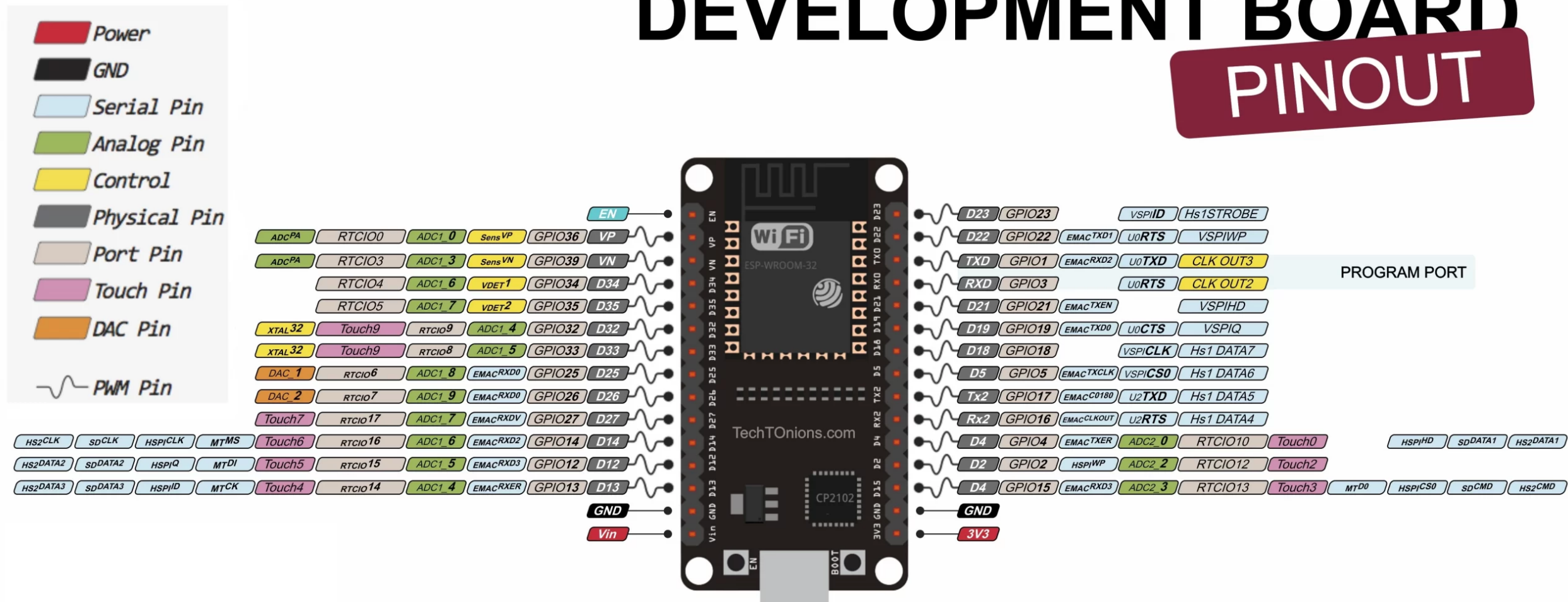
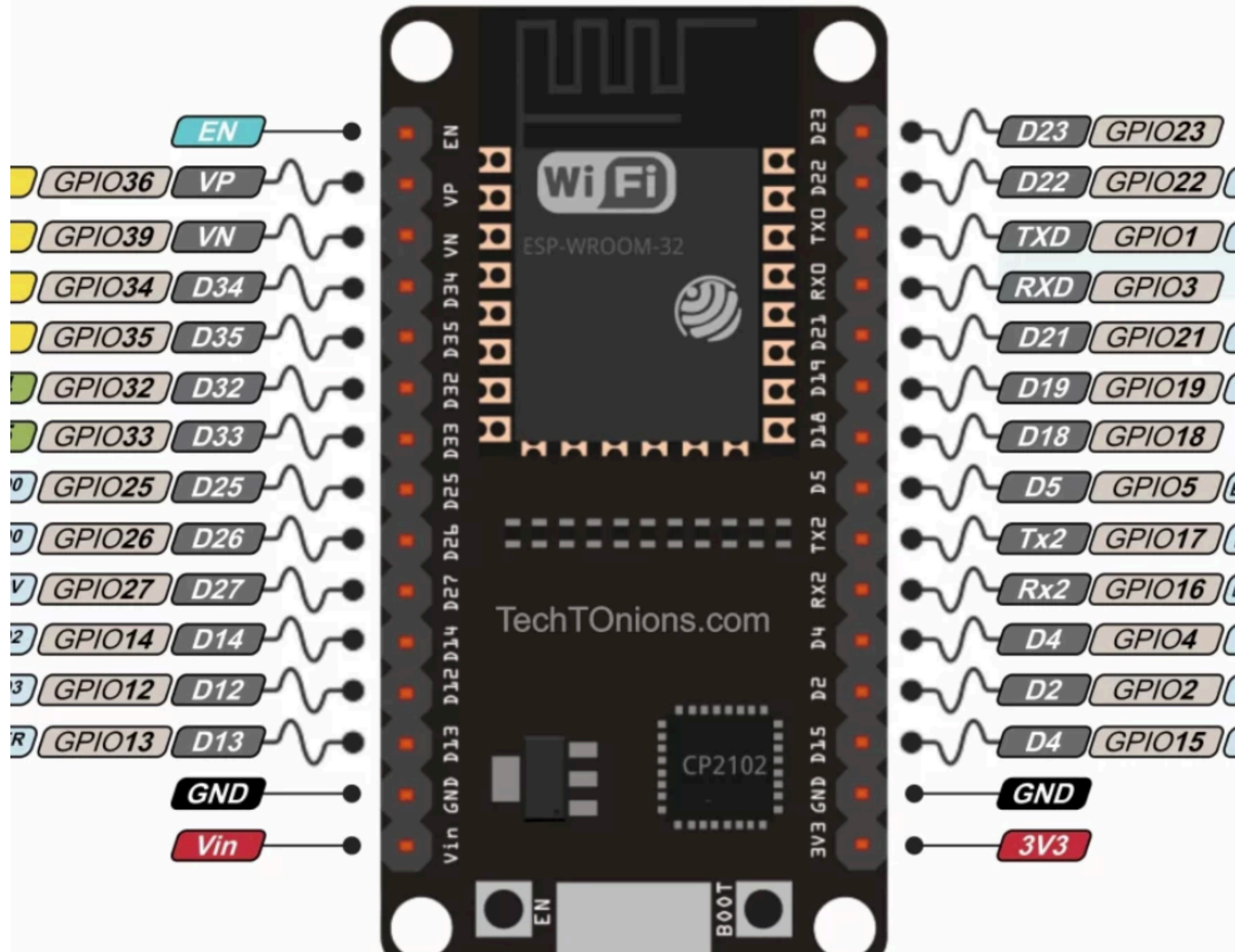


