

Reserve My Parking

Rohan Akhade

Electronics & Telecommunication

AISSMS IOIT

Pune, INDIA

rohan.akhade24x77@gmail.com

Purva Bali

Electronics & Telecommunication

AISSMS IOIT

Pune, INDIA

purvabali2000@gmail.com

Pranavi Wani

Electronics & Telecommunication

AISSMS IOIT

Pune, INDIA

pranaviwani2000@gmail.com

Ms. S.O. Ahire

Electronics & Telecommunication

AISSMS IOIT

Pune, INDIA

sandhya.ahire@aissmsioit.org

II. RELATED WORKS

Abstract — Historically, cities, businesses, and property developers have tried to match parking offer to growing demand for parking areas. In metropolitan cities drivers spend hours finding parking slots. So, to deal with these parking problems we introduce our device - “Reserve My Parking”. The aim is to reduce time and ease out the method of parking by creating it easier to pre-book and find the empty parking areas. In our project, we have developed an application which can display Available parking slots, users can reserve slots and can make payment. Our device/product is capable of saving time, energy of the user and fuel consumption. We are using Arduino IDE and Android Studio as a software platform with C language based and Java based Algorithm and Node-MCU (esp8266), IR sensors and servo motors as hardware. This reduces the unnecessary searching for parking space which ultimately reduces the traffic jams, pollution, saves a lot of time and overall efficiency is increased. This system is deployable in airports, multiplexes and confined parking spaces.

Keywords –Smart Parking, IoT, Node-MCU, Arduino, Application, Slots.

I. INTRODUCTION

Due to the proliferation of wide variety of automobiles on the road, parking issues are sure to exist. This is because of the reality that the modern transportation infrastructure and vehicle parking centers evolved are not able to deal with the inflow of automobiles at the road. Drivers attempting to find parking are expected to be accountable for approximately 30% of traffic congestion in cities. Cities, businesses, and builders’ belongings have attempted to fit parking supply to developing call for parking spaces. New approaches to use clever parking structure offer a greater balance view that better manages the connection between supply and demand.

With the implementation of the smart parking system, drivers can easily locate and can also secure a vacant parking space at any parking area convenient to them. The vehicle detecting sensors will confirm the availability of cars at the parking slot in the parking area. Also, these sensors will keep the count of the cars entered. Drivers can easily have access to the parking slot status on their mobile application or website. They will be able to pre-book their desired slot through the application and will be able to make the payment. This reduces the unnecessary searching for parking space which ultimately reduces the traffic jams, pollution, saves a lot of time and overall efficiency is increased. This system is deployable in airports, multiplexes and confined parking spaces, so there is a great possibility to take steps to implement this system on metropolitan level by creating a centralized parking system for a metropolitan area in order to move toward the concept of smart cities.

A. Problem Statement

In recent research in metropolitan cities the parking management problem can be viewed from several angles. High vehicle density on roads results in annoying issue for the drivers to park their vehicles as it is very difficult to find a parking slot. The drivers usually waste time and effort in finding parking space and end up parking their vehicles finding a space on streets. In worst case, people fail to find any parking space especially during peak hours and festive seasons.

B. Research Contributions

Using the existing technology, we can build much effective and cost-efficient solution for Parking.

- I. Smart parking reservation system using short message Services (SMS)^[1] was Published in 2009, authors are Noor HarinHany, Mohamad Hanif and Mohd Hafi Badiozaman. It enhanced security due to password requirements Also the system can be used & applied anywhere due to ease of usage. But the Cost of implementation is high, GSM feature creates bottlenecks and a microcontroller will have to take a lot of loads which can crash the system.
- II. An Intelligent Parking Guidance and Information System^[2] by using image processing technique was Published in 2013, authors are P.Dharma Reddy and A.Rajeshwar Rao. By using image processing technique, it identifies car only but if any object other than car is at parking slot it doesn't consider that slot is booked and could also show real time information. But have some disadvantages like high cost of implementation, user will have to inquire for every slot available, GSM system creates bottlenecks.
- III. Automated Parking System with Bluetooth access^[3] was published in 2014, the authors are Harmeeet Sing, Chetan Anand and Vinay Kumar. The system uses the user mobile's Bluetooth for identification and registration. The vehicle is transported to the parking location with the help of a rack and pinion mechanism for linear motion. It automatically detects the unique registration number stored in the Bluetooth chip to check if the new vehicle is to be parked. But it also has some disadvantages like cannot be used in existing parking system and the whole parking lot is to be designed with mechanical components such as rack and pinion mechanism.

