Smart Parking System using IoT

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Abstract— The In this era, with the modernization of cities, there is a grown need of travelling. As this need grew, number of vehicles grew as well. And with it comes the major concern of parking. With the rapid proliferation of vehicles availability and usage in recent years, finding a vacant parking space has become more and more difficult, and is resulting in a number of conflicts for space, day by day. This, therefore, has led us to the need for efficient parking management systems in the Smart cities, which we call "Smart Parking System." The Smart Parking System is based on IoT (Internet of Things), which has gained a huge popularity in the recent years. In this project, we present an IoT-based cloud integrated smart parking system. The proposed Smart Parking system consists of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A website is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly.

Keywords: Smart Parking System, IoT

I. INTRODUCTION

Seeking a vacant parking space during peak hours in areas like Hospitals, Hotels & Shopping Centers, Airports, Universities, and Exhibitions & Convention Center has always been frustrating for many drivers. Surveys says that traffic generated by cars searching for vacancies in Parking Spaces is up to 40% of the total traffic. Now that is a serious issue to look after, and Smart Parking System is one of the best available solutions to at least reduce the traffic congestion caused due to the above problem. This application gives information about the occupancy status of the spaces in the parking lot equipped with sensors that detect the presence of vehicles.

Roads are designed and built to handle traffic which doubles or triples in a quarterly rate. All these vehicles come to rest at some time, we see double parking everywhere and even triple parking (we had to come up with a term) because the drivers won't take the risk of going elsewhere to park their vehicles just because they have no idea of what awaits them in other parking areas.

II. SMART PARKING SYSTEM

Traditional In this Getting the right "information" about "space" to the drivers in our city so they won't waste their time looking for parking spaces or park inappropriately because of lack of information.

With the right funding and wide scale implementation, the project can be helpful in reducing illegal parking and in a way help with the traffic jams we see in our city. An Internet of Things (IoT) based Parking System informs the user to find out about the nearest parking area and gives availability of parking slots in that respective area.

It mainly focuses on reducing time in finding the parking slots and also avoiding unnecessary traveling through filled parking lots in a parking area. Thus, it reduces the fuel consumption which in turn reduces carbon footprints in the atmosphere. This project mainly focuses on the city of Addis Ababa and takes into account the city's infrastructural and technological advancements.

As a methodology, since we have worked on the hardware and software sections of the project separately we have used staged delivery for the hardware section and extreme programming for the software section, in which we worked our way up the system from the basic sensors all the way to our server problems.

III. SYSTEM ARCHITECTURE

The smart parking system that efficiently allows users to locate empty parking bays in the shortest possible time and keeps track of the activity of the parking bays. The system should be able to record, process, store and channel parking activity data to a central gateway where visualization and information dissemination are performed to improve management of the parking
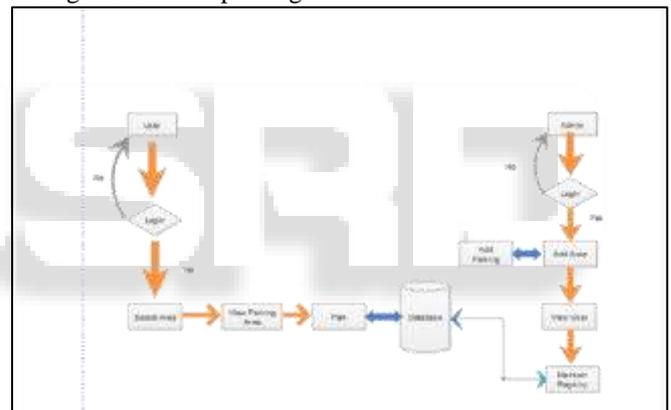

Fig. 1: System Architecture

IV. MODULES

1) Login Module
2) Registration Module
3) Parking Monitoring Dashboard

A. Login

The login module takes credentials from user as user names and password. These credentials are sent to the server for authentication. The server checks whether these credentials are correct or not. If they are correct the user will be redirected to next page, otherwise error message is shown. and it also provides a Registration button for new User Registration.

B. Registration Module

Add, the registration module takes user information from users. This information is stored at server site. Then it will provide user Id and password with which they can login. There are different registrations for farmer and retailer.

C. Parking Monitoring Dashboard

Add The Parking Monitoring Dashboard takes information from server and shows it to webpage. This page shows the layout of the parking slot a we made for parking. Here the vehicle holder can be used to check whether the space for parking is available or not and if the space is available then the vehicle holder can reserve the available space for himself.

Since all the data contained in the system are sensitive data such as parking status information, commodity information etc. so for that there is a need to provide some access rights to different type of users so that we can make it secure.

Different type of users will use this application directly or indirectly in some context so we will provide them to some access rights that will secure our system with user id and password mechanism.

Enabling a sustainable mobility is one of primary objectives of the Smart City vision, and the development of smart parking systems represents a key aspect.

Smart Parking involves the use of low cost sensors, real-time data and applications that allow users to monitor available and unavailable parking spots. The goal is to automate and decrease time spent manually searching for the optimal parking floor, spot and even lot. Some solutions will encompass a complete suite of services such as online payments, parking time notifications and even car searching functionalities for very large lots.

V. IMPLEMENTATION

An implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment.