Distance Sensor

Micro-python - IoT

ESP32-WROOM-DA DEVELOPMENT BOARD PINOUT



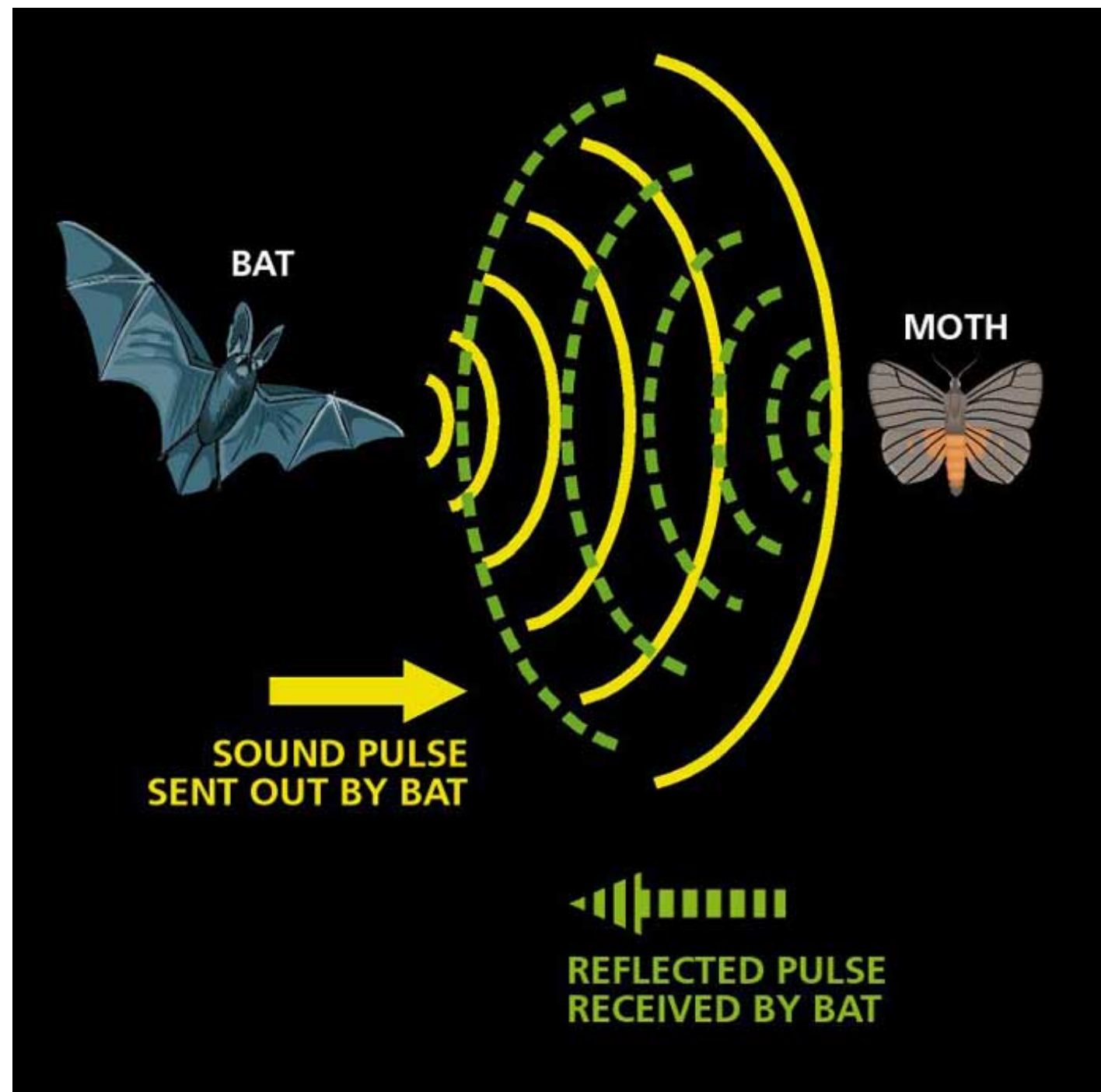


Distance Sensor

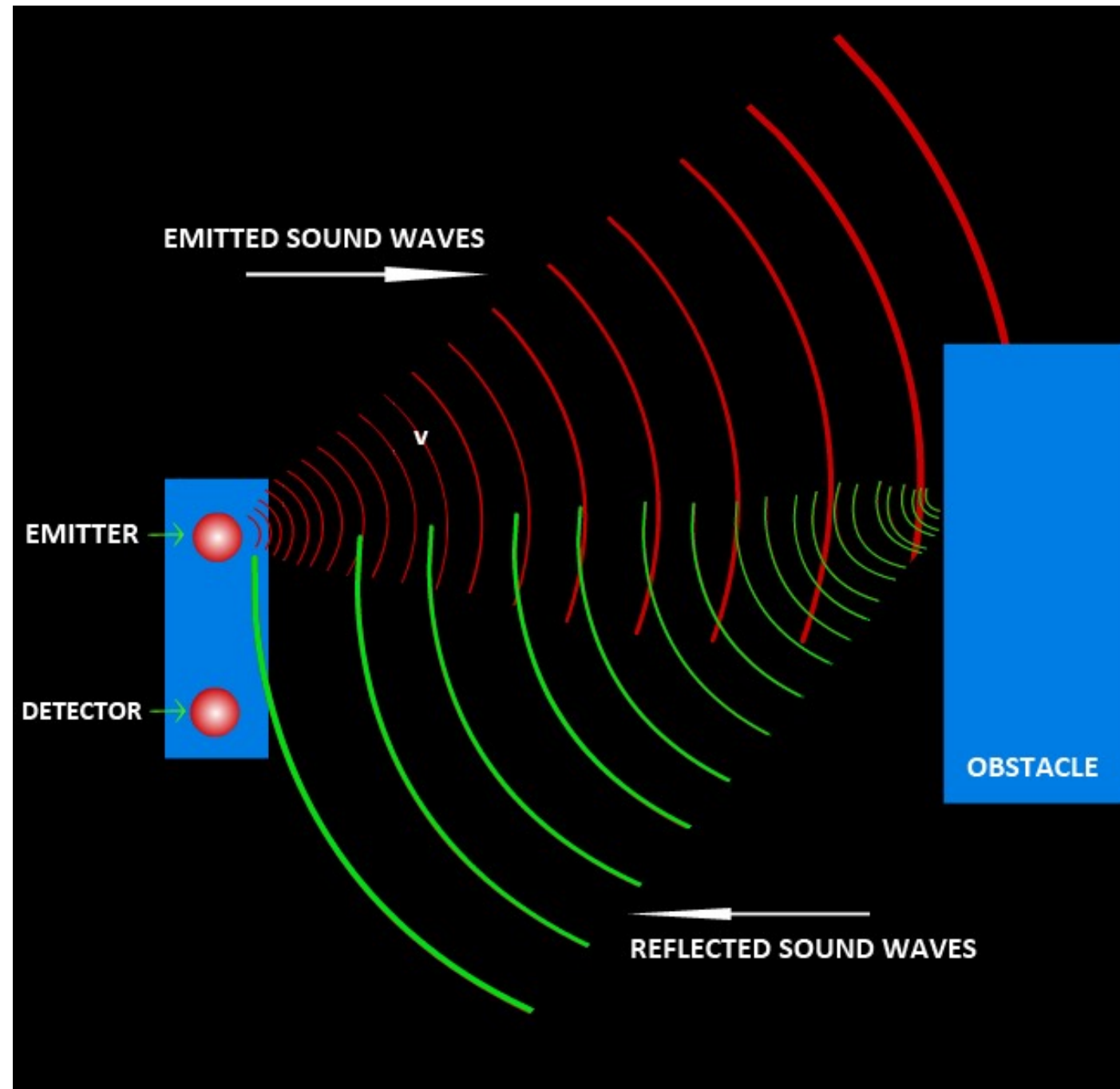
- Ultrasonic Sensor



Bat eye - ultrasonic

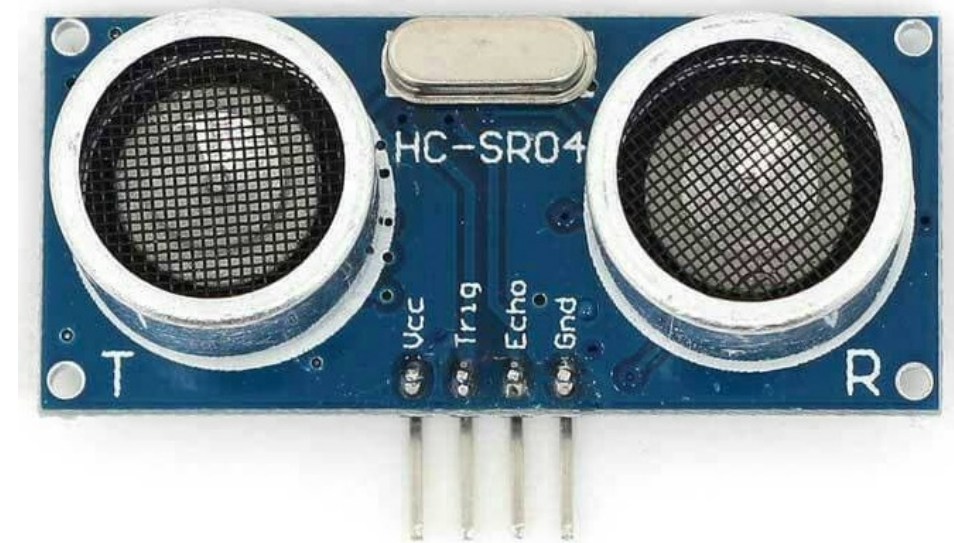


Ultrasonic



Ultrasonic Sensor

- Trigger pin is used to trigger ultrasonic sound pulses. By setting this pin to HIGH for $10\mu\text{s}$, the sensor initiates an ultrasonic burst.
- Echo pin goes high when the ultrasonic burst is transmitted and remains high until the sensor receives an echo, after which it goes low



