www.arduino.cc> › software

Software | Arduino

Dec 20, 2021 — Downloads. Arduino IDE 1.8.19. The open-source **Arduino Software (IDE)** makes it easy ...

Previous Release 1.8.18 · Donate · Getting Started · Release Notes

HARDWARE SOFTWARE CLOUD DOCUMENTATION ▾ COMMUNITY ▾ BLOG ABOUT

Downloads

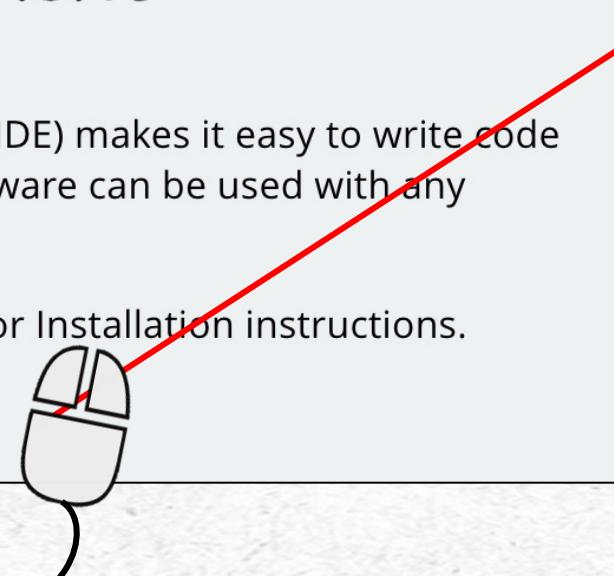


Arduino IDE 1.8.19

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the [Getting Started](#) page for Installation instructions.

SOURCE CODE



DOWNLOAD OPTIONS

Windows Win 7 and newer
Windows ZIP file

Windows app Win 8.1 or 10 

Linux 32 bits
Linux 64 bits
Linux ARM 32 bits
Linux ARM 64 bits

Mac OS X 10.10 or newer

Support the Arduino IDE

Since its first release in March 2015, the Arduino IDE has been downloaded **48,443,878** times — impressive! Help its development with a donation.

