

RaspberryPi



Smart Media
스마트미디어인재개발원
Smart Media Human Resource Development

스마트미디어인재개발원
나예호

RaspberryPi GPIO



RASPERRYPI



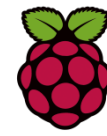
방향 주의!
USB 포트 방향으로 구분

+ 3,3 V	1	2	+ 5 V
(SDA) GPIO 2	3	4	+ 5 V
(SCL) GPIO 3	5	6	GND
(GPCLK0) GPIO 4	7	8	GPIO 14 (TXD)
GND	9	10	GPIO 15 (RXD)
GPIO 17	11	12	GPIO 18
GPIO 27	13	14	GND
GPIO 22	15	16	GPIO 23
+ 3,3 V	17	18	GPIO 24
(MOSI) GPIO 10	19	20	GND
(MISO) GPIO 9	21	22	GPIO 25
(SCLK) GPIO 11	23	24	GPIO 8 (CE0)
GND	25	26	GPIO 7 (CE1)
ID_SD	27	28	ID_SC
GPIO 5	29	30	GND
GPIO 6	31	32	GPIO 12
GPIO 13	33	34	GND
GPIO 19	35	36	GPIO 16
GPIO 26	37	38	GPIO 20
GND	39	40	GPIO 21



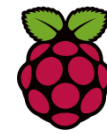
Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I ² C)		DC Power 5v	04
05	GPIO03 (SCL1 , I ² C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I ² C ID EEPROM)		(I ² C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40



- **GPIO : General Purpose Input Output**
 - 임베디드 시스템에서 외부와 입/출력 통신을 하기 위한 핀
 - 사용목적에 따라 입력 혹은 출력을 설정하여 사용 가능
 - 다양한 **센서들을 라즈베리파이와 연결**하고 **제어**할 수 있는 통신을 수행가능하도록 해주는 연결 핀

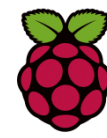




■ GPIO

- HIGH or LOW, 즉 디지털 신호 인식 가능
- Arduino는 ADC(Analog to Digital Convert) 내장
- 라즈베리파이는 별도의 ADC/DAC를 연결해주어야 함

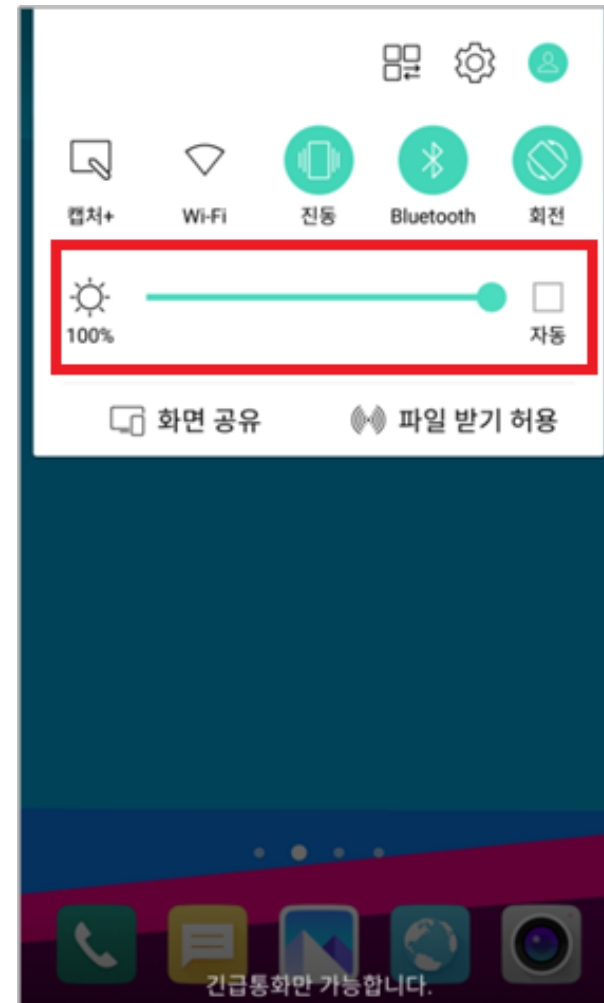
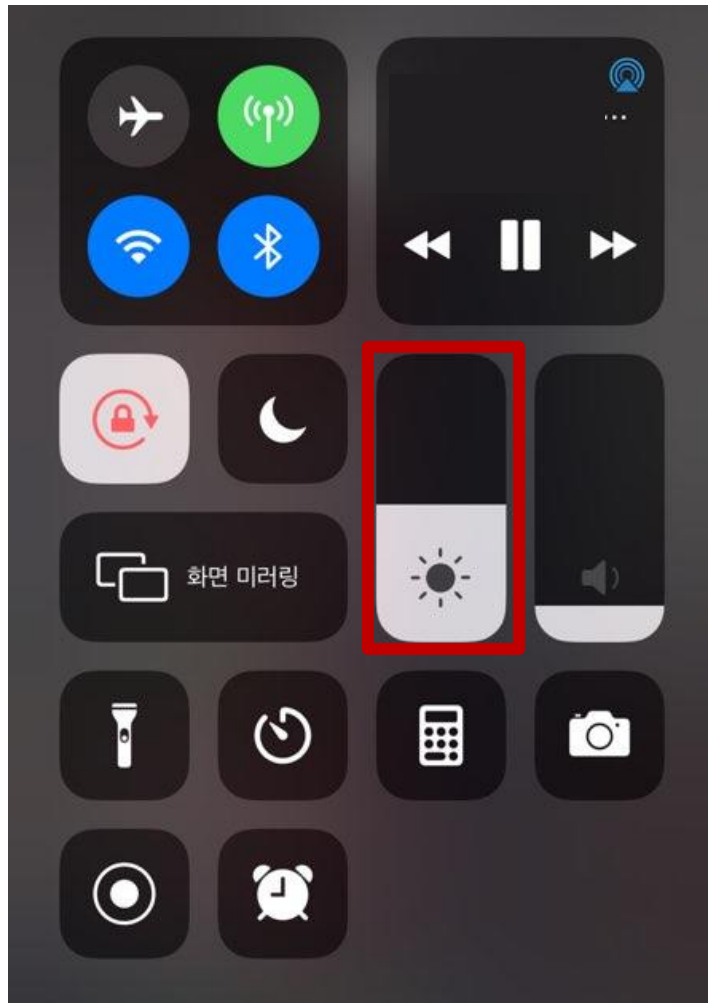