Implementation is the carrying out, execution, or practice of a plan, a method, or any design for doing something. As such, implementation is the action that must follow any preliminary thinking in order for something to actually happen. In an information technology context, implementation encompasses all the processes involved in getting new software or hardware operating properly in its environment, including installation, configuration, running, testing, and making necessary changes. The word deployment is sometimes used to mean the same thing.

Fig. 2: Home Page

The website is successfully opened on the Desktop, smart phone/tablet, after clicking on the sign in, icon the following login screen will appear.
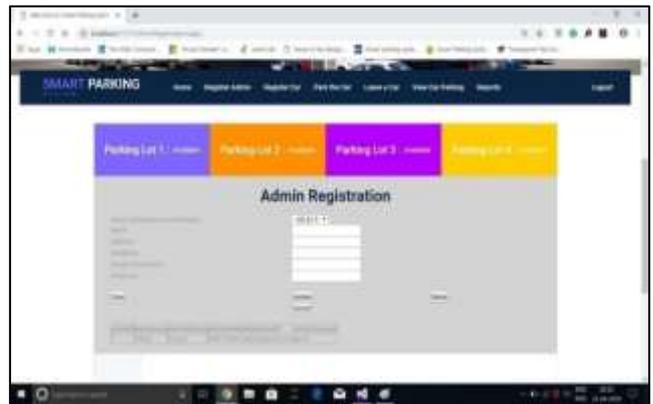

Fig. 3: Register Page

If you are Not authorized user then you should Register first, After Register it will redirect to login page.
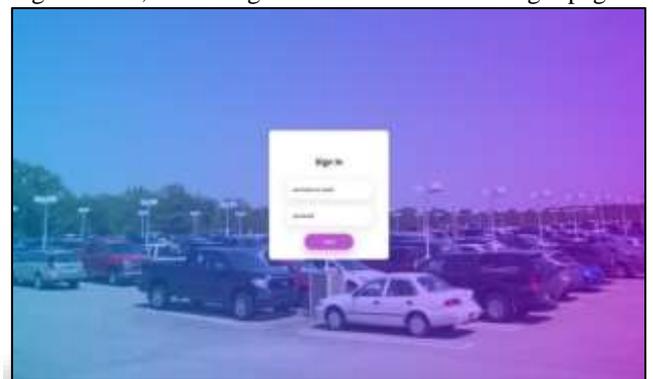

Fig. 4: Create Account

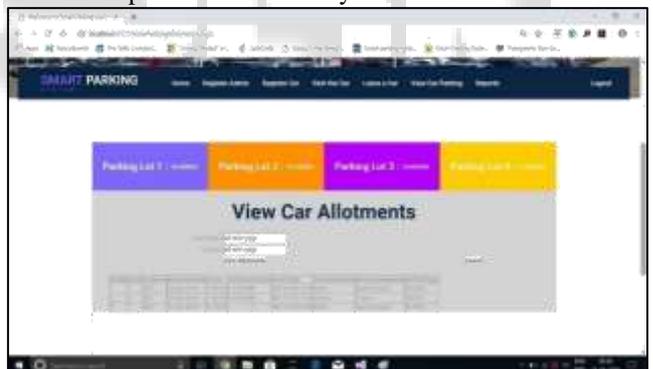After login, the home screen will be displayed as show in snapshot. It will Show you Dash Board

Fig. 5: Dash Board

In DashBoard it will shows which Parking Slot is available.

Fig. 6: Parking Slots

After clicking on Parking slot server displays all previous records of that Parking slot
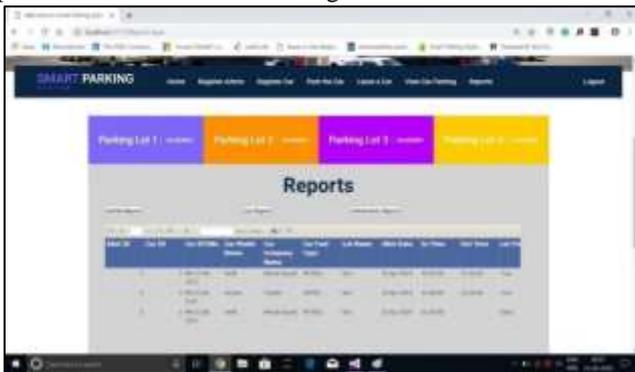

Fig. 7: Parking Slots

System testing, or end-to-end testing, tests a completely integrated system to verify that it meets its requirements. For example, a system test might involve testing a logon interface, then creating and editing an entry, plus sending or printing results, followed by summary processing or deletion (or archiving) of entries, then logoff.

In addition, the software testing should ensure that the program, as well as working as expected, does not also destroy or partially corrupt its operating environment or cause other processes within that environment to become inoperative (this includes not corrupting shared memory, not consuming or locking up excessive resources and leaving any parallel processes unharmed by its presence)

This website provides an easy mean for the User to remain updated with information of Available Parking slots in parking area. Firstly, the user needs to be open website with Mobile or Computer or tablet. The registration is on the server side .Then the User id and password will be provided to the registered user.

VI. CONCLUSION

Smart Parking System is a solution to the existing traffic congestion, to reduce drivers' frustration by providing information about the occupancy status of the parking spaces. The project development went smoothly while teaching me many best practices in programming using the current trending technologies like Python, Android and REST APIs. We could see that all the initial requirements of the project are achieved and also we tried doing minor data analysis on the parking spaces occupancy statuses.

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