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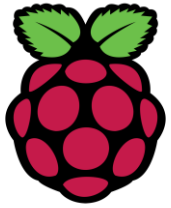
Al Hussein
Technical University
جامعة الحسين التقنية

Remote Lab For Engineering Project
Erasmus+ Program

Raspberry Pi -Take Home Lab

Lab Experiment # 4

Raspberry Pi- Motion Sensor



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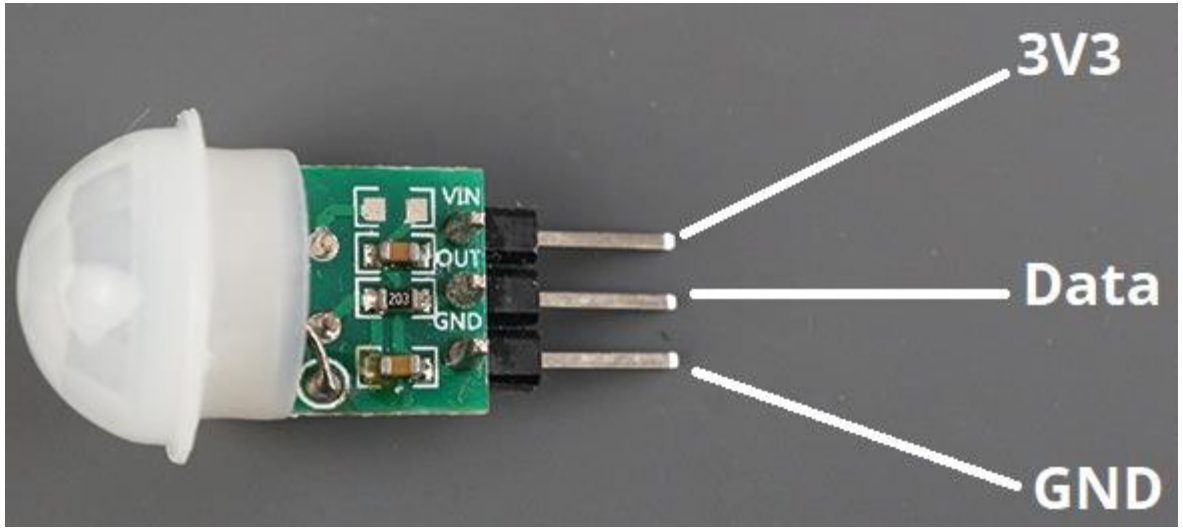
Motion Sensor (PIR Sensor)

- PIR motion sensor detects changes in infrared light in its field of view. This makes it ideal for detecting humans or animals because it will pick up living things (or heat-emitting objects) that move within its range but not inanimate objects.
- The PIR motion sensor has three pins: VCC, GND, and Data. You should connect VCC to the 3V3 pin, GND to a GND pin, and the Data pin to a suitable Raspberry Pi GPIO.



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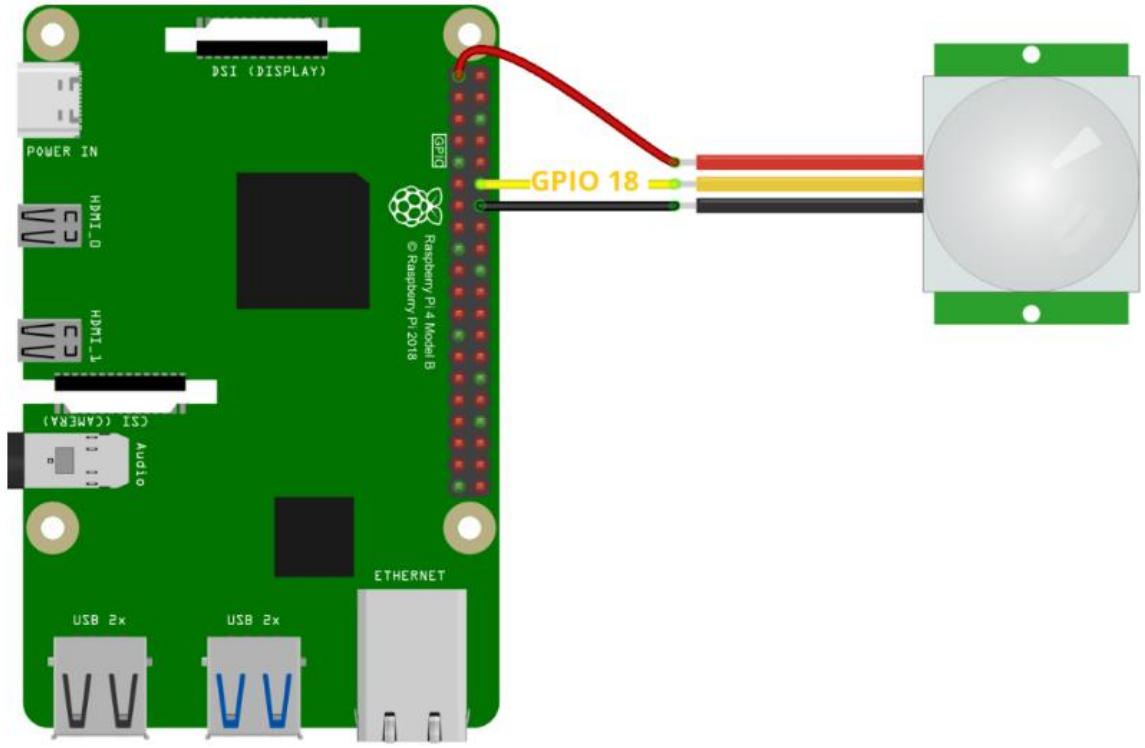
Motion Sensor- Wiring Diagram