IV. Car Park Management with Networked Wireless Sensors and Active RFID^[4], was published in 2015, authors are El Mouatezbillah Karbab and Djamel Djenouri. The main advantage of the gate management model is its low cost and simplicity over lot management model. Gate management service: Another use of RFID tags is gate management. As example, a gate can be opened automatically using an RFID reader and the vehicle's tag at the gate. But No driver guidance systems to guide towards the parking lot.

V. Smart Parking Management System^[5] was published in 2019, the authors are Amol Pomaji, Suraj Boinwad, Shrikant Wankhede, Pushpendra Singh, Bhagyashree Dhakulkar this application allows users to view different parking lots and check parking lot availability. When a user reserves a particular slot, that slot is highlighted in red and all available slots turn green. Reservations can be made by credit card / online banking. The application also provides the additional ability to cancel a slot reserved within 20 minutes of booking. If the user does not arrive at the destination on time, the booking will be cancelled & payment will be refunded. Once payment is complete, parking number will be sent to your email address or mobile number for further inquiries. Therefore, this application reduces traffic connections over the Internet of Things.

VI. Smart Car Parking System^[6], was published in 2020, the authors are Aashish Joshi, Arni Tharakaram Hariram, K M Vishal Somaiya, Mubashir Hussain. The project will use IR sensors to detect vehicles and provide feedback to address an effective way to find free space in complex multistorey car parks and manage the number of vehicles entering and exiting. It's a simple circuit designed for the specific purpose of parking cars. This automated system is used to find available parking spaces and guide drivers to reach the desired space using visuals and an effective manner, thus reducing search time.

III. METHODOLOGY

We came across the car parking problem and started doing research on the solutions available. Firstly, we studied the requirements and selected the microcontroller Node-MCU (ESP8266) which is Wi-Fi based as we are updating the real time data on application. We found out which type of sensor is needed to fulfill the requirement and its alternatives. We finalized on the IR Proximity Sensor because of its features fulfilling the need of the system. Then for the Entry and Exit gates we selected the SG-90 servo motor as we needed to give the rotation to the gates to open/close. For the application development we will be using Android Studio and Firebase database connectivity.

A. Component Selection

As per the women safety device design and other system requirements the hardware and software components are finalized as follows-

- 1) *Node-MCU ESP8266 IoT Module*: The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network.

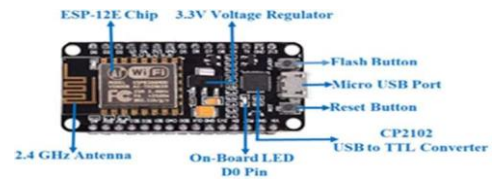


Fig 1. Node MCU

- 2) *IR sensors*: Infrared Technology is used in a wide The IR sensor is a kind of electric component, used to detect specific characteristics in its surroundings through emitting IR radiations. It has operating voltage of 5V DC, operating range is up to 20 cm, operating angle is 35 degrees, supply current is 20mA.



Fig 2. IR sensor

- 3) *Servo motors*: A *servomotor* is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. Its specifications are Pulse Width is 500 μ s - 2400 μ s, it gives torque up to 4.8V, range is 180 degree and its phase voltage is 5V.



Fig 3. Servo motor

Software Components –

- 1) Proteus Simulation Software is being used for the purpose of testing the sensors before actually testing it on the hardware.
- 2) Arduino IDE is being used for the code development of Node MCU. Before interfacing with Application to Node MCU, they were tested with Arduino.
- 3) Android studio is used to develop application, language used is Java xml and firebase is used as backend.

