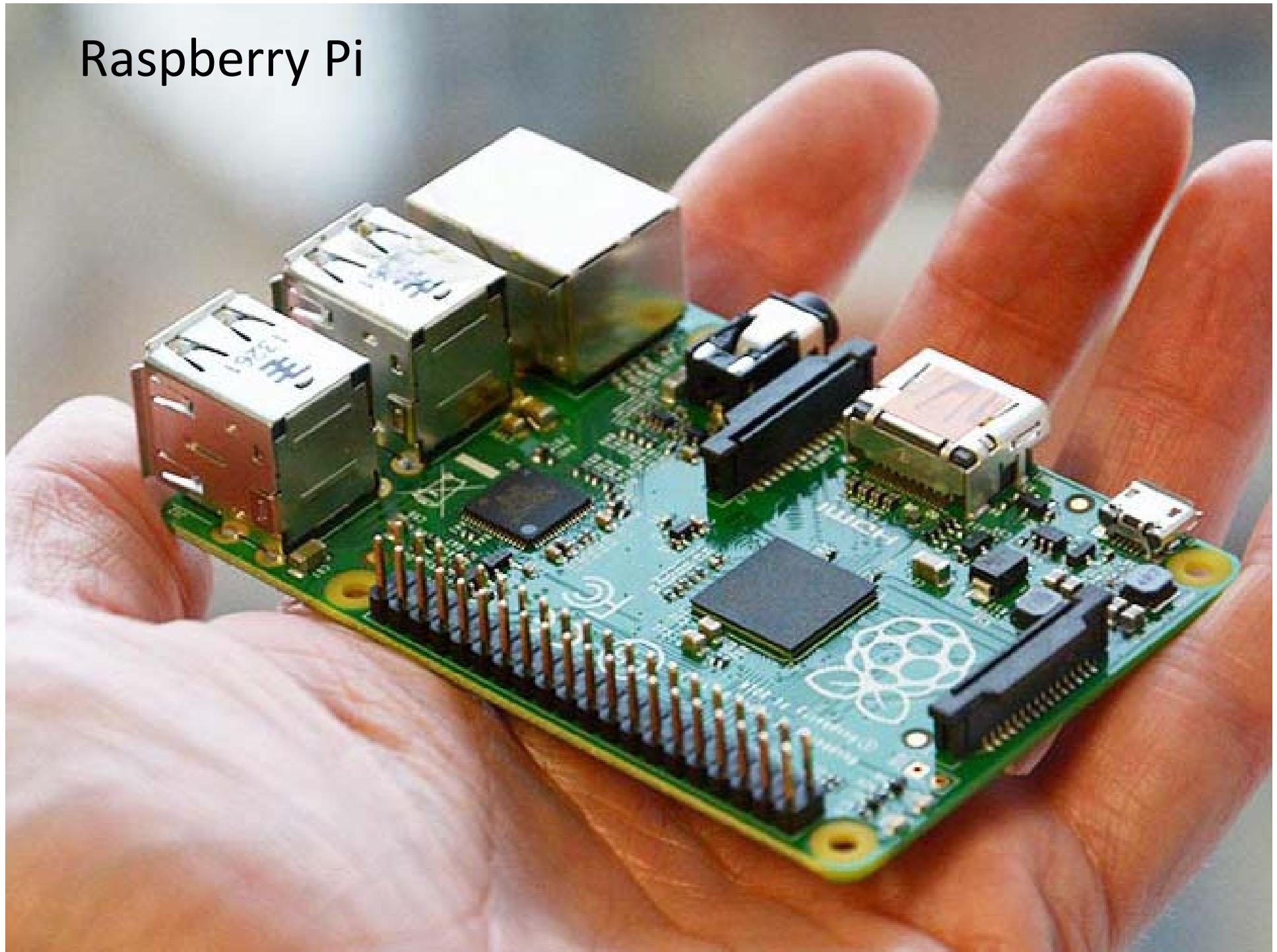
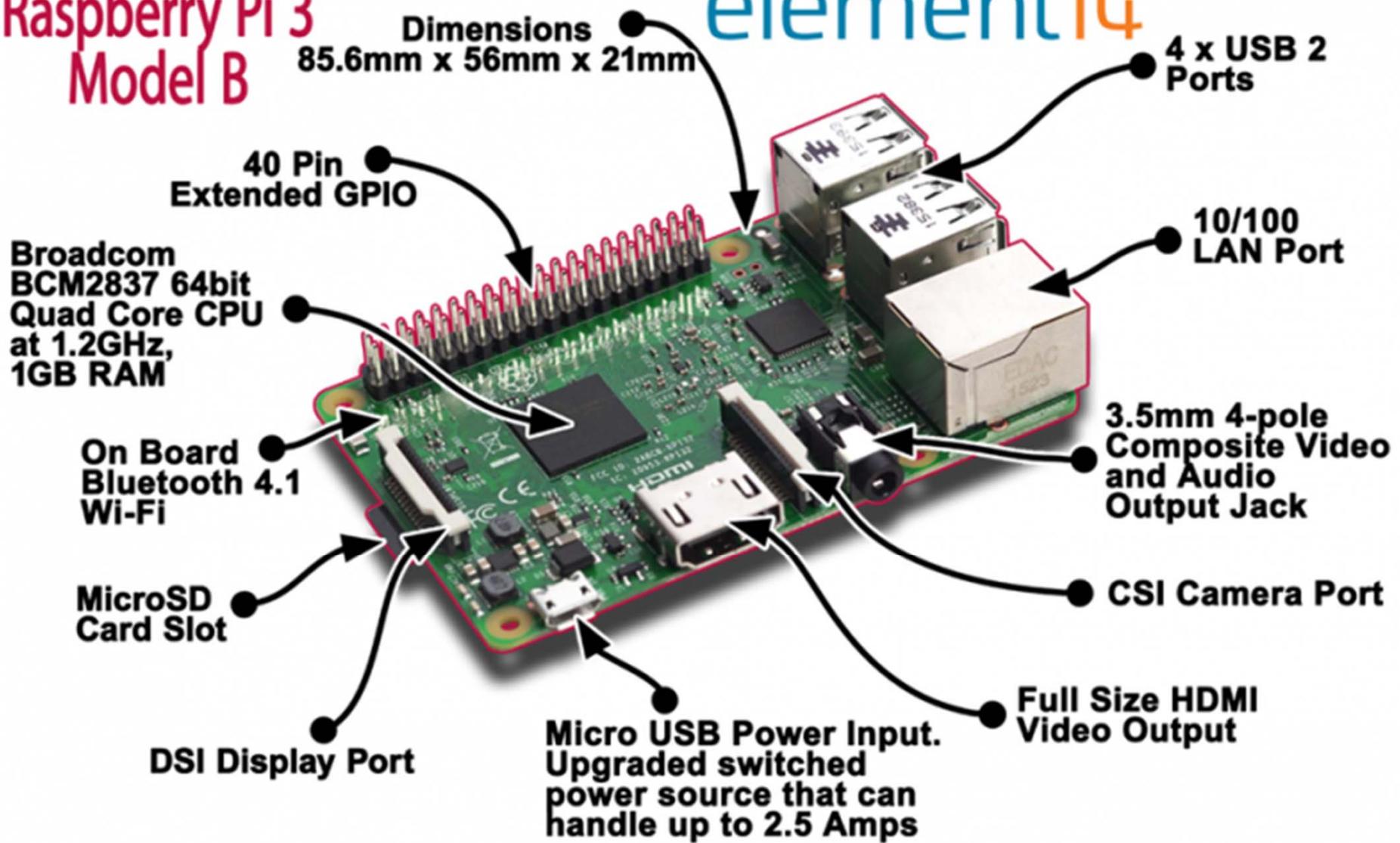