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Motion Sensor- Code

```
from gpiozero import MotionSensor
from signal import pause

pir = MotionSensor(18)

def motion_function():
    print("Motion Detected")

def no_motion_function():
    print("Motion stopped")

pir.when_motion = motion_function
pir.when_no_motion = no_motion_function

pause()
```

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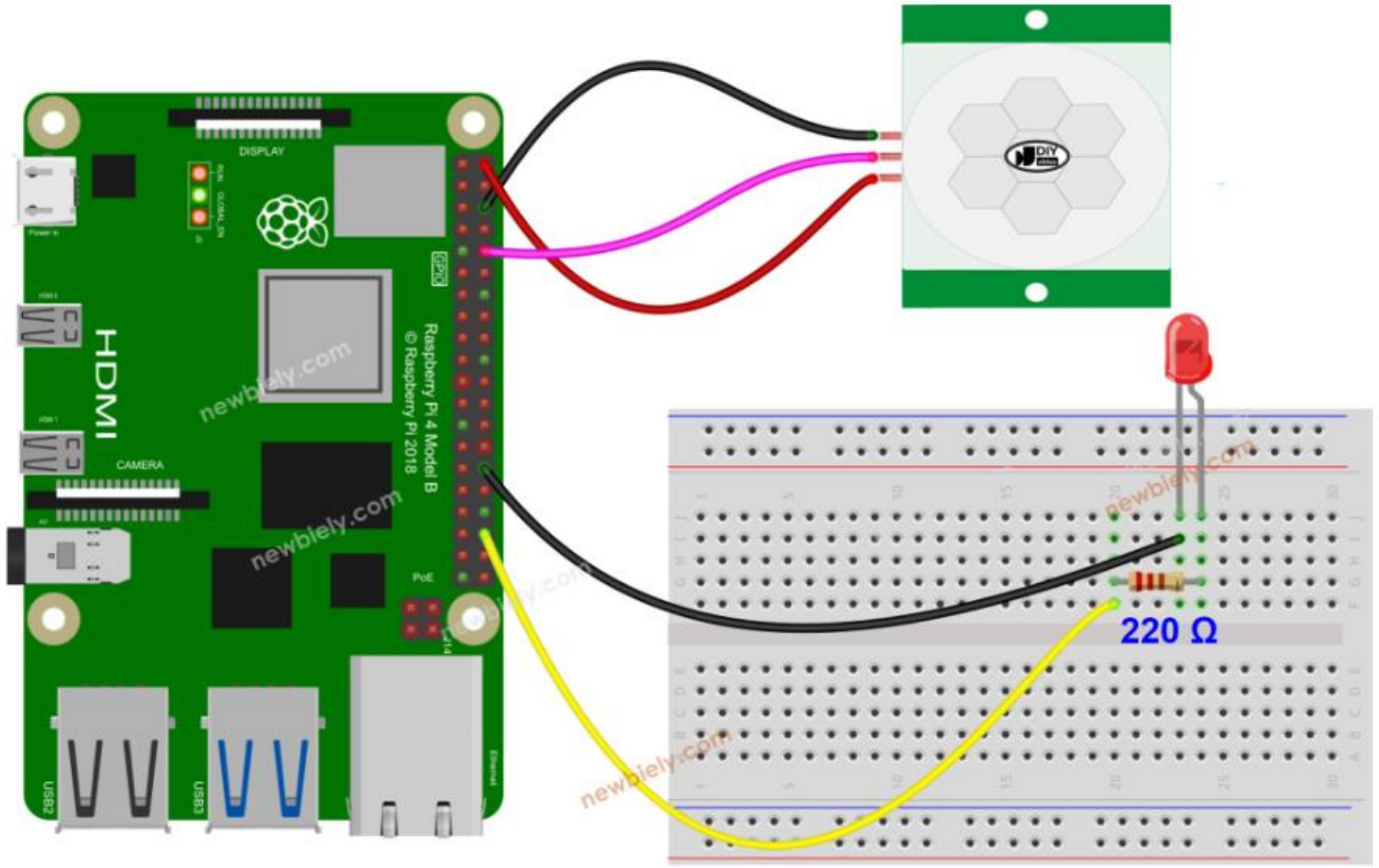
Motion Sensor with LED- Wiring Diagram