Ultrasonic Sensor

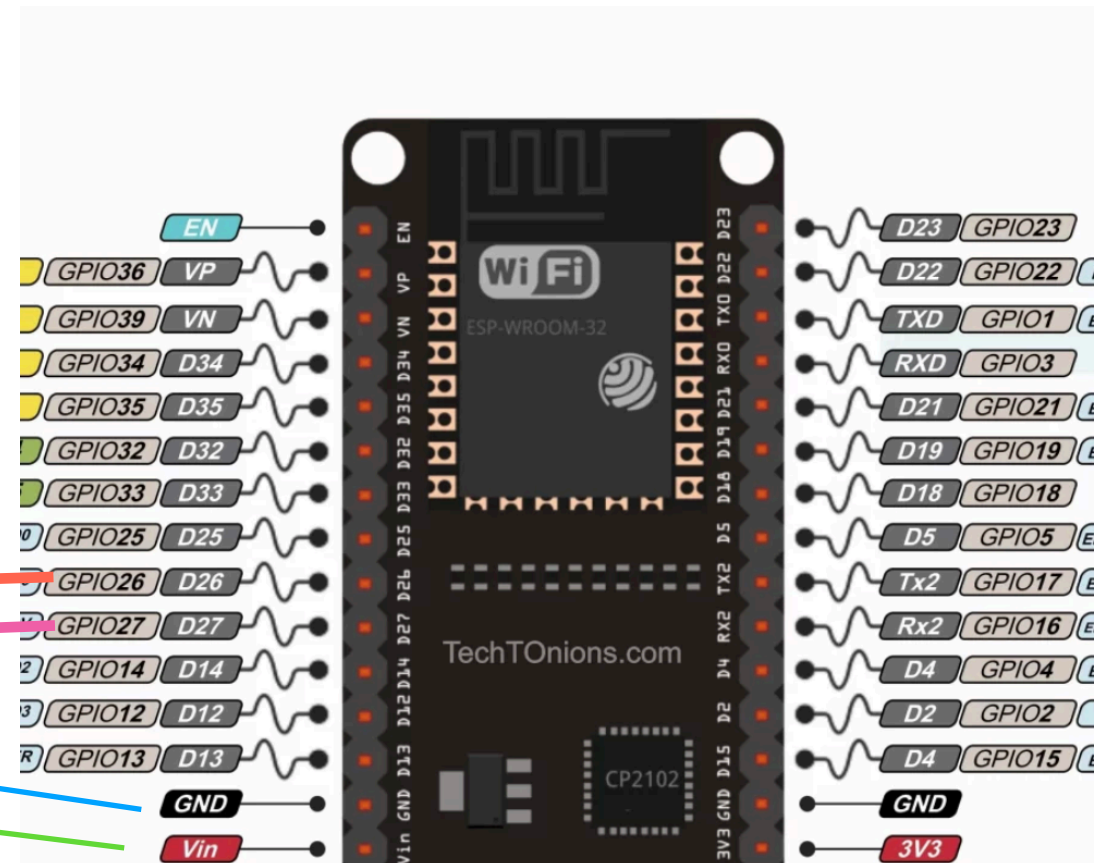
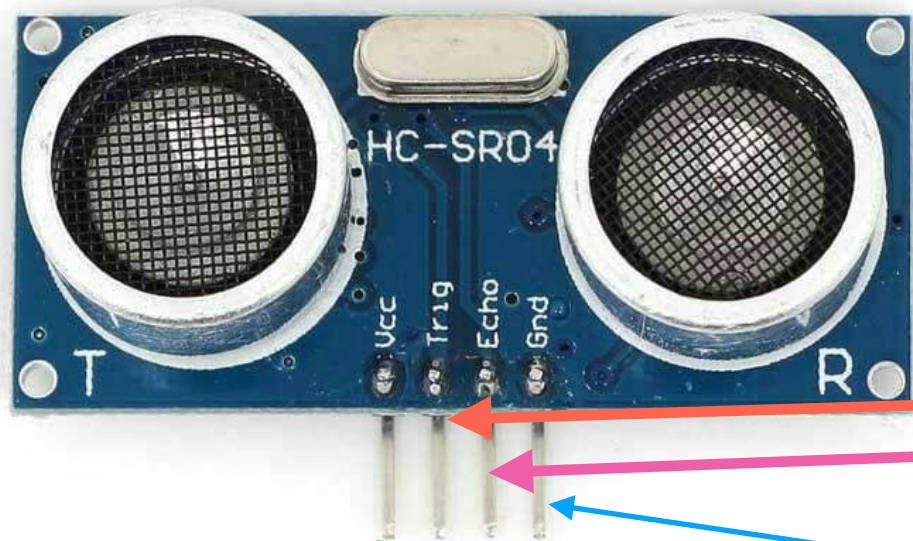


Ultrasonic Sensor

- By measuring the time the Echo pin stays high, the distance can be calculated.
- Distance = Speed x time
 - Speed is known : $343 \text{ m/s} = 0.0343 \text{ cm}/\mu\text{s}$
 - time: Calculate time difference between start and reflected time
 - distance = $(0.0343 * \text{time}) / 2$

Ultrasonic Diagram

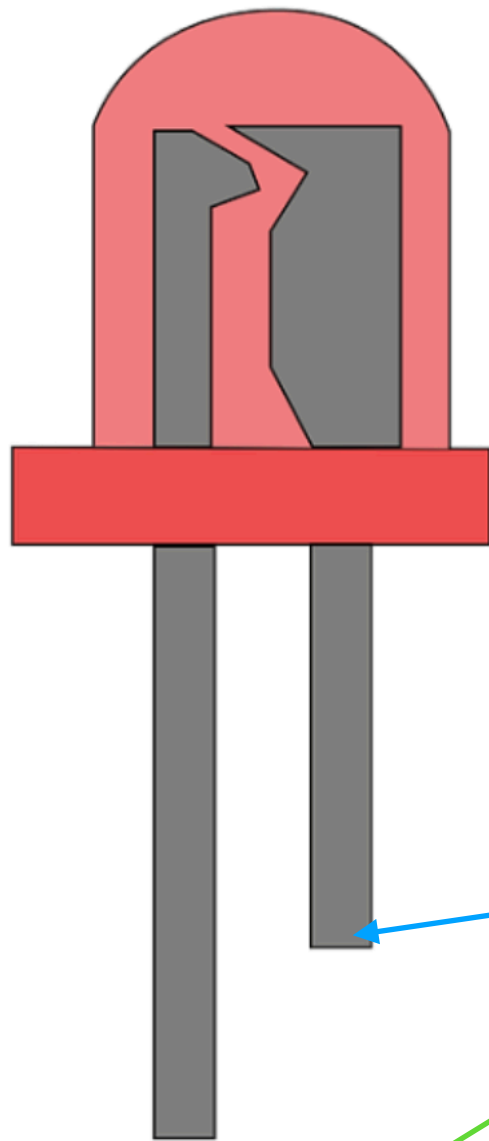
GND (Ground)