Raspberry Pi



Raspberry Pi 3 Model B

element*14*

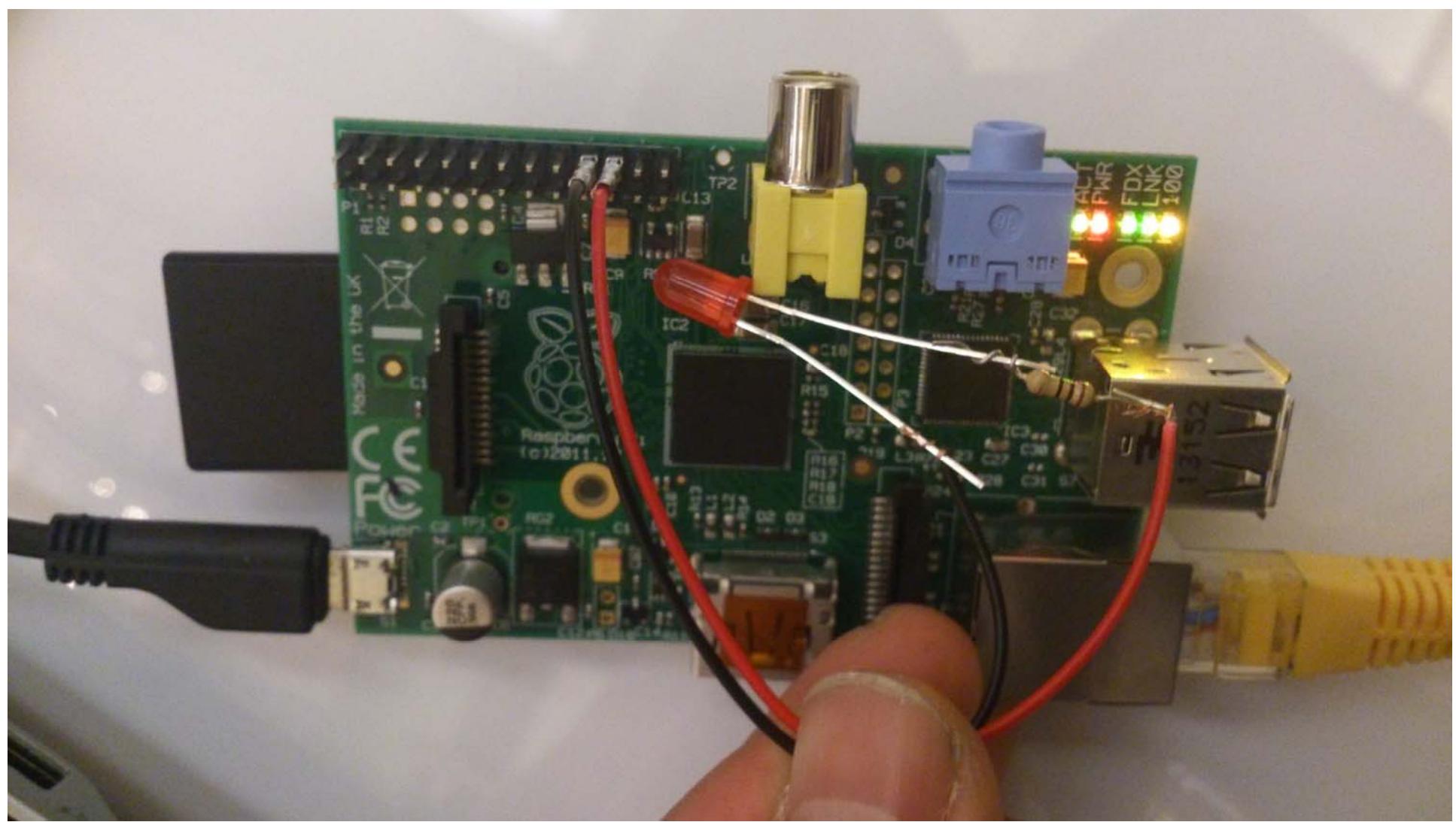


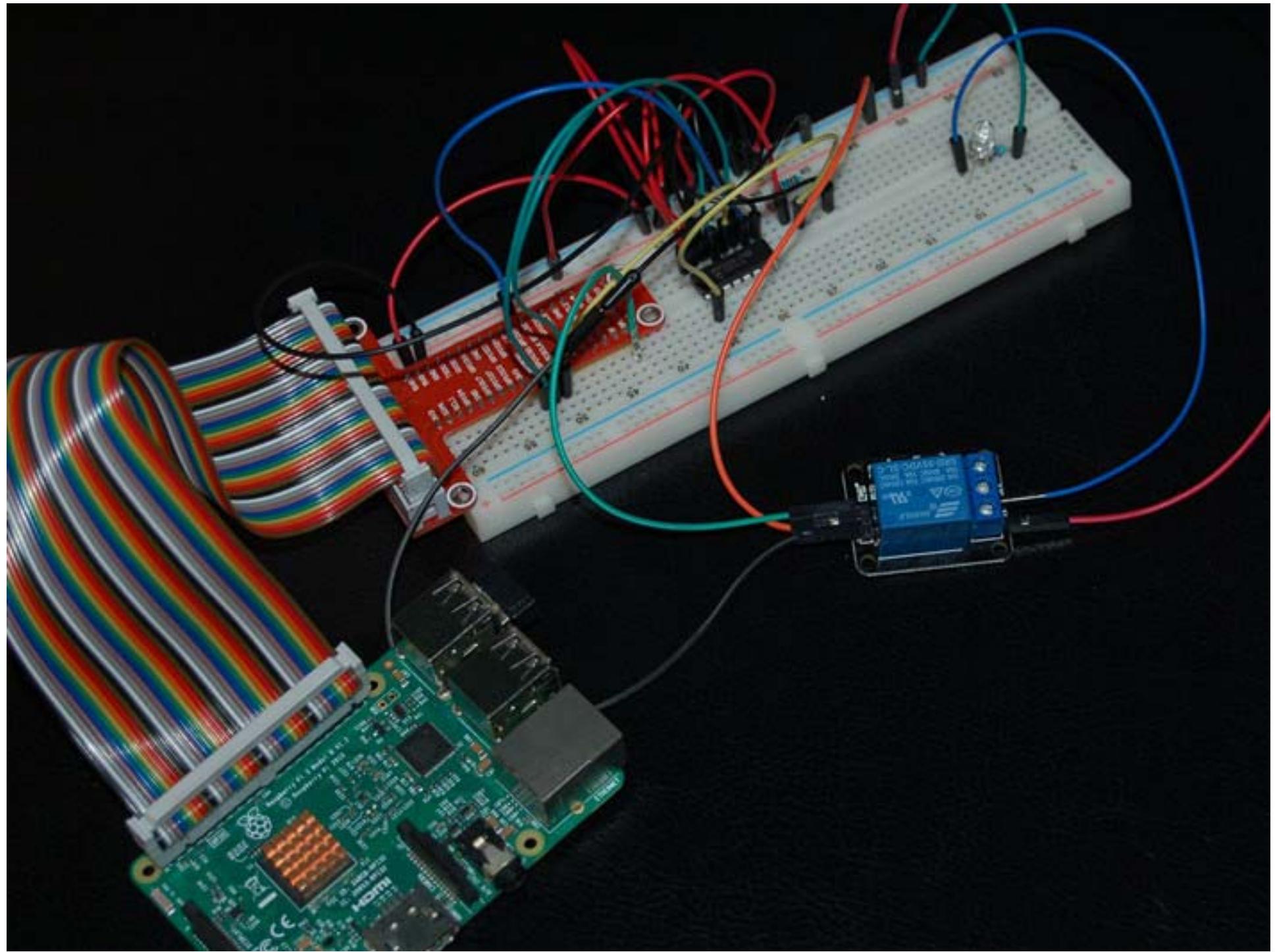


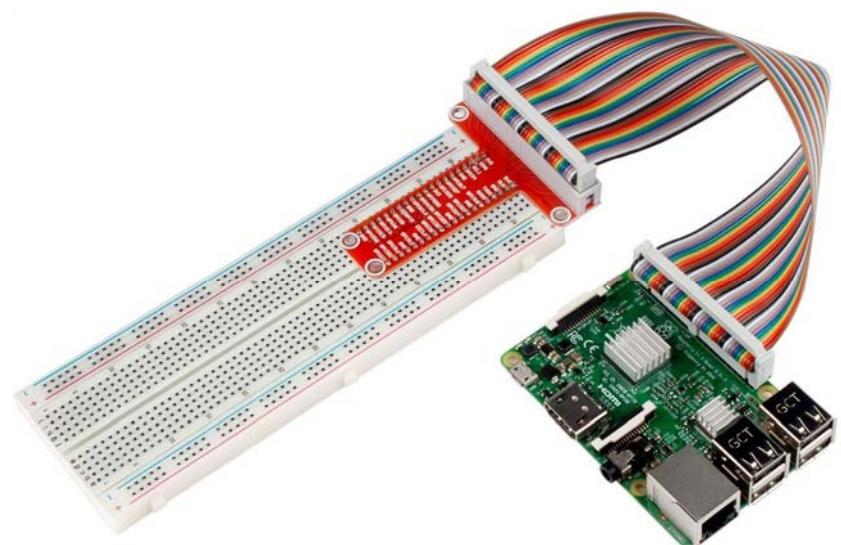
Alternate Function	
3.3V PWR	1
I2C1 SDA	GPIO 2
I2C1 SCL	GPIO 3
GPIO 4	5
GND	7
GPIO 17	9
GPIO 27	11
GPIO 22	13
3.3V PWR	15
SPI0 MOSI	GPIO 10
SPI0 MISO	GPIO 9
SPI0 SCLK	GPIO 11
GND	19
Reserved	21
GPIO 11	23
GND	25
Reserved	27
GPIO 5	29
GPIO 6	31
GPIO 13	33
SPI1 MISO	GPIO 19
GPIO 26	35
GND	37
2	3.3V PWR
4	5V PWR
6	GND
8	UART0 TX
10	UART0 RX
12	GPIO 18
14	GND
16	GPIO 23
18	GPIO 24
20	GND
22	GPIO 25
24	GPIO 8
26	GPIO 7
28	Reserved
30	GND
32	GPIO 12
34	GND
36	GPIO 16
38	GPIO 20
40	GPIO 21
SPI0 CS0	
SPI0 CS1	
SPI1 CS0	
SPI1 MOSI	
SPI1 SCLK	

