**SMART PARKING SYSTEM USING INTERNET OF THINGS (IOT)**

**PYTHON SCRIPT**

**INTRODUCTION**:

\*The proposed IoT-based Smart Parking System leverages a network of sensors and communication devices to monitor and manage parking spaces in real-time. These sensors are strategically deployed in parking areas, and they continuously collect data related to parking space occupancy and availability. This data is then transmitted to a central cloud-based platform for analysis and dissemination.

**SENSORS USED IN SMART PARKING SYSTEM:**

**Raspberry Pi**

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch **and** Python.

**Ultrasonic Sensors**

The integration of ultrasonic sensors, which measure the distance between objects using ultrasonic waves, allows for precise parking. However, such devices have one drawback — the sensor might get blocked with dirt.

**Electromagnetic Field Sensors**

An electromagnetic field sensor detects and measures changes in the magnetic field. This way, it reacts to the approach of metal objects.

**Infrared Sensors**

Infrared (IR) sensors emit an infrared signal and catch the reflection of this signal from the environment. Integrating such a device enables measuring the temperature

**Python script on Raspberry Pi:**

import machine

import time

import urequests

import network

# WiFi credentials

WIFI\_SSID = "Wokwi-GUEST"

WIFI\_PASSWORD = ""

# ThingSpeak API settings

THINGSPEAK\_API\_KEY = "Y9M5L1HHUIBOYQXX"

THINGSPEAK\_CHANNEL\_ID = 2320595

# Define the GPIO pins for the sensor

TRIG\_PIN = machine.Pin(2, machine.Pin.OUT)

ECHO\_PIN = machine.Pin(3, machine.Pin.IN)

# Set the occupancy threshold in centimeters

OCCUPANCY\_THRESHOLD = 30.0 # Adjust this value as needed

# Connect to WiFi

wifi = network.WLAN(network.STA\_IF)

if not wifi.isconnected():

print("Connecting to WiFi...")

wifi.active(True)

wifi.connect(WIFI\_SSID, WIFI\_PASSWORD)

while not wifi.isconnected():

pass

print("Connected to WiFi")

def send\_to\_thingspeak(occupancy):

url = "https://api.thingspeak.com/update?api\_key={}&field1={}".format(THINGSPEAK\_API\_KEY, occupancy)

response = urequests.get(url)

response.close()

try:

while True:

# Trigger the ultrasonic sensor

TRIG\_PIN.on()

time.sleep\_us(10)

TRIG\_PIN.off()

pulse\_start = time.ticks\_us()

pulse\_end = time.ticks\_us()

# Wait for the echo signal

while ECHO\_PIN.value() == 0:

pulse\_start = time.ticks\_us()

while ECHO\_PIN.value() == 1:

pulse\_end = time.ticks\_us()

# Calculate the distance

pulse\_duration = time.ticks\_diff(pulse\_end, pulse\_start)

distance = (pulse\_duration / 1000000) \* 17150 # Speed of sound in cm/s

# Check for occupancy

if distance < OCCUPANCY\_THRESHOLD:

srinaath = "Occupied"

print(srinaath)

send\_to\_thingspeak(1) # Send 1 to indicate occupancy to ThingSpeak

else:

srinaath1 = "Not Occupied"

print(srinaath1)