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Motion with LED Sensor- Code

```
# Pin configuration
PIR_SENSOR_PIN =40  # Physical pin 16 (BOARD numbering)
LED_PIN = 22         # Physical pin 18 (BOARD numbering)

# GPIO setup
GPIO.setmode(GPIO.BOARD)  # Use physical pin numbering
GPIO.setup(PIR_SENSOR_PIN, GPIO.IN)  # Set PIR sensor pin as input
GPIO.setup(LED_PIN, GPIO.OUT)  # Set LED pin as output

try:
    while True:
        if GPIO.input(PIR_SENSOR_PIN):  # Motion detected
            print("Motion detected! Turning LED ON.")
            GPIO.output(LED_PIN, GPIO.HIGH)  # Turn LED ON
        else:
            print("No motion. Turning LED OFF.")
            GPIO.output(LED_PIN, GPIO.LOW)  # Turn LED OFF
        time.sleep(0.1)  # Small delay for stability
except KeyboardInterrupt:
    print("Exiting program.")
finally:
    GPIO.cleanup()  # Reset GPIO settings
```

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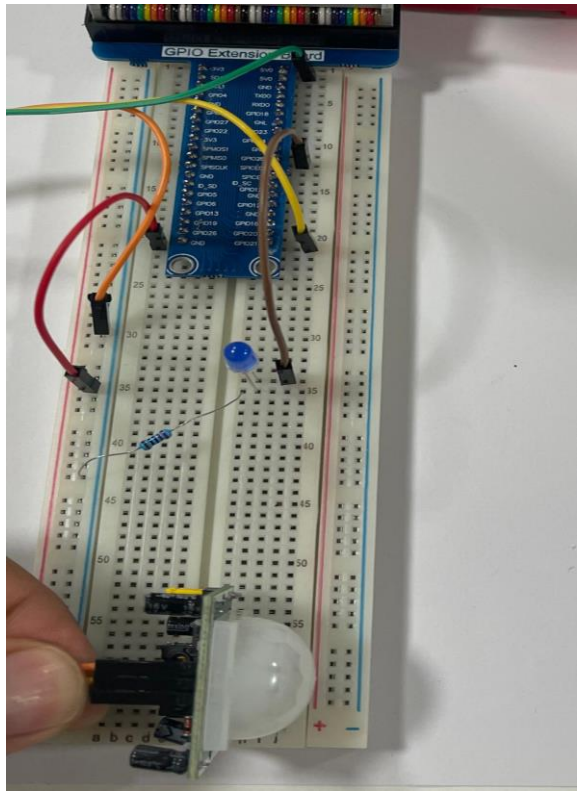
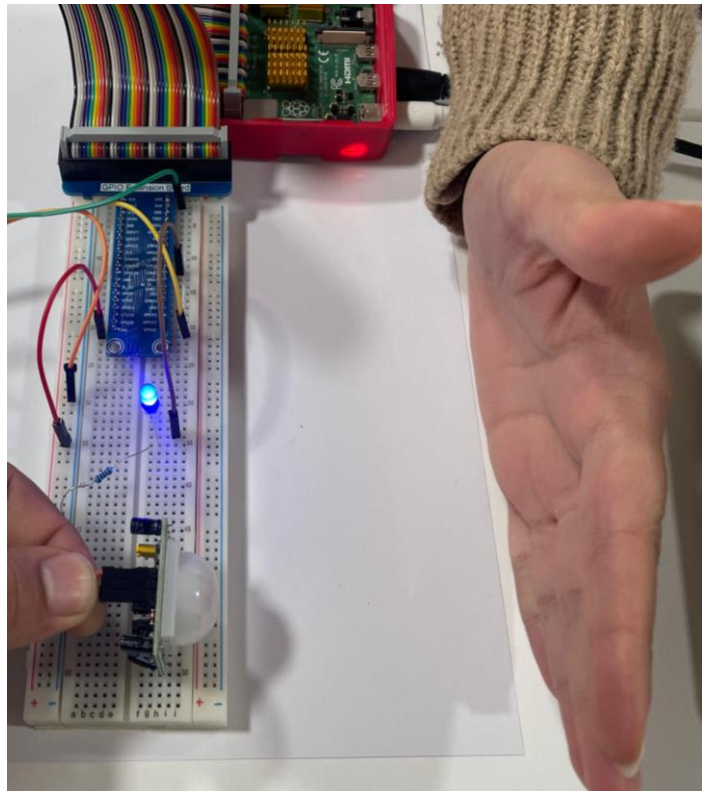
Motion with LED Sensor- Experimental Results



No Motion!



Motion Detected!

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Keypad

- It is a set of buttons arranged in rows and columns(called matrix). Each button is called key.
- Keypad 4x4 has 8 pins:
  4 row-pins(R1,R2,R3,R4) and 4 column-pin (C1,C2,C3,C4).
- It is widely used in many devices such as door lock, ATM, calculator…

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Take-home Practice

Use the keypad to rotate a servo motor shaft in specific angle as following:

1 → Rotate to angle **0 degree**

2 → Rotate to angle **45 degree**

3 → Rotate to angle **90 degree**

4 → Rotate to angle **135 degree**

5 → Rotate to angle **180 degree**