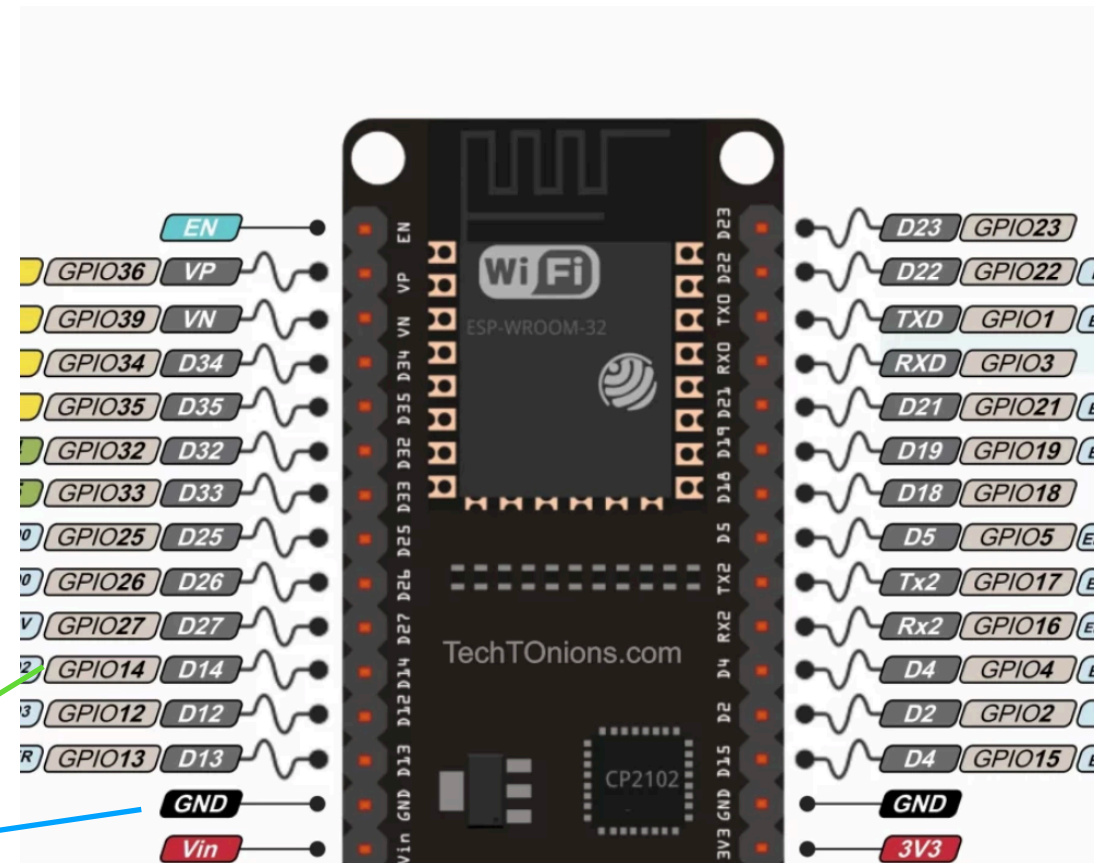
GPIO 26: Trigger
GPIO 27: Echo
Vin : VCC

LED Diagram

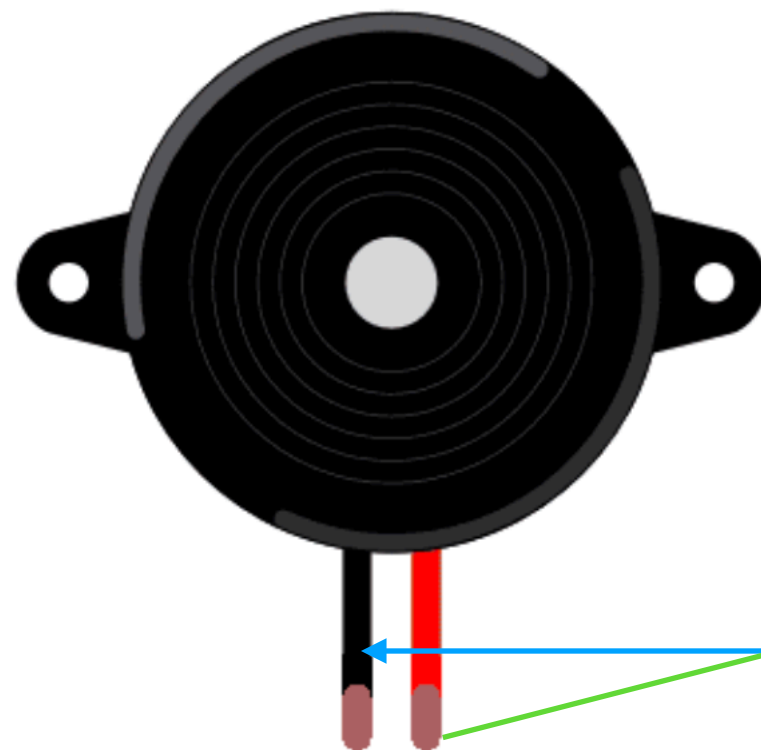
GND (Ground)



