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Android-IOT Based Parking System

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ABSTRACT: Traffic congestion is a common phenomenon in developing countries like India. This is the quotidian scenario in many of the metropolitan cities. Because of heavy traffic, people lose their valuable time from their busy schedule and also cause pollution while searching for parking spaces. One of the prime reasons causing this heavy traffic is parking on the roadside. So, a need arises to build a parking system in order to reduce the traffic congestion in near future. We are going to develop an Android Application and Internet of Things (IOT) based parking model which will provide parking spaces. Earlier it was difficult to search for a particular space to park a vehicle due to shortage of parking spaces and being offline. But due to the advancements in technology it has been made possible to book for parking spaces online. It will have a user login (Android Application) for people who want to search for parking spaces and admin login (Web Application) that will provide the parking spaces.

KEYWORDS: Traffic Congestion; quotidian; parking; Internet of Things (IOT); Android Application, Web application, online payment system

I. INTRODUCTION

Variety of occasions turns up when we visit various public places like shopping malls, 5-star hotels, multiplex cinema halls etc. The difficulty we encounter at these places the availability of parking space. Most of the times we need to travel to find a free space for parking. The problem becomes more tedious if parking slots are full and it becomes time consuming. This situation calls for the need for an automated parking system that not only regulates parking in given area but also keeps the manual intervention to a minimum.

The number of personal vehicles usage is increasing day by day. Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. In disciplinary parking may result in damage to the vehicles. Thus there is a need to provide sufficient parking places coupled with plenty of slots to help the user park his vehicle safely. This will also ensure the user that he does not end up parking on non-parking area and cause discomfort to pedestrian.

Our project introduces a scaled down model of an automated car parking system that provides the parking slot at any time to user. The proposed project is a smart parking booking system that provides customers an easy way of reserving a parking space online. It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time. Hence this project offers a android based reservation system where users can view various parking areas and select the space to view whether space is available or not. If the booking space is available then he can book it for specific time slot. On using Android application on user's device, he can make reservation for parking space by providing the information like name, date, time and the id provided while signing in the app. After completing the booking successfully, the user will be provided a booking id that will be verified when he will arrive at the parking space.

This system provides an additional feature of cancelling the bookings. User can cancel their books space anytime. Users can even make payment online the client app allows parking booking on android phone. The server-side web service is stored on a web service.

When car arrives at entrance parking area, the given booking id will be verified. If the booking is matched successfully then user can park the car at designated slot. For retrieval purpose the user has to pay bill and extra charges (if any) then only barrier will get opened. The system is based on modules of Android Application. Thus, this system proves to be useful for the purpose of the car parking automation and thereby helps to reduce car driver's time as the user can book his parking spot beforehand.

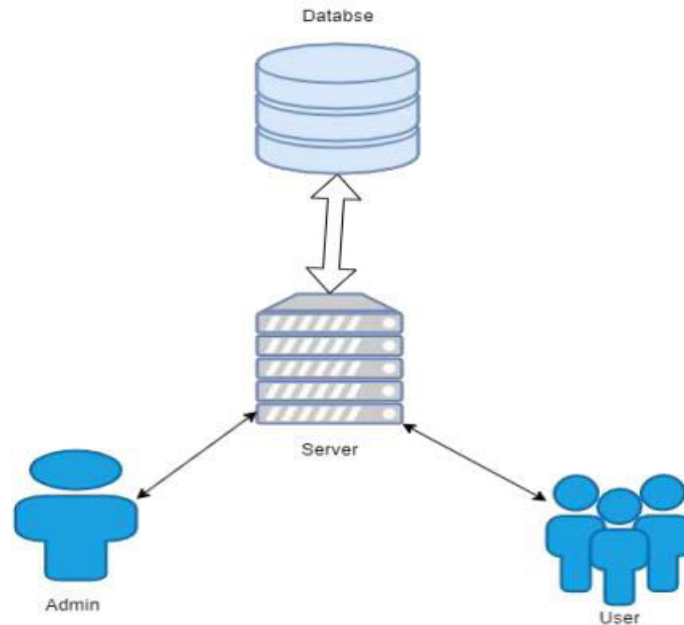


Fig 1. Architectural Diagram

II. RELATED WORK

After identifying the above problems related to traffic congestion, environmental pollution, wastage of time, Indisciplinary parking spaces. We took a survey on the following papers to see what type of papers had been published to solve these problems.

