SMART WATER MANAGEMENT SYSTEM USING IOT

WATER LEAKAGE DETECTION

1.PROJECT DESCRIPTION:

Ultrasonic water sensor brick is designed for water detection, which can be widely used in sensing rainfall, water level, and even liquid leakage.Connecting a Ultrasonic water sensor to an Arduino is a great way to detect a leak, spill, flood, rain, etc. It can be used to detect the presence, the level, the volume and/or the absence of water.While this could be used to remind you to water your plants, there is a better Grove sensor for that. The sensor has an array of exposed traces, which read LOW when water is detected.we will connect the water sensor to Digital Pin on Arduino, and will enlist the very handy LED to help identify when the water sensor comes into contact with a source of water.

2.PROJECT IMPLEMENTATION:

Using ultrasonic detection sensor also we detect the water flow level. We take ultrasonic sensor from Arduino simulation tool and we place on the simulation . We use Arduino simulation for this project.Arduino software tool was taken from the component tool. Ultra Sonic sensor,led , connecting wires as per required taken from component tool.

Empty components taken. We connect led negative pin to ground (voltage in).Next we connect the wire from sensors VCC to vin. Connect the negative pin to the ground from the sensor or short to the led to the ground pin. Connect the echo pin to D22. Connect the trigger pin to D19 .

Then we run the simulation with the help of source code.

2.1SENSOR:

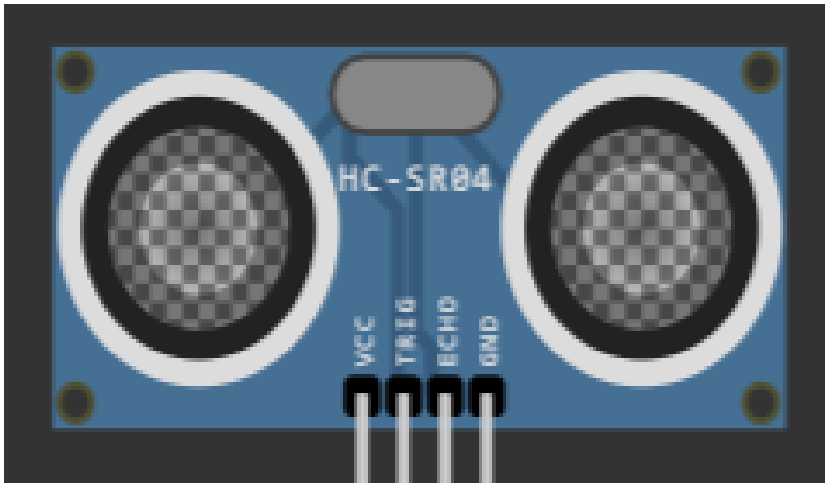

Fig 2.1:Ultra sonic detection sensor

3. CIRCUIT DIAGRAM:

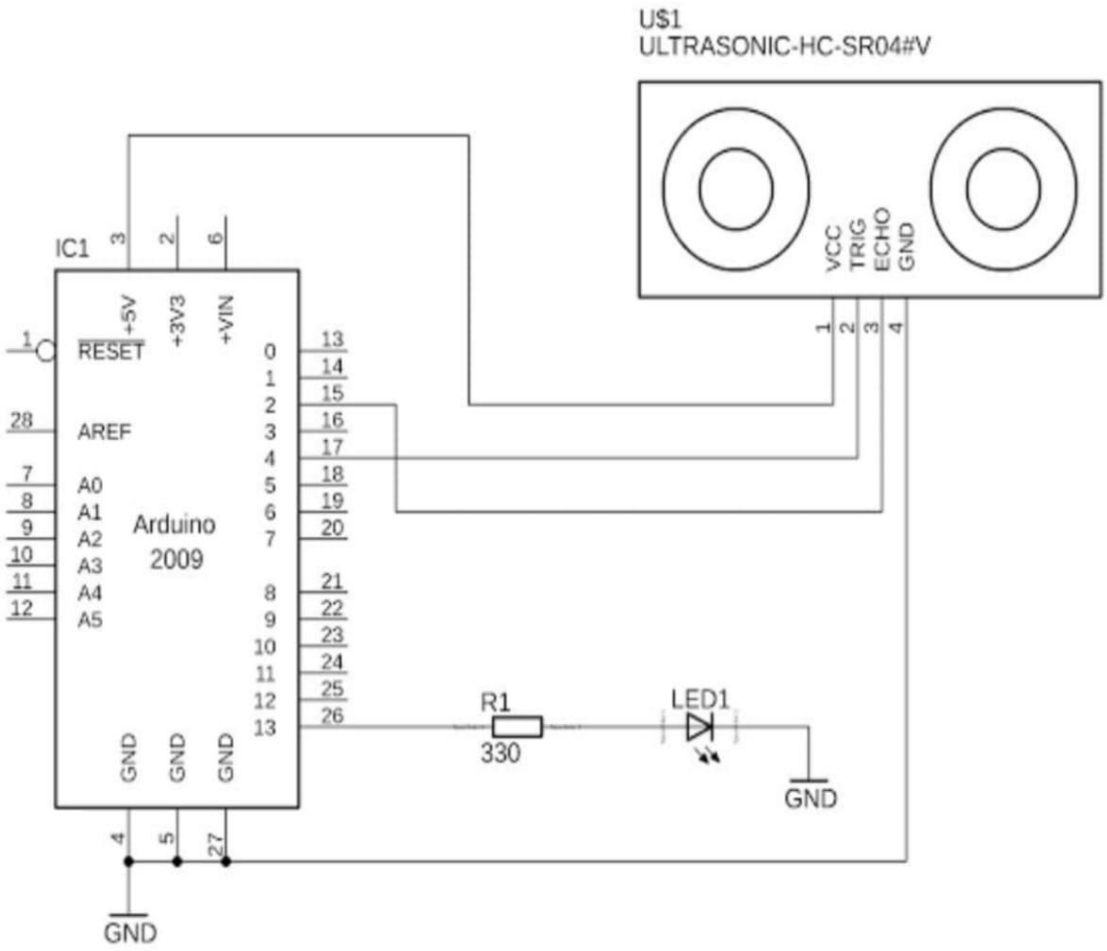

Fig 3:Circuit Diagram of water detection system

4.SOURCE CODE:

4.1.FRONT END(Python):

```
import machine
import time

# Pin assignments for the ultrasonic sensor
TRIGGER_PIN = 23  # GPIO23 for trigger
ECHO_PIN = 22     # GPIO22 for echo

# Pin assignment for the LED
LEAK_LED_PIN = 19  # GPIO19 for the LED

# Set the pin modes
trigger = machine.Pin(TRIGGER_PIN, machine.Pin.OUT)
echo = machine.Pin(ECHO_PIN, machine.Pin.IN)
leak_led = machine.Pin(LEAK_LED_PIN, machine.Pin.OUT)

# Function to measure distance using the ultrasonic sensor
def measure_distance():
    # Generate a short trigger pulse
    trigger.value(0)
    time.sleep_us(5)
    trigger.value(1)
    time.sleep_us(10)
    trigger.value(0)

    # Measure the echo pulse duration to calculate distance
    pulse_start = pulse_end = 0
    while echo.value() == 0:
        pulse_start = time.ticks_us()
    while echo.value() == 1:
        pulse_end = time.ticks_us()

    pulse_duration = pulse_end - pulse_start

    # Calculate distance in centimeters (assuming the speed of sound is
343 m/s)
    distance = (pulse_duration * 0.0343) / 2  # Divide by 2 for one-way
travel
```

```
    return distance

# Function to check for a water leak
def check_for_leak():
    # Measure the distance from the ultrasonic sensor
    distance = measure_distance()

    # Set the threshold distance for detecting a leak (adjust as needed)
    threshold_distance = 10  # Adjust this value based on your tank setup

    if distance < threshold_distance:
        # If the distance is less than the threshold, a leak is detected
        return True
    else:
        return False

# Main loop
while True:
    if check_for_leak():
        # Blink the LED to indicate a leak
        leak_led.value(1)  # LED ON
        time.sleep(0.5)
        leak_led.value(0)  # LED OFF
        time.sleep(0.5)
    else:
        leak_led.value(0)  # LED OFF

    time.sleep(1)  # Delay between measurements
```

