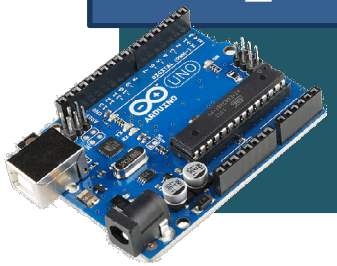
2021년 IoT기반 스마트 솔루션 개발자 양성과정



Firmware [펌웨어]

5-AnalogRead

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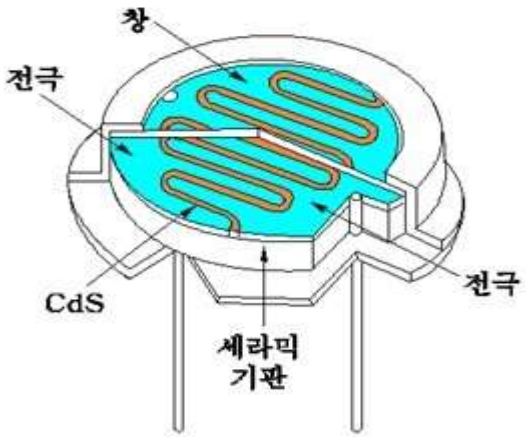
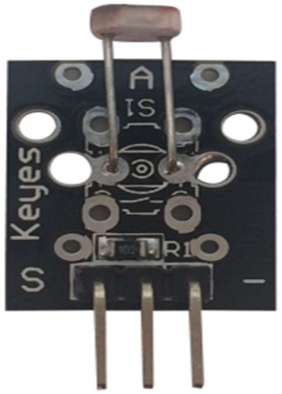
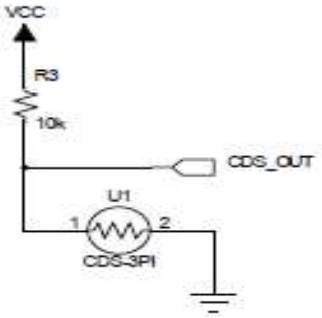
rgt3340@naver.com
http://cafe.naver.com/cbdsp

CdS 센서

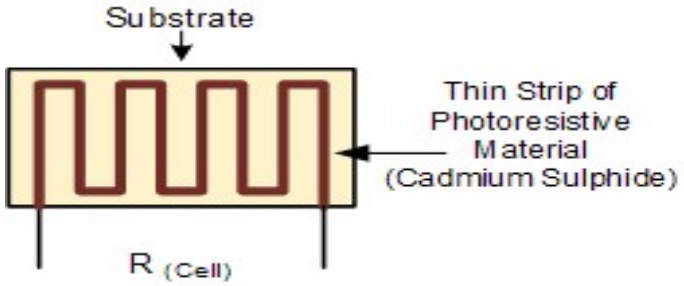
- CdS : 황화(S) 카드늄(Cd) 셀
  - 빛의 세기에 따라 도전율(저항값) 변화 : 광도전효과