GPIO.BOARD

GPIO.BCM

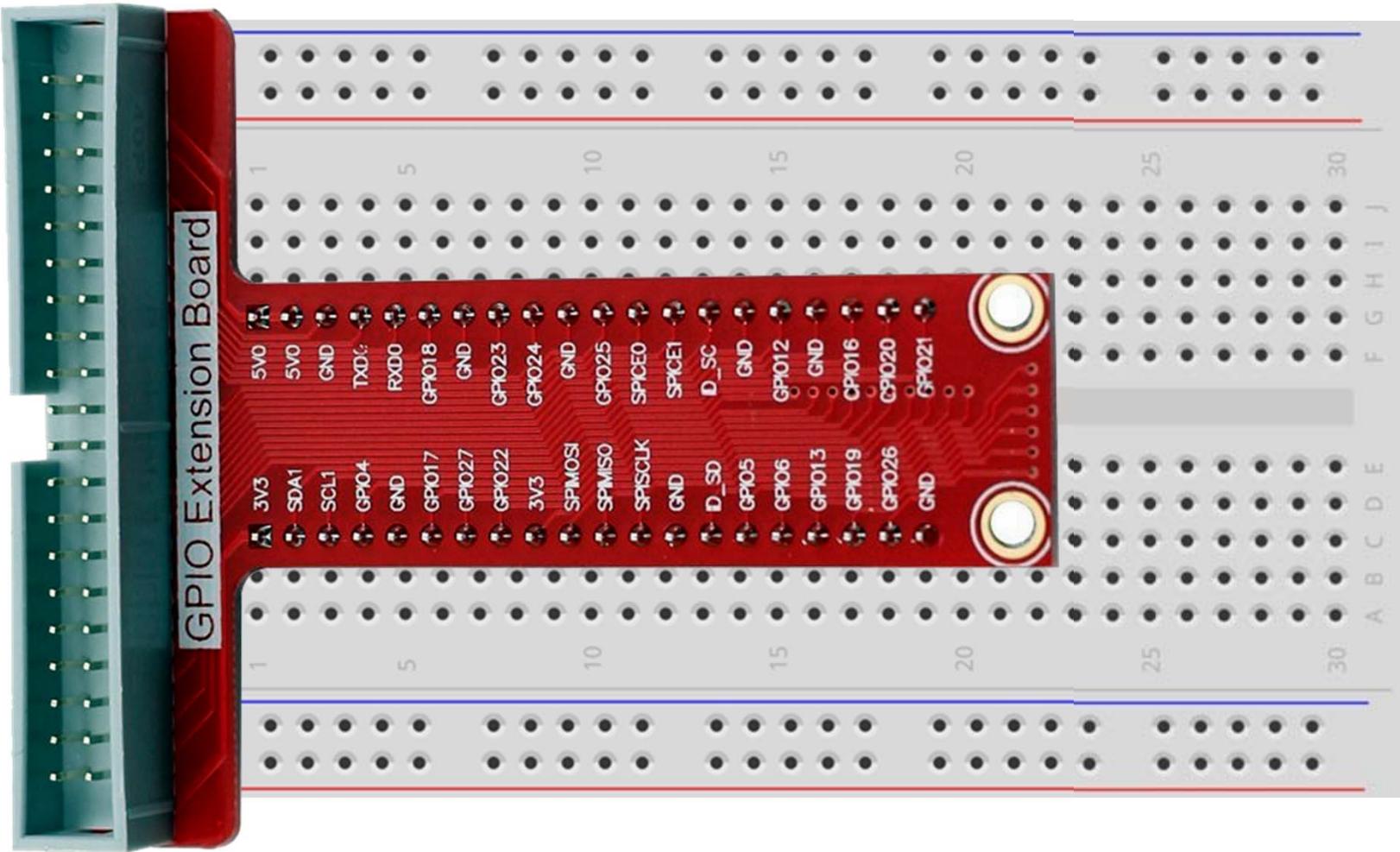


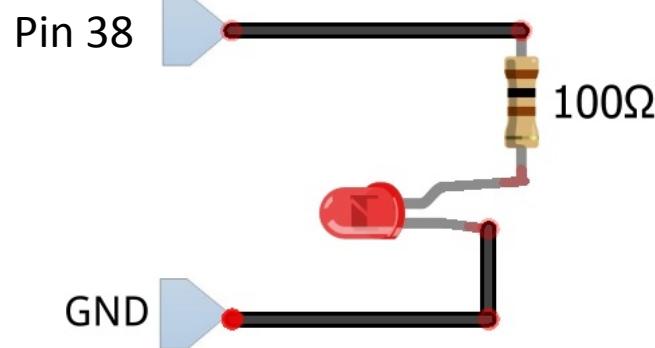
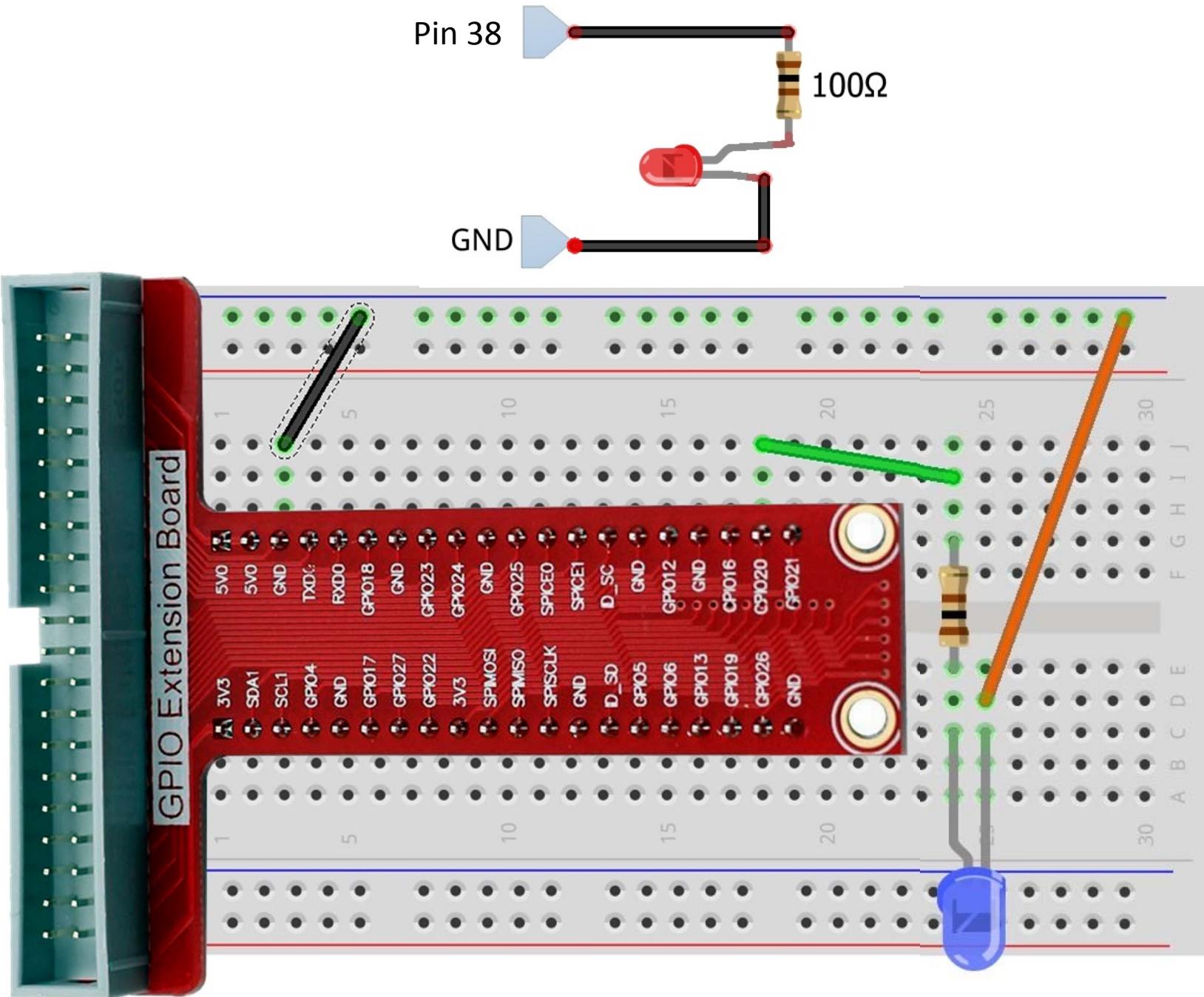


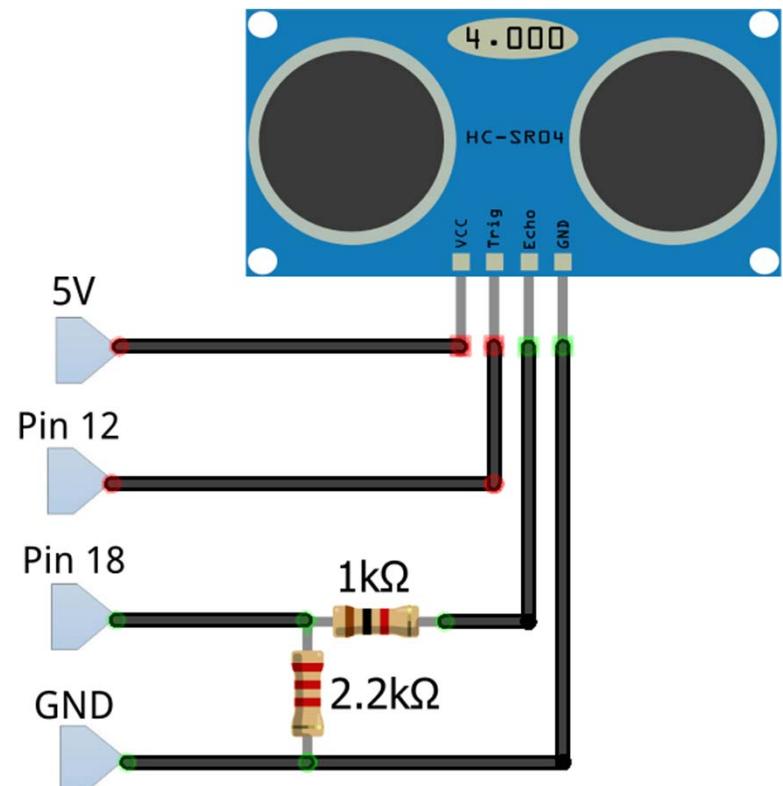
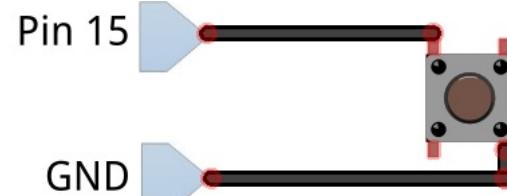
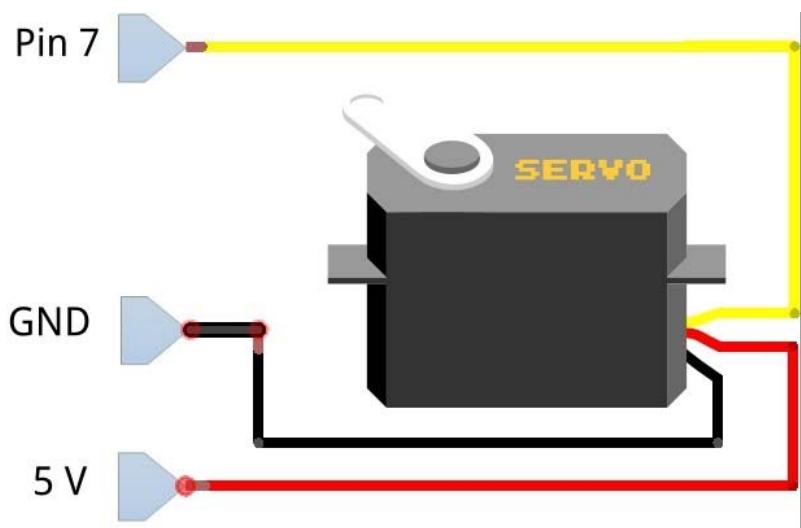
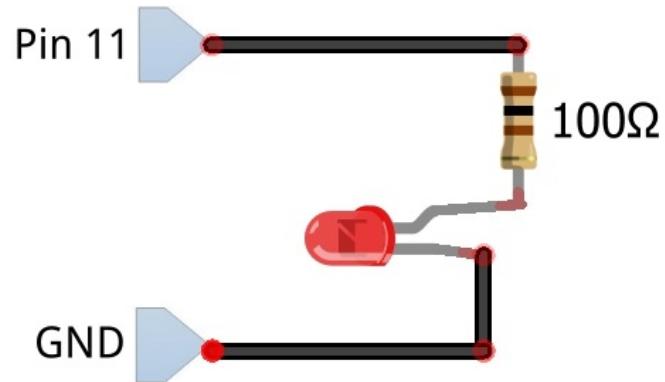


