Smart Car Parking System

S.Roshan Jesiya, M.Kavipriya, S.Deepa, S.T.P. Senthil Kumar.
M.Tech, *Electronics & Communication Engineering, Chettinad College of Engineering & Technology, Karur.*
roshanjesiya@gmail.com, kavipriyamusiri@gmail.com, deepa2752000@gmail.com, senthilarul13@gmail.com
Ph.:6374991700, 952481919, 9047791917, 9790120482

***Abstract*— With the increase in vehicle production and world population, more and more parking spaces and facilities are required. In this project a new parking system called Smart Car Parking System (SCPS) is proposed to assist drivers to find vacant spaces in a car park in a shorter time. The new system uses IR sensor to detect car park occupancy. Different detection technologies are reviewed and compared to determine the best technology for developing SCPS. This system calculates the count of the car entered in the parking. Once a car entered in the parking area, the gate is opened automatically and also closed. If the car parking is filled this display no space and the gate is not open. Features of SPS include vacant parking space detection, display of available parking spaces, and automatic gate open system. This report also describes the use of an SPS system from the entrance into a parking lot until the finding of a vacant parking space. In SCPS we are developing a web page for pre car parking slot booking system. In SCPS has separate space for online and offline.**

***Key words* —IoT, Arduino, Sensors, LCD display, servo motor.**

I. INTRODUCTION

With the increasing number of vehicles, parking has become a major issue for the people. Today in many cities it has become almost impossible and quite expensive to build new parking areas for the vehicles as they have almost reached its full occupancy. Improper use of parking areas leads to congestion for drivers or those who are seeking the parking in that particular area. It has been observed around 28-45% of traffic congestion is because of unavailability of parking at an appropriate time. It has been observed that a driver usually spend nearly about 80 million hours to search 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 so as to reduce the traffic congestion on roads and saving the time of people in search for parking and even reducing 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. The usefulness and potential for smart cities are estimated at around 100 billion dollars by 2020, with around $17bn as an annual spend. Also, 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

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are pre-informed about the spots that are available of the place one wants to go, or they can book the slot for parking their vehicle before their arrival at their destination. The system proposed in this report describes an approach to maximize the existing resources to reduce the traffic congestion issues and saves time in Smart Cities using the concept of IoT.

II. Existing System VS Proposed System

In existing system around view monitoring (AVM) can compensate for the disadvantages of distance-sensor-based detection because it can recognize parking spaces based on parking slot markers instead of empty spaces. In this system, false-positive (FP) features can be detected from 3-D objects and shadows, and these are occluded by the help of AVM camera. Here filter is used to detect parking slot markers.
Whereas the proposed system overcoming the problem by avoiding AVM camera and we provide separate parking area for online booking and offline parking. Here we develop an automatic gate way to avoid the man power and display the available parking space in the entrance of the parking area. Here IOT is only used for online booking process and for offline all the process are controlled by the microcontroller.

III. System Descriptions

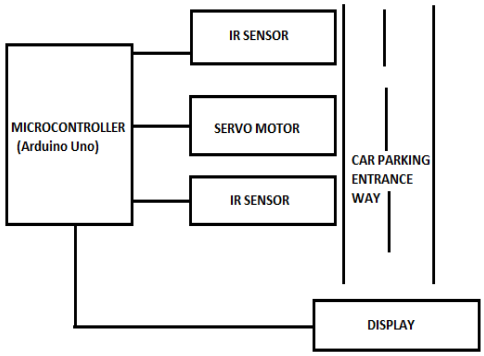

Figure.1 Overview of SCPS system

The above block diagram (fig.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 servo motor to open the gate. An IR sensor 2 is placed after the servo 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 availability of space inside the parking area. Here we provide separate parking area for online pre-booking method.

IV. Components Explanation

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button.

IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver.

Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

LCD Display

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.

V. SOFTWARE DESCRIPTION

Language

- C programing(for hardware implementation)
- HTML code(for web page development)

From fig.2 an Arduino Uno (ATmega328) code is developed using C language. The process like entering

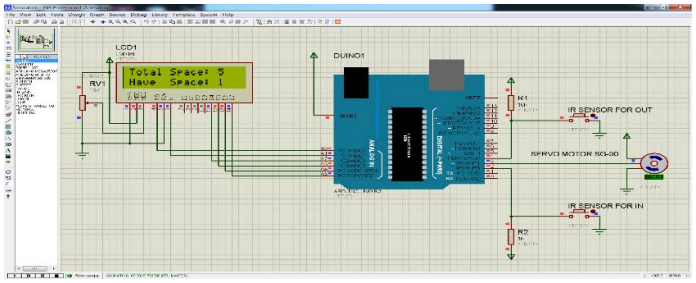

Figure.2 proteus simulation

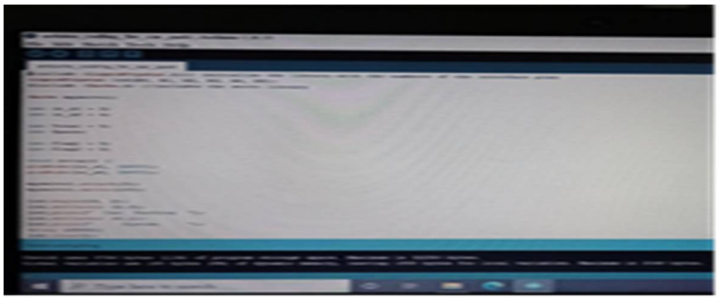

Figure.3 Arduino code

Car count, leaving car count, gate open and close, display the space details are controlled by the microcontroller through C coding. By using proteus software simulate the hardware part and make the connection as similar to proteus connection, then dump the C coding in Arduino Uno through Arduino IDE.