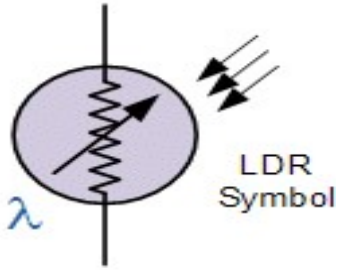


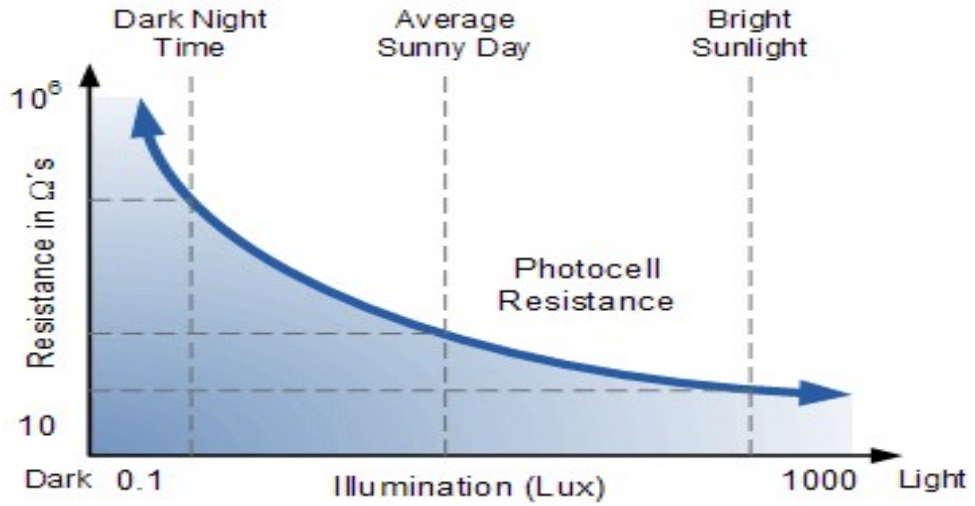




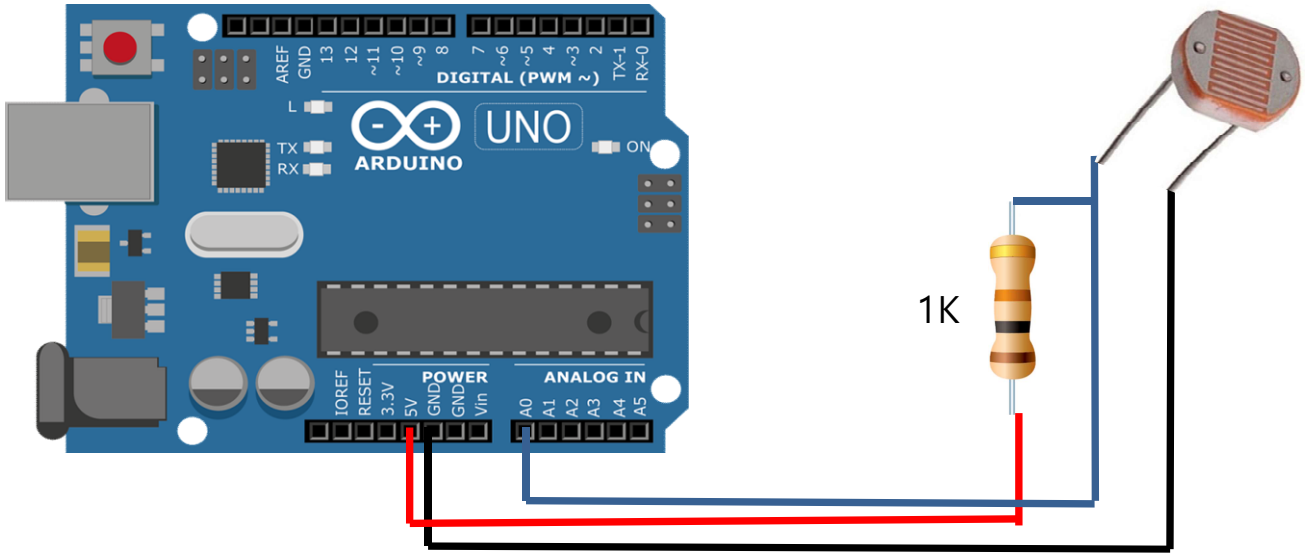
CdS 센서 특성


Substrate
Thin Strip of
Photoresistive
Material
(Cadmium Sulphide)
R (Cell)