Breadboard

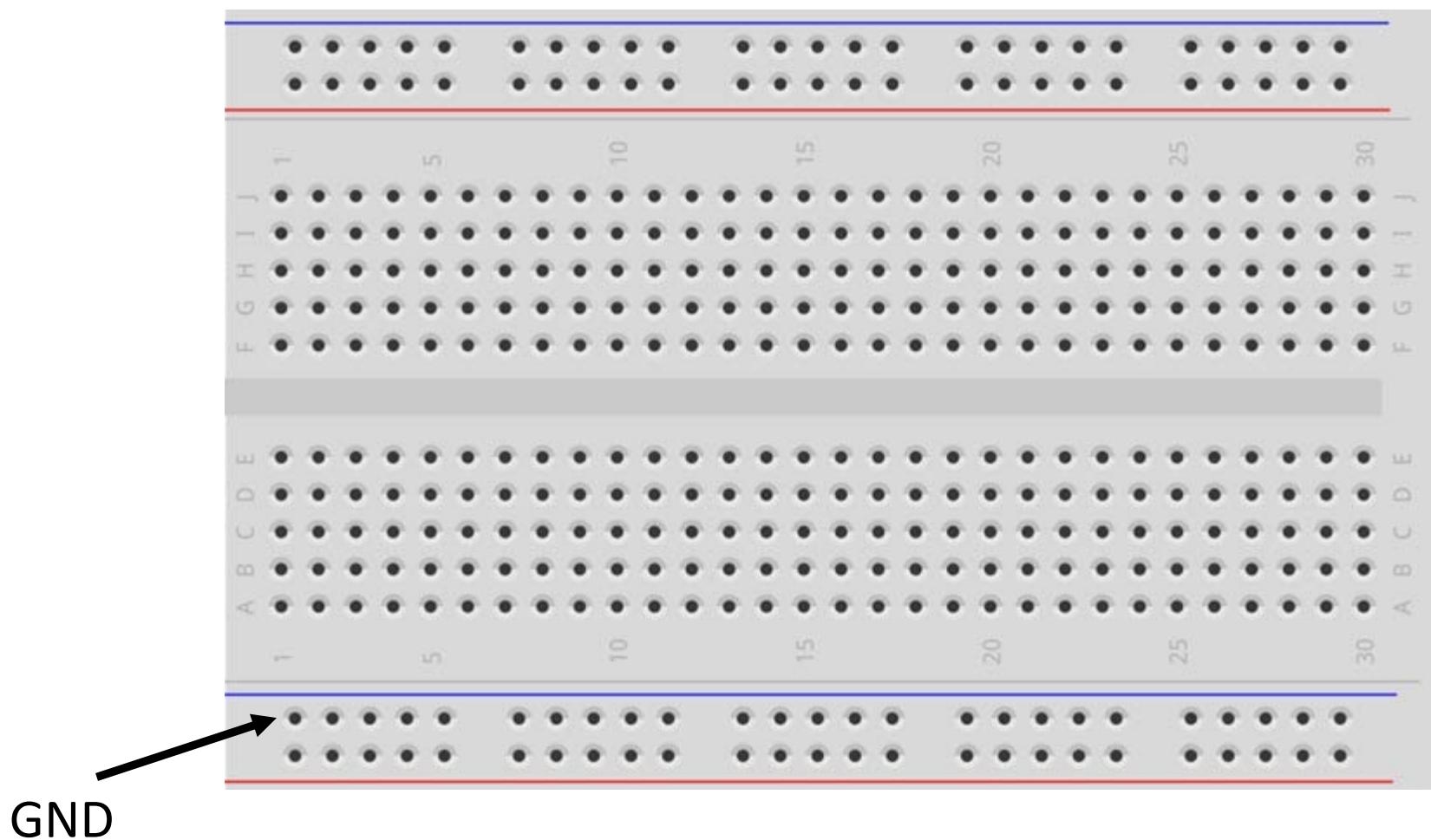


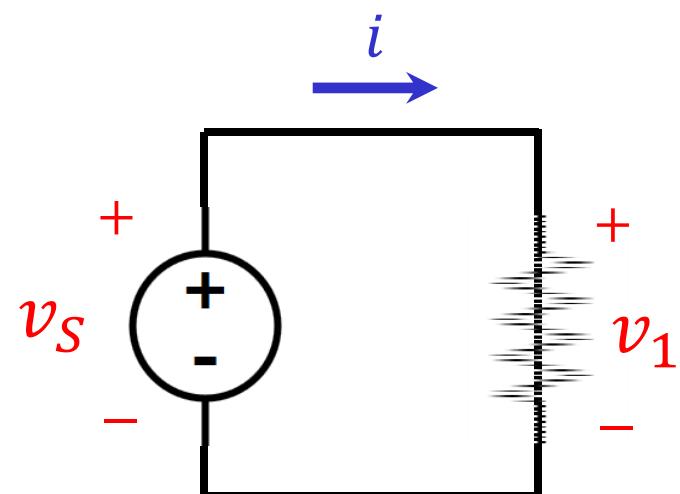
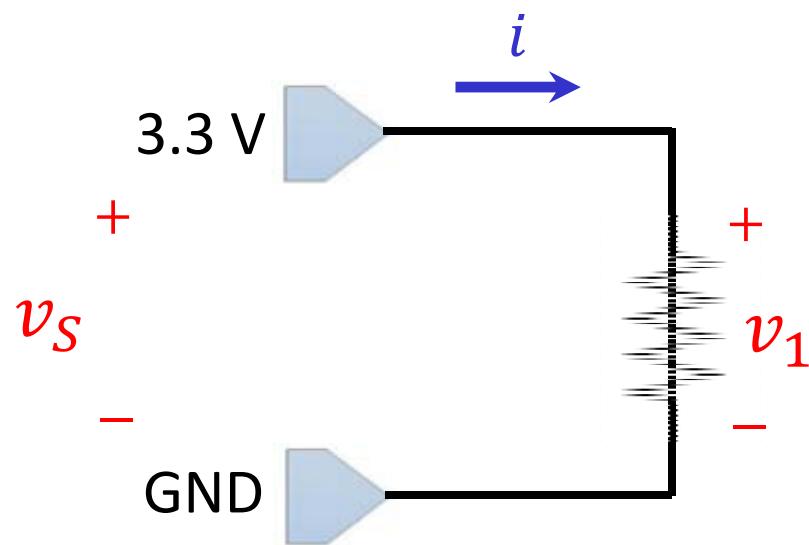
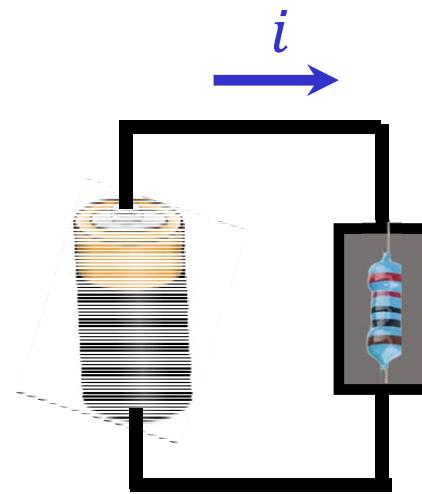
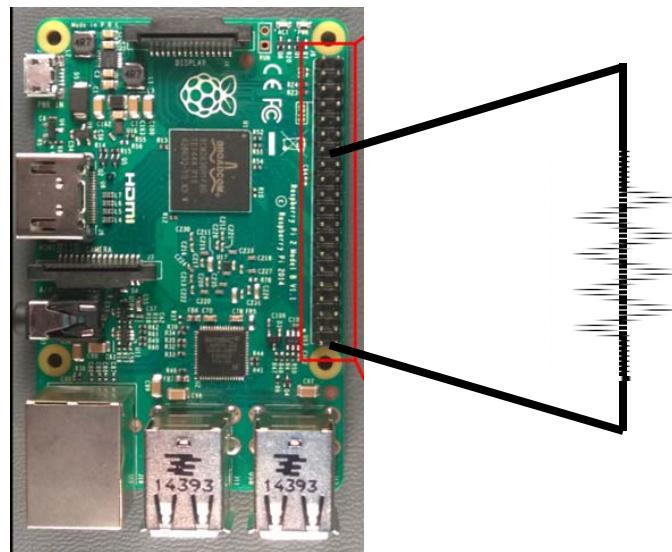


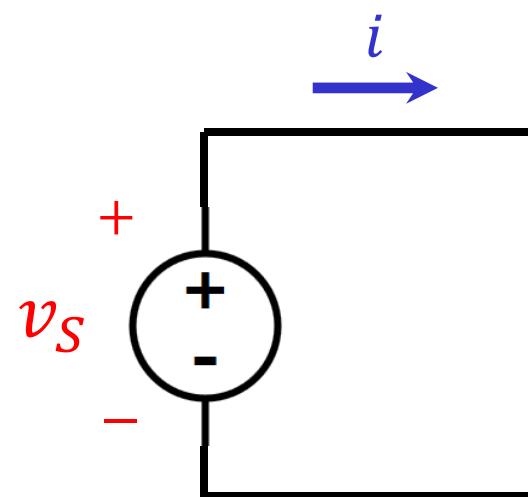
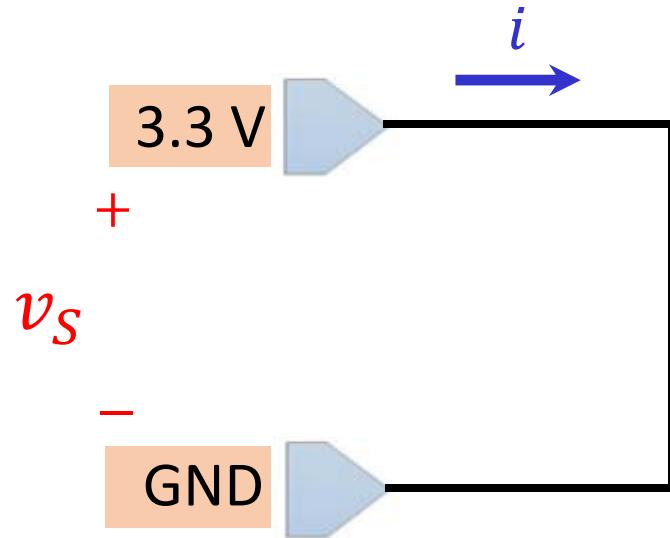
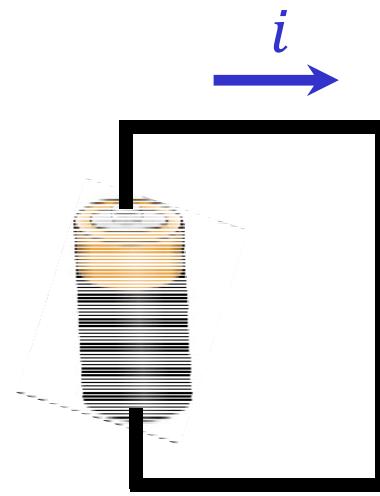
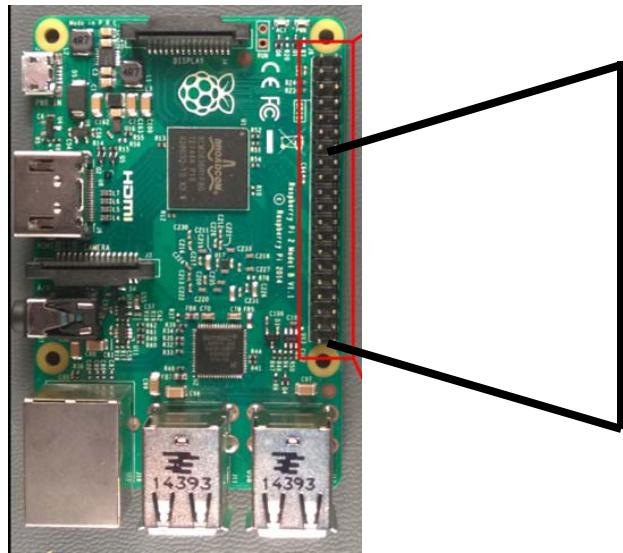




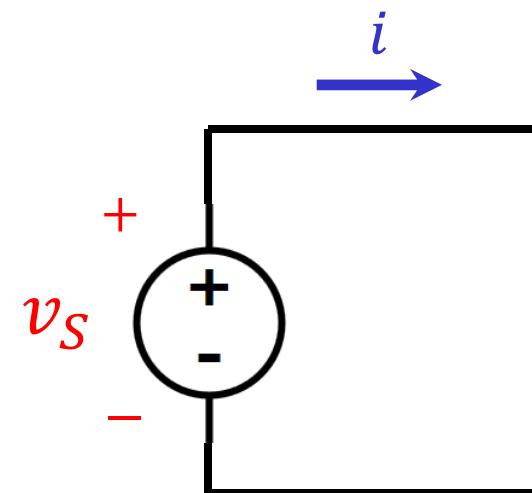
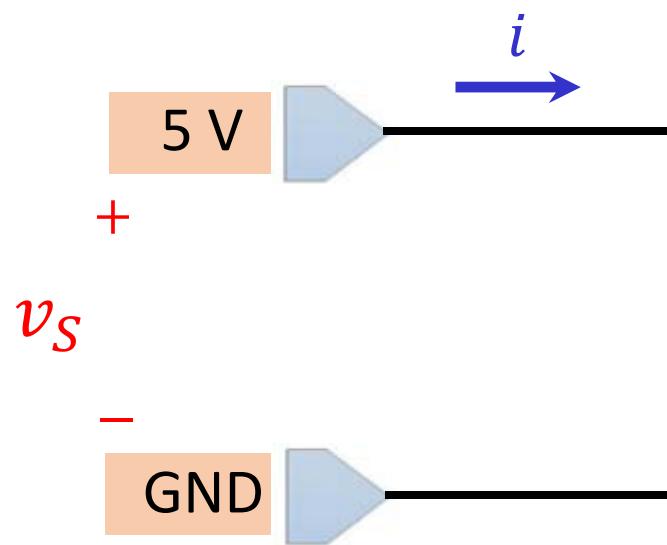
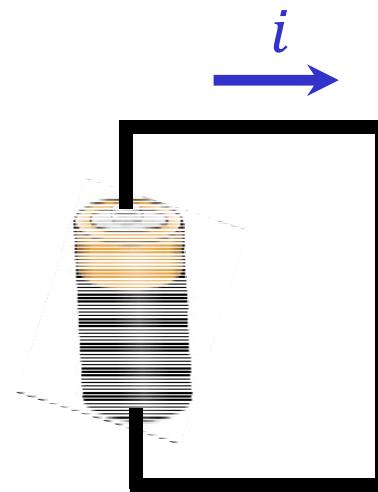
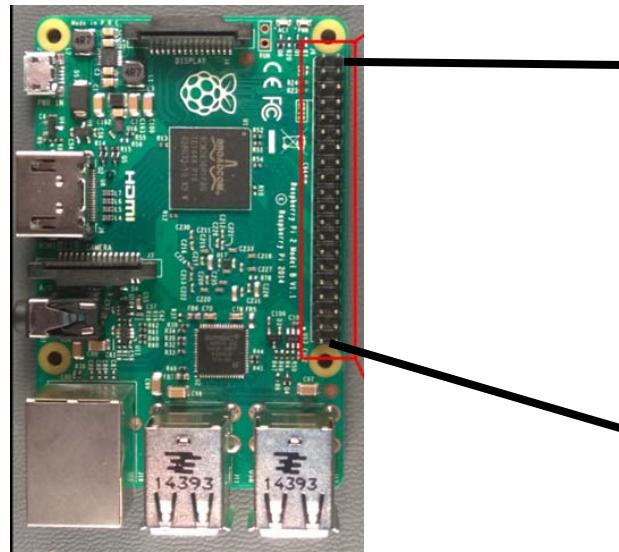
Breadboard