\$3

\$5

\$10

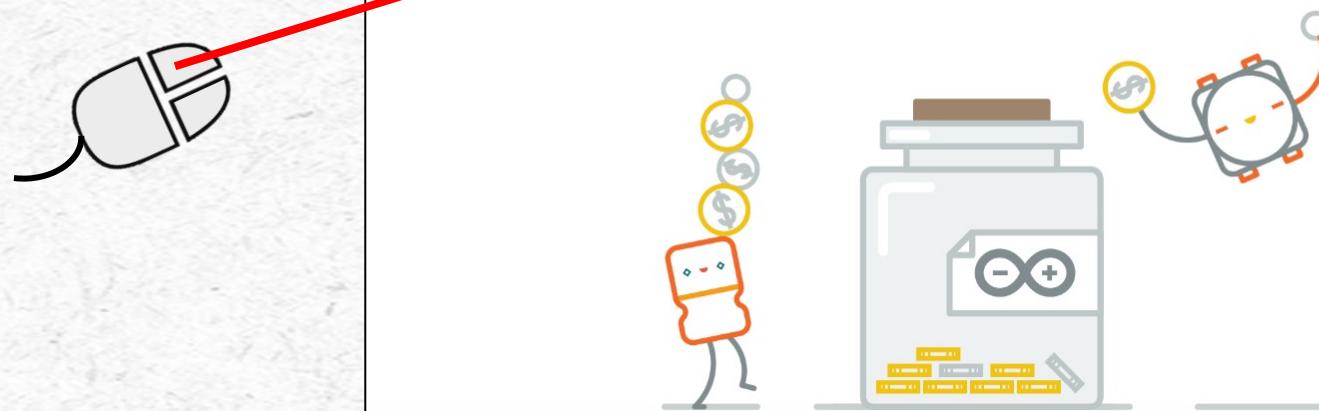
\$25

\$50

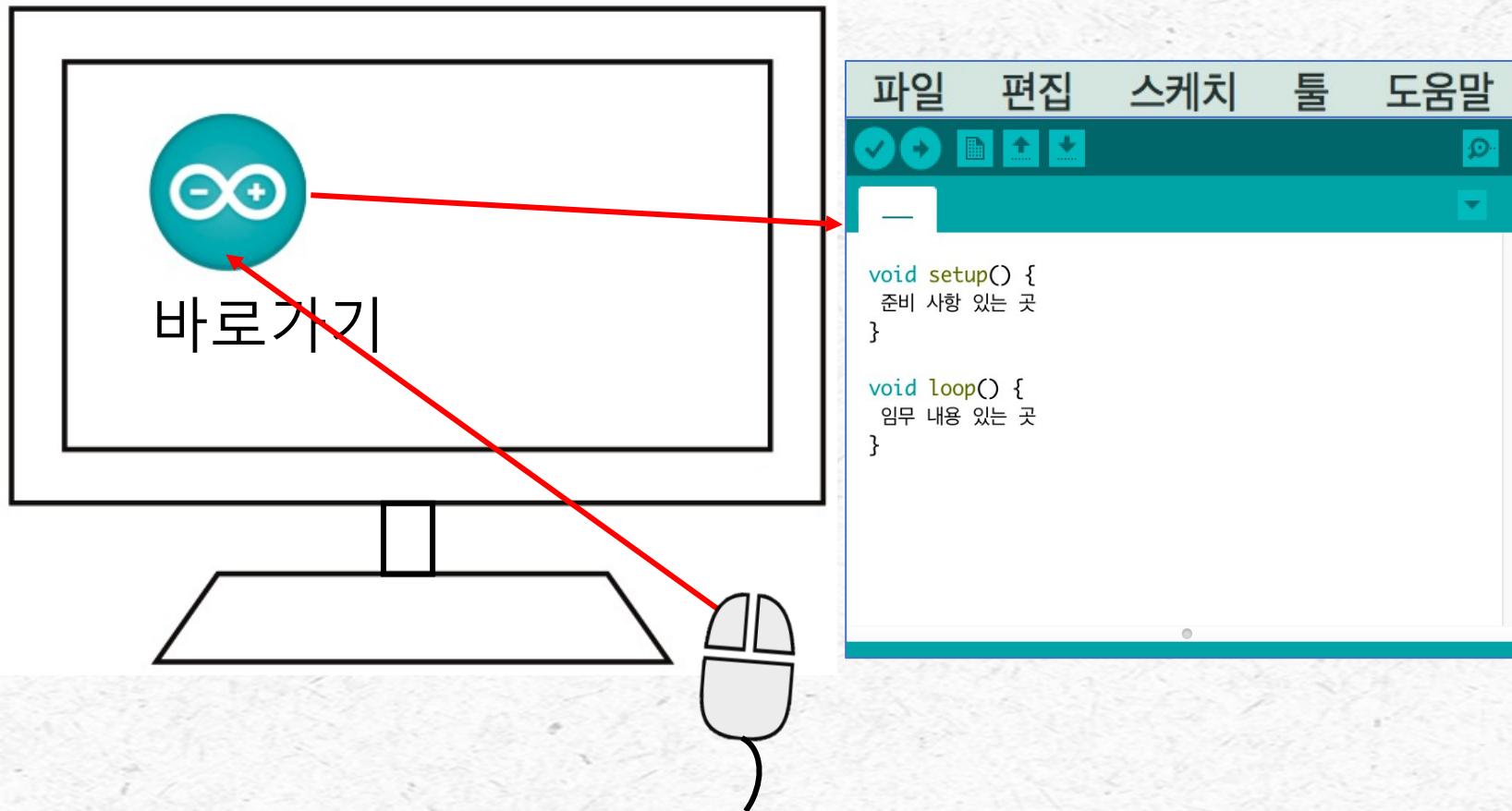
Other

JUST DOWNLOAD

CONTRIBUTE & DOWNLOAD



Arduino IDE 설치합니다



IDE

아이언 코다즈(IDE)

파일 편집 스케치 툴 도움말

✓ ↗ ⌂ ⌃ ⌄ ⌅

—

▼

```
void setup() {
    준비 사항 있는 곳
}

void loop() {
    임무 내용 있는 곳
}
```



A photograph of a table setting featuring two glasses, a plate with pink flowers, and cutlery.