아날로그 신호



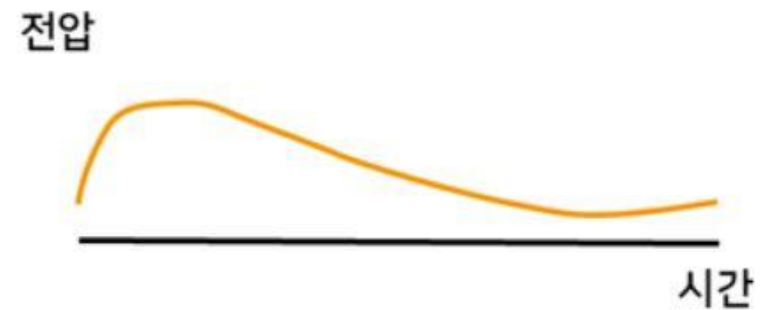
RASPBERRYPI





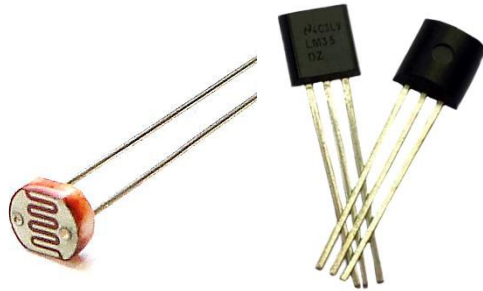
디지털 신호

2개의 신호로 불연속적으로 변함



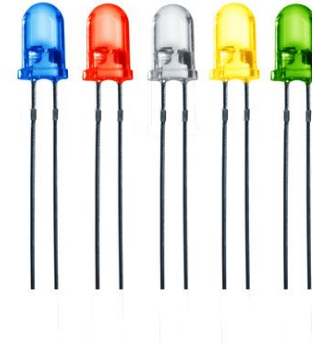
아날로그 신호

여러개의 신호로 연속적으로 변함



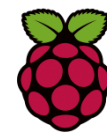
**센서
(Sensor)**

**감각하여
알아내는 장치**



**액추에이터
(Actuator)**

**시스템을 움직이거나
제어하는 기계 장치**



LED





라즈베리파이

액추에이터

원하는 명령을 통해
제어되는 장치

업로드

전기신호

LED



```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

GPIO.setup(2,GPIO.OUT)
GPIO.setup(26, GPIO.IN)

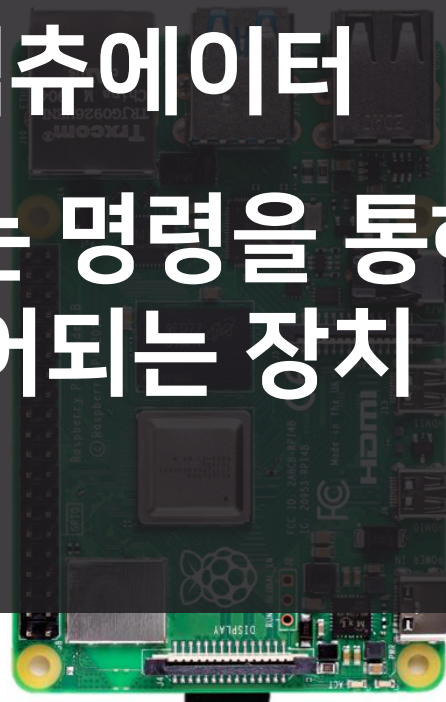
try :
    while True :
        inputI0 = GPIO.input(26)

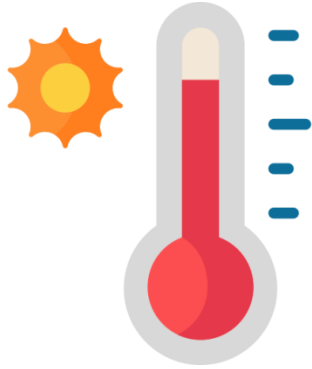
        print(inputI0)

        if inputI0 == 1 :
            GPIO.output(2,GPIO.HIGH)

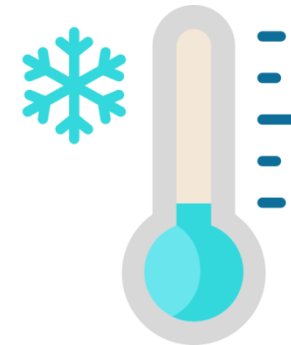
        else:
            GPIO.output(2, GPIO.LOW)

except KeyboardInterrupt:
    GPIO.cleanup()
```



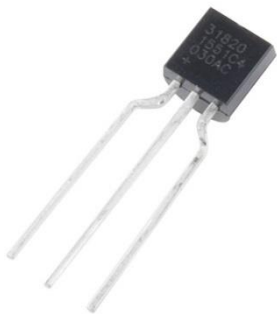


온도센서





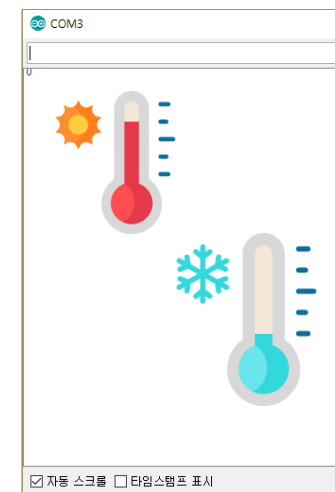
온도센서



전기신호



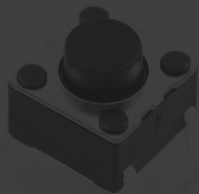
라즈베리파이





라즈베리파이

버튼

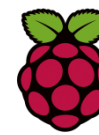


전기신호

센서

양, 변화를 감지하거나 구분 하여
일정한 신호로 알려주는 부품이나 기구





LED

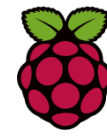




- **특별 용도의 GPIO핀**
 - I2C 통신 핀 : GPIO2, 3
 - SPI통신 핀 : GPIO7, 8, 9, 10, 11
 - EEPROM(비휘발성 메모리) : ID_SD, ID_SC
 - Serial통신(TXD, RXD) : GPIO14, 15
 - PWM : GPIO12, 13, 18, 19



LED Blink



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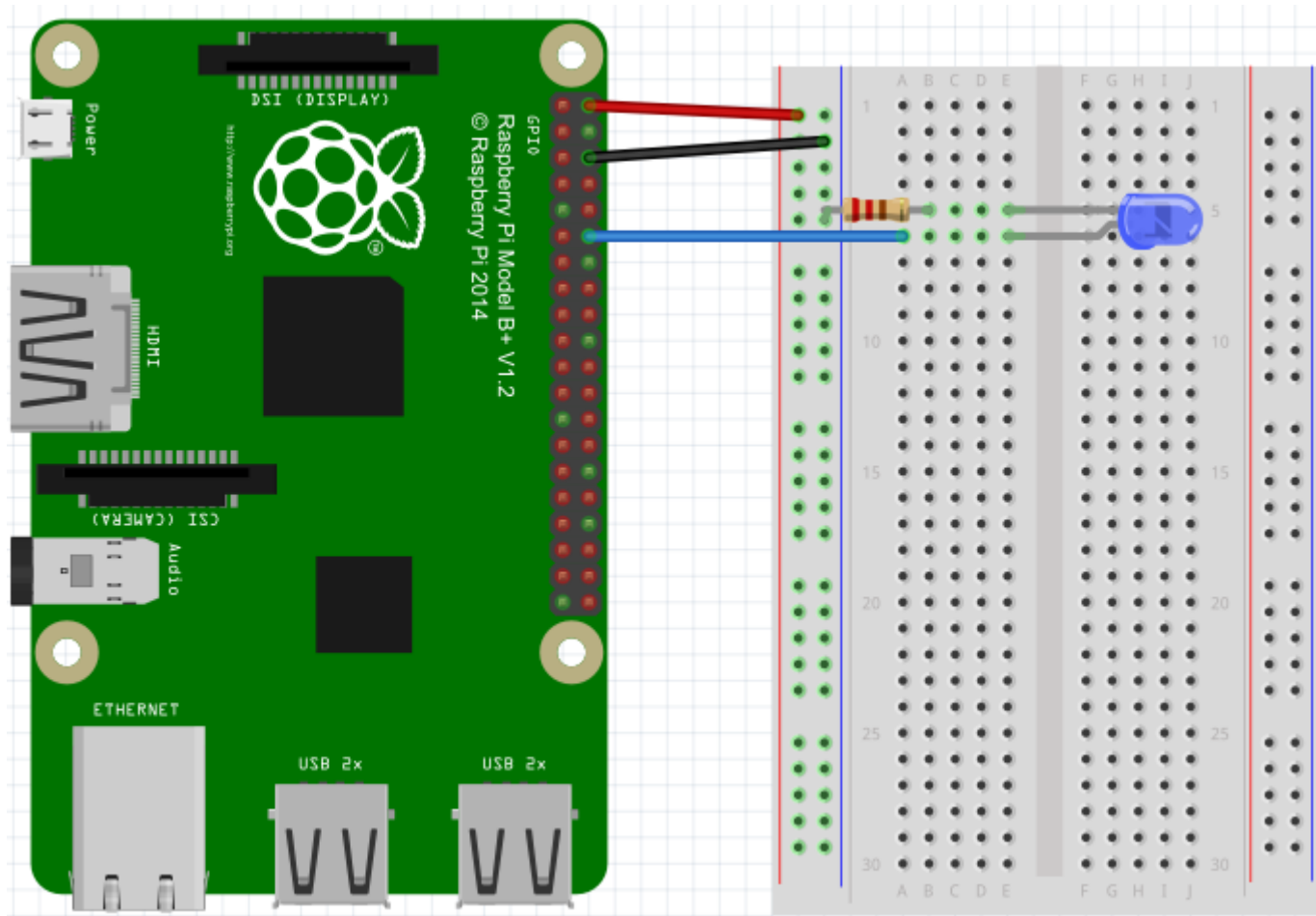


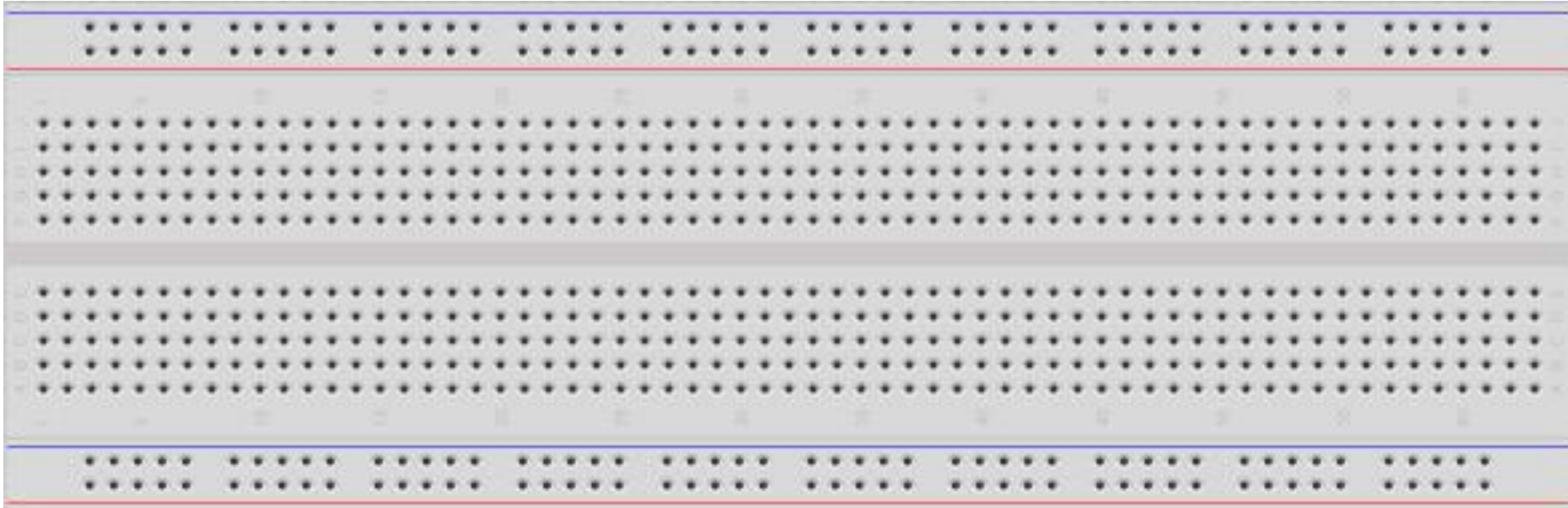
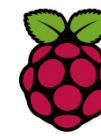
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LED Blink 회로