[1] Smart Parking Systems obtain information about available parking spaces, process it and then place the car at that position. A prototype of the parking assistance model based on the architecture was developed. The circular design is introduced having rack-pinion mechanism which is used to lift and move the vehicle in desired position place. An advanced car parking system is fabricated and developed in this system using locally available material. This design is efficient because comparing to other existing designs it will carry more vehicles in a limited area. From the simulated result it can be shown that the structure can be designed and implemented for the parking of any type of vehicles.

[2] The issue that usually occurs at the car park is time being wasted in searching for close and proper parking spaces. Users will continue for searching the parking area until they found a vacant parking space. This problem occurs in urban areas, where the amount of vehicles are higher as compared to the parking slots. These inappropriate conditions happens due to lack of implementation in technologies that are easily available today. Various projects have been tried to ensure smoothness of traffic congestion in car park areas. From manual implementations used in the old systems, it has evolved into fully computerized systems. This paper presents an intelligent system for detection of parking spaces based on image processing technique that will capture and process the rounded image drawn at parking area and produce the data of the empty car parking slots. It will get displayed at the display unit that consists of many segments in real time.

[3] In the great majority of cities it is hard and expensive to create more parking areas for vehicles since they have nearly reached its full occupancy. Considering this problem with an inefficient use of parking areas leads to congestions due to antagonism of parking seekers and regular drivers. The new advances in low-cost, low-power embedded systems shows the opportunity to create new ways to solve these problems. Metropolitan cities greatly enrich their sustainability by defining new resource management that rely in those constrained devices that is a significant part of the functionality of the system. The proposed smart parking solution consist on mainly in the on-site deployment of an IOT solution to monitor and signalize the state of availability of each single parking space, as well as



using context information generate by the city and its citizens to provide accurate responses to driver's demands.

[4] It addresses the issues in terms of parking systems, traffic law enforcement, road monitoring, and real time application of systems that support intelligent parking systems to improve lives. Number Plate Recognition (NPR) involves main three components: Detection (Number Plate), segmentation of character and Character Recognition of Optical (OCR). For Detection (number plate) and segmentation of character, we are going to use Open CV libraries. And for OCR, Tesseract-OCR. There are numerous NPR systems available today. These systems are based on various methodologies but perhaps it is really tricky job as some of the factors like fast speed of vehicle, improper vehicle number plate and different lights has overloaded the recognition rate. Most of the systems work under these limitations.

[5]Automated parking is a perfect strategy for parking cars using detecting device like sensors. The entering to orleaving from parking lot is also commanded by an android based application. This provide users to book parking spaces online in advance for given location and then park the vehicle with minimal fees. We have focused on some new systems and it displays that the new systems are not totally automated and require a level of human interaction and communication with the system. The uniqueness between their system and existing systems is that they intend to make their system less human independent .The development of bookings for parking slots commanded by android app, number plate identification, parking slot situation and online billing system is implemented. This model reduces the user's effort and time to search for parking slot. Also the money transfer is made online which makes the system more human independent.

