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SMART CAR PARKING SYSTEM USING IR SENSOR

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ABSTRACT

With the increase in vehicle production and world population, more and more parking spaces and facilities were required. In this project, a new parking system named, Smart Car Parking System (SCPS) was proposed to assist drivers in locating available spaces in a car park in a shorter time. Different detection technologies were analyzed and compared to determine the best technology for developing SCPS. This system calculates the count of the car entered in the parking area and displays the parking availability status at the entrance. Once a vehicle enters the parking area, the gate opens automatically using sensors and motors to avoid manpower. The characteristics of SCPS include available parking space detection, display of available parking spaces, and an automatic gate opening system. An online pre-booking facility was also added to facilitate the drivers.

Keywords: Smart Car Parking, IoT, Arduino Uno, IR Sensor

1. INTRODUCTION

Today in many cities it has become almost impossible and quite expensive to build new parking areas for vehicles as they have almost reached their full occupancy. Finding car parking can be a daunting task, especially during festival times. We do not know how many cars can be parked inside the car parking area. Improper use of parking areas leads to congestion for drivers or those who are seeking parking in that particular area. It has been observed around 28-45% of traffic congestion is because of the unavailability of parking at an appropriate time. It has been observed that a driver usually spends nearly about 80 million hours searching for a perfect parking slot in France yearly. Increasing traffic in urban cities causes more pollution that even causes various body diseases.

An effort is required to manage the parking facilities and resources to reduce the traffic congestion on roads and save the time of people in search for parking and even reduce the pollution indirectly and thereby improvising the quality of life as well. Nowadays smart cities focus more on sustainability by developing more resource-managing technologies like the internet of things. It has been observed that the potential parking business is increasing every year and is expanding at a rapid pace, more attention as per the International Parking Institute after having undergone a survey came to conclude that analyses the growing trends in sparking innovation. Infrastructure for car parking and systems for controlling traffic are the major areas that are a part of the smart city.

Issues related to parking and increasing congestion in cities can only be solved if the driver or private car owners are pre-informed about the spots that are available at the place one wants to go, or they can book the slot for parking their vehicle before they arrived at their destination. The proposed system describes an approach to reduce traffic congestion issues and to save time in the search for parking spaces thereby making smart Cities using the concept of IoT.

2. RELATED WORK

Parking slot recognition for parking assistance systems and autonomous parking systems uses distance sensors and image sensors. A distance sensor-based parking assistance system recognizes a space using ultrasonic sensors and lidar sensors. Even if a space is not a parking space, the system recognizes a parking space when a space that is equal to the width of the vehicle is detected. Distance-sensor-based parking slot recognition is applied in a parking assistance system where a person finally determines a parking space. However, it is difficult to apply in a fully autonomous parking system, where the system judges a parking space and moves the car. The disadvantages of distance-based sensors can be compensated for by image sensors such as Around View Monitoring (AVM) because the image-sensor-based parking space recognition detects spaces based on parking slot markers. However, image-based feature extraction sometimes detects false positives because of other objects such as shadows, vehicles, and guidance cones.

These false-positive features result in the misrecognition of a parking space because of the characteristics of AVM. When a 3D object such as a parked vehicle is recognized by an AVM system, the shape of the vehicle is distorted and occupies a space in a parking area. When a false positive feature of the parking slot marker is detected from the parked vehicle, it is recognized as a no-parking space or an occupied space, even though it is an empty parking space.

3. PROPOSED WORK

The proposed system overcomes the problem by avoiding AVM cameras and we provide a separate parking area for online booking and offline parking. The proposed system avoids the slot markers and the use of the camera to monitor the slot marker in car parking. It implements an automated gateway for the car park to avoid manpower and also displays the status of the availability of the parking space at the parking entrance. Here IR sensors are used to count the number of cars entering and leaving the car parking. Here IoT is used for the online booking process and microcontrollers are used for the offline process.

3.1 Block Diagram

Figure: 1 represents the overall structure of the SCPS. The display is placed at the entrance to show the available parking space. An IR sensor 1 is placed at the entrance to count the entering cars. Once the IR sensor senses the incoming car then the signal is transmitted to the DC motor to open the gate. An IR sensor 2 is placed after the DC motor to count the exiting cars. Once the entire parking space is filled it will display No space and the gate will not open until the availability of space inside the parking area. Here we provide a separate parking area for online pre-booking methods.

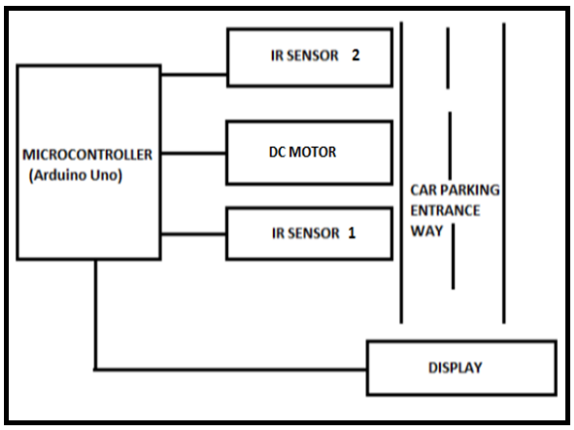

Fig-1: Overview of SCPS

3.2 Components Used To Develop SCPS

Arduino Uno

IR Sensor

16*2 LCD Display

DC Motor

4. EXPERIMENT RESULTS

The figures (2-8) show the real-time output of the Smart Car Parking System (SCPS). In this offline parking system the space is viewed by LCD at the entrance of the parking area and online parking system the web page shows the booked slot and empty slot in the car parking area.