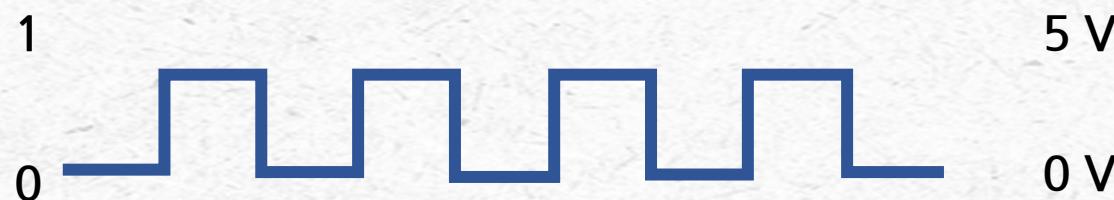
디지털값과 아날로그 전압값

디지털 값은 0과 1 두 종류 뿐이다.

이 값을 아날로그 전압으로 나타내면 0 V와 5 V이다.

소프트웨어에서 0 또는 1은,

하드웨어에서 0 V 또는 5 V이다.



소프트웨어에서 1을 HIGH로 0을 LOW라고 표기하기도 한다.

즉 $0 = \text{LOW} = 0 \text{ V}$ 이며 $1 = \text{HIGH} = 5 \text{ V}$ 이다.