[6]Sometime if we did not park the car at a time the parking slot is allocated by other at that time the paid money goes wasted. The paid money will not get back. Some of disadvantages listed with the implemented system as the cost and time to develop personal area network technology is very expensive. It gives liability issue of stolen or lost. During peak hours most of the reserved parking area gets full and this leaves behind the customers to search for their parking among other parking spaces which creates more traffic congestion and leaves them with no idearon availability of parking area. To solve this problem there requires a need for designing parking spaces in commercial surrounding. To make such parking spaces we need to consider of reservation of parking space with optimal parking area which depends on money and required time. Cost procedure will also combine with the parking cost and proximity to the arrival. However here they have designed the time driven method which then solves the issue of parking using allocation method. This paper proposed an app, which is used to create a prototype of Parking Space based on booking that allows users to find and reserve the empty parking spaces with the help of Internet of Things with space allocation method.

[7]This paper specifies the needs for the production and design of the parking for the Android operating system. This android application includes an efficient vehicle parking search, i.e. empty areas. The interface of user is easy to handle and permit the user to visit between other apps. It will use the Android operating system, which is on a lot of cell phones today. The android uses a market area to sell applications. Web page combines geographic data and parking vacancy details with user location, different data sources in order to let its users find parking slots, when coming for work or driving in city. App has a particular focus on availability of space, data about car parks through sourcing of crowds from the inputs of the customer.

III. METHODOLOGY

After taking the survey from the above pages we have identified that there can be some more work we could do on this topic. The authors of the above papers have made the model using image processing methods and some authors have made an android application/ app for booking the parking spaces. In accordance that people can find better and legal parking spaces and not waste their important time and do not cause traffic .Our group have made an Android based IOT Parking system which will not only help people to find their parking spaces using our android application (app) but also we are going to provide them an complete IOT based parking slots where they can park their vehicles.

Our project is divided into three major modules

Module 1:- Android Application

The following algorithm defines the step-by-step approach of our android application(app).

- 1) At first the user has to register in the application with the credentials like Name,Email ID,Contact No and password.



- 2) Then after successful registration the user can login with his/her email id and password provided while registration
- 3) After logging in successfully, user can see various options in the menu bar. The options are contact us, add feedback, book parking, Home page and logout.
- 4) In the Contact Us option user can see the admin's email id and contact no. in case any problem occurs and user needs to communicate with the admin
- 5) If the user clicks on the home option, the application will be directed to the main page.
- 6) In Book Parking option user can book the parking by selecting the proper slots.
- 7) After selecting the slot, user has to provide some information like driver name, his vehicle no. (Number plate), his vehicle type (Two-wheeler/Three-wheeler)
- 8) After providing the information, user can then select the date for parking and the particular time for which the user will park the vehicle.
- 9) The cost of the parking is dependent on the amount of time the user acquires the parking space. If the user acquires the parking space for 2 hours, then the amount charged will be 20 rupees i.e. 1 hour- 10 rupees
- 10) After using the parking space, user can share his/her experience like if he/she liked it or if there are some changes to be made in add feedback option.
- 11) And after using the application, user can logout of the application by selecting the logout option.

Module 2:- Web Application

The following algorithm defines the step-by-step approach of our web application (website).

- 1) After opening the website, the front page will display the option of admin login, the home page and about us option
- 2) After clicking on the admin login option, a screen will pop-up of username and password.
- 3) After entering the username, password and successfully logging in the website, all the options will be displayed.
- 4) The options are home, view users, view bookings, view feedback, logout
- 5) After selecting the View Users option, admin can see the user's information like his/her name, Mobile number, email id.
- 6) In the view booking option, admin can see all the bookings made and the information that the user provided while booking the parking space which are:- The driver's name, vehicle number, vehicle type (Two-Wheeler/Three Wheeler), parking date, parking time and amount of money charged for the respective time.
- 7) In the view feedback option, the admin can see the responses experienced by the users.
- 8) After selecting the home option, the admin will be directed to the main page of the website.
- 9) The admin can then logout of the application after selecting the logout option respectively

Module 3:- IOT Model

We have made our IOT model on Tinkercad.com.

Tinkercad is a free online collection of software tools that help people all over the world think, create and make. It is the ideal introduction to Autodesk, the leader in 3D design, engineering and entertainment software.

