

Automated Parking System utilizing IoT and Android App

^[1] Mohitsinh Parmar, ^[2] Dhruv Kansara, ^[3] Keval Shah

^[1] CMPICA, CHARUSAT, Charotar University of Science and Technology (CHARUSAT),
CHARUSAT Campus, Changa, India.

Corresponding Author Email: ^[1] mohitsinhparmar.mca@charusat.ac.in, ^[2] dhruvkansara38@gmail.com,
^[3] kbshah98@gmail.com

Abstract— To take the advantage of modern wireless connectivity, we have designed and developed a new parking system based on IOT especially for the Malls and other places where parking plays an important role with a simple parking system. This design solves the problem of the over parking in the parking slot at populated areas like streets, Malls and other business area and also it helps to check the free slot before you arrive on the place or slot using Android app. Here new module is added if any sector wants their personal parking then they will be having a new module in application with login where the authenticated user will be allowed to allocate their parking slot to any other person if that person is not available for a couple of days. To allocate the slot to other people the user should make sure that his/her car must be outside the parking slot otherwise at the time of allocation be the message that "to apportion your leaving space to others, your vehicle should be outside the leaving opening, Thank You!" We additionally have a Map office for new clients to follow the stopping spaces.

Keywords: Smart parking, IoT (Internet of Things), Parking Slots, Wireless Sensor, Android Application.

I. INTRODUCTION

Mechanical headways have to gem rectify the progression and pervasiveness of the Internet of Things (IoT) in a few of man's exercises. The IoT comprises different low-costing sensor hubs that are coordinated to decide an impromptu organization by means of a remote correspondence module that is prepared on the hubs [2]. The finder hubs are furnished with very surprising sensors, calculation units, and capacity components to assemble hand in glove, interact, and deal with tangible information for confinement and reconnaissance.

IoT innovation had been applied in different applications like brilliant homes, and shrewd robots among others. This paper portrays the execution of an IoT utilized in making a Smart Parking System with an Android Application in light of the minimal expense of remote sensors [1]. The Parking region will identify the vehicle when it's left in the leaving opening and send similar information to the server utilizing NodeMCU(ESP8266) to show a similar outcome on the android application. The clients can continuously see vehicles leaving openings from the android application and it will likewise show all subtleties like Name, Date, and Time at which the vehicle is left. To enter the stopping region, you first need to verify yourself at the confirmation point which is likewise set apart in the android application and because of some explanation on the off chance that you are not coming for quite a few days then you can permit your space to others. Utilizing the android applications you can do a similar errand and when you are doing it ensure that your vehicle is outside the leaving region if not it won't permit you to validate others and when you permit others to leave their vehicle then you

can't leave your vehicle before you prevent that help from the android application and the NodeMCU(ESP8266) will continuously check the web association and there is any web association blunder that will be shown on the screen which is connected close to the leaving region [3].

The IoT Project is separated into three stages; the first stage is making your vehicle noticeable to different vehicles while left. In the leaving openings, this stage will be for the normal leaving region, yet the area region leaving should confirm their RFID tag by checking at the validation point then, and afterward, just the leaving space will be accessible for that equivalent individual who needs to leave their vehicle. The subsequent stage incorporates the enlisting and executing remote boundaries to the trial to empower the framework to speak with the server to store and handle the information. The Third stage incorporates bringing the information from the server to the Android Application where you can see the inhabitation of the stopping openings and furthermore assuming your stopping is area stopping that you can assign your space to other [4].

II. WORDS FROM LITERATURE

Shrewd Parking was sprung up in the psyche when the individual couldn't view as his/her vehicle in the leaving opening of the shopping center which was gigantic and that individual took more than 10min to track down the vehicle, simultaneously I and my group was learning Android Studio IDE and furthermore IoT at the essential level and afterward we looked through a ton on Google. There we saw that the model was made utilizing a similar IoT Hardware and arduino however at that point we began perusing the exploration

paper to realize what is being there in the current framework and what different changes we can bring to our model and execution.

We read search papers by following:

- 1) The Plan of Automated Parking Networks in the Smart Cities.
- 2) Wireless Sensors and Sensor Networks for Structural Health Monitoring. Shock and Vibration Digest.
- 3) Stopping Guidance System Utilizing Wireless Sensor Network and Ultrasonic Sensor.
- 4) Working guideline of arduino and involving it as an instrument with study also with examination.
- 5). Real-time Communication Application Based on Android Using Google Firebase.

Existing System	Proposed System
No Security of vehicle	Security of Vehicle because you can see your car with details on Android Applications
No direction of Map to nearby Smart Parking Area which may lead in the wastage of petrol or may lead to air pollutions	There is a proper direction of map on the android application
There is no place where you need to authenticate yourself before parking	You need to authenticate yourself before you park your vehicle when the parking area is for sector parking
No need of internet connections	There is the main requirement of internet connections to save and fetch the data from server
For implementing existing system, the cost will be less compared to Proposed System.	For implementing existing system, the cost will be High compared to Existing System.

A few different benefits of this new It are the accompanying to Park System:

Checking of Parking Slots, Resource enhancement, effective observing and controlling of Parking Slots, Efficient using time effectively, Environment -accommodating arrangement, proficient utilization of labor supply, and efficient fuel utilization.

III. SOFTWARE AND LANGUAGES USED

The fundamental idea to utilize this IoT-based stopping is to stay away from traffic issues in megacities and furthermore to decrease air contamination. To make this undertaking execution we have utilized numerous IDEs, equipment parts, and various dialects to make the equipment work as indicated by the guidelines.