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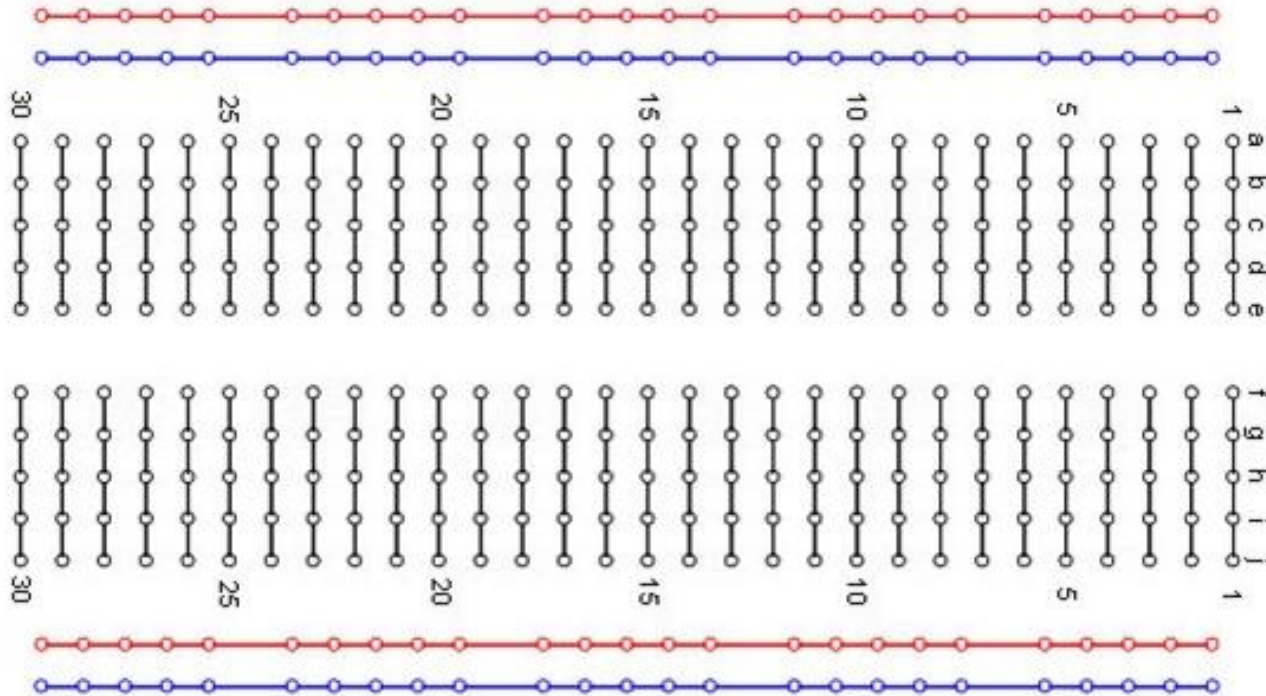
Breadboard(뽕판)