4.1 Hardware Implementation

Fig-2 Arduino Uno code

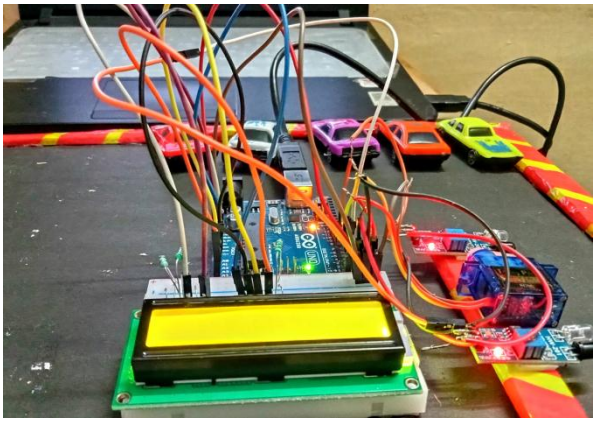

Fig-3 Connection image

Fig-4 Program dumping

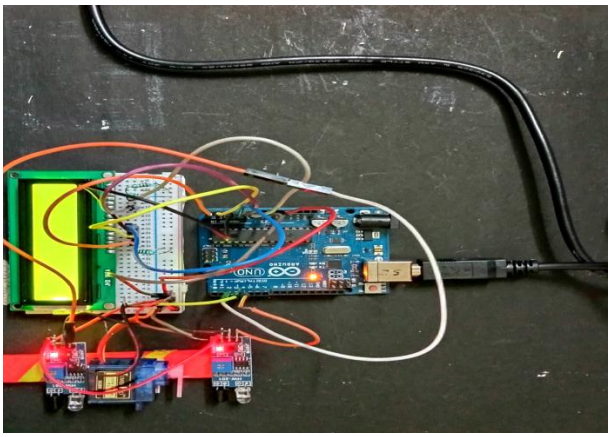

Fig-5 Final Output

4.2 Software Implementation

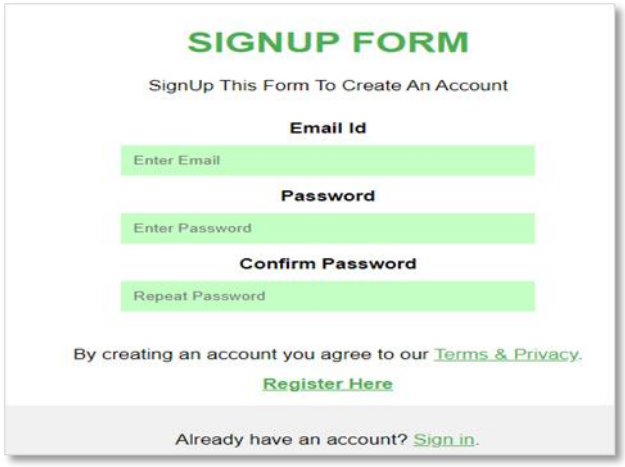

Fig-6 Signup Page

Fig-7 Login Page

Fig-8 Booking Page

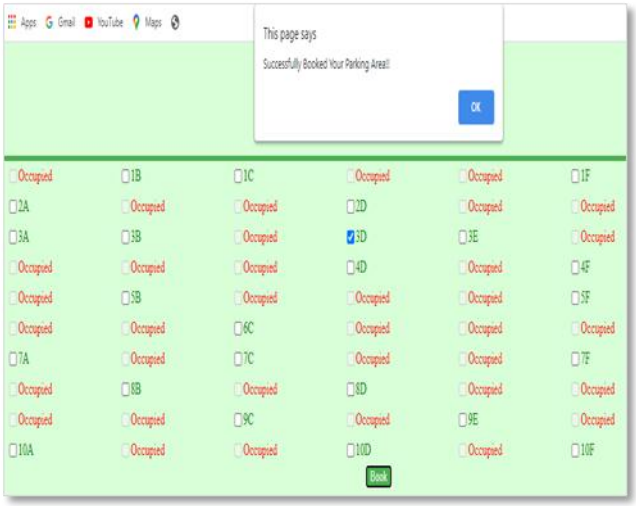

Fig-9 Booking Conformation Page

5. CONCLUSION

In this paper, we have addressed the problem of parking and presented a Smart Car Parking system. Drivers or private owners of vehicles could book a parking slot for them by checking the available slots for parking. Drivers today, prefer and demand smarter and quick services for hassle-free parking. Smart parking is, however, an inevitable service, especially in urban towns. The smart parking system in the paper is gradually moving towards an improved service with better time saving, cost saving, and increased revenues. In this method, we can avoid the use of several sensors for car detection. This method contains only two sensors at the entrance to count the entering and leaving of the car in the car parking. The automatic gateway avoids manpower. The display at the entrance shows the parking availability; thereby saving the search time.

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