A. Software (Integrated Development Environments)

- 1) Android Studio 4.0:

Android Studio is the authority incorporated improvement climate (IDE) for Google's Android working framework, based on JetBrains' IntelliJ IDEA programming and planned explicitly for Android advancement. It is accessible for download on Windows, macOS and Linux-based working frameworks. It is a trade for the Eclipse Android Development Tools (ADT) as the essential IDE for local Android application improvement.

- 2) Android (IDE):

An authority programming presented by Arduino. cc is basically utilized for composing, accumulating, and transferring the code to the Arduino Device. Practically all Arduino modules are viable with this product that is open-source and is promptly accessible to introduce and begin incorporating the code in a hurry.

B. Languages

- 1) JAVA:
- 2) Objective C:

C. Hardware used:

- 1) NodeMCU (ESP8266):

Prototyping platform/Board based on Microcontroller which runs on ESP8266 Wi-Fi SoC (System on a Chip).

Operates on 5V and 3.3V.

11 Digital I/O pins.

Govern all modules in this system.

Work as an Intermediate between H/W and S/W.



Figure 1: NodeMCU(ESP8266) Board

- 2) NodeMCU (ESP8266):

LM358 IC 2 IR Transmitter and Receiver Pair.

Variable Resistors.

Used to detect the obstacle.

It works with 3 pin (VCC, GND, OUT).



Figure 2: IR Obstacle Sensor

- 3) Servo Motor 9G:

Operating voltage is +5V typically.

Rotation: 0° - 180°.

Operating Speed: 0.1s/60°.

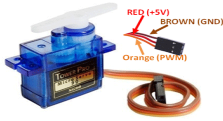


Figure 3: Servo Motor 9G

4) 16x2 LCD Display:

16 character by 2 lines.

Here it is used to display message to inform end user.

Display real time Data.



Figure 4: 16x2 LCD Display

5) Bread Board:

Solder-less board for temporary prototype connection and test circuit design.

Here we are using this board to connect all different board with main Arduino board and interface them all with each other.

6) Buzzer:

Piezoelectric material.

To produce a sound.

By this sound notification end user can identify that there is some kind of error in system.

D. Database:

1) Firebase Realtime Database:

The Firebase Real-time Database is a cloud-facilitated information base. Information is put away as JSON and synchronized progressively to each associated client. Whenever you construct cross-stage applications with our iOS, Android, and JavaScript SDKs, each of your clients share one Real-time Database example and consequently get refreshes with the most current information.

IV. IMPLEMENTATION AND RESULTS

1) Implementations:

a. Model of Smart Parking:



Fig 5: Model of smart parking

Fig 5 shows the basic model of smart parking using IOT.

b. Login:

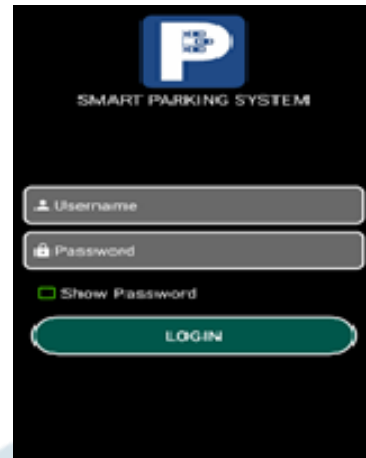


Fig 6: Login

c. Dashboard:



Fig 7: Dashboard

d. Parking Slots



V. CONCLUSION AND FUTURE ENHANCMENT

In this paper, we have concentrated on the functioning rule of NodeMCU and its equipment/programming highlights. This framework will assist megacities with keeping away from traffic and different issues.

Future Enhancement:

Will permit booking of the openings ahead of time.

Will permit execution same for all understudies.

Will permit following end-client in the event that it's for any private stopping or area stopping.

We will likewise make the participation framework utilizing a similar RFID cards in private stopping or area stopping.

REFERENCES

- [1] Dr.V. Kepuska, Humaid Alshamsi, Smart Car Parking System, In Proceedings International Journal of Science and Technology Volume 5 No. 8, August, 2016.
- [2] Idris, M.Y.I., Tamil, E.M., Noor, N.M., Razak Z. and Fong, K.W. 2009. Parking Guidance System Utilizing Wireless Sensor Network and Ultrasonic Sensor. Information Technology Journal, 8: 138-146.
- [3] Bhende, Manisha, and Sanjeev Wagh. Intelligent Car, Park Management System, Using Wireless Sensor Network. International Journal of Computer Applications 122 (2015): 1-6. Print.
- [4] Familiar, Miguel S., et al. "Building service-oriented smart infrastructures over wireless ad hoc sensor networks: A middleware perspective." Computer Networks 56.4 (2012): 1303-1.
- [5] Abhirup Khanna, Rishi Anand, IoT based Smart Parking System, 2016 International Conference on Internet of Things and Applications (IOTA) Maharashtra Institute of Technology, Pune, India 22 Jan - 24 Jan, 2016
- [6] Leo Louis, WORKING PRINCIPLE OF ARDUINO AND USING IT AS A TOOL FOR STUDY AND RESEARCH, International Journal of Control, Automation, Communication and Systems (IJCACs), Vol.1, No.2, April 2016.
- [7] Nilanjan Chatterjee, Souvik Chakraborty, Aakash Decosta, Dr. Asoke Nath, Real-time Communication Application Based on Android Using Google Firebase, International Journal of Advance Research in Computer Science and Management Studies, Volume 6, Issue 4, April 2018.