GPIO 14

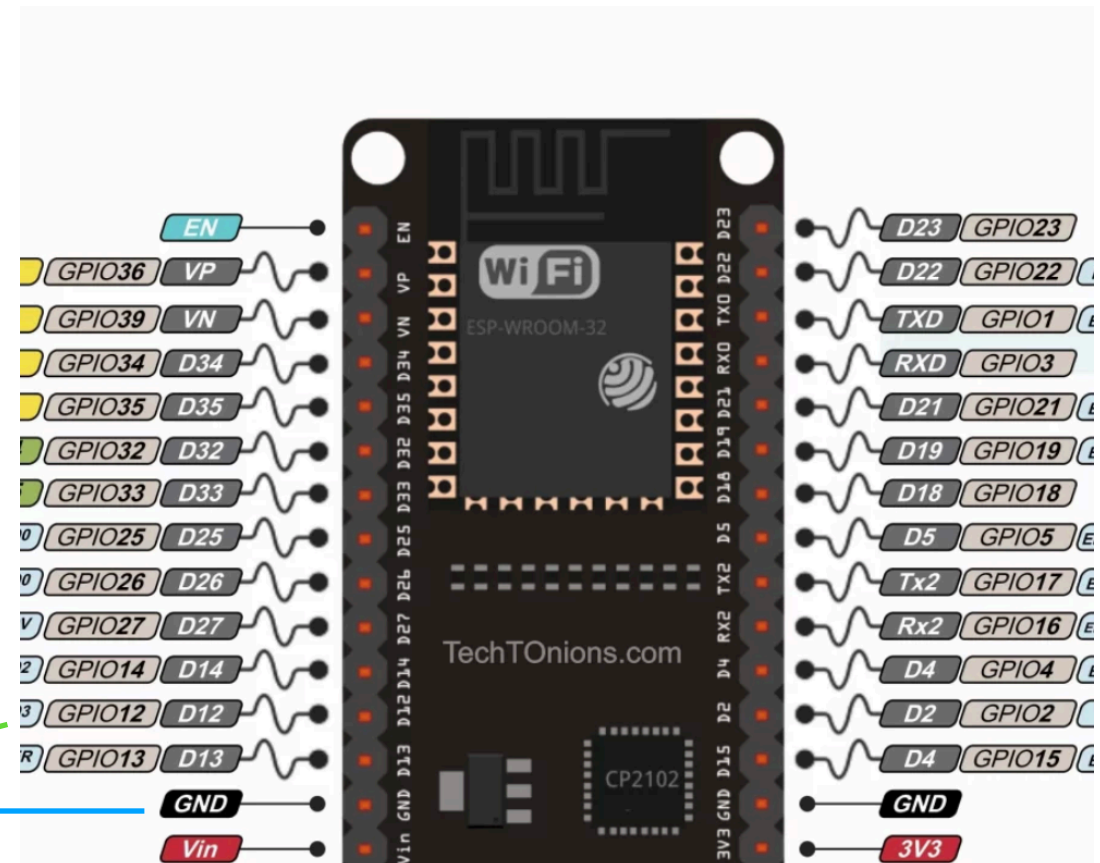


Circuit Diagram



Buzzer

GPIO 12



Initialization

```
from machine import Pin, PWM, time_pulse_us  
from time import sleep_us, sleep
```

```
# Ultrasonic sensor  
TRIGGER_PIN = 26  
ECHO_PIN = 27  
SPEED = 0.0343
```

```
# LED  
LED_PIN = 14
```

```
# BUZZER/SPEAKER  
SPEAKER_PIN = 12
```

```
# Initialize Pin  
trigger = Pin(TRIGGER_PIN, Pin.OUT)  
echo = Pin(ECHO_PIN, Pin.IN)  
led = Pin(LED_PIN, Pin.OUT)  
buzzer = Pin(SPEAKER_PIN, Pin.OUT)  
buz = PWM(buzzer)
```

Detect distance

```
while True:
    # Reset Trigger
    trigger.value(0)
    sleep_us(5) # stabilize and wait 5 us

    trigger.value(1)
    # send pulse for 10 us
    sleep_us(10)
    # Stop the pulse
    trigger.value(0)
    # Read pulse time for 1 value
    pulse_time = time_pulse_us(echo, 1)
    # Calculate distance
    distance = (SPEED * pulse_time) / 2

    if (distance < 50):
        print('distance:', distance)
```

Exercise-1

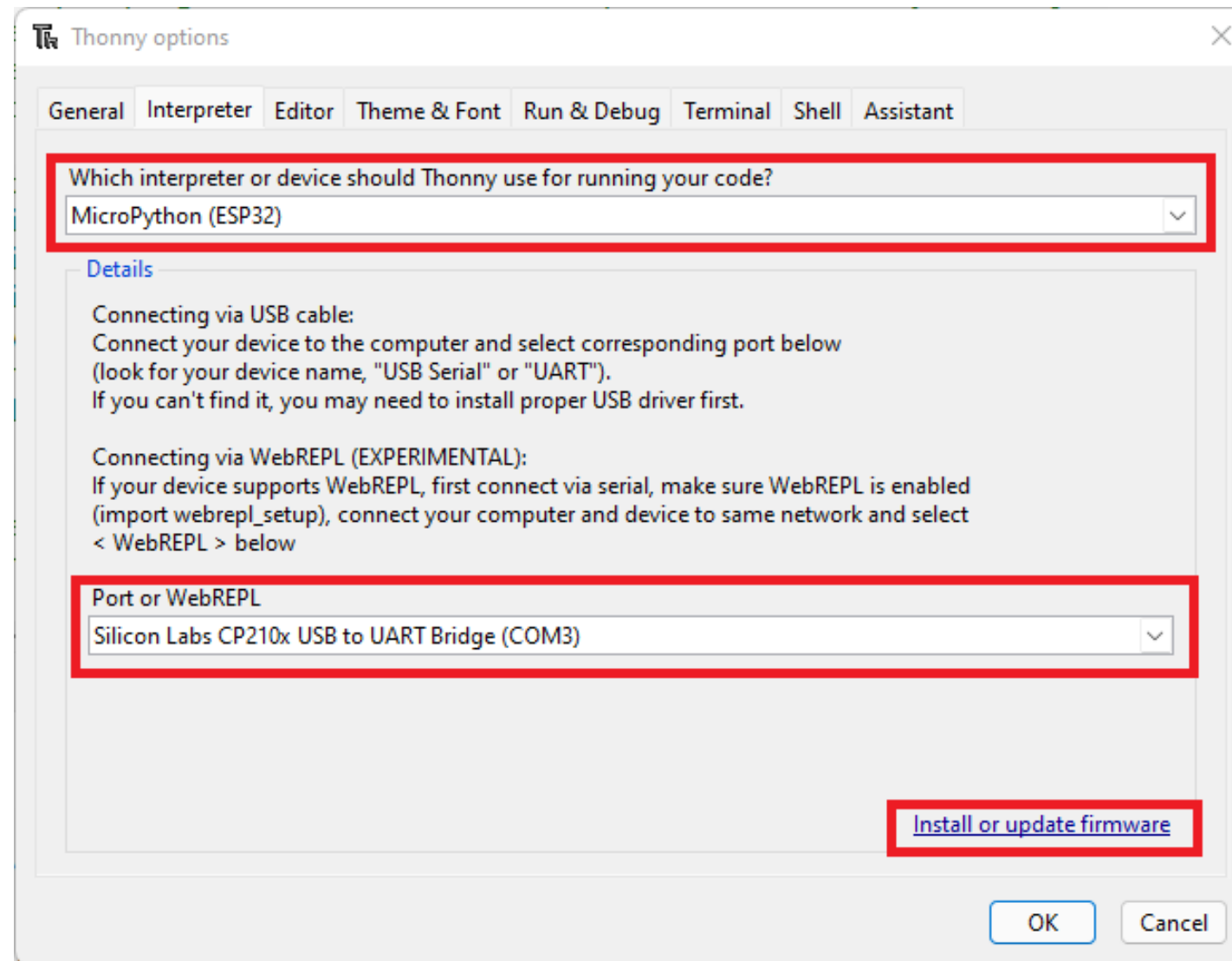
- If Obstacle is detected
 - LED ON
 - Beep sound
- Otherwise, LED and Sound OFF

