Date:31/10/2023

Project _ID:proj_223339_4

Project tittle:SMART PARKING

Phase -5

Objectives:

- **Problem statement**

- **IoT sensor setup**

- **Mobile app development**

- **Raspberry Pi integration**

- **Code implementation and diagram schematics**

- **Benefit drivers and alleviate parking issues**

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Problem statement:

Smart Parking is a parking strategy that combines technology and human innovation in an effort to use as few resources as possible—such as fuel, time and space—to achieve faster, easier and denser parking of vehicles for the majority of time they remain idl .
Smart parking: Smart Parking and its sister approach, Intelligent Transportation, are based on the fundamental ecological principle that we are all connected. Parking and transportation are both essential in the movement of people and goods. The Smart Parking and Intelligent Transportation vision and overlapping technologies are steadily melding into one integrated

Take the below scenario, for example:

In the not-too-distant future, you will be sitting at your kitchen table contemplating your plans for shopping, dinner, a movie and your favorite seat at your special watering hole. Since you want to have a place to stash your purchases before you head off for your evening's pleasures, you opt to drive. You enter your destinations into your laptop/smartphone/tablet, let the app know that you don't mind walking a bit to get a lower parking price, that you only want to park once, you don't need electric vehicle charging and you don't care whether the parking is on-street, off-street, covered or uncovered.

The app gives you three low price options, including the probability of (likely underpriced) on-street spots or two more expensive but reservable off-street spots. You opt for the reserved spot in the garage because it houses a bubble tea shop you like in its retail space. Then, you pay in advance with your credit card and receive an emailed $2-off coupon for the bubble tea.
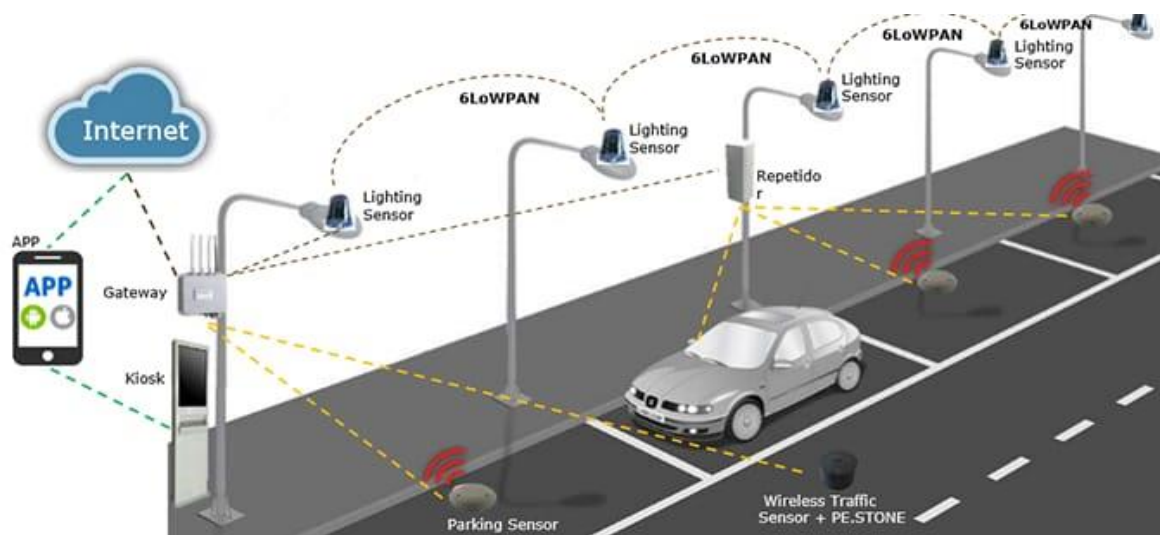
Later, after the Home Depot run, the half-hour faucet washer repair that took two hours and a nice hot shower, you settle into your car and call up your trip on your GPS system, to whicyour app fed your trip information. It turns out there's an accident on your normal route into town, and some construction too, so the GPS automatically reroutes you to a faster alternate route. You arrive in good time, the garage recognizes your car as you drive in and the internal garage's wayfinding system guides you to your reserved parking spot.