4.2.BACK END(JSON):


```
{
  "version": 1,
  "author": "Uri Shaked",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -14.5, "left":
81.4, "attrs": {} },
    { "type": "wokwi-led", "id": "led2", "top": 6, "left": -111.4, "attrs":
{ "color": "blue" } },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": -113.7, "left": -
71.3, "attrs": {} }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],
    [ "esp:RX0", "$serialMonitor:TX", "", [] ],
    [ "ultrasonic1:GND", "esp:GND.2", "black", [ "v0" ] ],
    [ "ultrasonic1:ECHO", "esp:D22", "green", [ "v0" ] ],
    [ "ultrasonic1:TRIG", "esp:D23", "green", [ "v0" ] ],
    [ "ultrasonic1:VCC", "esp:VIN", "red", [ "v0" ] ],
    [ "led2:A", "esp:D19", "green", [ "v0" ] ],
    [ "led2:C", "esp:GND.1", "black", [ "v0" ] ]
  ],
  "dependencies": {}
}
```

4.3SAMPLE OUTPUT SCREENSHOTS:

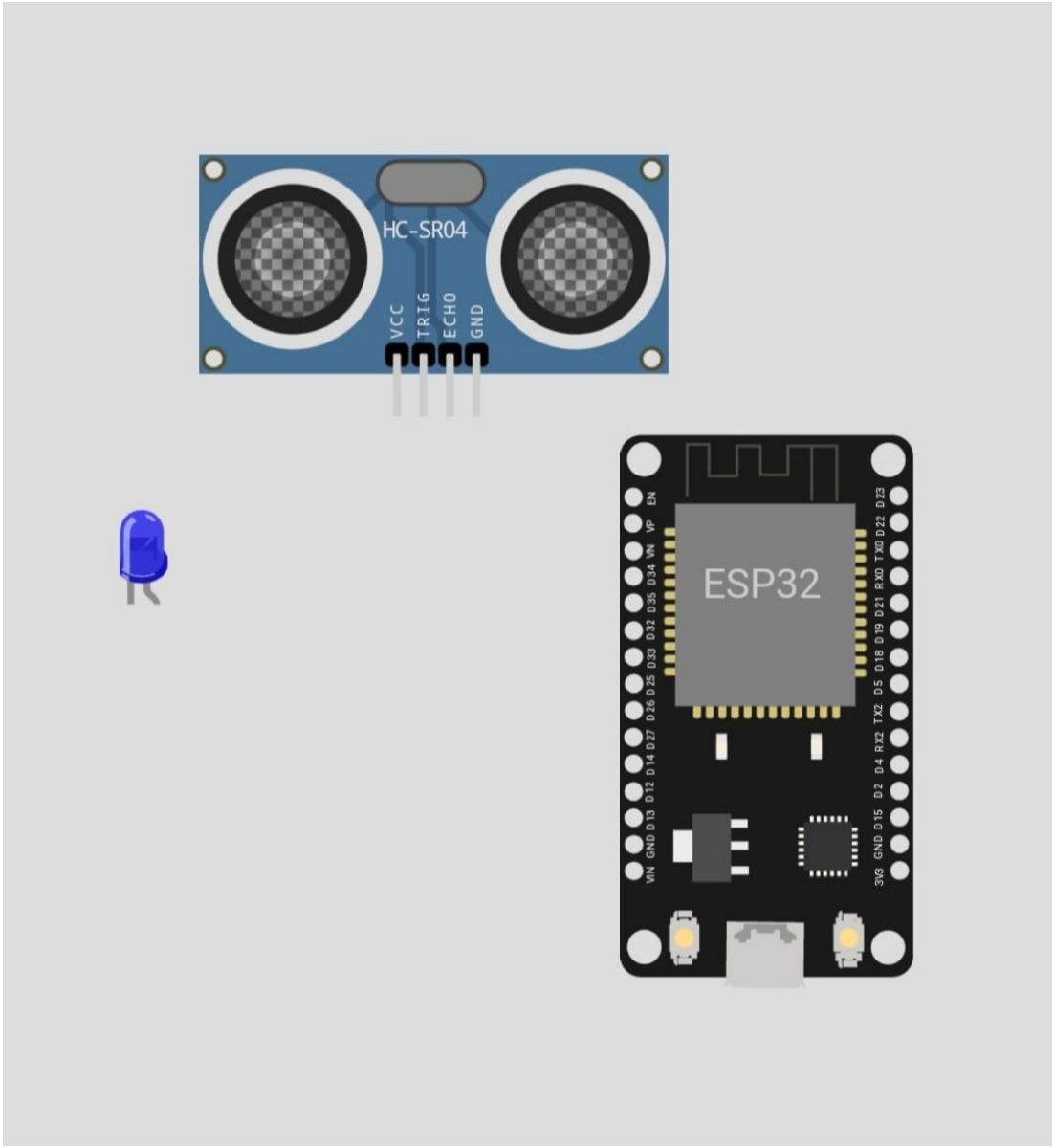

Fig:4.3.1:Take the components needed