Breadboard 구조



RASPBERRYPI

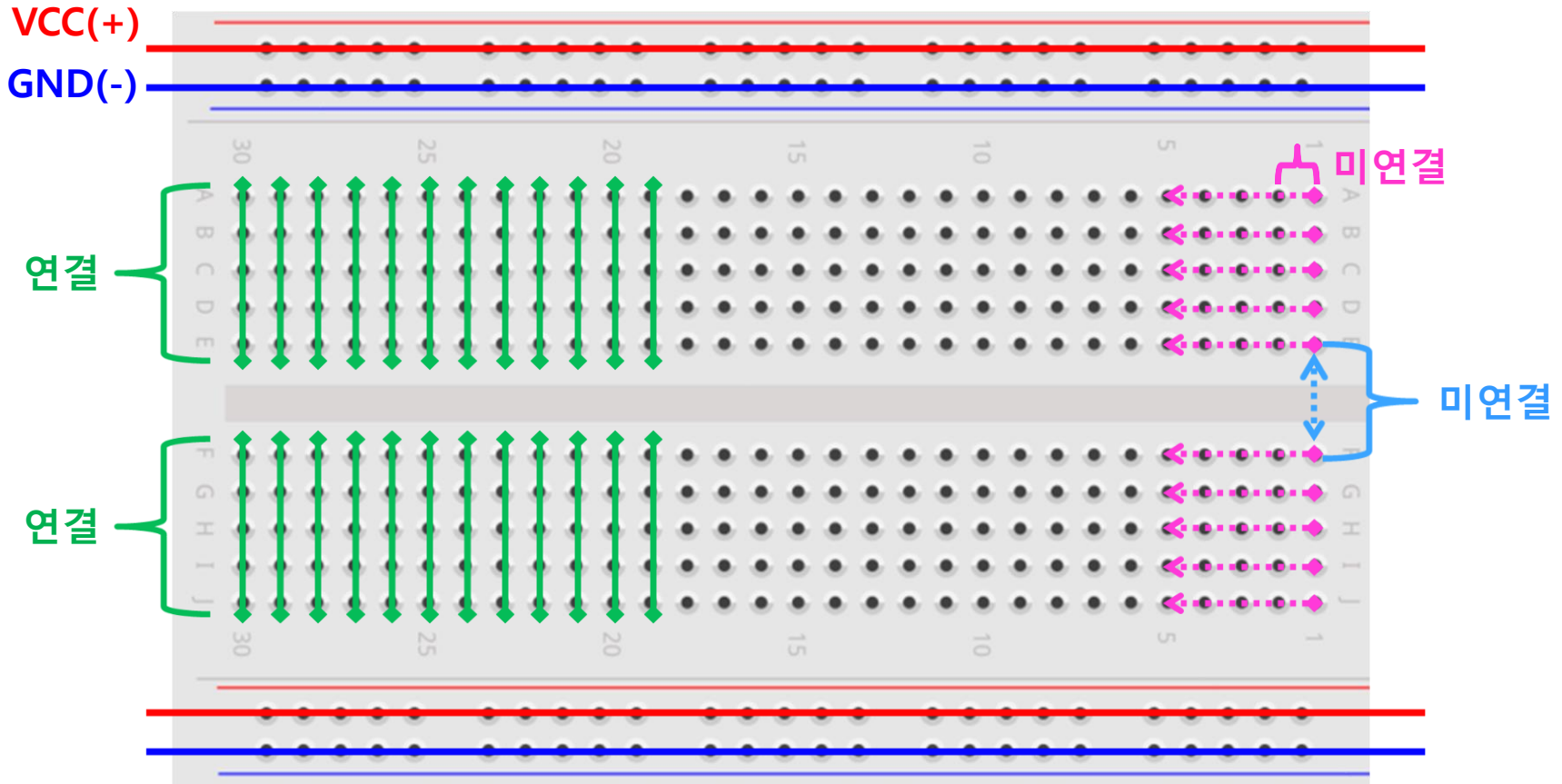


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Breadboard 구조

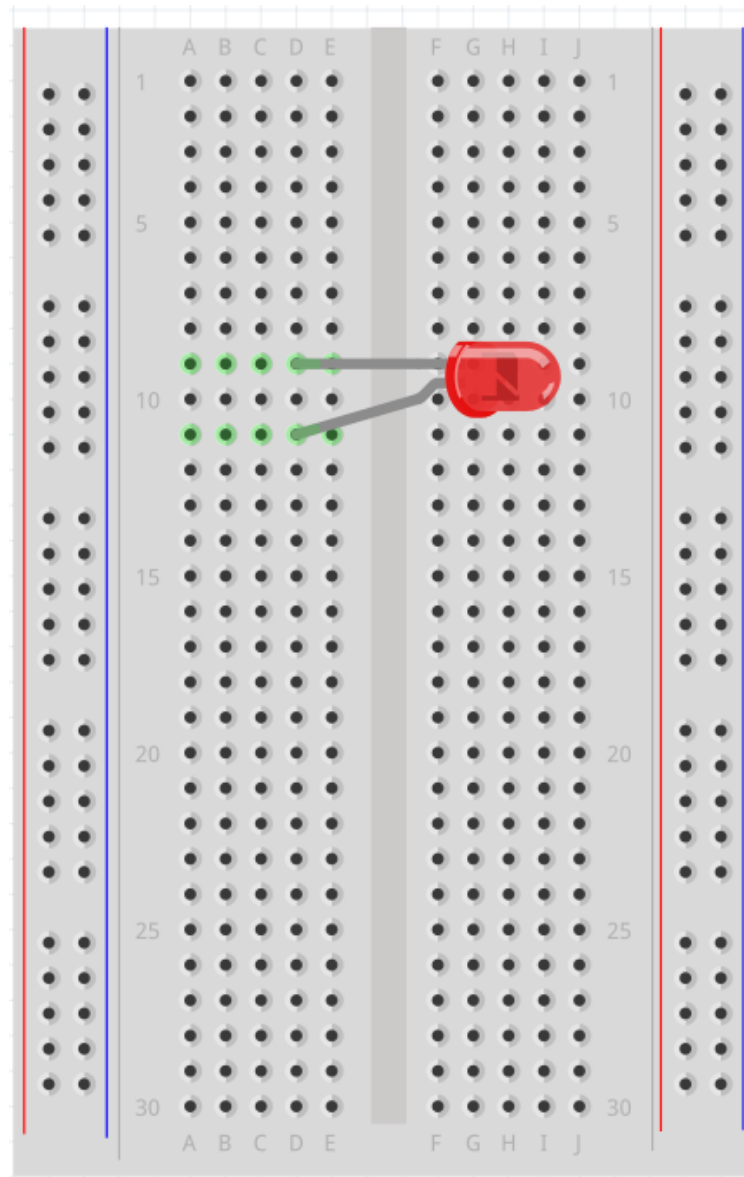


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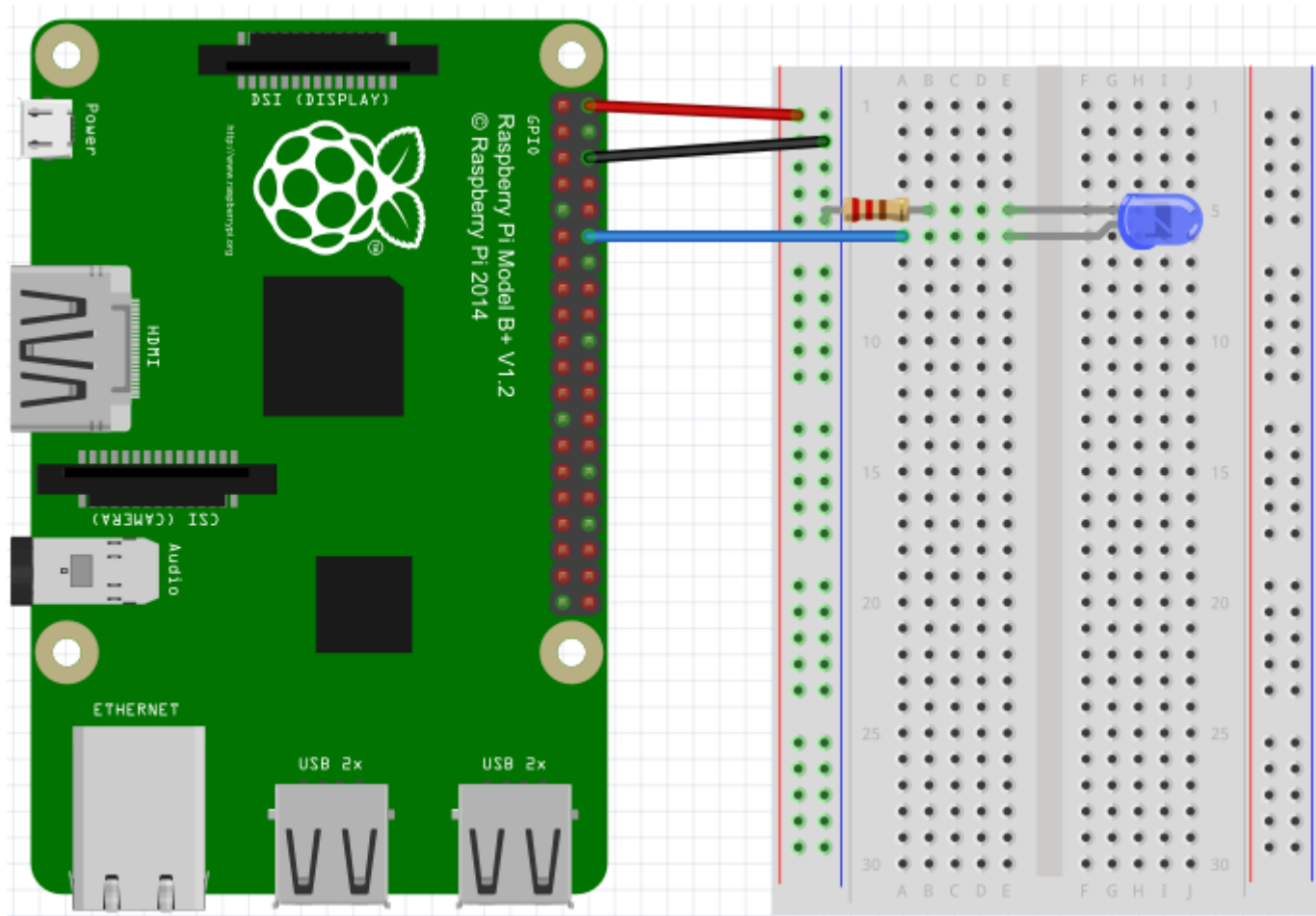
Breadboard를 이용한 LED제어

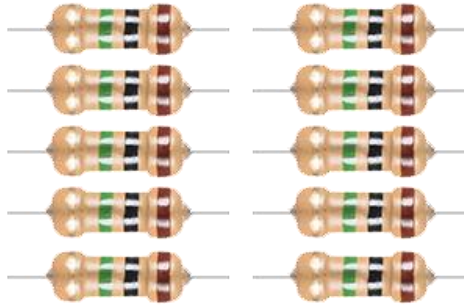


LED Blink 회로











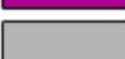



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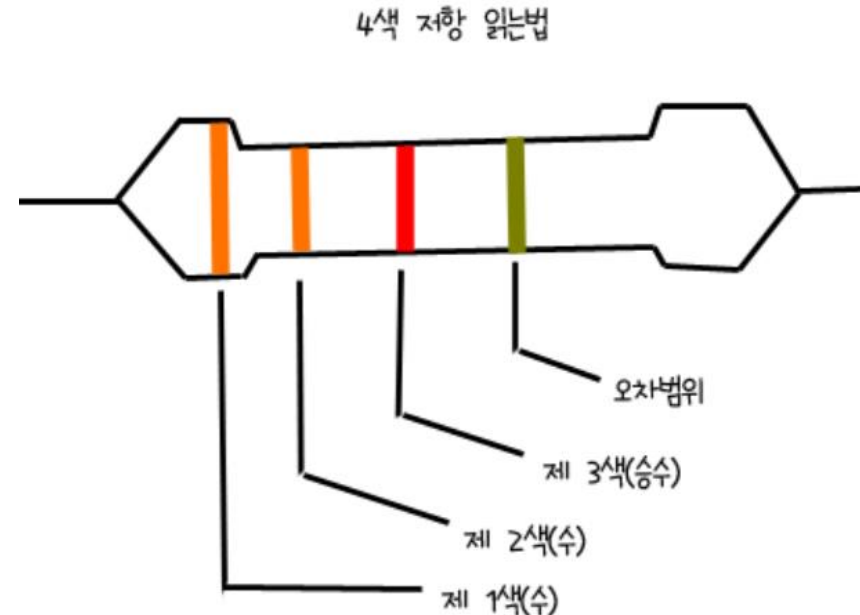




저항

저항(resistance)색띠읽는법

	수	승수	오차
 검정색(Black)	0	1	
 갈색(Brown)	1	10	1%
 빨간색(Red)	2	100	2%
 주황색(Orange)	3	1000	
 노란색(Yellow)	4	10000	
 초록색(Green)	5	100000	
 파란색(Blue)	6	1000000	
 보라색(Violet)	7	10000000	
 회색(Gray)	8	100000000	
 흰색(White)	9	1000000000	
 금색(Gold)			5%
 은색(Silver)			10%





220 ohm



RPi.GPIO명칭 대신 GPIO사용

```
import RPi.GPIO as GPIO
```

GPIO를 사용할 수 있게 하는 라이브러리

```
import time
```

시간 관련 라이브러리



메서드명	기능
<code>GPIO.setmode(GPIO.BOARD)</code> <code>GPIO.setmode(GPIO.BCM)</code>	핀 번호를 라즈베리파이 보드(BOARD) 번호로 참조 BCM(Broadcom chip-specific pin numbers)모드로 설정
<code>GPIO.setup(pin, GPIO.IN)</code> <code>GPIO.setup(pin, GPIO.OUT)</code>	핀을 입력으로 설정 핀을 출력으로 설정
<code>GPIO.output(pin, GPIO.HIGH)</code> <code>GPIO.output(pin, GPIO.LOW)</code>	디지털 출력을 HIGH로 설정 디지털 출력을 LOW로 설정
<code>GPIO.input(pin)</code>	디지털 값을 읽음
<code>GPIO.cleanup()</code>	GPIO 모듈의 점유 리소스 해제
<code>GPIO.VERSION</code>	Rpi.GPIO 모듈의 버전 값을 갖는 변수



```
GPIO.setmode(GPIO.BCM)
```