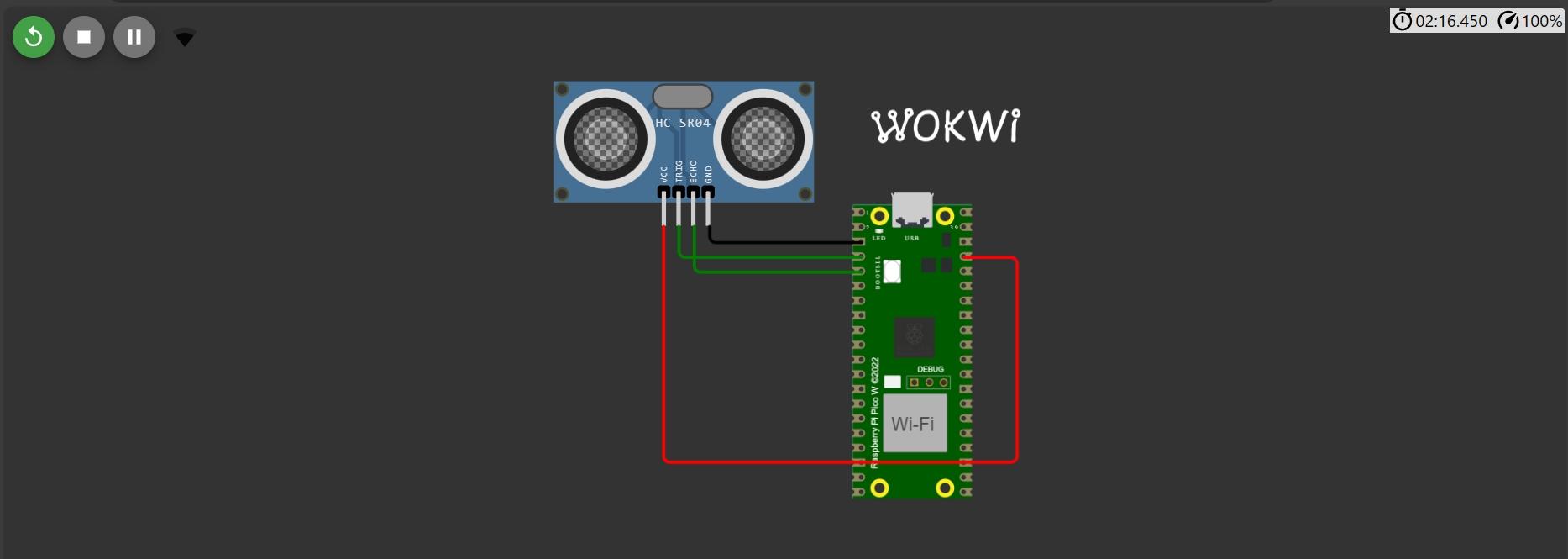
send\_to\_thingspeak(0) # Send 0 to indicate no occupancy to ThingSpeak

time.sleep(5) # Delay for 15 seconds (ThingSpeak allows up to 15-second updates)

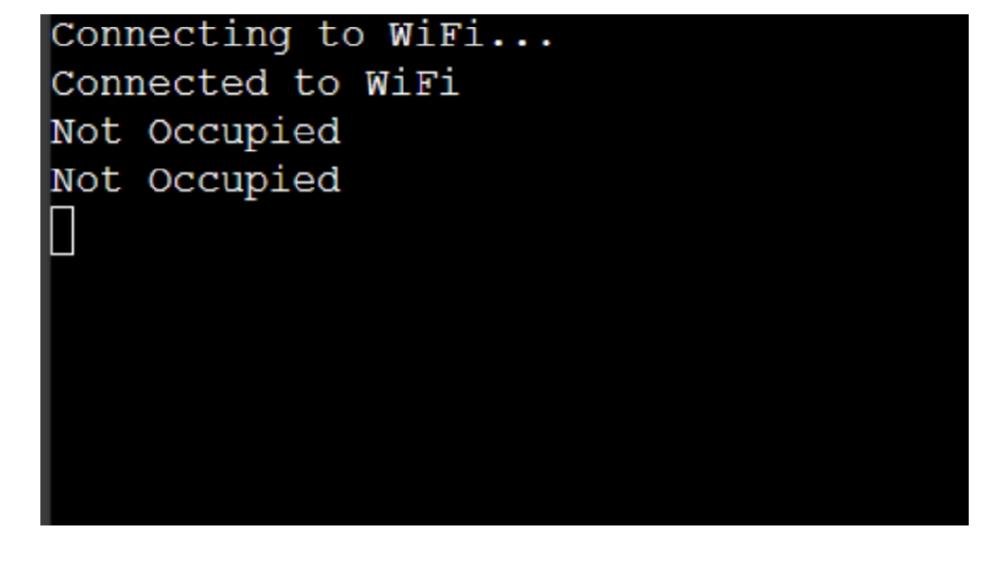
except KeyboardInterrupt:

pass

**Simulation circuit :**

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**Output:**

** In ThingSpeak(cloud platform):**

**APPLICATION OF SMART PARKING SYSTEM USING IOT:**

An IoT-based smart parking system is a decent solution for businesses and consumers,

Providing real-time data on parking space availability, pricing, payments, and more. It can positively impact the environment and traffic.

Moreover, IoT solutions ensure efficient parking reservation and management.