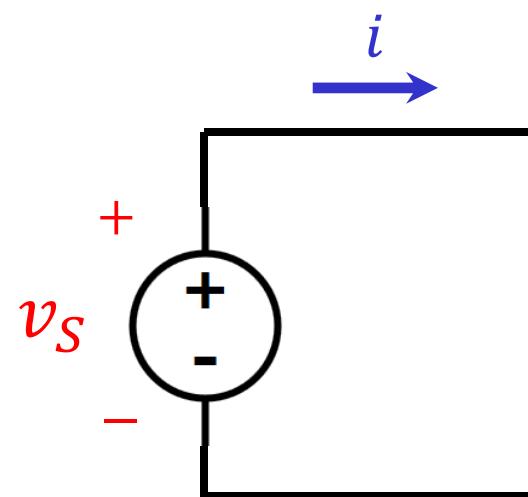
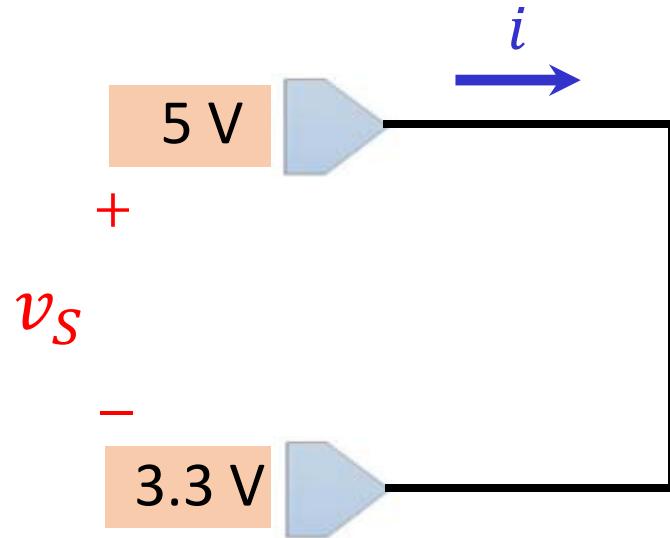
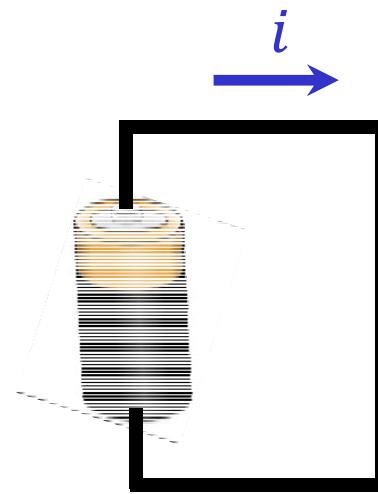
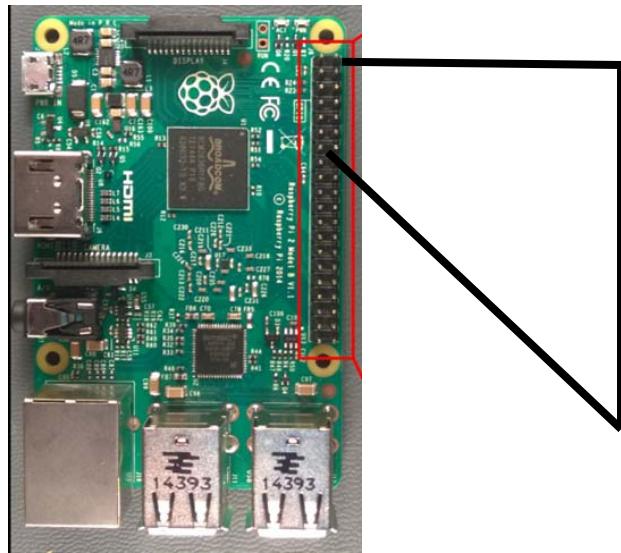




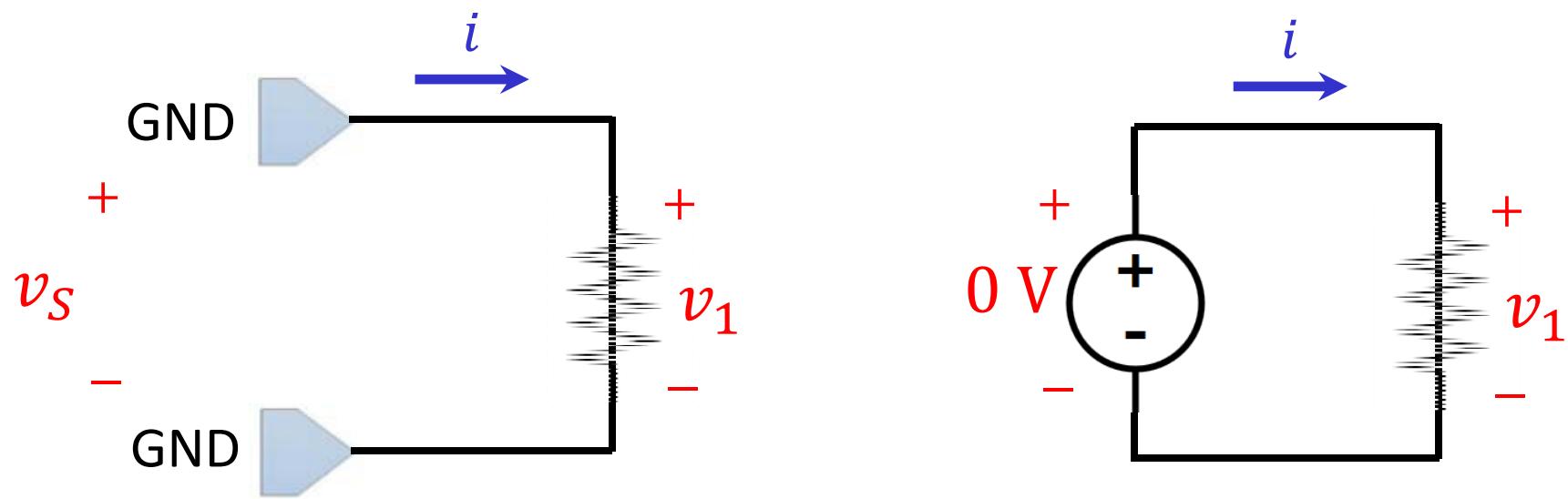
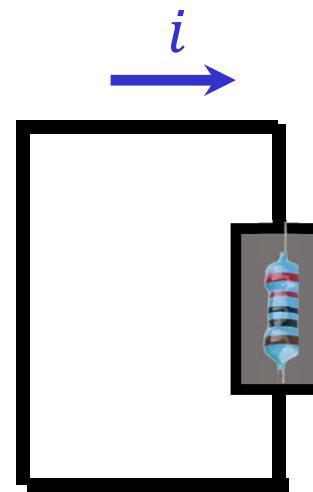
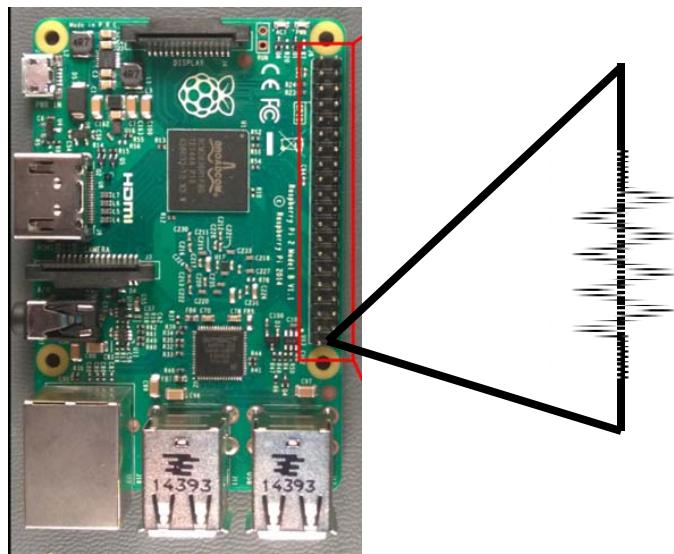
Very bad!



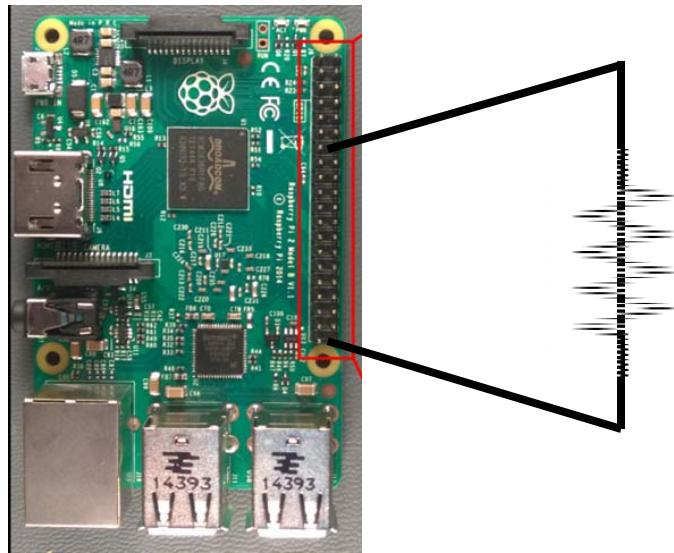
Very bad!



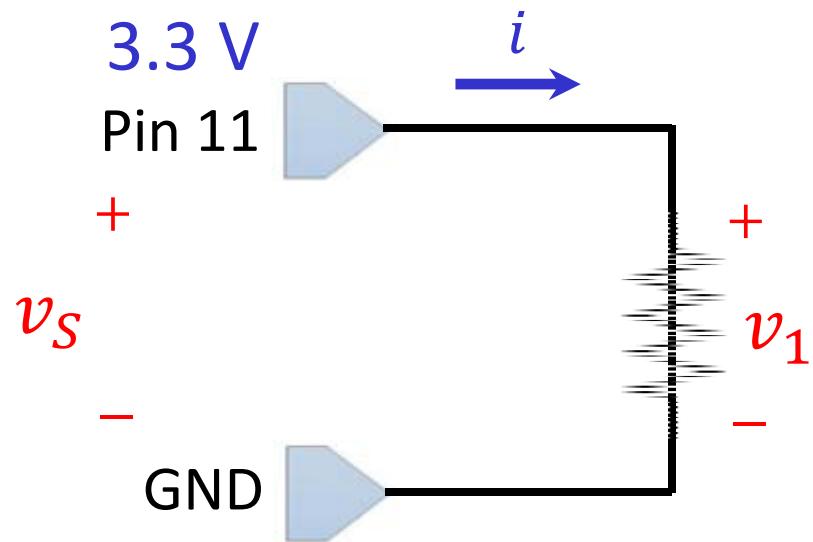
Very bad!