It is an online 3D modelling program that runs in a web browser, known for its simplicity and ease of use. Since it became available in 2011 it has become a popular platform for creating models for 3D printing as well as an entry-level introduction to constructive solid geometry in schools.

The following algorithm defines the step-by-step approach of our IOT Model

- 1) After logging in with tinkercad, we can make some interesting IOT projects
- 2) We have made the IOT Model for our parking space.
- 3) To run the model we have to click on start simulation button
- 4) After clicking in start simulation, the LCD screen displays the message space left for 7 cars
- 5) Then after clicking on the enter button, the micro servo(gate) gets opened for the vehicle to enter in the parking space
- 6) After the vehicle enters in the parking space, the gate gets closed and the message displays space left for 6 cars.
- 7) After repeating these steps until all 7 spaces is occupied, the message gets displayed as No space available.
- 8) If the vehicle wants to leave the parking space, then the exit button is pressed, this will again open the micro servo(gate) and after the vehicle has left the parking space the gate will get closed and the message will be displayed space left for 1 car.
- 9) Thus after repeating the 8th step the spaces will be made vacant for other vehicles until the message gets displayed space left for 7 cars.



IV. EXPERIMENTAL RESULTS

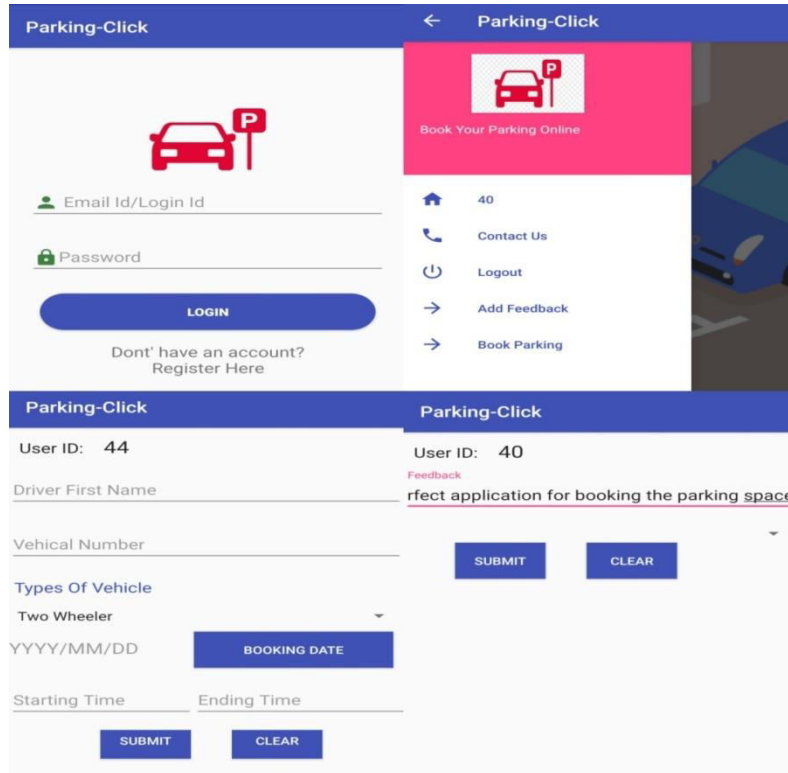


Fig 2. Android Application(App)

