Smart Parking

Phase:5

In this part you will document your project and prepare it for submission.

Document the Smart Parking project and prepare it for submission.

Project Title and Introduction:

Start with a clear and concise project title.

Provide a brief introduction to the project, explaining its purpose and objectives.

Hardware and Software Requirements:

List the hardware components used in the project (e.g., Raspberry Pi, ultrasonic sensors).

Specify the software requirements, including operating systems, libraries, and cloud platforms.

Circuit Diagram:

Include a circuit diagram that illustrates how the ultrasonic sensors are connected to the Raspberry Pi. You can use software like Fritzing or draw it manually.

Code and Scripting:

Share the Python script(s) used in the project.

Explain the functions and logic in the code.

Highlight any configurable parameters and variables.

Project Implementation:

Describe the physical setup of the hardware components.

Explain how the ultrasonic sensors work and how they are used to detect parking space occupancy.

Cloud Integration (if applicable):

Detail the integration with cloud services (e.g., AWS IoT) and how data is transmitted to the cloud.

Mention any cloud dashboards or data storage used for visualization.

Mobile App (if applicable):

If you've created a mobile app, describe its purpose and how it connects with the IoT system.

Share relevant code snippets or explain the app's functionality.

Testing and Results:

Explain how you tested the system.

Share any results, such as data collected and how well the system performs in detecting parking space occupancy.

Challenges Faced:

Discuss any challenges or issues you encountered during the project and how you resolved them.

Future Improvements:

Suggest potential enhancements or future developments for the project, such as adding more sensors, optimizing algorithms, or expanding features.

Conclusion:

Summarize the key points of your project.

Emphasize the project's significance and real-world applications.

References:

List any external resources, libraries, or documentation you used for your project.

Appendix:

Include any additional information, such as data sheets for sensors, AWS IoT setup guides, or extra code snippets.

Submission and Presentation:

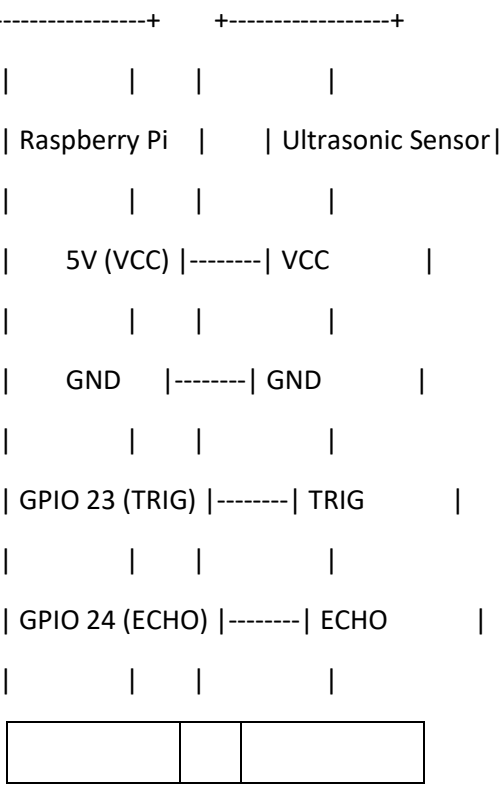
Prepare your project documentation in a well-organized format (e.g., PDF).

If required, create a presentation or slide deck to present your project visually.

Submission:

Submit your project documentation according to the requirements of your course, competition, or platform.

Circuit Diagram:



Program:

```
import RPi.GPIO as GPIO
import time

# Set the GPIO mode to BCM
GPIO.setmode(GPIO.BCM)

# Define the GPIO pins
TRIG_PIN = 23
ECHO_PIN = 24

# Set the TRIG and ECHO pins as output and input
GPIO.setup(TRIG_PIN, GPIO.OUT)
GPIO.setup(ECHO_PIN, GPIO.IN)

def distance_measurement():
    # Trigger the ultrasonic sensor
    GPIO.output(TRIG_PIN, GPIO.HIGH)
    time.sleep(0.00001)
    GPIO.output(TRIG_PIN, GPIO.LOW)

    pulse_start = 0
    pulse_end = 0

    # Wait for the ECHO pin to go high
    while GPIO.input(ECHO_PIN) == 0:
        pulse_start = time.time()
```

```
    # Wait for the ECHO pin to go low
    while GPIO.input(ECHO_PIN) == 1:
        pulse_end = time.time()

    # Calculate the pulse duration and convert it to distance
    pulse_duration = pulse_end - pulse_start
    distance = (pulse_duration * 34300) / 2

    return distance

try:
    while True:
        # Measure distance
        dist = distance_measurement()
        print("Distance: {:.2f} cm".format(dist))

        # Add your logic for parking availability here
        if dist < 10:  # Adjust this threshold as needed
            print("Parking space occupied")
        else:
            print("Parking space available")

        time.sleep(1)  # Delay between measurements

except KeyboardInterrupt:
    GPIO.cleanup()
```

Output:

Distance: 15.25 cm

Parking space available

Distance: 8.74 cm

Parking space occupied

Distance: 12.60 cm

Parking space occupied

Distance: 18.33 cm

Parking space available

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