Hardware Components –

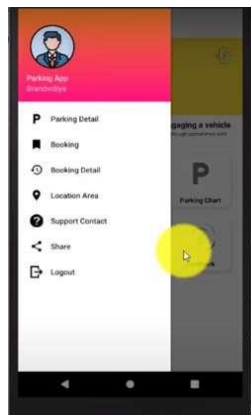


Fig 4. Parking Application

B. Wireframes of the Application

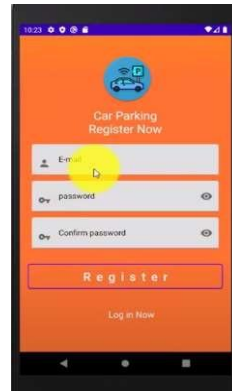


Fig.7 Login/Register Page

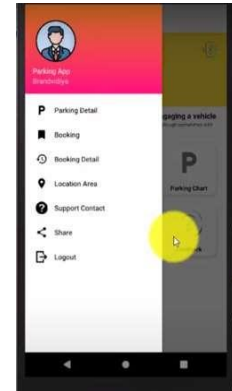


Fig.8 Navigation Menu

B. SYSTEM ARCHITECTURE

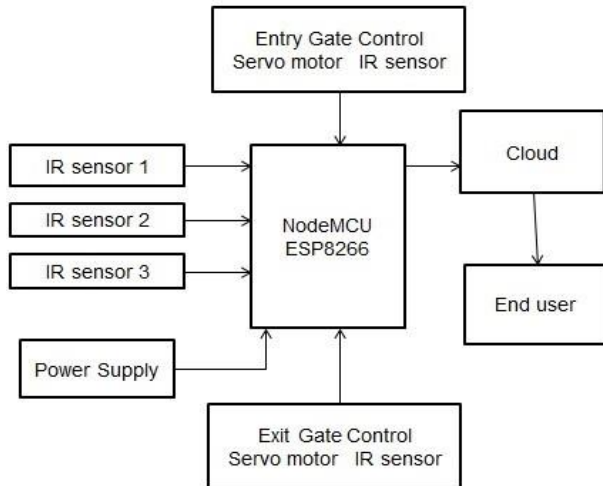


Fig 5. Block Diagram

The IR sensors present at every slot will detect the vehicle and send the data to the cloud we'll use Node-MCU for this purpose and the status of slot availability can be seen on the application. The drivers will get to know the free slot availability and can park accordingly. Entry and Exit control consist of Servo motor to lift the barricades and an IR sensor to detect vehicles at the gate which will give the signal to lift the barricades.



Fig.9 Home Page

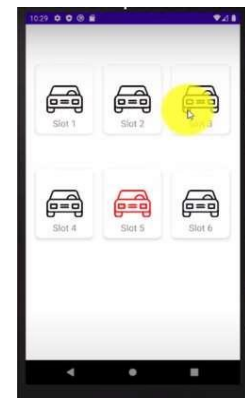


Fig.10 Page showing slots

C. Working

The project uses IOT technology to make the parking for drivers hassle free. IR sensors are used to detect the presence of the vehicles which is integrated to Node-MCU which has an inbuilt Wi-Fi module which helps to send the data to the cloud at runtime. This data is then reflected in the parking application, which the user has to download in his/her own mobile to avail its features.

When the car enters the parking area, IR sensor that is present at the Entry gate will detect the passing vehicle and the barricade will get lifted automatically.

When the car enters the empty slot, the IR sensor present there which is integrated to an parking application will detect its presence and update the status of the slot in parking application as occupied.

The operation of the exit side will be same as that of the entrance. When the car is leaving the parking area, the IR sensor that is present at the Exit gate will detect the passing vehicle and the gate will be opened automatically.

The user just has to register on parking application and can have access to the parking area status and other features. User can pre-book the available slot using the application. The flow of procedure of user booking the slot and making the payment via application is shown in the fig.7.

IV. IMPLEMENTATION OF THE SYSTEM

A. Flowchart

The flowchart describes the control flow of application

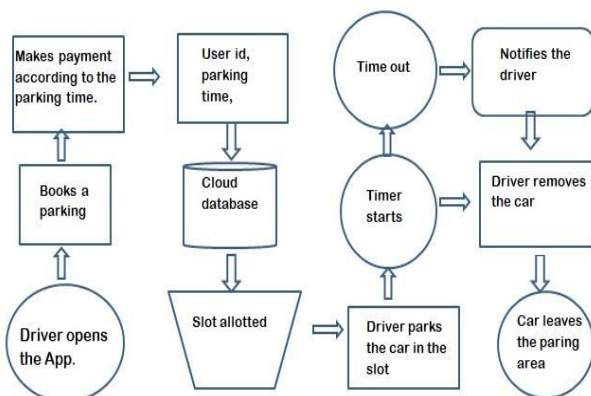


Fig 6. Flow Chart

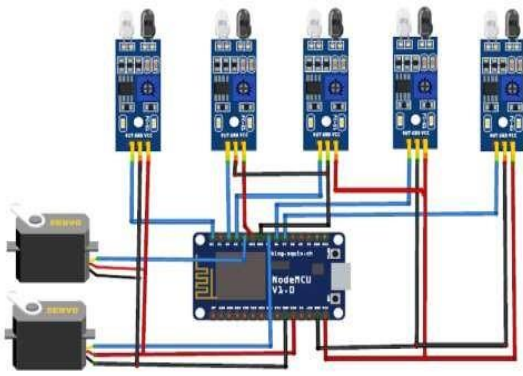


Fig 11. Circuit Diagram

V. RESULTS & CONCLUSION

By the implementation of Reserve My Parking, we will be able:

- 1. To locate the free slots in the parking area.
- 2. To pre-book the desired parking slots.