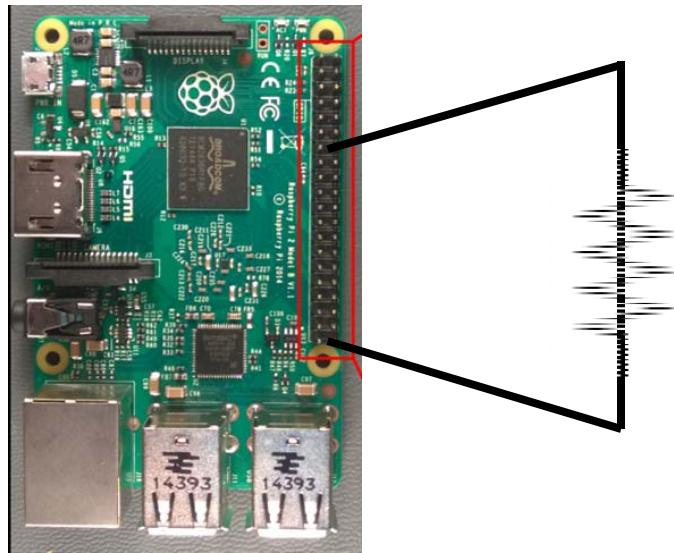
No current



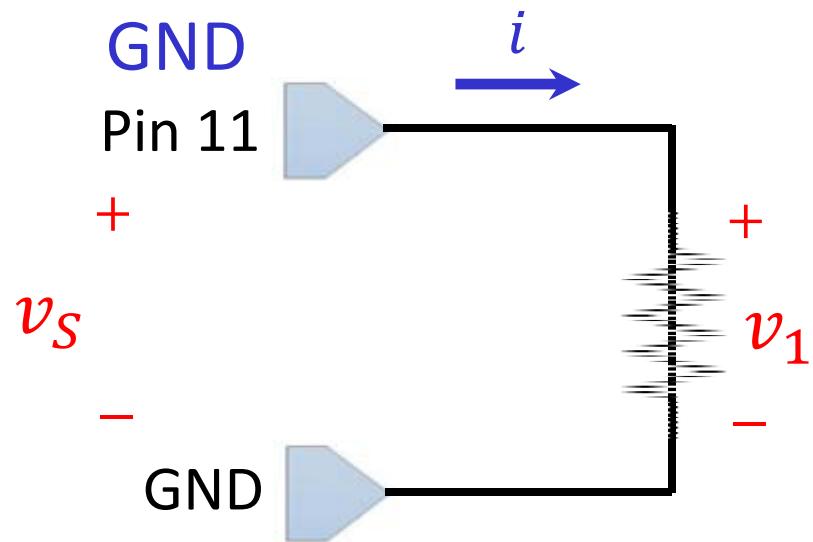
`GPIO.setup(11, GPIO.OUT)`



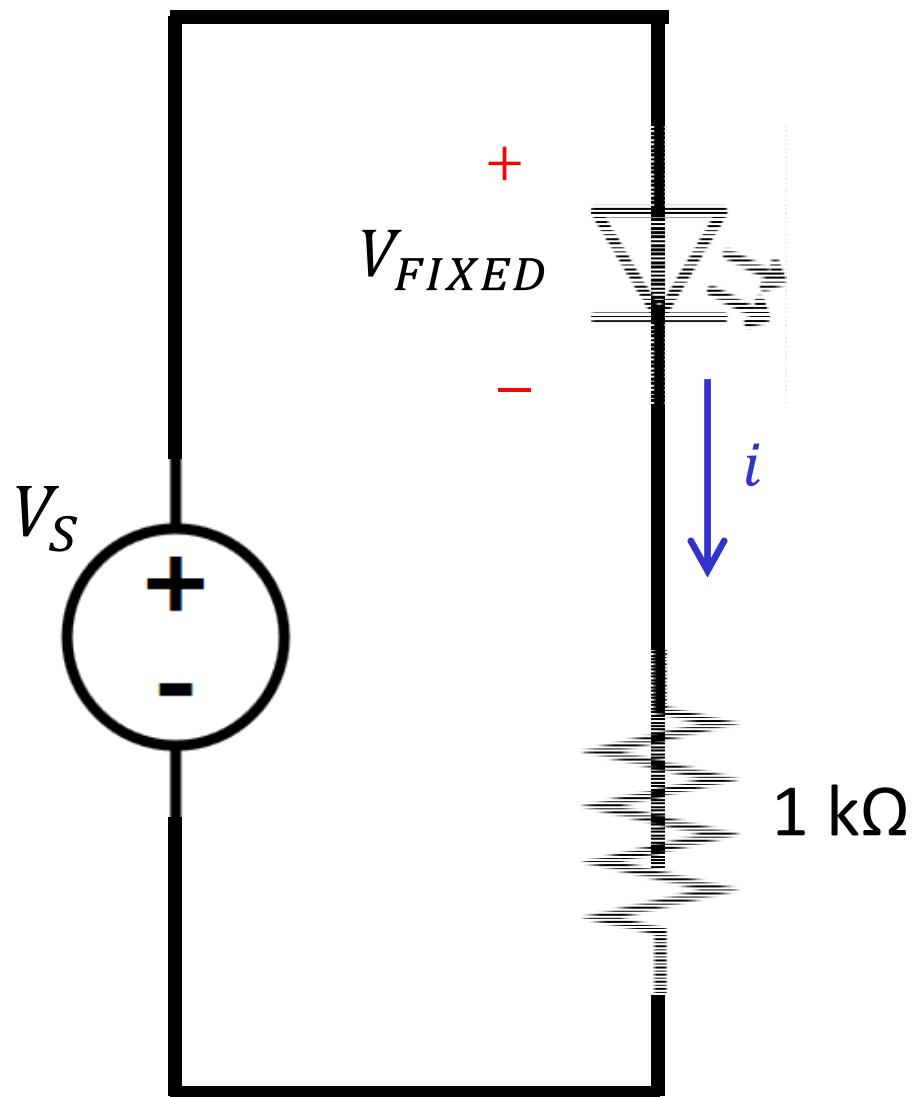
`GPIO.output(11, GPIO.HIGH)`



`GPIO.setup(11, GPIO.OUT)`

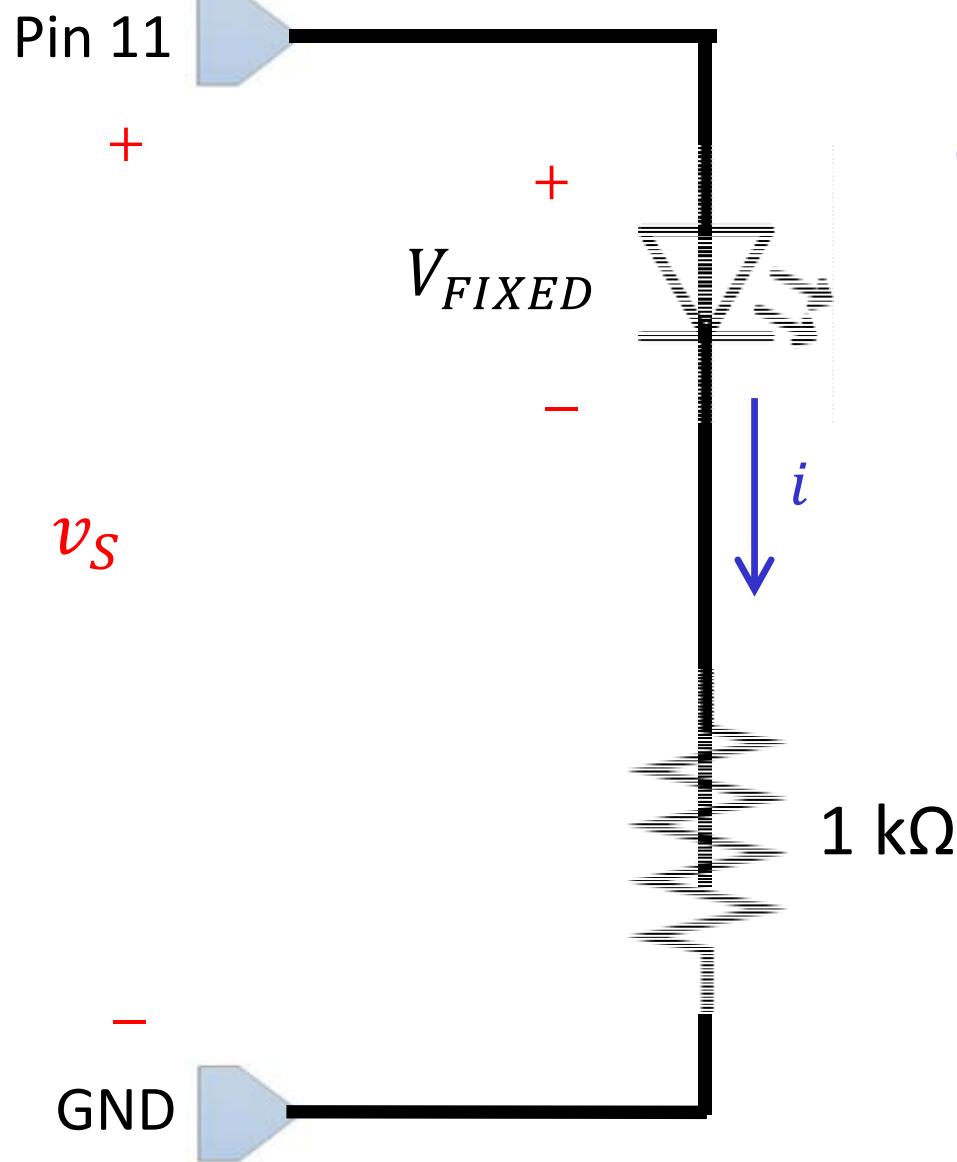


`GPIO.output(11, GPIO.LOW)`



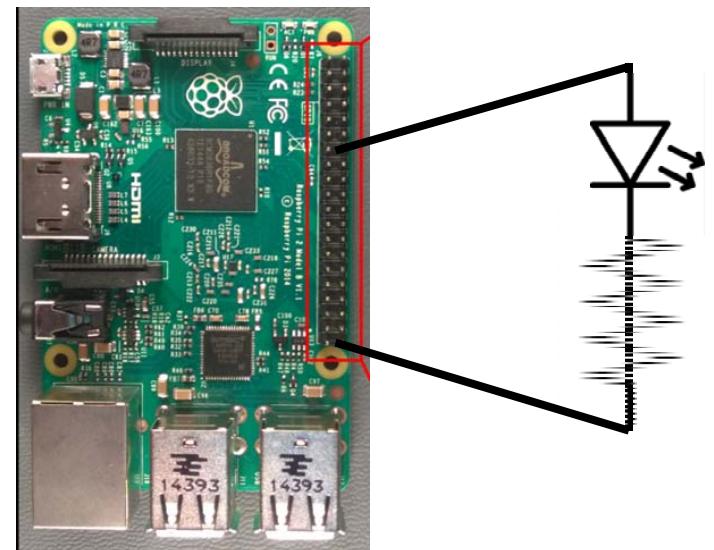
Generate V_S