This could be the future of parking: a smart system that seamlessly integrates with your plans and activities to move people around from home to work to errands and back again.

I can certainly provide a textual description of the project, but I'm unable to create or display diagrams, schematics, or screenshots.

Project Objectives:

The project aims to develop a real-time parking availability system that benefits drivers and

alleviates parking issues by providing up-to-date information on parking space availability in a given area.

IoT Sensor Setup:

The IoT sensor setup includes a network of parking sensors installed in parking spaces. These sensors detect the presence of vehicles and send this data to a central hub for processing. Each sensor is equipped with RFID or ultrasonic technology to accurately monitor parking space occupancy.

Mobile App Development

The mobile app is designed for drivers to access real-time parking information. It provides a user-friendly interface that displays available parking spots, navigation to the nearest spot,

and allows users to make reservations or pay for parking. The app communicates with the central system to fetch real-time data.

Raspberry Pi integration

A Raspberry Pi serves as the central hub to collect and process data from the IoT sensors. It aggregates the sensor data and makes it available for the mobile app. The Raspberry Pi also connects to the internet for real-time updates.

Code Implementation:

The code is divided into three main components:

1. **Sensor Code:** This code runs on each IoT sensor, collecting data and sending it to the central Raspberry Pi. It's programmed to detect vehicle presence and communicate with the central system.

2. **Raspberry Pi Code:** This code on the Raspberry Pi processes incoming data from sensors, updates the central database, and provides APIs for the mobile app to access parking availability information.

3. **Mobile App Code:** The app is developed for Android and iOS platforms. It uses APIs provided by the Raspberry Pi to display real-time parking data, handle user interactions, and allow payments or reservations.

    ```
    Import java.util.ArrayList;
    Import java.util.Scanner;

    Public class ParkingSystem {

        Static int totalSlots, availableSlots;
        Static ArrayList<String> parkedCars = new ArrayList<String>();

        Public static void main(String[] args) {

            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the total number of parking slots:");
            totalSlots = sc.nextInt();
            availableSlots = totalSlots;
    ```

```java
        while (true) {
            System.out.println("\nWhat would you like to do?");
            System.out.println("1. Park a car");
            System.out.println("2. Remove a car");
            System.out.println("3. View parked cars");
            System.out.println("4. Exit");
            Int choice = sc.nextInt();

            Switch (choice) {
                Case 1:
                    parkCar();
                    break;
                case 2:
                    removeCar();
                    break;
                case 3:
                    viewParkedCars();
                    break;
                case 4:
                    System.exit(0);
                Default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
    }

    Public static void parkCar() {
        If (availableSlots == 0) {
            System.out.println("Sorry, there are no available parking slots.");
            Return;
        }

        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the license plate number of the car:");
        String licensePlate = sc.nextLine();
        parkedCars.add(licensePlate);
        availableSlots--;
        System.out.println("Car parked successfully. Available slots: " + availableSlots);
    }

    Public static void removeCar() {
```

```java
            If (availableSlots == totalSlots) {
                System.out.println("There are no parked cars.");
                Return;
            }

            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the license plate number of the car to be removed:");
            String licensePlate = sc.nextLine();
            If (parkedCars.contains(licensePlate)) {
                parkedCars.remove(licensePlate);
                availableSlots++;
                System.out.println("Car removed successfully. Available slots: " +
        availableSlots);
            } else {
                System.out.println("The car is not parked here.");
            }
        }

        Public static void viewParkedCars() {
            If (availableSlots == totalSlots) {
                System.out.println("There are no parked cars.");
                Return;
            }

            System.out.println("Parked cars:");
            For (String licensePlate : parkedCars) {
                System.out.println(licensePlate);
            }
        }
    }
```

Benefits to Drivers and Alleviation of Parking Issues:

1. **Time and Fuel Savings:** Drivers can quickly find available parking spaces, reducing the time and fuel wasted searching for parking.

