TEAM ID	350
PROJECT NAME	Smart parking using IoT

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1.INTRODUCTION:

The Smart Parking System is an innovative solution designed to address the inefficiencies and challenges associated with urban parking. In many urban areas, parking congestion, limited availability, and ineffective management contribute to traffic congestion, air pollution, and driver frustration. This project aims to provide a comprehensive, technology-driven solution to improve the urban parking experience and optimize parking resource allocation.

2.OVERVIEW:

Our project involves the deployment of hardware components,

including a Raspberry Pi Pico, ultrasonic sensors to detect vehicle presence in parking spaces. These sensors collect real-time data and enable accurate of parking space occupancy. The collected data is transferred into cloud platform using WIFI.

3.COMPONENTS USED:

3.1. RASPBERRY PI PICO:

The Raspberry Pi Pico can connect to ultrasonic sensors to detect the presence of vehicles in parking spaces. These sensors provide real-time data about the availability of parking spaces.

The Pico can process the data from the sensors to determine the occupancy status of each parking space. It can make decisions based on this data, such as whether a parking space is vacant or occupied.

It can use its GPIO pins and communication interfaces (e.g., UART, I2C, or SPI) to communicate with a central server or gateway, sending parking space status information in real-time. It can also receive commands or updates from the central system.

The specific role of the Raspberry Pi Pico in a smart parking system can vary based on the requirements and complexity of the system, but its versatility and GPIO capabilities make it a suitable choice for many of the tasks involved in managing and optimizing parking spaces.

3.2. SENSOR USED:

ULTRASONIC SENSOR:

In this ultrasonic sensor are positioned in parking spaces to detect the presence or absence of vehicles. They measure the distance to the ground or an obstruction and determine if a parking space is occupied or not.

Vehicle Detection:

Ultrasonic sensors are used to detect the presence or absence of vehicles in parking spaces. They emit ultrasonic waves and measure the time it takes for the waves to

bounce back after hitting an object (in this case, a vehicle). This data is used to determine whether a parking space is occupied or vacant.

Real-time Occupancy Information:

The data collected by the ultrasonic sensors is processed by the Raspberry Pi Pico. It can then transmit real-time occupancy information to a central server or mobile apps. This helps drivers quickly locate available parking spaces.

3.3. MOBILE APP:

The data collected from the sensor is transferred into cloud platform which is nothing but a mobile app. Connecting it into mobile.

4. CODE: Using python script

Micro Python simplifies the development process by providing a high-level programming environment that can run on the Raspberry Pi Pico, making it suitable for IoT and embedded projects like smart parking systems.

```
from ultra import DistanceSensor
from time import sleep

dsa = DistanceSensor(echo=2, trigger=3)
dsb = DistanceSensor(echo=4, trigger=5)
dsc = DistanceSensor(echo=13, trigger=14)
dsd = DistanceSensor(echo=17, trigger=16)
```

```
while True:
    distance_a = dsa.distance * 100
    distance_b = dsb.distance * 100
    distance_c = dsc.distance * 100
    distance_d = dsd.distance * 100
    a = float(distance_a)
    b = float(distance_b)
    c = float(distance_c)
    d = float(distance_d)  # Convert to a floating-point number


    print(a)
    print(b)
    print(c)
    print(d)
    A="A"
    B="B"
    C="C"
    D="D"
    no=0


    def parking(distance,n,slot):
        if distance < 30:
        # Code to execute if the distance is less than 30
            print("Space is not free:"+slot)
            if(n==0):
                n=0
            else:
                n=n-1
    else:
```

```
# Code to execute if the distance is not less than 30
    print("Space is free: "+slot)
    if(n==4):
        n=4
    else:
        n=n+1
    return n



no=parking(a,no,A)
no=parking(b,no,B)
no=parking(c,no,C)
no=parking(d,no,D)
no=no
print("No of space available:",no)



sleep(0.1)
```