λ
LDR
Symbol

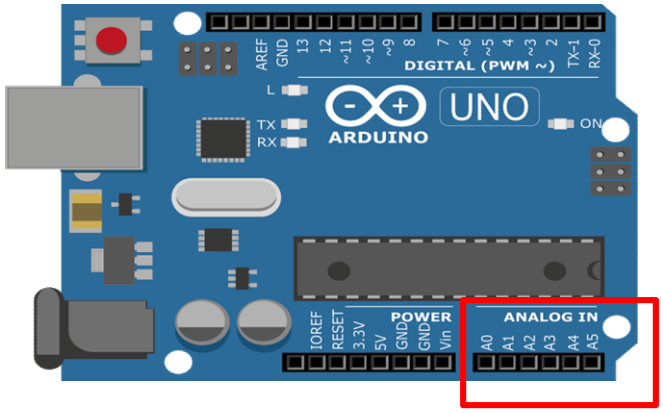

Dark Night
Time
Average
Sunny Day
Bright
Sunlight
10^6
Resistance in Ω's
Photocell
Resistance
10
Dark
0.1
Illumination (Lux)
1000
Light

Wiring



analogRead( )

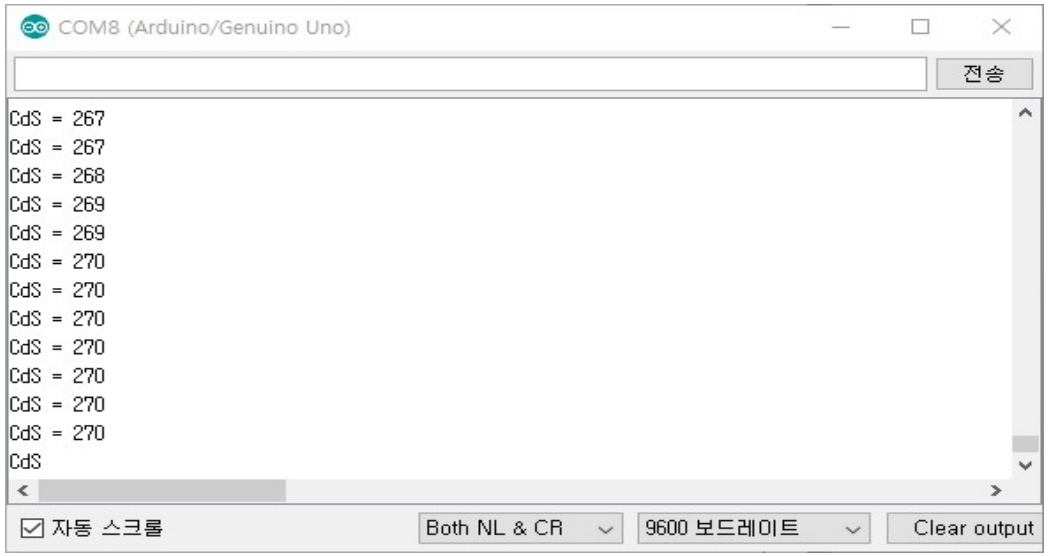
- analogRead(pin)
  - Pin : 입력 핀 번호 (UNO : 0~5, NANO : 0~7, MEGA : 0~15)
  - Return : int (0~1023)
  - Reference : default DC 5V
  - 입력 범위와 해상도 변화 -> analogReference( )



A5-1 : 조도

```
#define CdS A0
int adValue;

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

void loop( ) {
  adValue=analogRead(CdS);

  Serial.print("CdS = ");
  Serial.println(adValue);
  delay(200);
}
```

Serial Monitor



map( )

- map(value, fromLow, fromHigh, toLow, toHigh)
  - value : 변환할 수
  - fromLow: 현재 범위 값의 하한
  - fromHigh: 현재 범위 값의 상한
  - toLow: 목표 범위 값의 하한
  - toHigh: 목표 범위 값의 상한