Exercise-2

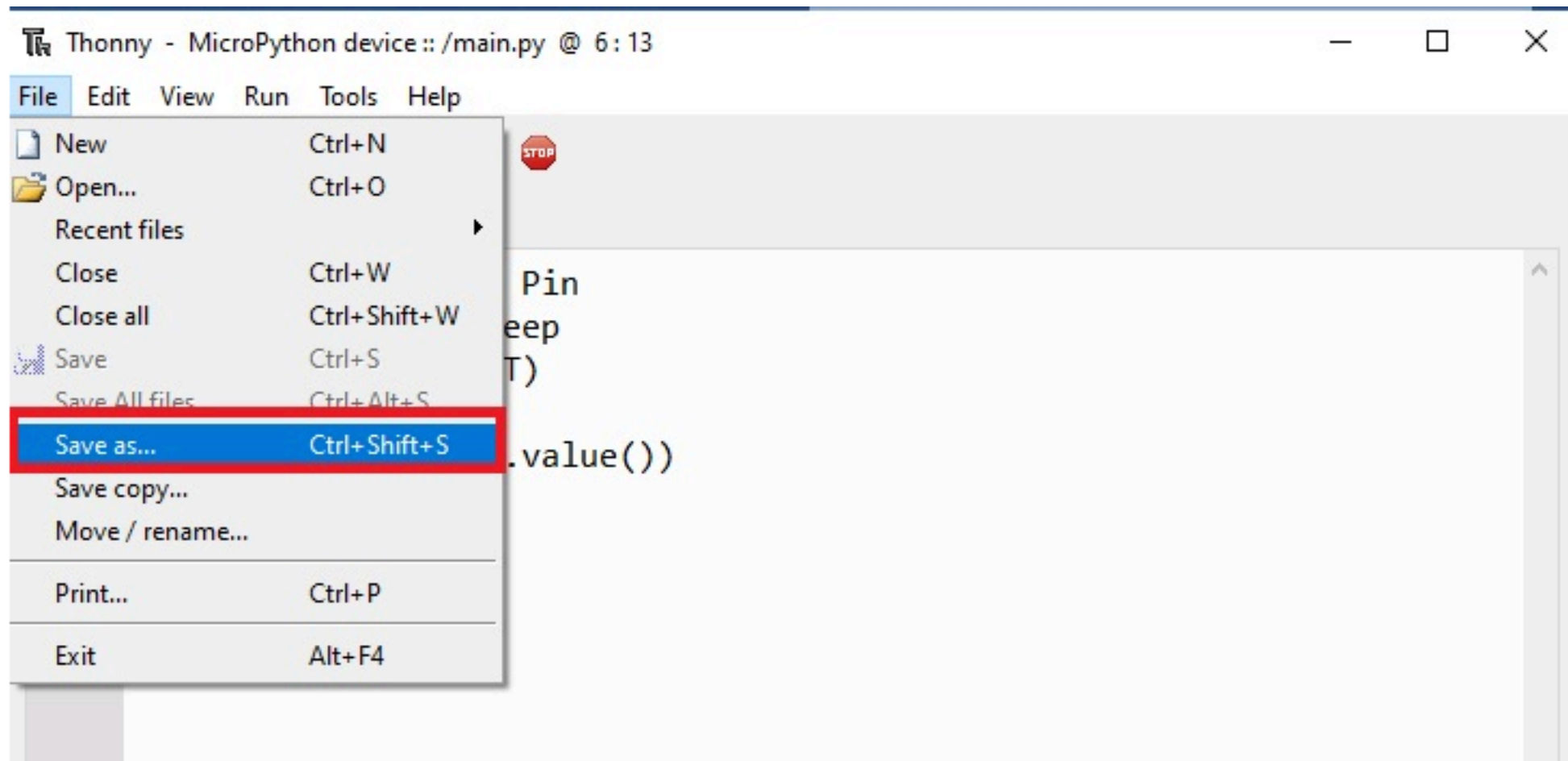
- Make Reverse Car Parking sensor
 - Assume 3 level distance: 50 cm, 30 cm, 10 cm
 - For example
 - 50 cm => Beep intensity 1 second
 - 30 cm => Beep intensity 0.5 second
 - 10 cm => Beep intensity 0.2 second