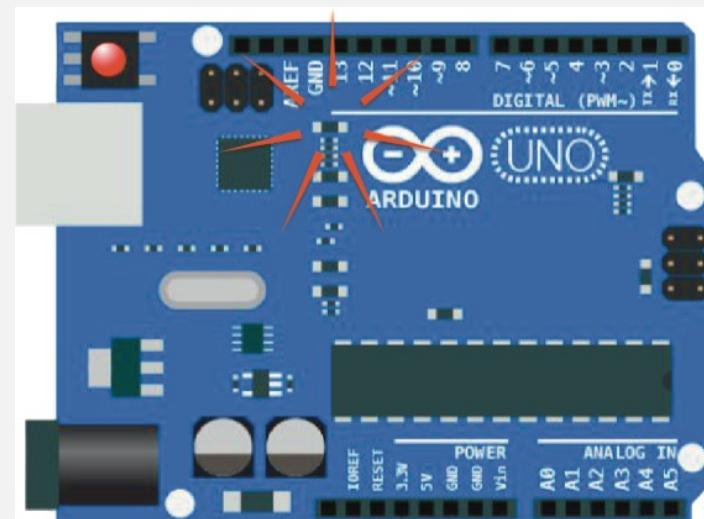
아두이노 보드에 있는 LED 켜기 및 끄기

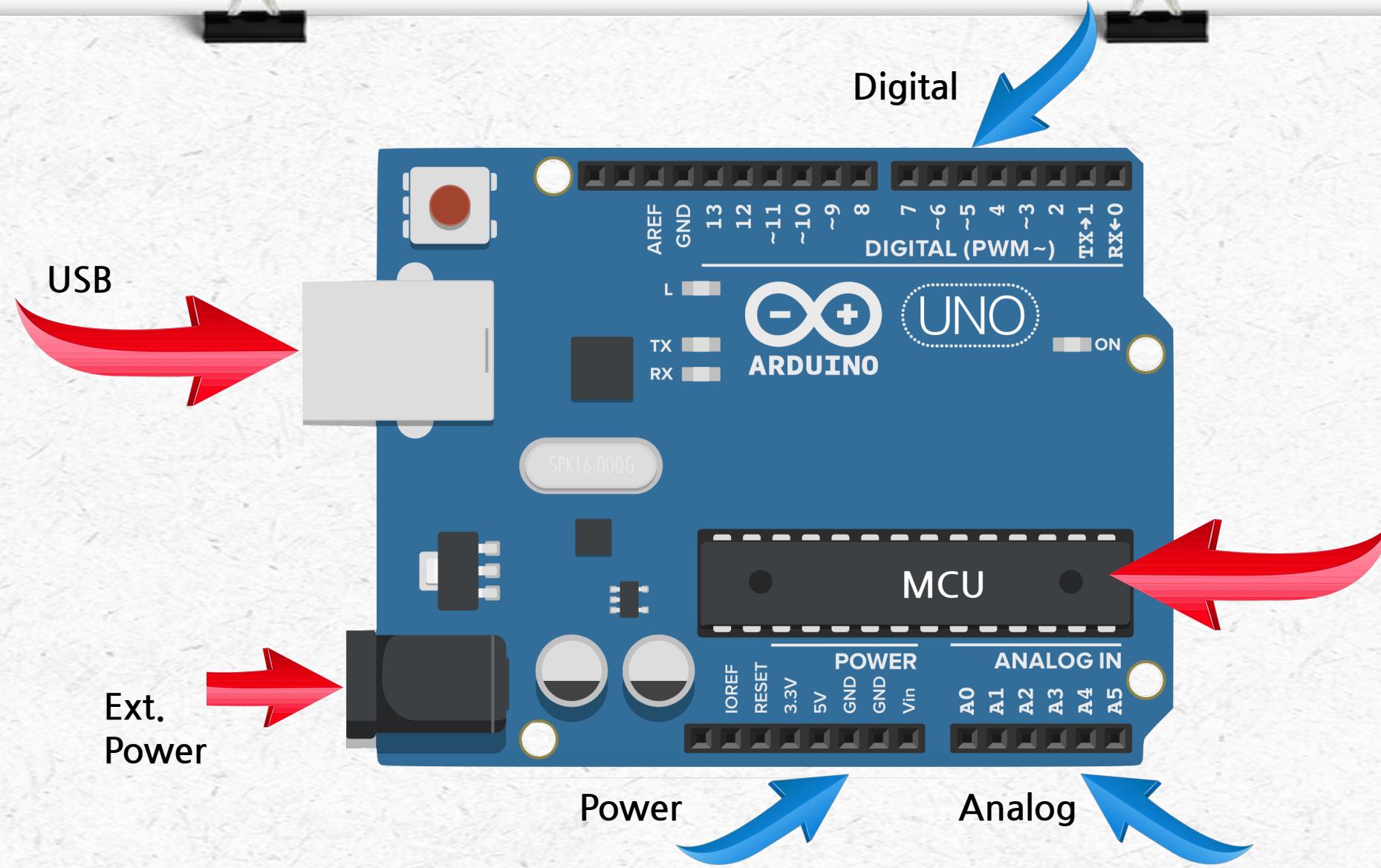
Turn OFF LED at digital pin 13

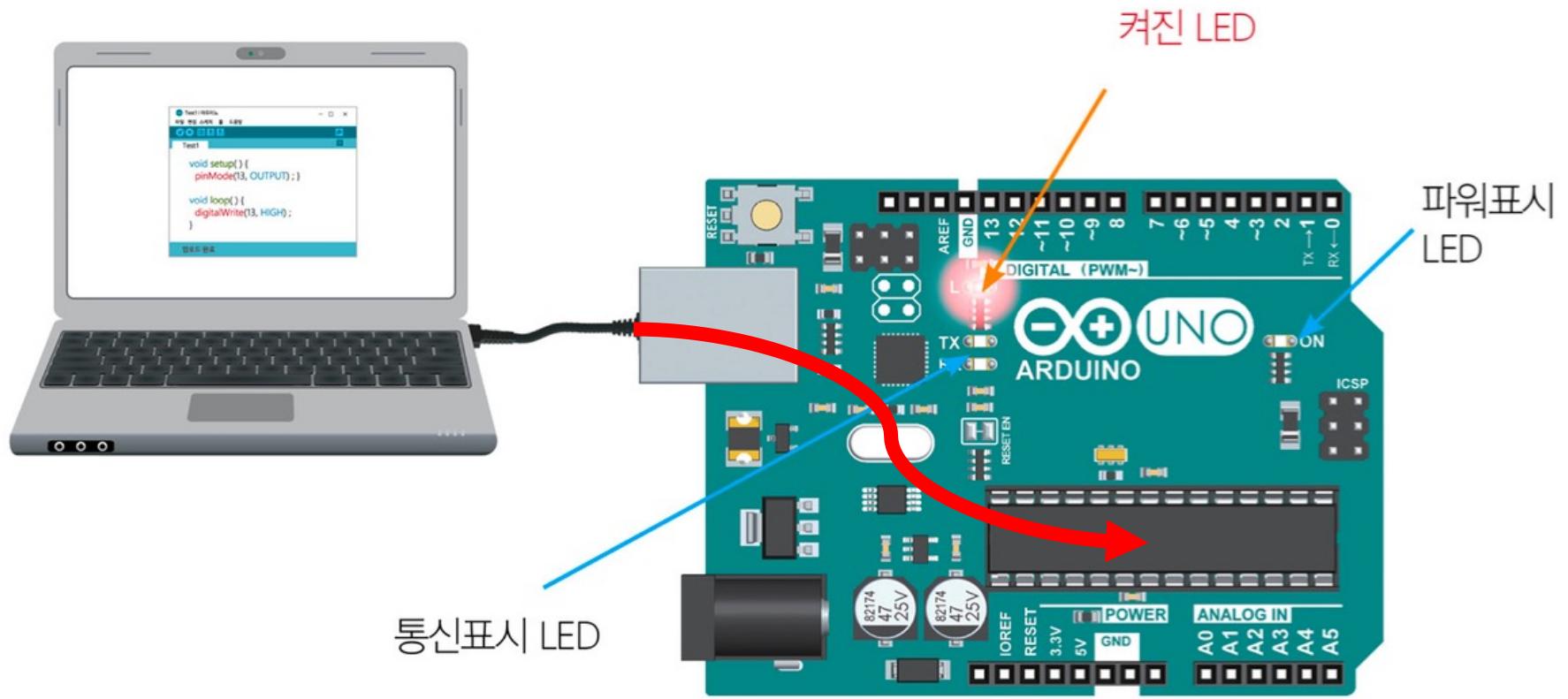
준비물 :

아두이노 보드 1개

USB 케이블 1개







핀 번호 출력 또는 입력 쎄미 콜론

pinMode(#, OUTPUT/INPUT);

셋업 안에서

핀 번호 높게 또는 낮게 쎄미 콜론

digitalWrite(#, HIGH/LOW);

루프 안에서

컴파일



Word 를
바이너리 코드로 변환

```
sketch_mar01a §
1
2 void setup() {
3   pinMode(13, OUTPUT) ;
4 }
5
6 void loop() {
7   digitalWrite(13, HIGH) ;
8 }
9
```

Save As: LED ON

Tags:

Desktop

The screenshot shows the Arduino IDE interface. At the top, there are fields for 'Save As:' containing 'LED ON' and 'Tags:'. Below that is a file browser showing 'Desktop'. The main area displays a sketch titled 'LED_ON' with the following code:

```
1
2 void setup() {
3     pinMode(13, OUTPUT) ;
4 }
5
6 void loop() {
7     digitalWrite(13, HIGH) ;
8 }
9
```

Below the code, a status bar shows the message '컴파일 완료.' (Compile completed). At the bottom, there is a summary of memory usage in Korean.

컴파일 완료.

스케치는 프로그램 저장 공간 207547 바이트(15%)를 사용.
전역 변수는 동적 메모리 15220바이트(4%)를 사용, 31246