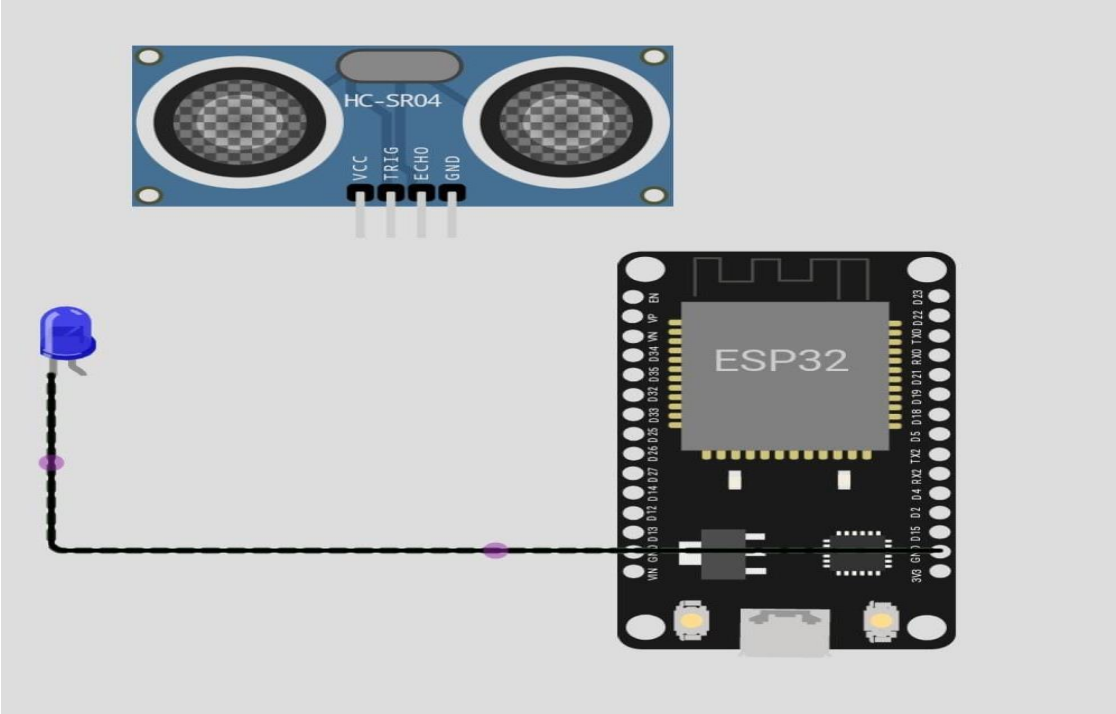

Fig4.3.2:Led negative pin connected to the ground

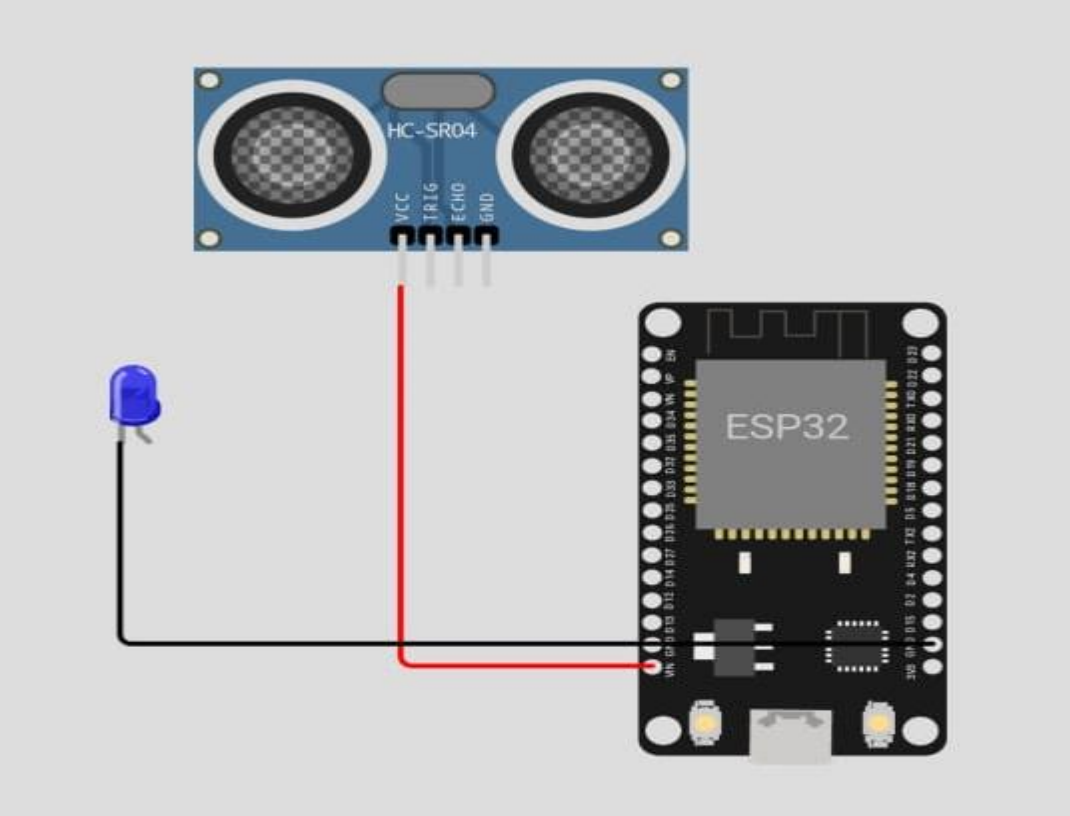

Fig:4.3.3:VCC connected to VIN

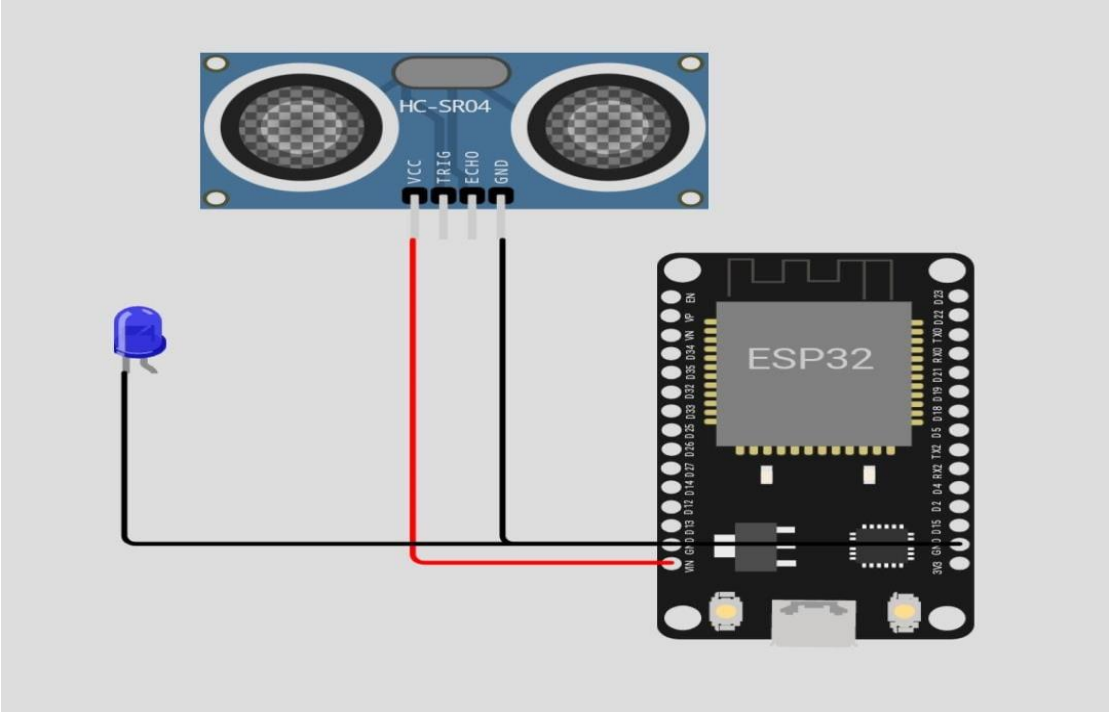

Fig:4.3.4:Ground connections are given

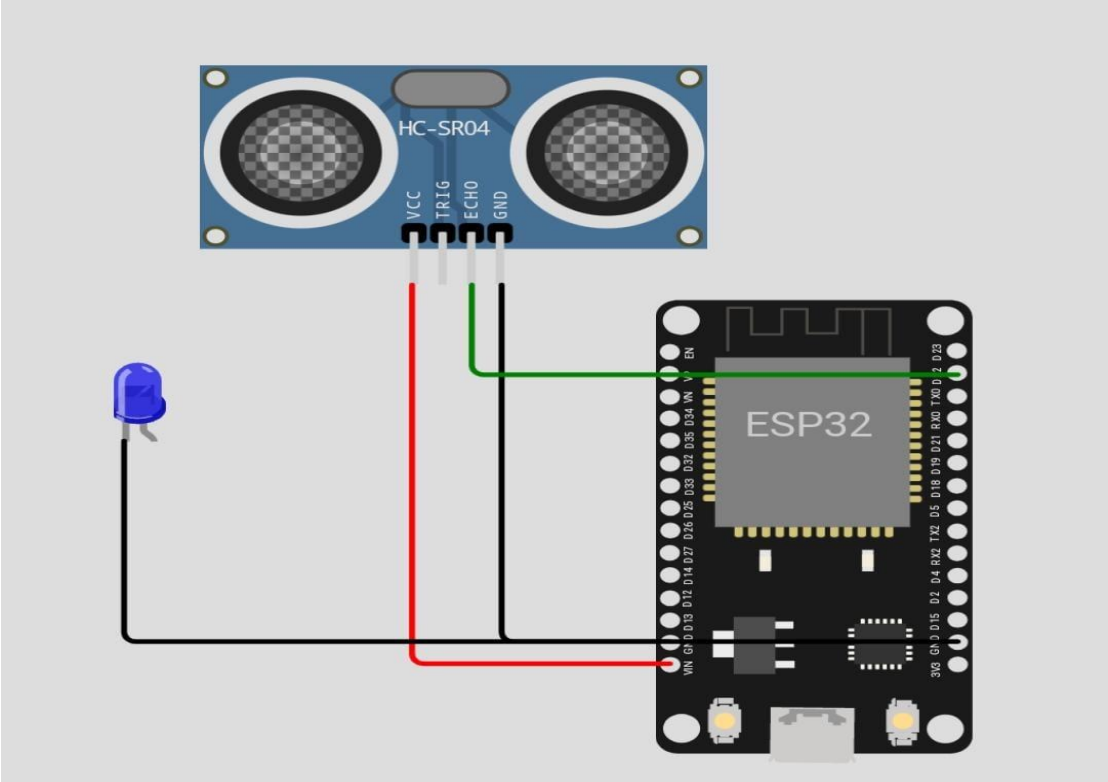