This project focuses on the implementation of parking space detection using the Internet of Things. The system benefits of smart parking go well beyond avoiding time and fuel wasting. Thus, this system is useful in easing the parking process without much manual labour.

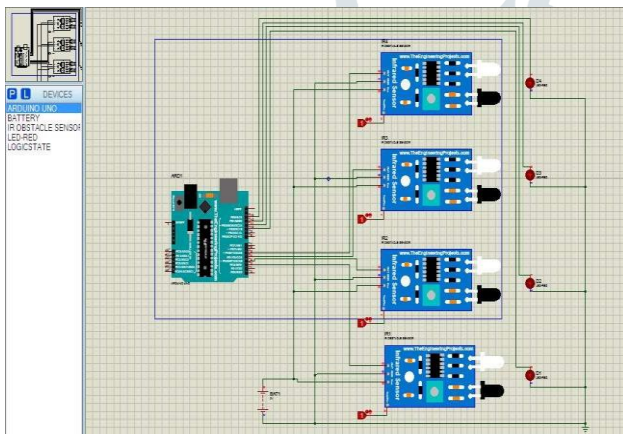


Fig.12. Simulation

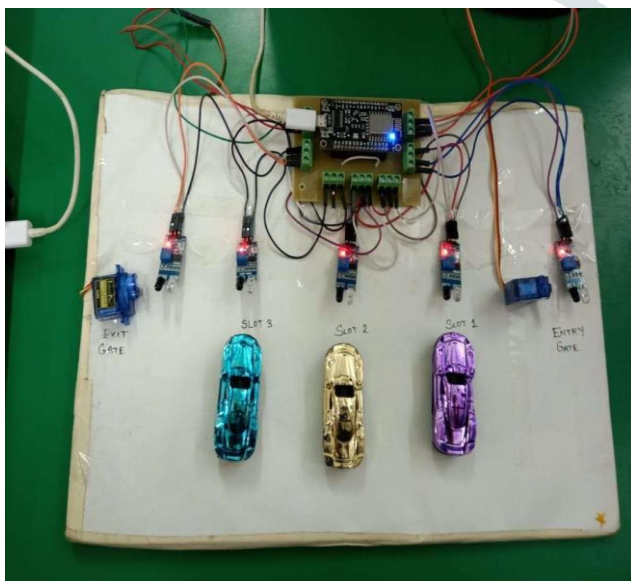


Fig.13. Hardware Setup

VI. FUTURE SCOPE

According to the Literature Survey we performed, the systems proposed by various authors help us effectively in reserving as well as eliminates the need for searching of a parking space in private parking lot. Many researchers have implemented systems which have dynamic arrangement scheme for satisfying the different needs of drivers and service providers, which is based on real-time parking information.

The table contains advantages and disadvantages of various systems implemented by researchers. In future work, we will innovate this system further which is not only used in a particular parking area available, but can be extended and also be implemented on various other platforms such as railway stations, airports, mall parking spaces. This will make the management of the parking spaces efficiently, by eliminating need of manual labor work

ACKNOWLEDGEMENT

I would like to thank my guide and all other departmental teachers who have contributed in my project. The constant support from the college faculty and required attention from the guide was very helpful during the implementation of project. Additionally, I would also like to thank the people who have supported directly/indirectly for this project.

REFERENCES

- [1] Noor HarinHany Mohamad Hanif and Mohd Hafi Badiozaman, "Smart parking reservation system using short message Services(SMS)", Researchgate Publication Intelligent and Advanced Systems (ICIAS),2009.
- [2] P.Dharma Reddy and A.Rajeshwar Rao, "An Intelligent Parking Guidance and Information System by using image processing technique", International Journal of Advanced Research in Computer and Communication Engineering ,Vol. 2, Issue 10, October 2013.
- [3] Harmeet Sing,Chetan Anand and Vinay Kumar, "Automated Parking System with Bluetooth", International Journal of Engineering and computer science, vol.3 no.5, 2014.
- [4] El Mouatezbillah Karbab and Djamel Djenouri, "Car Park Management with Networked Wireless Sensors and Active RFID", IEEE International Conference on Electro Information Technology, 2015.
- [5] Amol Pomaji, Suraj Boinwad, Shrikant Wankhede, Pushendra Singh, Bhagyashree Dhakulkar, "Smart Parking Management System", International Journal of computer science and Engineering, 7(5):1204-1208,2019.
- [6] Aashish Joshi, Arni Tharakaram Hariram, K M Vishall Somaiya, Mubashir Hussain, "Smart Car Parking System", International Journal of technical Research, V9(09), 2020.