Upload / Burn Firmware

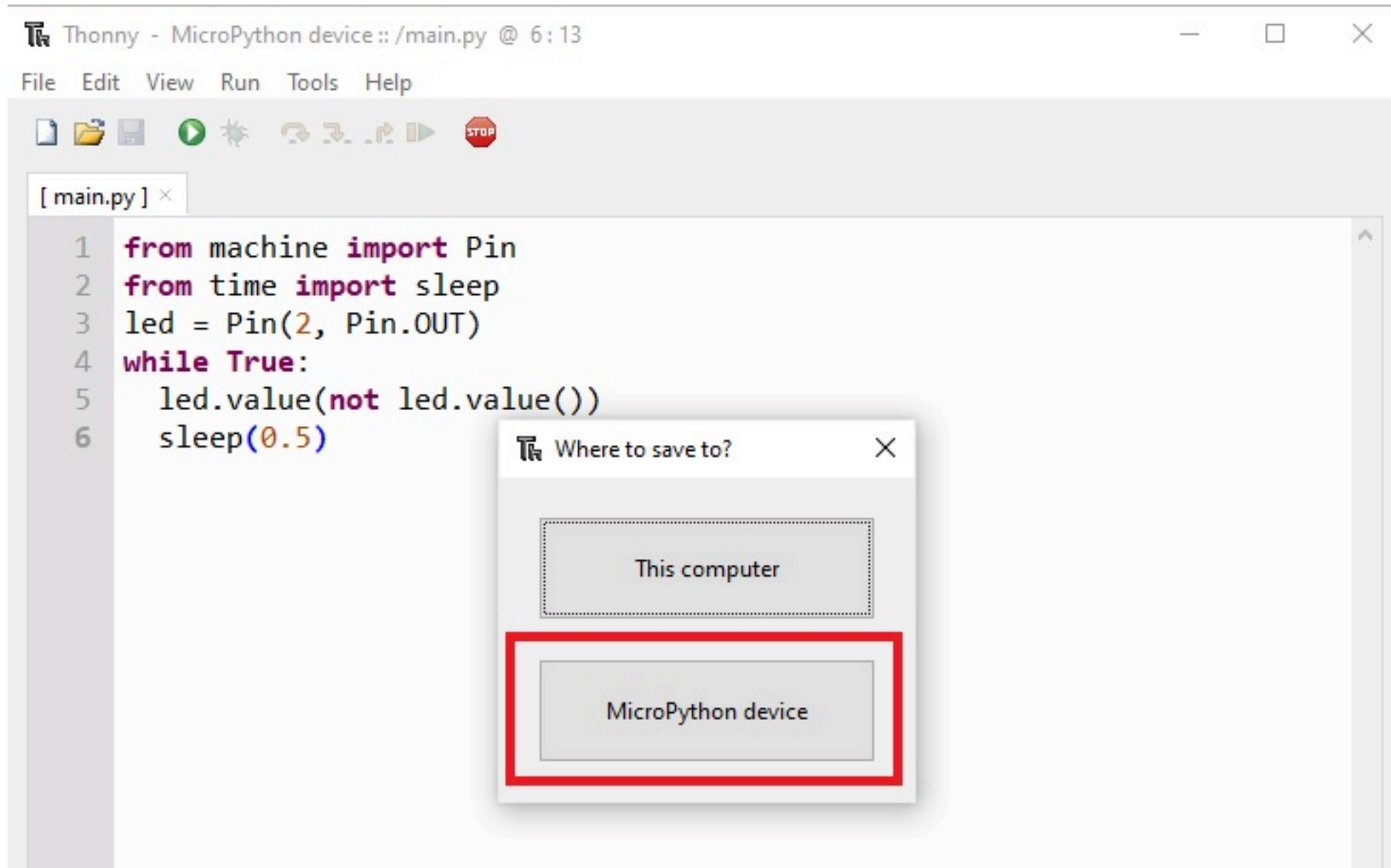
- Menu Tools -> Options



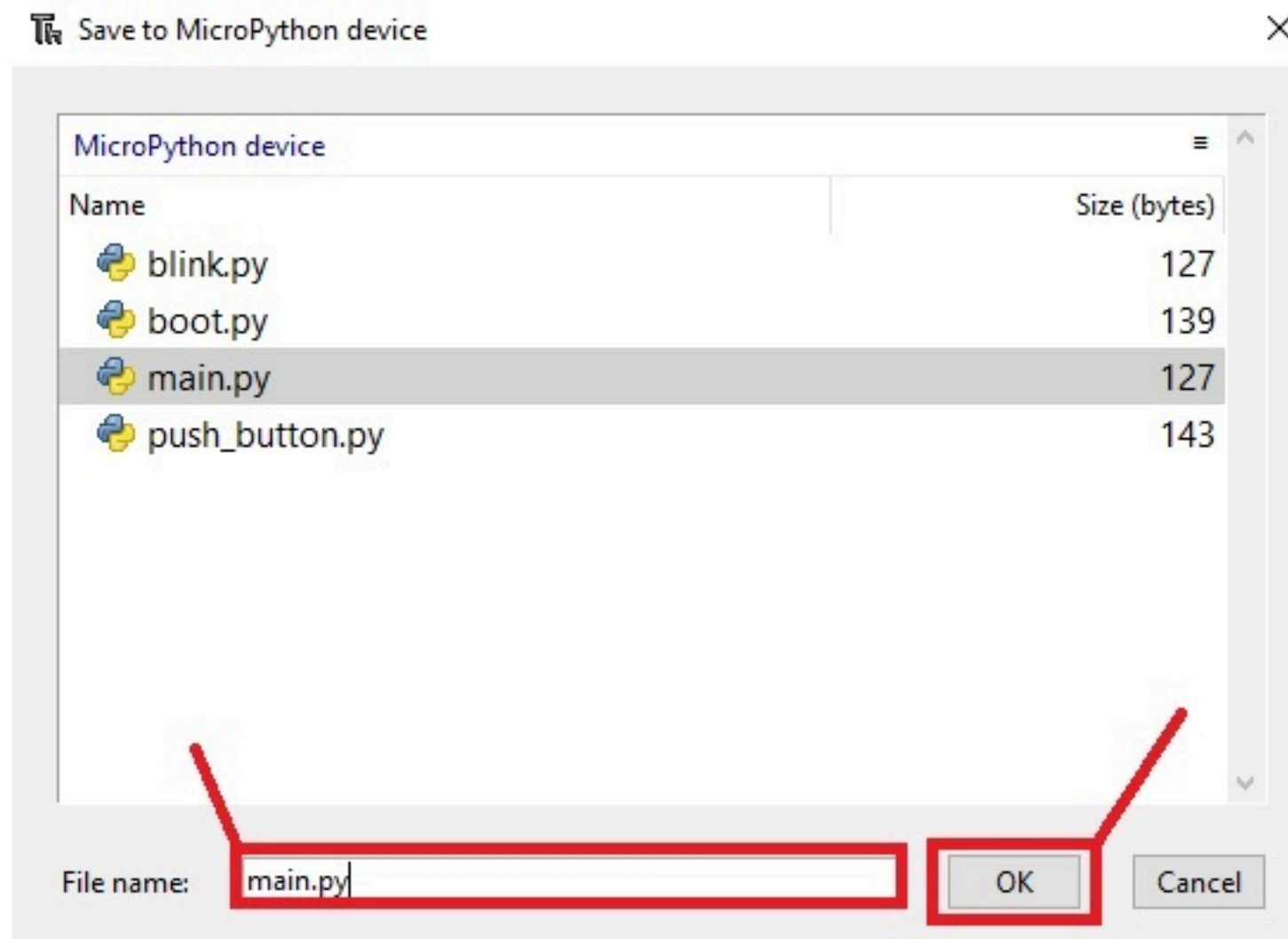
Upload Code



Upload Code



Upload Code



Upload Code

Press Enable/Reset
Button