Fig:4.3.5:Echo pin connected to D22

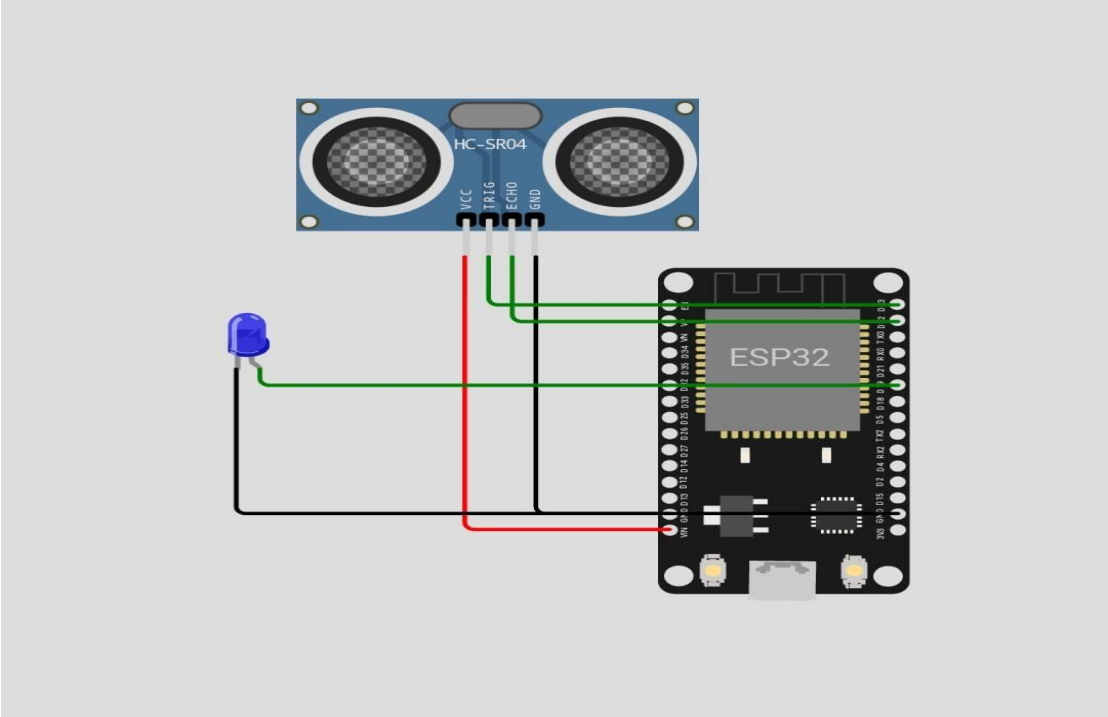

Fig:4.3.6:TRIG pin connected to D23

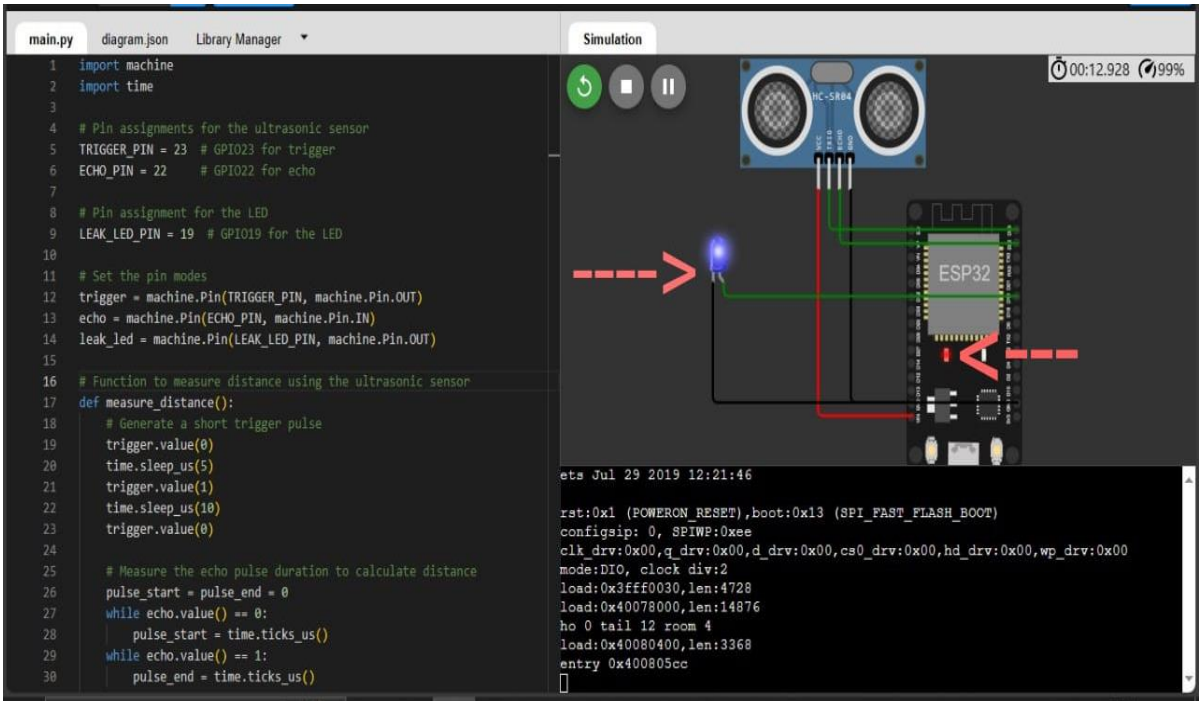

Fig:4.3.7:Final output

You will see the indication LED turn ON when the sensor detects water.You will see the indication LED turn ON when the sensor detects water.