라즈베리파이 GPIO를 BCM모드로 설정

```
GPIO.setup(led_pin, GPIO.OUT)
```

원하는 핀(led)을 출력 모드로 설정



try :

LED 점등 반복

while True :

```
GPIO.output(2, GPIO.HIGH)  
time.sleep(1)
```

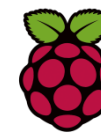
```
GPIO.output(2, GPIO.LOW)  
time.sleep(1)
```

except KeyboardInterrupt :

GPIO.cleanup()

리소스 반환

디지털 신호의 출력(LED * 3)



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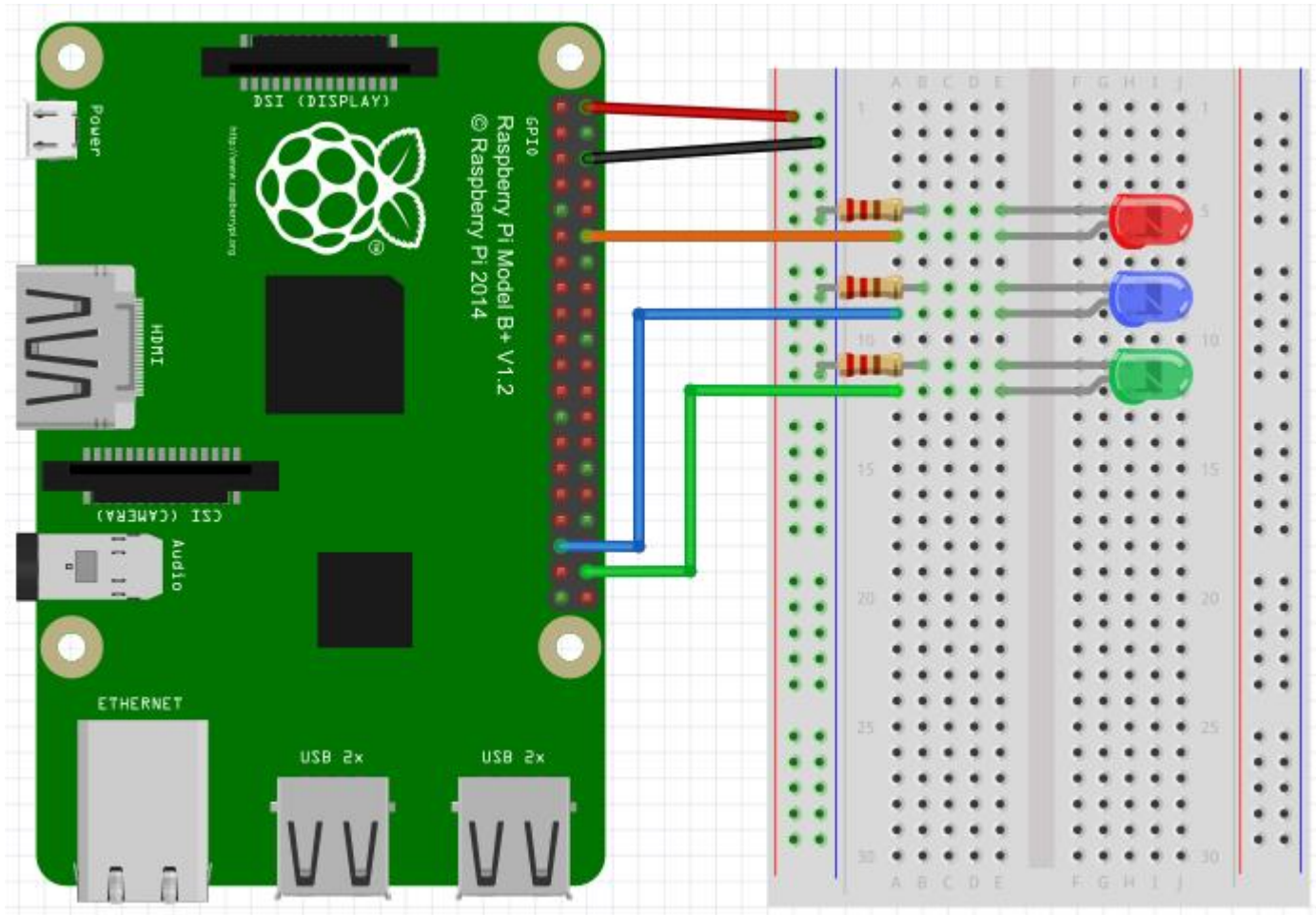


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디지털 신호의 출력(LED * 3)

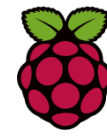


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디지털 신호의 입력(Button)



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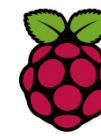
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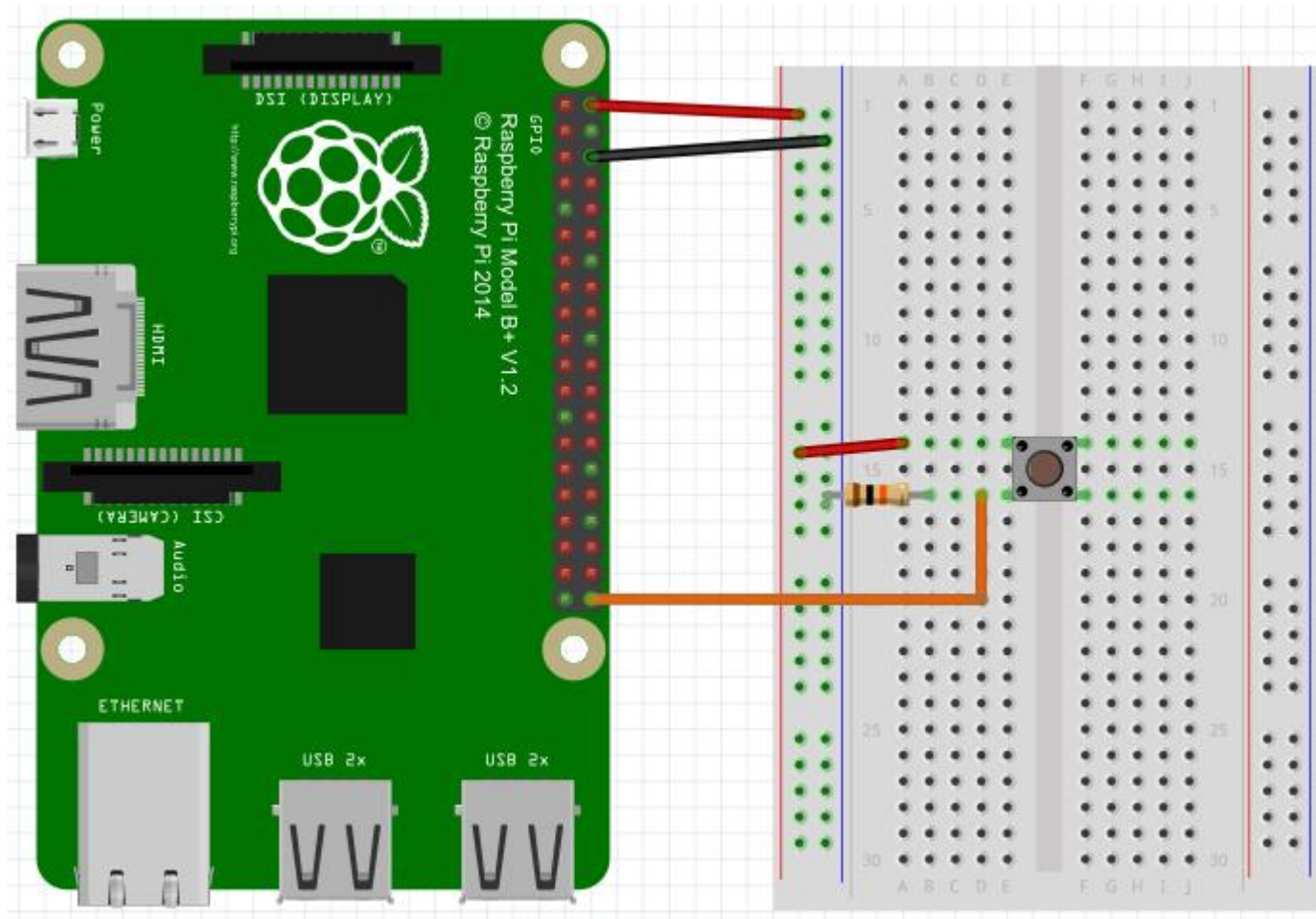
RASPBERRYPI

[illegible][illegible]

디지털 신호의 입력(Button)