HIGH: light on
LOW: light off



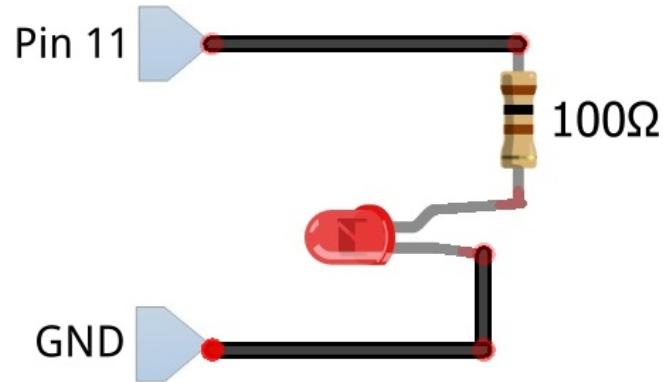
Generate V_S

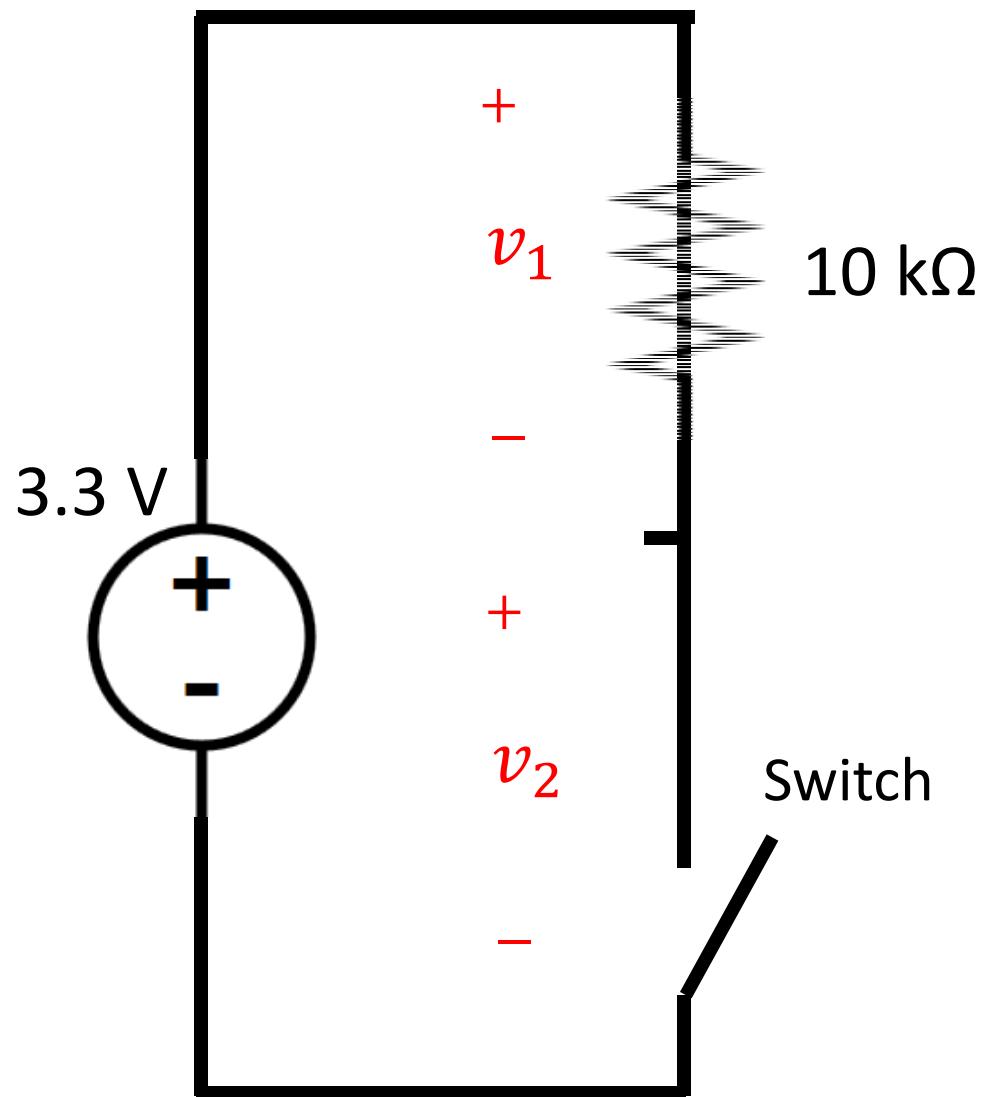
`GPIO.output(11, GPIO.HIGH) : light on`
`GPIO.output(11, GPIO.LOW) : light off`



Generate V_S

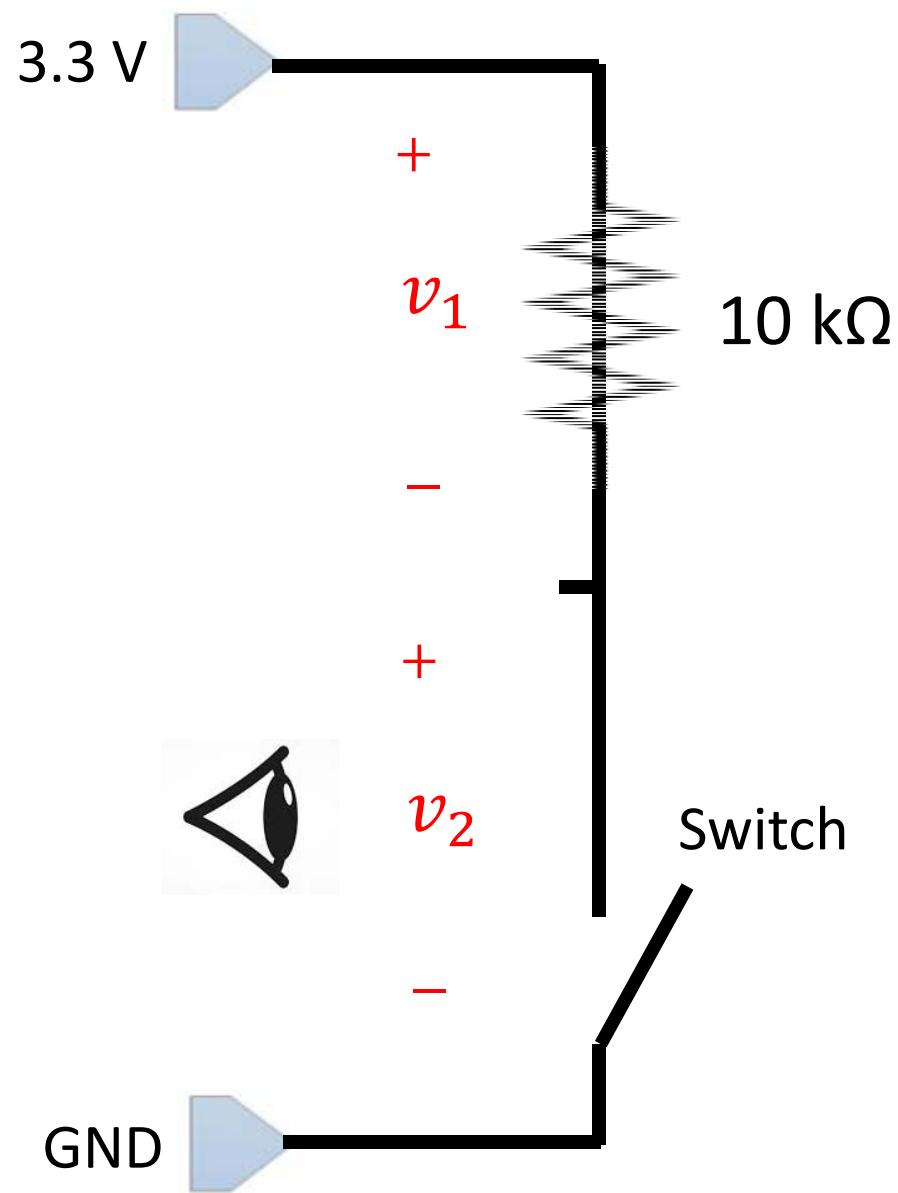
`GPIO.output(11, GPIO.HIGH)` : light on
`GPIO.output(11, GPIO.LOW)` : light off