  - Return : long

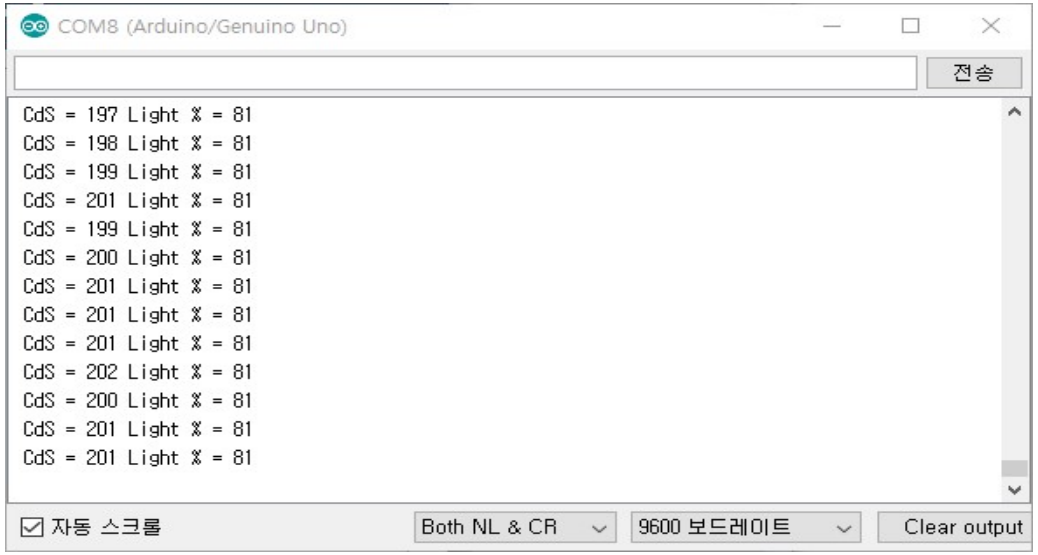
```
long map(long x, long in_min, long in_max, long out_min, long out_max) {
        return (x - in_min) * (out_max - out_min) / (in_max - in_min) + out_min;
}
```

A5-2 : 0~100% 범위설정

```
#define CdS A0

int adValue;
int lightValue;

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

```
void loop( ) {
  adValue=analogRead(CdS);
  lightValue = map(adValue,0,1023,100,0);