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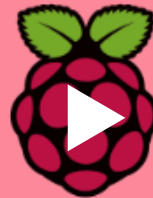


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Button + Led



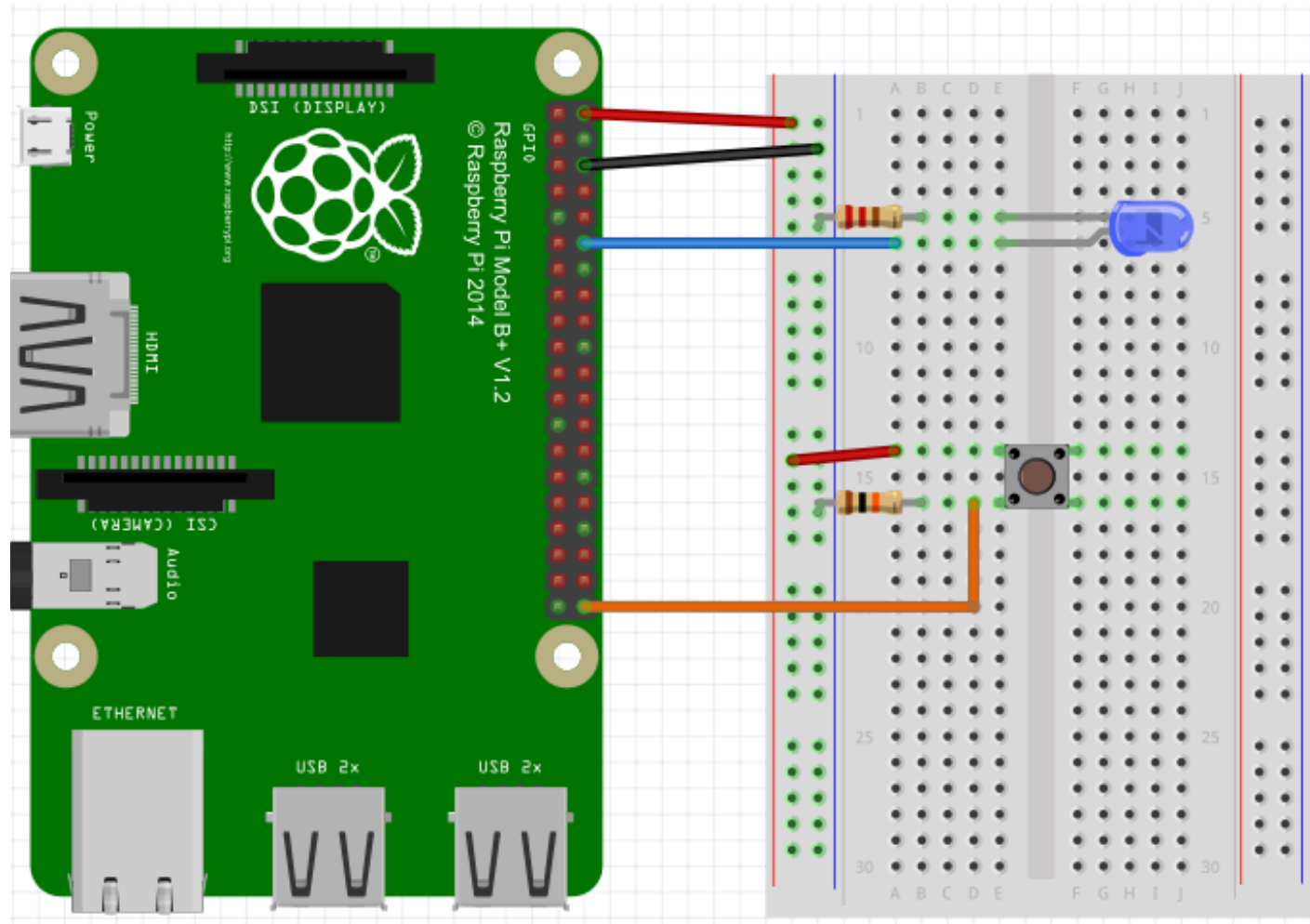
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Button + Led 회로



RASPERRYPI



Button x 3 + LED x 3



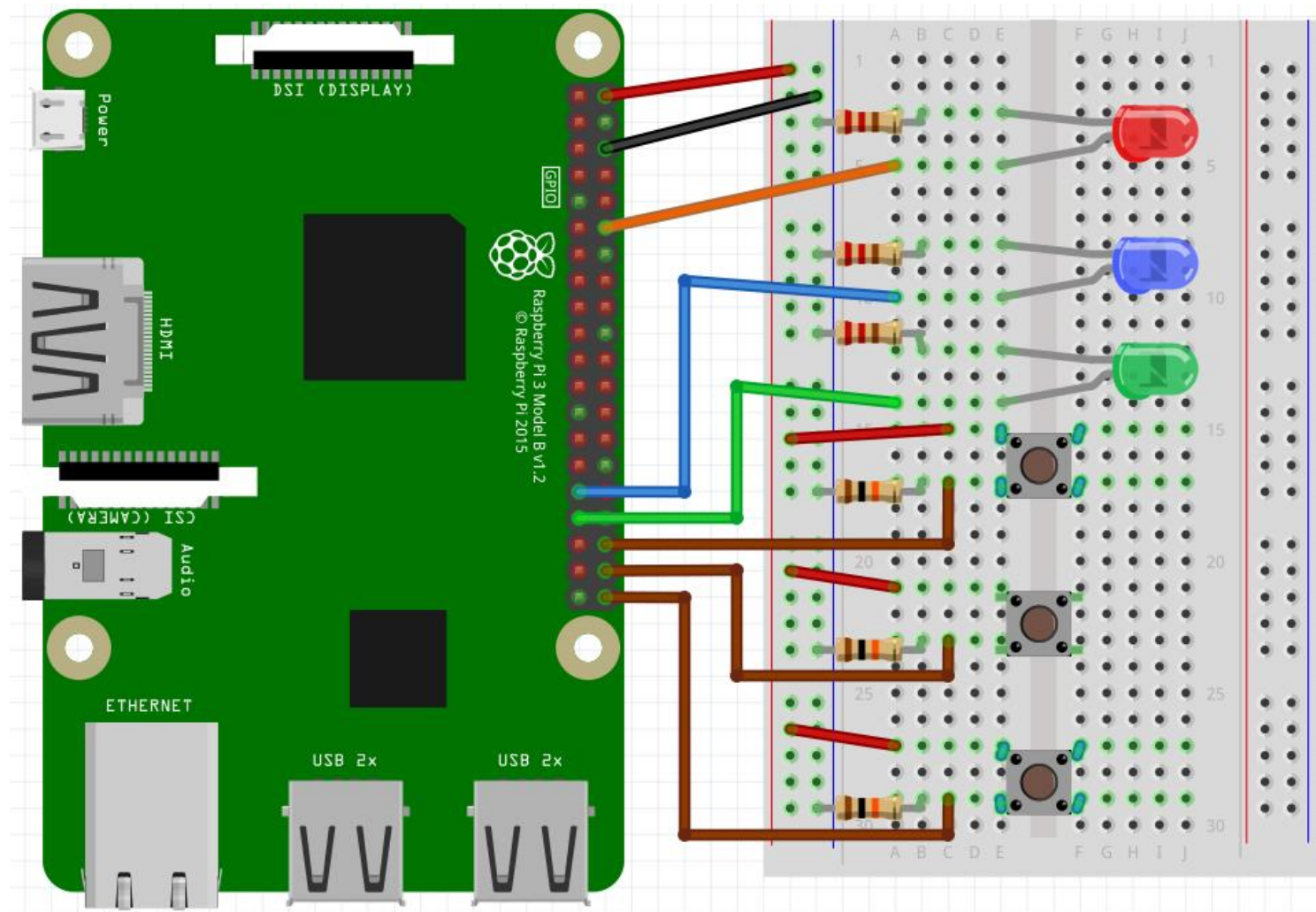
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Button x 3 + LED x 3 회로



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LED 밝기제어(PWM)



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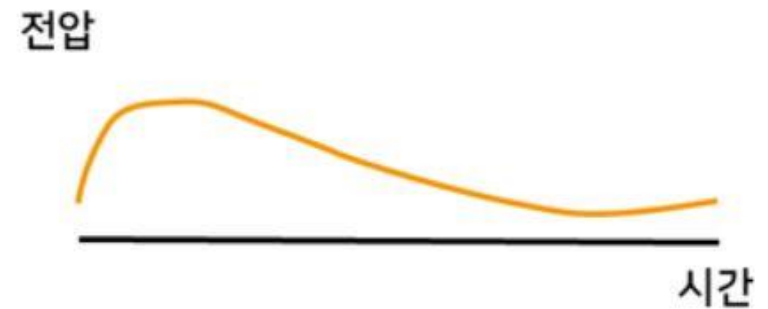