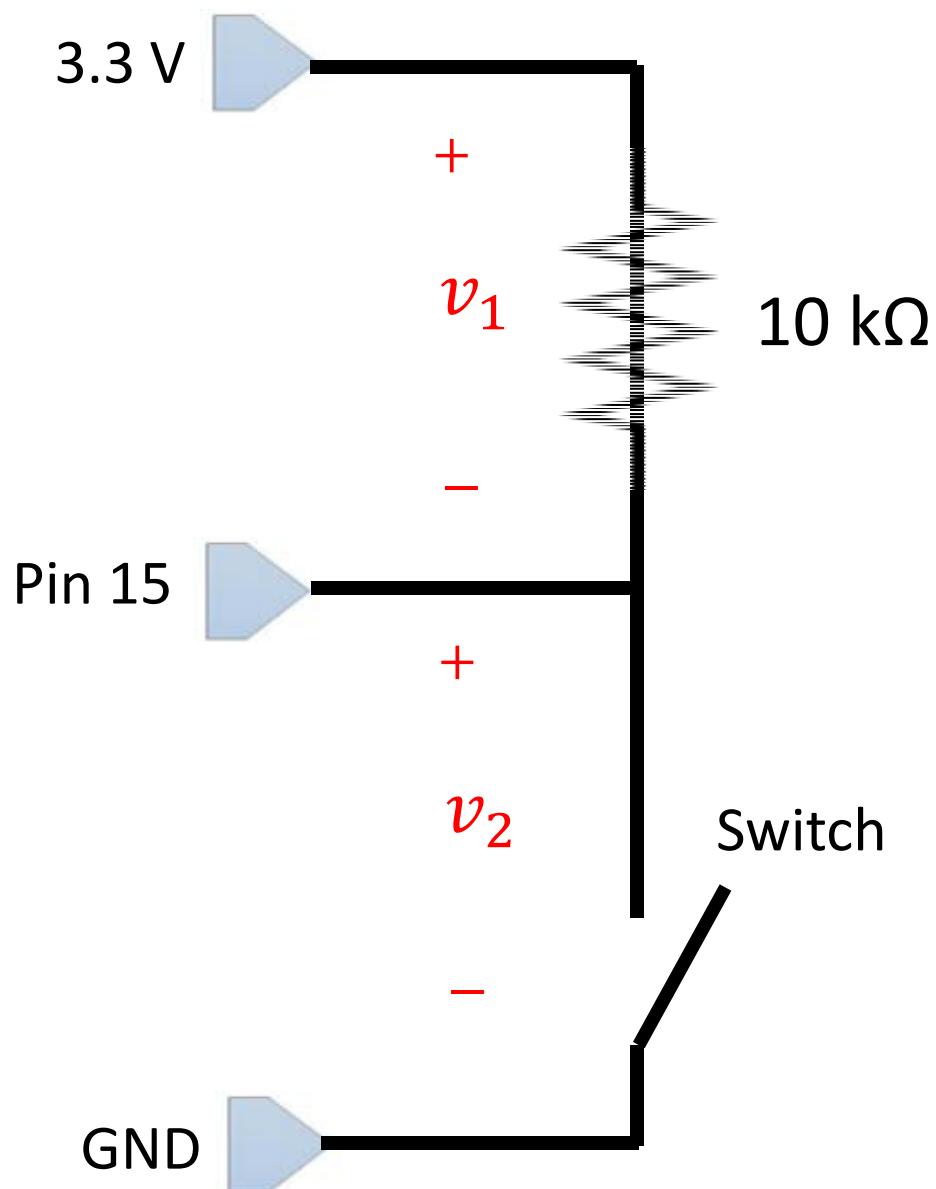
Switch open: $v_2 = 3.3 \text{ V}$

Switch closed: $v_2 = 0 \text{ V}$



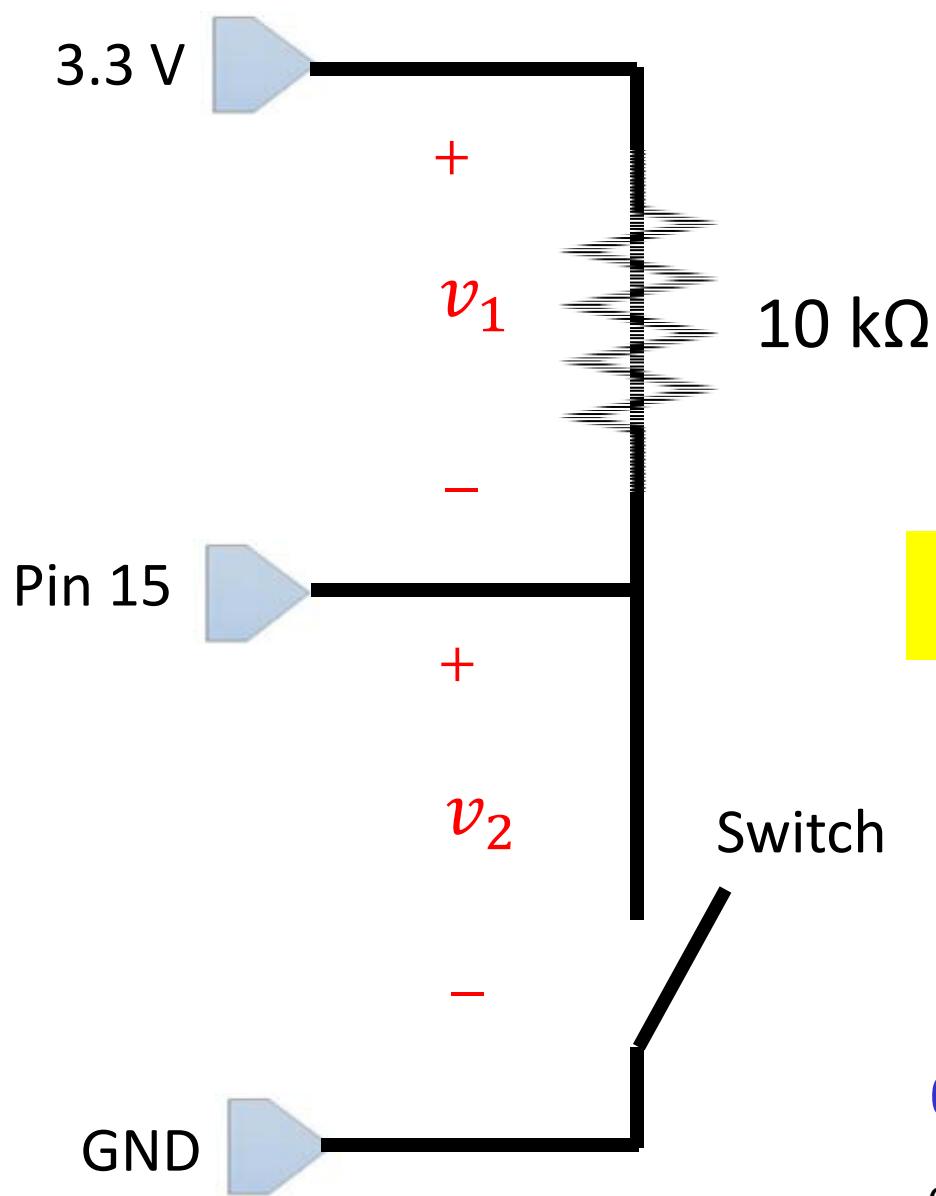
Switch open: $v_2 = 3.3 \text{ V}$

Switch closed: $v_2 = 0 \text{ V}$



Switch open: $v_2 = 3.3 \text{ V}$

Switch closed: $v_2 = 0 \text{ V}$



Switch open: $v_2 = 3.3 \text{ V}$

Switch closed: $v_2 = 0 \text{ V}$

`GPIO.setup(15, GPIO.IN)`

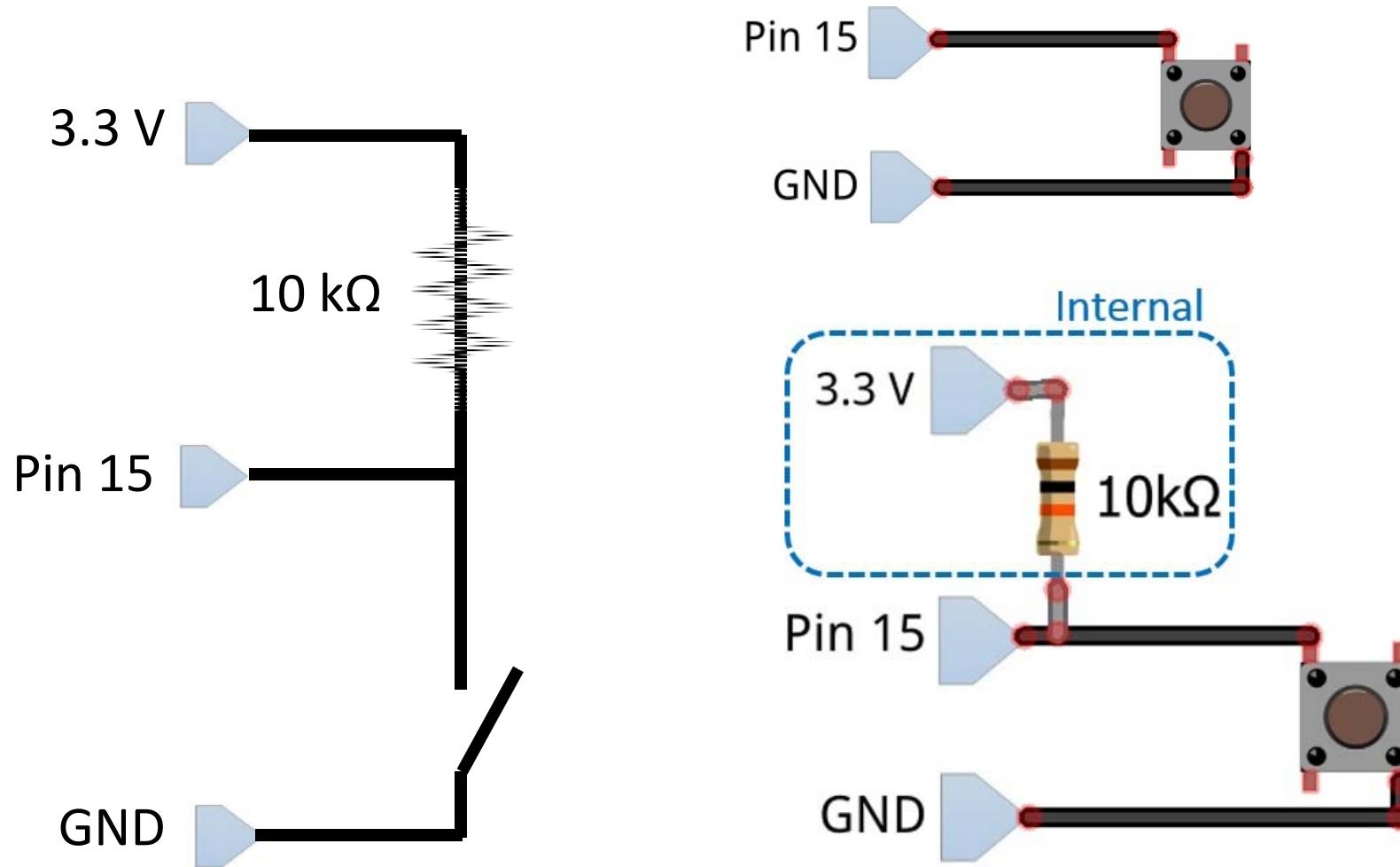
`result = GPIO.input(15)`

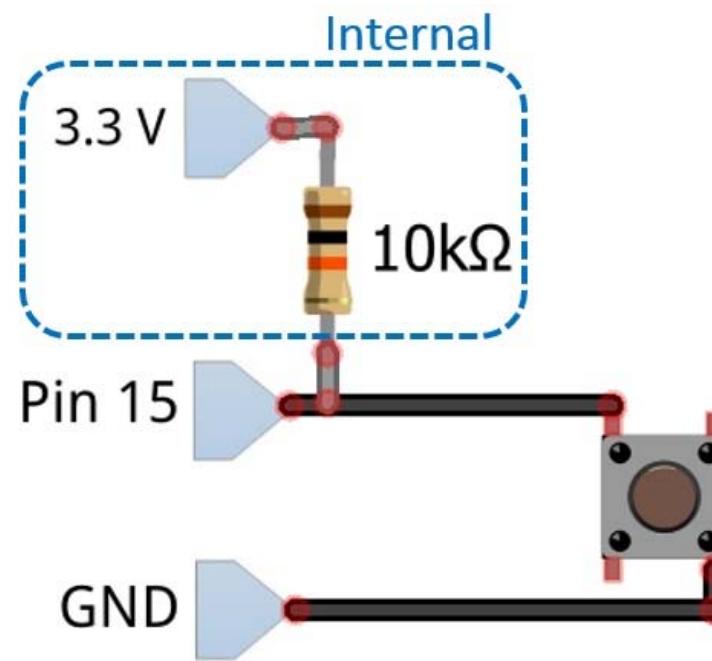
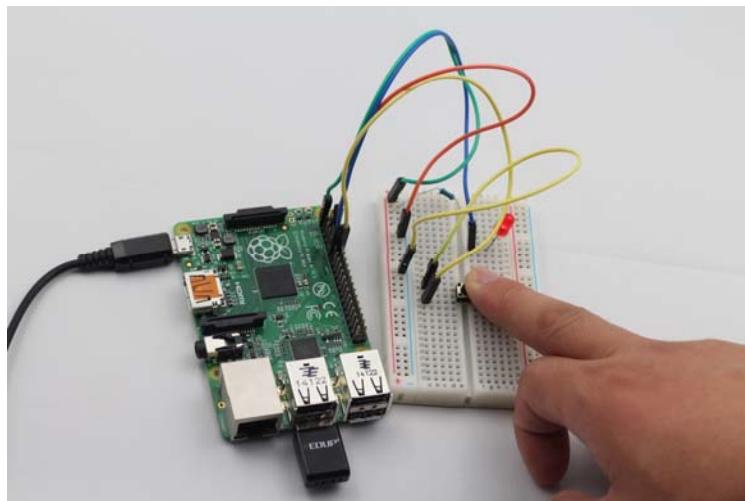
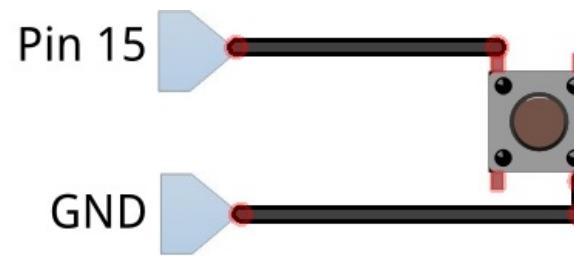
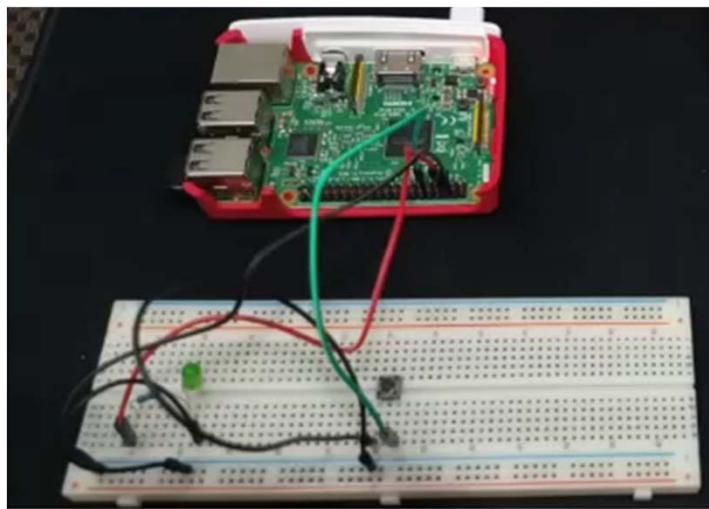


0 (LOW) or 1 (HIGH)

0V ... 1.65V 1.65V ... 3.3V

```
GPIO.setup(15, GPIO.IN, pull_up_down = GPIO.PUD_UP)
```





220Ω



$1 \text{ k}\Omega$



$10 \text{ k}\Omega$



$100 \text{ k}\Omega$



Diagram illustrating the resistor value and tolerance calculation for a 22000 ohm resistor (+/-5% tolerance):

$$22000 = 22\text{K} \pm 5\%$$

Band	1 1 st Digit	2 2 nd Digit	3 3 rd Digit	4 (No. of zeros)	5 Tolerance % (No band +/- 20%)
Silver				.00 (divide by 100)	+/-10%
Gold				.0 (divide by 10)	+/-5%
Black	0	0	0	No Zeros	
Brown	1	1	1	0	+/-1%
Red	2	2	2	00	+/-2%
Orange	3	3	3	,000	
Yellow	4	4	4	0,000	
Green	5	5	5	00,000	+/-0.5%
Blue	6	6	6	,000,000	+/-0.25%
Violet	7	7	7	0,000,000	+/-0.1%
Grey	8	8	8		+/-0.05%
White	9	9	9		

```
# Import the relevant libraries
import RPi.GPIO as GPIO
import time

# GPIO Mode (BOARD / BCM)
GPIO.setmode(GPIO.BOARD)

# Set GPIO Pins
LedPin = 11                                # GPIO pin for the LED

# Set GPIO direction (IN / OUT)
GPIO.setup(LedPin, GPIO.OUT)                  # Set LedPin's mode to output

# Start conditions
GPIO.output(LedPin, GPIO.LOW)                # Set LedPin low to turn the led off

# Main program
if __name__ == '__main__':
    # Program starts here

    try:

        # This code repeats forever
        while True:

            print('LED on')
            GPIO.output(LedPin, GPIO.HIGH)      # LED on
            time.sleep(0.5)
            print('LED off')
            GPIO.output(LedPin, GPIO.LOW)       # LED off
            time.sleep(0.5)

    # Reset by pressing CTRL + C
except KeyboardInterrupt:
    print("Program stopped by User")
    GPIO.output(LedPin, GPIO.LOW)             # LED off
    GPIO.cleanup()                          # Release resource
```