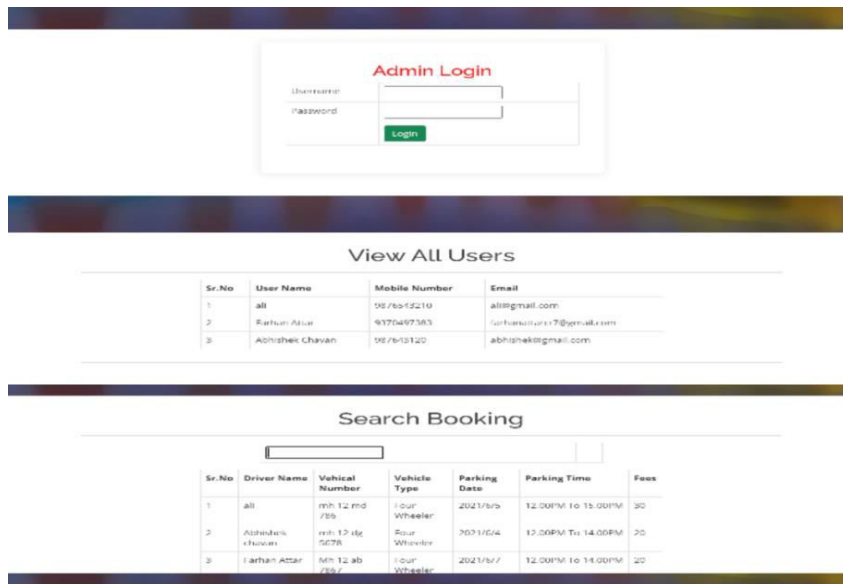


Fig 3. Web Application(Webpage)

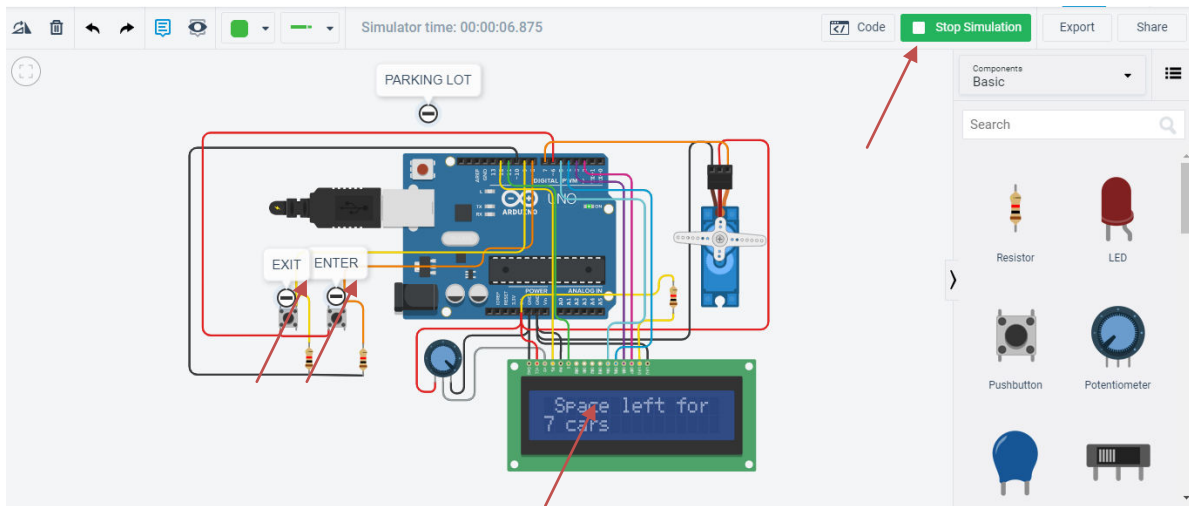


Fig 4. IOT Model

V. CONCLUSION

This paper summarizes a proper survey on the referred papers. After completing the survey of the papers we have made some development. We have made an android app and the supporting IOT model where the customers can find, book their desired parking spaces and pay for it sitting at their houses. This app will allow the users who will take control of the parking decisions and will save their time of searching several parking spaces physically. Usage of this app at large scale would benefit the user even if a user is in new place. This app is user friendly and handy so people of all age groups can use it easily. This system gives a visual display to the user regarding the current parking situation. This system made it easy for the user to book or reserve a space on the smartphone. Thus smartphone acts as a park finder. This system ultimately reduce the time that every driver spends for searching a parking space which have reduced the fuel consumption, traffic and pollution.

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