LED : 0~255



디지털 신호

2개의 신호로 불연속적으로 변함



아날로그 신호

여러개의 신호로 연속적으로 변함



PWM

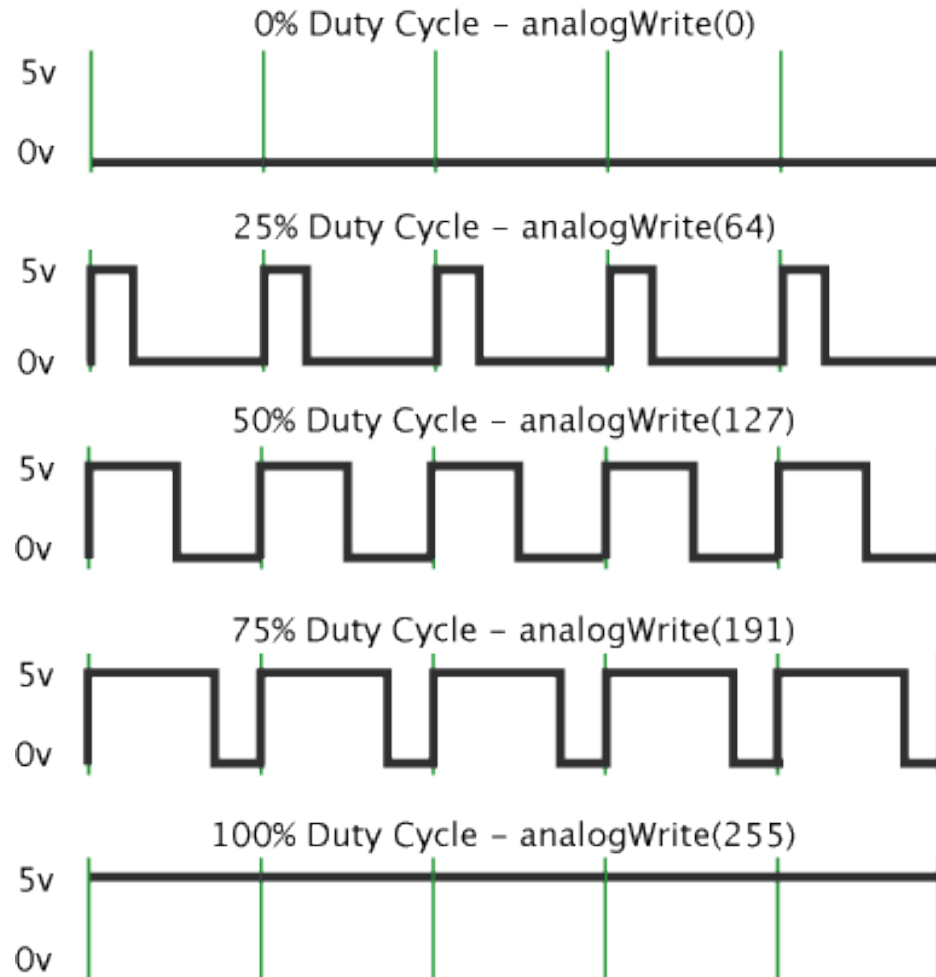
Pulse Width Modulation

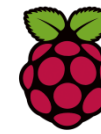
펄스폭 변조





Pulse Width Modulation





- **특별 용도의 GPIO핀**
 - I2C 통신 핀 : GPIO2, 3
 - SPI통신 핀 : GPIO7, 8, 9, 10, 11
 - EEPROM(비휘발성 메모리) : ID_SD, ID_SC
 - Serial통신(TXD, RXD) : GPIO14, 15
 - PWM : GPIO12, 13, 18, 19

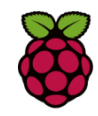




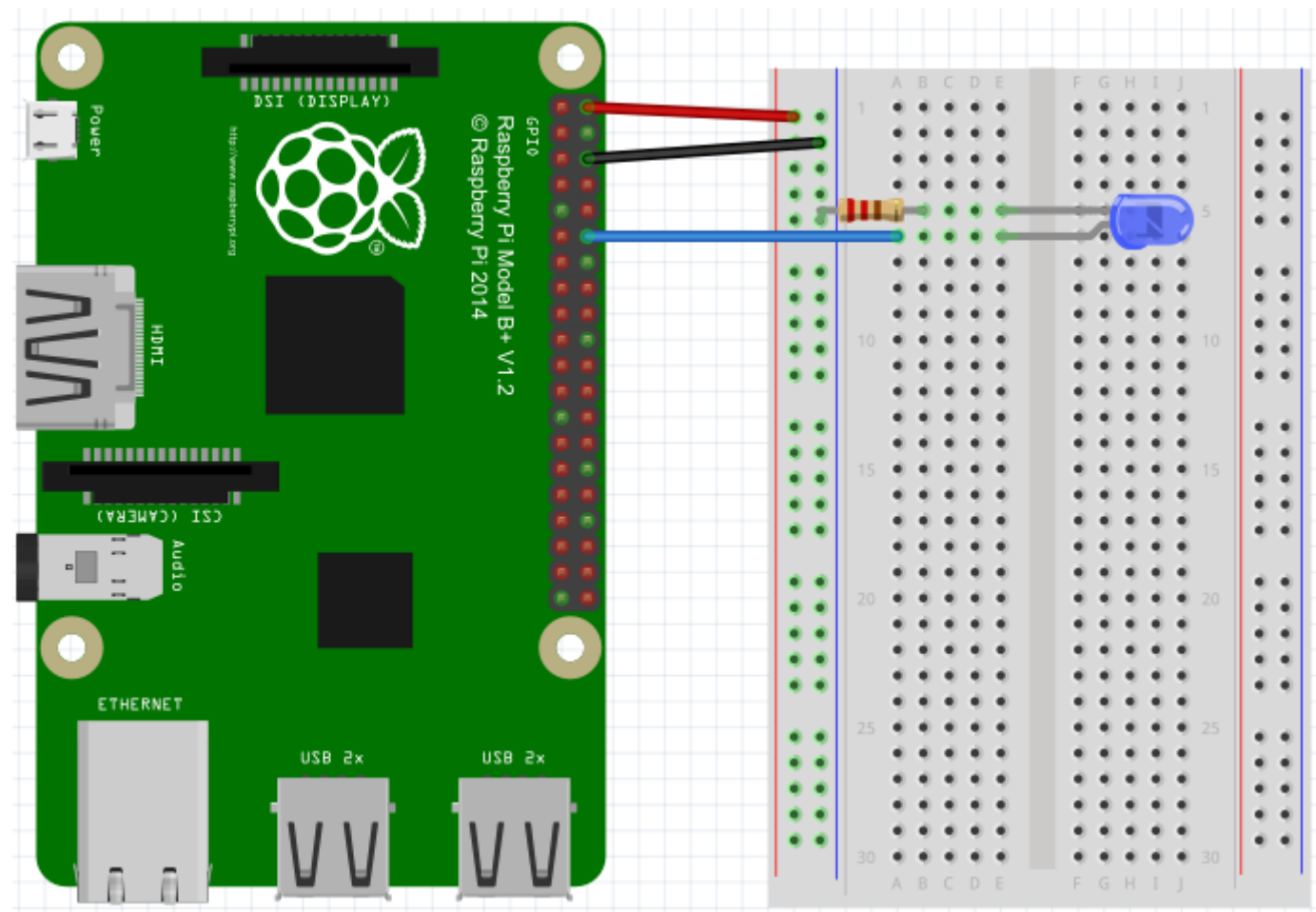
Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I ² C)		DC Power 5v	04
05	GPIO03 (SCL1 , I ² C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I ² C ID EEPROM)		(I ² C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Analog Led 회로



RASPERRYPI



PWM LED Code



RASPBERRYPI

```
*blink_analog.py - /home/pi/blink_analog.py (2.7.9)*
File Edit Format Run Options Windows Help

import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
GPIO.setup(2,GPIO.OUT)

p=GPIO.PWM(2,50)

p.start(0)

try :
    while True :

        p.ChangeDutyCycle(0)
        time.sleep(0.5)

        p.ChangeDutyCycle(50)
        time.sleep(0.5)

        p.ChangeDutyCycle(100)
        time.sleep(0.5)

except KeyboardInterrupt :
    GPIO.cleanup()
```



```
import RPi.GPIO as GPIO
```

GPIO를 사용할 수 있게 하는 라이브러리

```
import time
```

시간 관련 라이브러리



```
GPIO.setmode(GPIO.BCM)
```

라즈베리파이 GPIO를 BCM모드로 설정

```
GPIO.setup(led_pin, GPIO.OUT)
```

원하는 핀(led)을 출력 모드로 설정



```
GPIO.setmode(GPIO.BCM)
```

라즈베리파이 GPIO를 BCM모드로 설정

```
GPIO.setup(led_pin, GPIO.OUT)
```

원하는 핀(led)을 출력 모드로 설정



```
p=GPIO.PWM(led_pin,500)
```

LED핀 PWM핀으로 사용, 500Hz

```
p.start(0)
```

설정된 PWM 시작, 초기값 설정



```
p.ChangeDutyCycle(0)  
time.sleep(0.5)
```

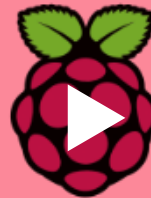
```
p.ChangeDutyCycle(50)  
time.sleep(0.5)
```

```
p.ChangeDutyCycle(100)  
time.sleep(0.5)
```