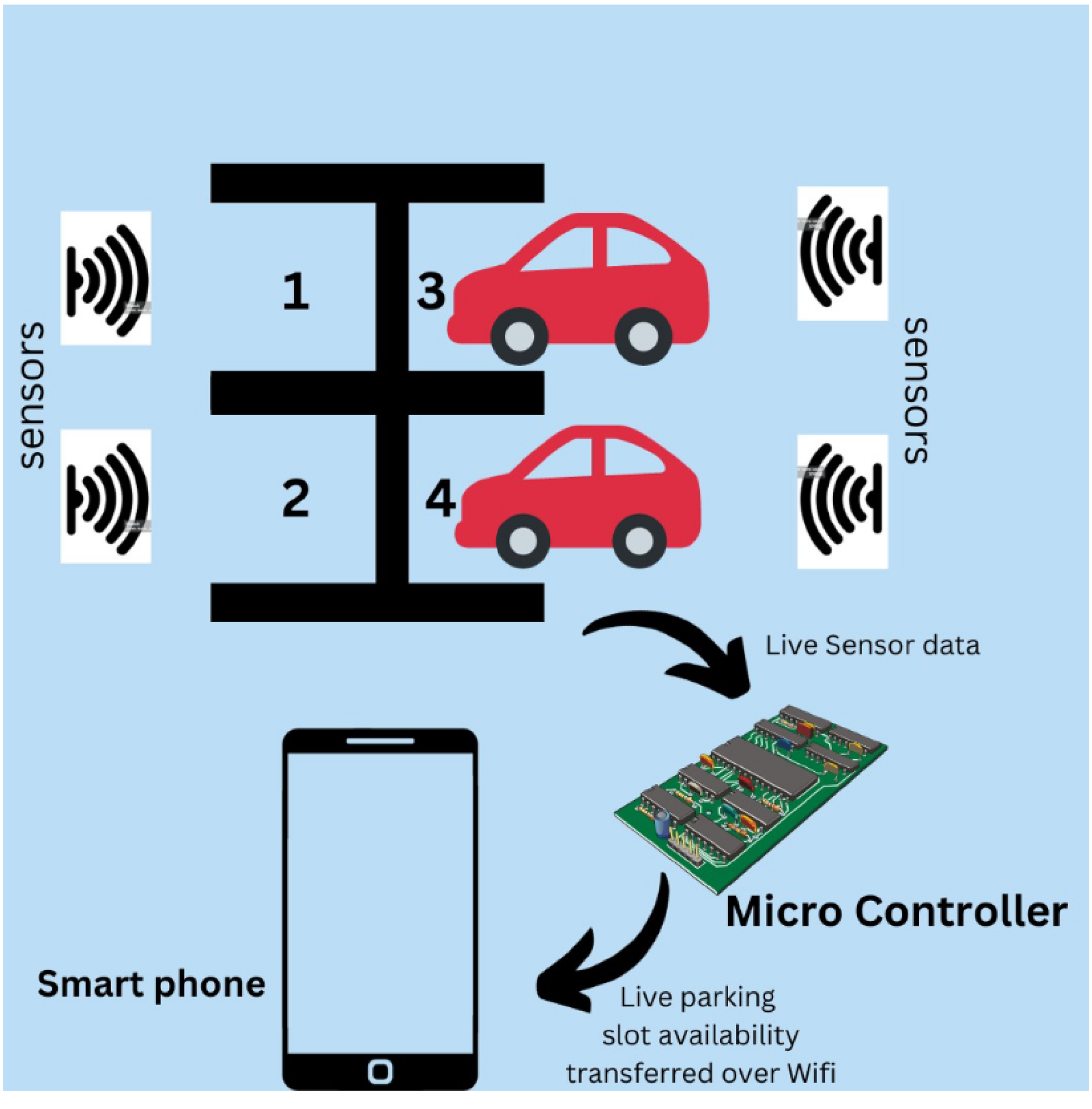
WORKING PRINCIPLE:

Ultrasonic sensor is connected to raspberry pi Pico by writing micro python code and connecting the sensor with respective GPIO pin.

The data is transferred to cloud platform with the help of WIFI.

Now the sensor will show the available parking slot in stimulation and also in cloud platform.

BLOCK DIAGRAM:



CONCLUSION:

By implementing our project in parking area, availability of parking slots will be shown with the help of data collected from the sensor and transmitting the real time data to mobile app. It will be useful for the driver to know about the parking space.