  Serial.print(" CdS = ");
  Serial.print(adValue);
  Serial.print(" Light % = ");
  Serial.println(lightValue);
  delay(200);
}
```

Serial Monitor



constrain( )

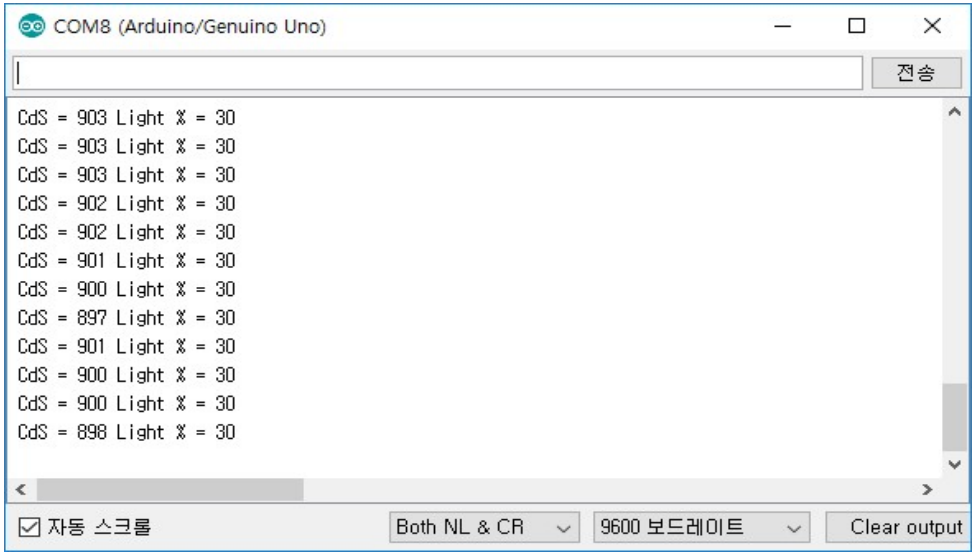
- constrain(x, a, b)
  - x : 제한할 수, 모든 자료형
  - a : 범위의 하한, 모든 자료형
  - b : 범위의 상한, 모든 자료형
- return
  - x : x가 a 와 b 사이에 있으면
  - a : x가 a 보다 작으면
  - b : x가 b 보다 크면

A5-3 : 30~90% 범위조정

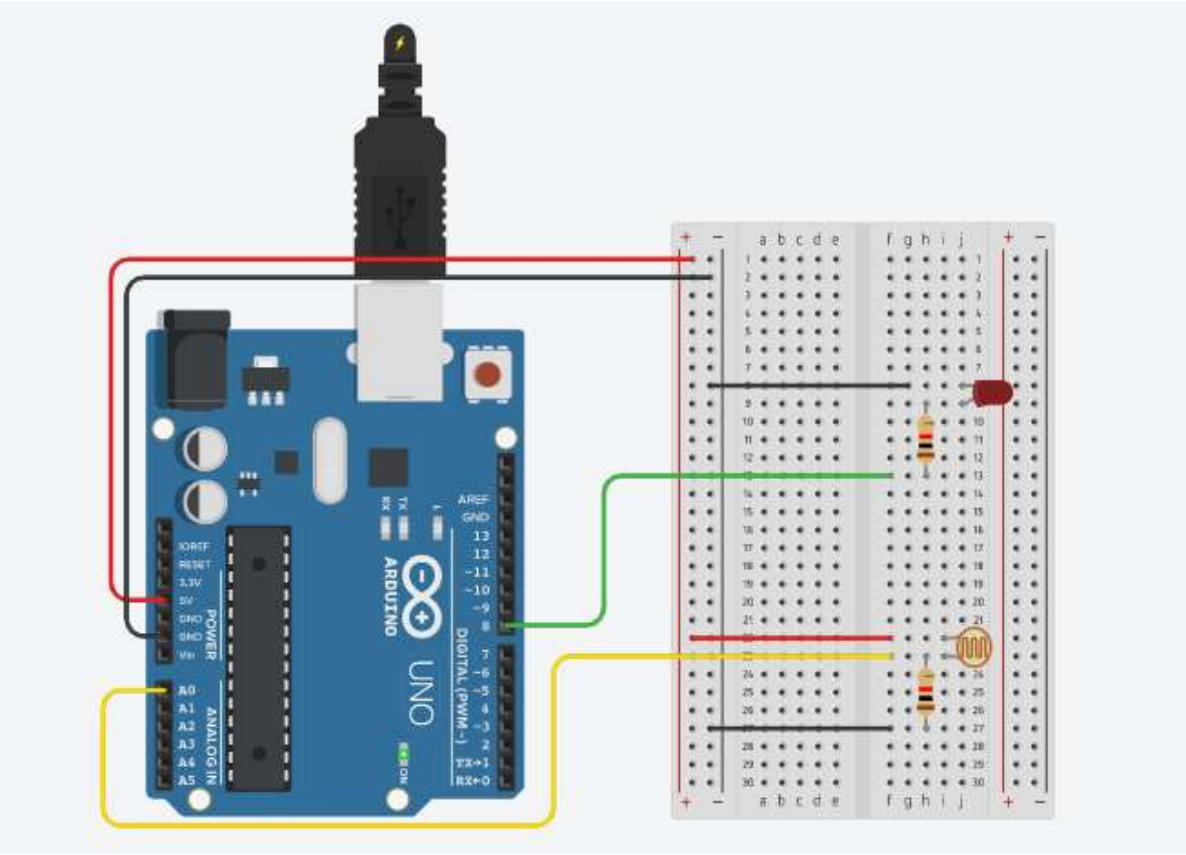
```
#define CdS A0
int adValue, lightValue;