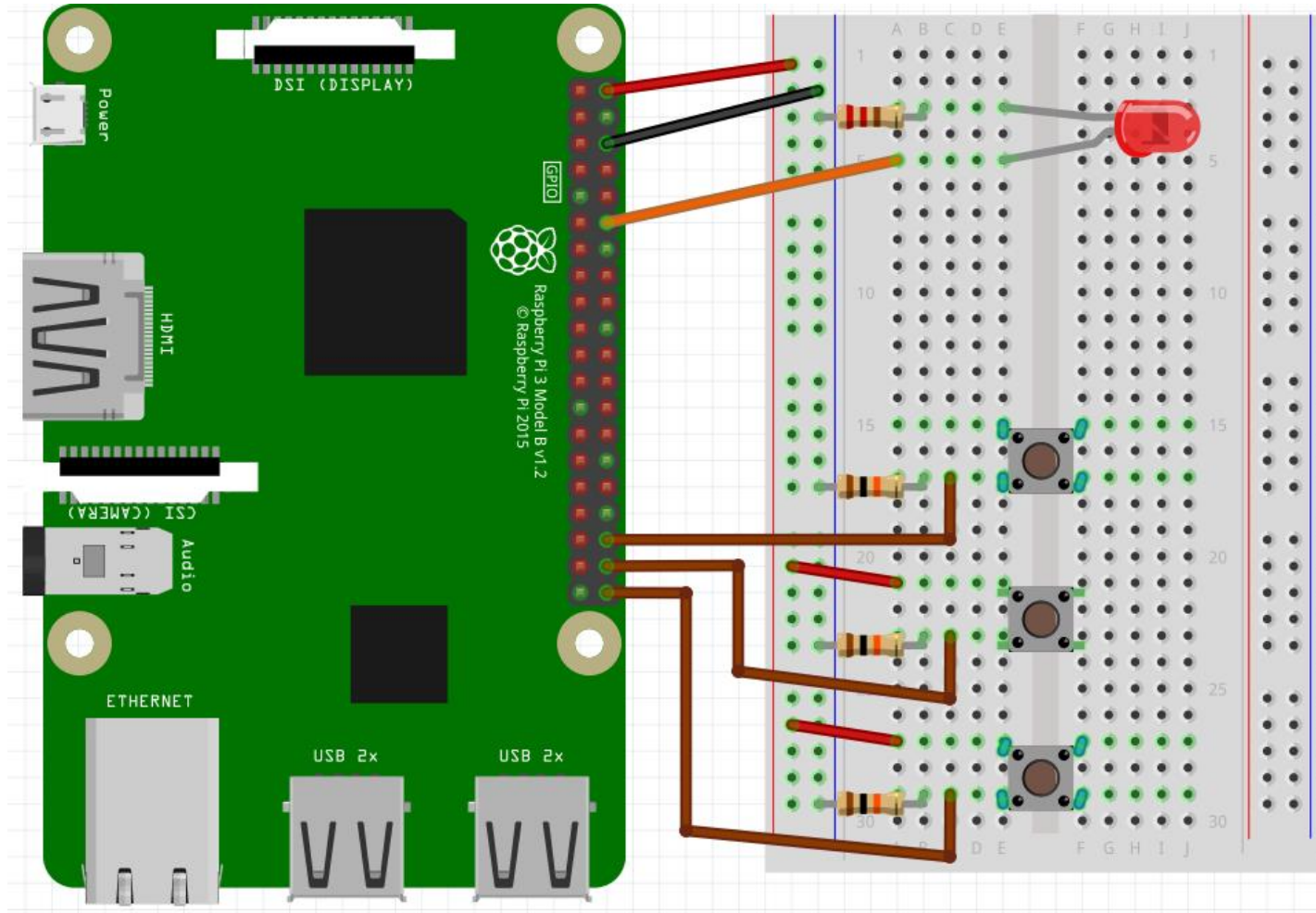
LED 밝기제어(PWM) 예제 2



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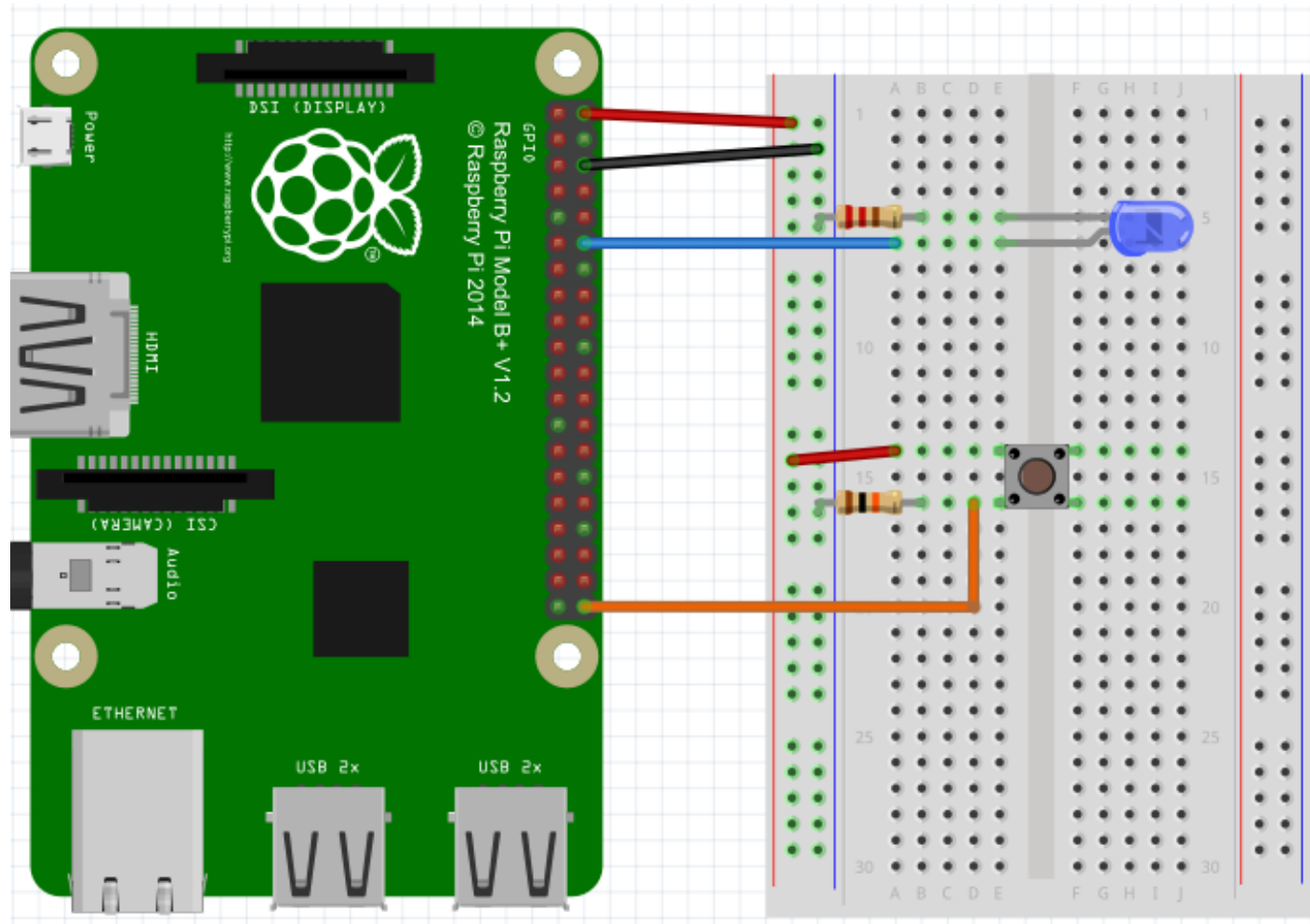


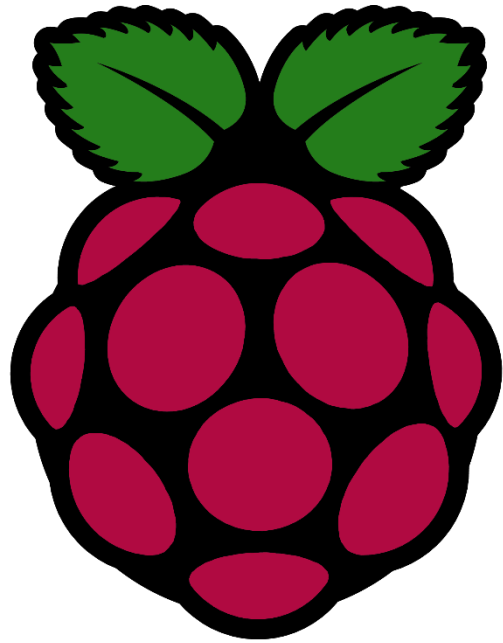


디바운스 스탠드 회로



RASPBERRYPI





RaspberryPi



Smart Media
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