2. **Reduced Congestion:** Efficient parking leads to reduced traffic congestion, which benefits both drivers and the environment.

3. **Convenience:** Users can reserve parking spots in advance, making it convenient for planned trips.

4. **Payment Convenience:** The mobile app allows for cashless payments, simplifying the parking process.

5. **Reduced Stress:** With real-time information at their fingertips, drivers can avoid the frustration of searching for parking.

While I can't provide diagrams or screenshots, you may consider hiring a professional designer or using design tools to create visuals for your project presentation.

Flowchart:
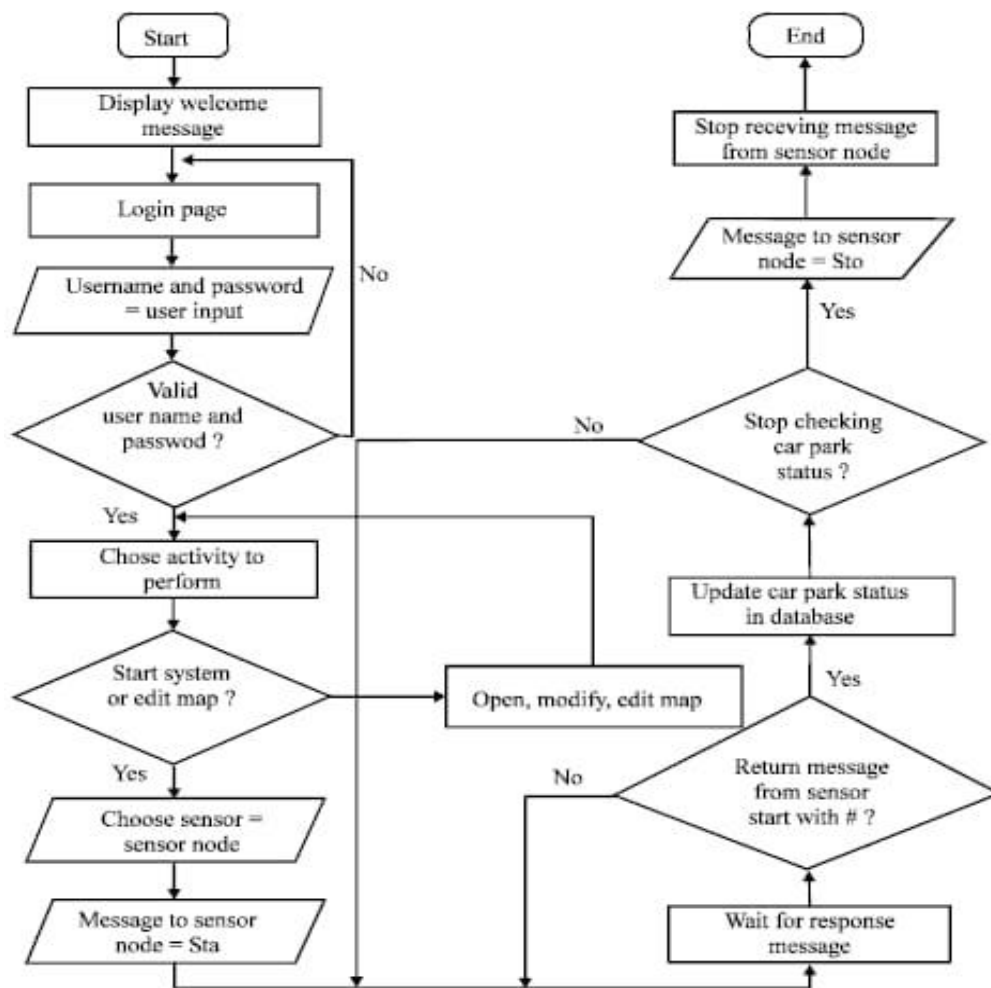
Conclusion:

As a conclusion, this project will help in reducing the amount of time a driver has to spend around the parking just to find an available spot, reducing the amount of traffic around the parking and also reducing the bad parking around the parking space.