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

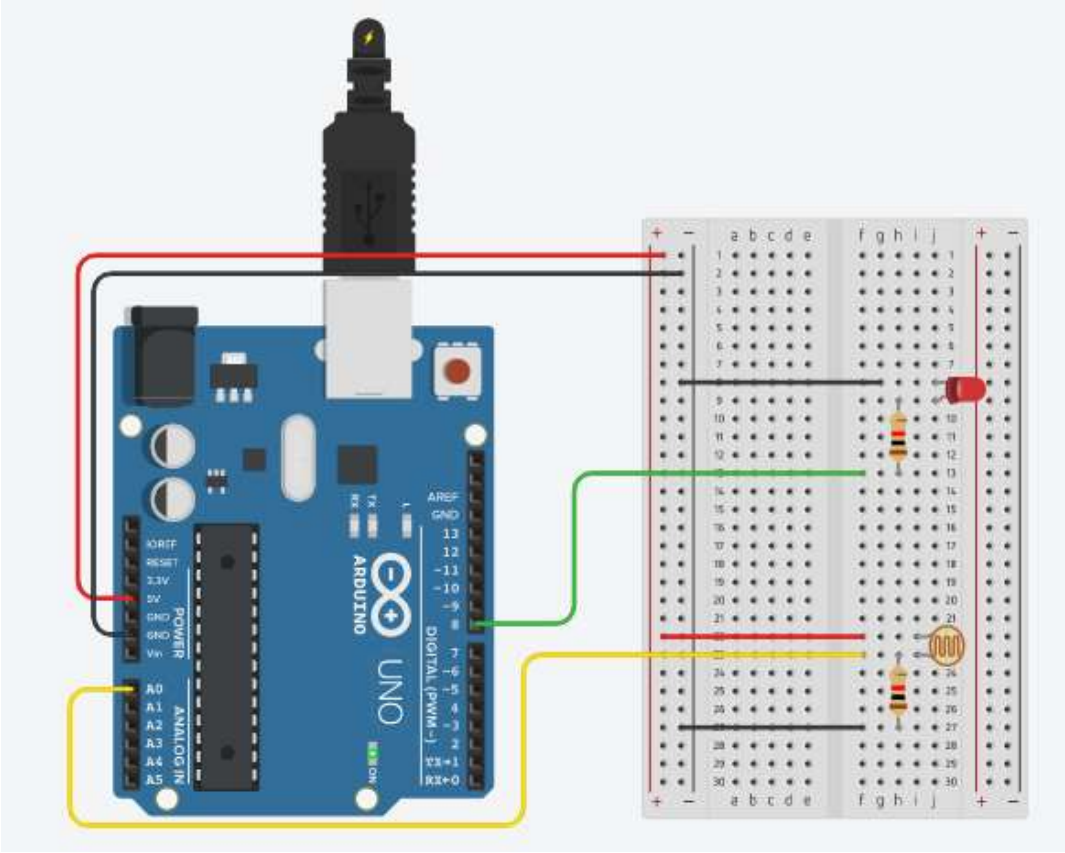
```
void loop( ) {
  adValue=analogRead(CdS);
  lightValue = map(adValue, 0, 1023, 100, 0);
  lightValue = constrain(lightValue, 30, 90);

  Serial.print(" CdS = ");
  Serial.print(adValue);
  Serial.print(" Light % = ");
  Serial.println(lightValue);
  delay(200);
}
```

Serial Monitor



A5-4 : Photo-LED




ARDUINO
UNO
POWER
ANALOG IN
DIGITAL (PWM~)

```
void setup()
{
  pinMode(8, OUTPUT);
  Serial.begin(9600);
}

void loop()
{
  int readValue = analogRead(A0);
  Serial.println(readValue);

  if(readValue < 550){
    digitalWrite(8,HIGH);
  }
  else{
   digitalWrite(8,LOW);
  }
}
```