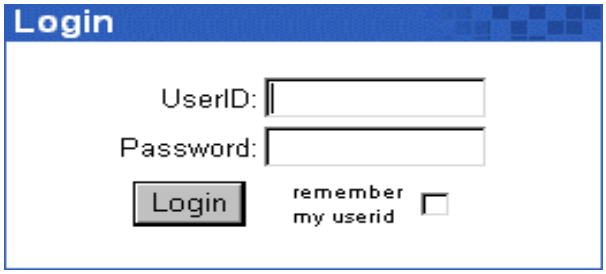

Figure.4 Login page

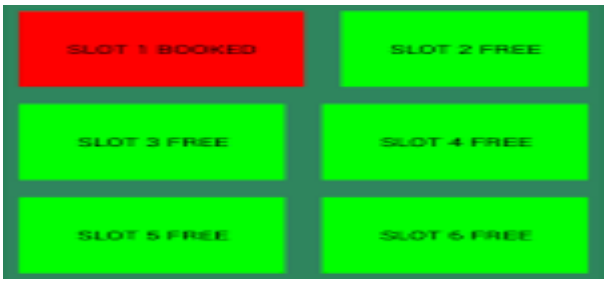

Figure.5 booking page

For online pre-booking system we develop HTML code in notepad file saver with extension.html and run it on web browser. Add some design in that code using cascading style sheet (CSS), then now it looks like creative+ design website. Add required menus and submenus in that web browser and create login and signup in that

website. If user enter the login and sign up details it stores the data in database [MySQL].Finally the webpage +MySQL for parking system is read to access, then user can able to access the website.

VI. System Implementation And Results

Figure.6 Hardware connection

The figure.6 represents the hardware implementation of Smart Car Parking System (SCPS)**.** These connections are based on proteus simulation which is demonstrated in fig.2.

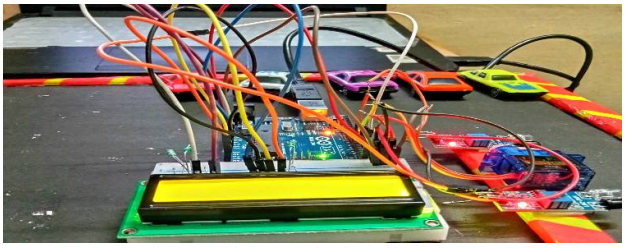

Figure.7 Final result

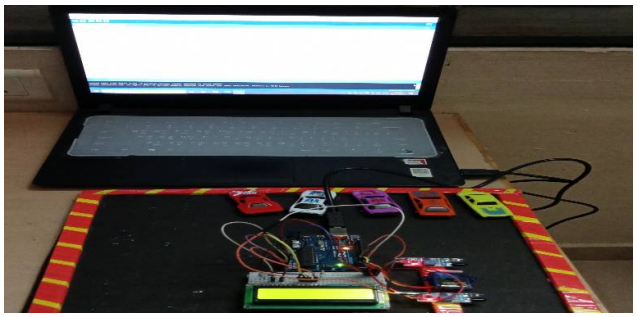

Figure.8 Sample image

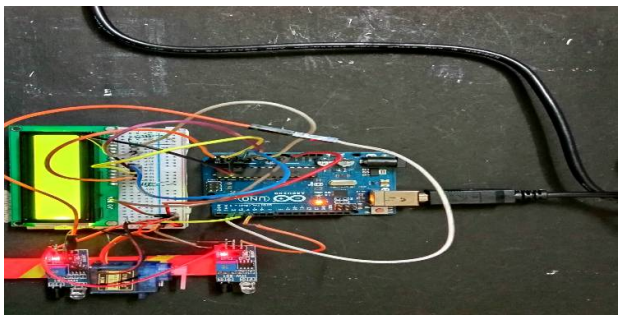

Figure.9 Sample image

The figure.7 shows the real time output of Smart Car Parking System (SCPS)**.** In this offline parking system the empty space is viewed by LCD display at the entrance of the parking area and online parking system the web page shows the booked slot and empty slot of the car parking area.

VII. ADVANTAGES

- To reduce human power.
- This need less space to implement.
- No need of specified car parking construction.
- Autonomous gate way for open and close.
- Online parking area booking method.
- Display the total space and balance space.

VII. CONCLUSION

In this paper we have addressed the problem of parking and presented an 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 a 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. Checking parking spaces in real time, if it is available or not, enables operators to gain maximum advantages.

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