Parking Allocation System

Mehta Vandan H [1], Prof. Ajaykumar T. Shah[2]
Department of Computer Engineering
[1] Alpha College of Engineering & Technology, Gujarat, India
[2]H.O.D, Alpha College of Engineering & Technology, Gujarat, India

Abstract- *To find a parking space is a daily challenge for all the people across the world, Due to the increasing amount of automobiles. The people who are looking for a parking space in peak hours are often forced to drive around city blocks until they spot a free parking place. This process costs a lot of time and gas for the drivers, generates unnecessary traffic load and affects the environment negatively due to increased emissions. This project proposes the design and of a Parking Allocation System that will be helping the user for finding the available parking slots and their tariffs within an area. The system requires input from driver's smart phones. So that the driver can see the availability of parking slot at the specific place with the help of smartphone. The key feature of the system is to deliver parking availability estimations on a map. Other services, parking extension time, parking location reminder, and parking expiration reminder are also provided as an incentive of the user to use the application and contribute on the parking availability system.*

Keywords- Parking Management, Pooling System, Online Parking Availability Tracer

I. INTRODUCTION

As we know to find a parking space now days is really a very difficult task for the drivers. Among of many different types of congestion like the standard flow congestion, there are also many types of parking-related congestion. This causes many undesirable problems such as environmental issues, air pollution, noise energy consumption and parking space shortage. Once a study was conducted about the issues that are being faced by the drivers regarding the parking. According to that approx. 30% of cars in a traffic jam are looking for parking slot and the average time to find an available parking slot is eight minutes. This work describes the process of designing and developing a prototype Parking Allocation System that collects and processes data about available parking places and their tariffs within an area. The key feature of the system is to deliver parking availability estimations on a map, based on the data provided by the users. This will be a web based application made by asp.net using C#. hence it will be a platform independent, thus the major mobile Operating Systems (OS) such as Android and iOS are supported. Furthermore, the system aims to be used from drivers that are not familiar with parking-related regulations of a location.

II. FUNCTIONALITIES

The functionality of the controller application is based on the requirements given below:

A. Every parking inspector or security guards should be having an account on this controller application.

B. With the help of the account on controller application, PI (Parking Inspector will be able to check about the available parking slots and about the specific vehicle whether it is parked or not (With QR Code or manually).

C. PI should be able to record a fine and send the fine to the owner of the vehicle that is parked illegally. So that the parking will be done by owners according to the rules and regulations. And in worst case if the vehicle which is not parked at the correct place will be towed away then the notification to the owner will be sent by the PI with the help of the application.

D. Pooling functionality will also be given in controller application, with the help of pooling functionality the college mates from the same area can be found. Name and Email ID of the nearest ones will be shown for the communication purpose for sharing the vehicle.

E. User authentication shall be secure.

F. User Management: - The use of the application is only granted to registered users in the database. Thus, the parking provider (PP) has to register each parking inspector (PI). The rational for individual accounts for the PI is that each fine has to be linked with the PI who issued the fine. Admin Registration will also be given at the controller application. So that they can manage the parking spaces as per the area of the place. And they will also be able to see the details of any students like with whom he/she used to come in the college, Reporting time of students in the college and more.

G. Check Vehicles The controller application provides three ways to check if a vehicle is parked legally. First, the parked

vehicle can be checked by scanning a NFC-tag attached behind the front window. Second, the vehicle can be checked by scanning a QR-code attached to the front window. In both methods the license plate, brand, model, color and the city where the vehicle is licensed is stored on the NFC-tag resp. the QR-code.

The third option to check if a vehicle is parked legally is to enter the license plate manually. In all three methods, a request is sent to the server where the check is performed and the result, if the vehicle is parked legally or not, is returned after the check. To prevent fraud, the brand, model, color and license plate are displayed to enable the PI to cross-check the user information in the database with the reality.

H. The features of the controller Application consist of

(1) the map to show parking lots or the position of the parked car,
(2) Parking management,
(3) User Profile Management,
(4) Platform Independent
(5) location-based regulations.

III. STUDY FINDINGS

A. Parking Management Study will outline a strategic parking management plan that addresses the current, upcoming and long term parking challenges and needs of the community. The strategic plan will consider that the system is finalizing the proposed recommendations to address visitor demand and the ongoing impacts to the park resources.

B. The industry standard states that parking occupancy should be kept below 85% to avoid the perception that there is no parking and increased congestion because of motorists searching for available parking. Even at the peak occupancy time, the on street parking did not approach this rate. These rates are low partially because the study area is very large. Throughout the data collection process, there were few cars parked in the Entrance zone.

IV. FUTURE ENHANCEMENT

Firstly, a possible way to increase the usability of the end-user application is the native implementation. Moreover, additional regulations for more cities and communities may improve the quality of the end-user application. Accordingly, additional data about parking spaces in Zurich and other cities would improve the estimation of available parking spots. Another topic for future work is scalability testing of the application with real world parking spot data of a whole city and with a larger user base. Although the Parking Allocation System is developed in a generic approach to fit different needs in different regions, the adaption of the system in other countries would demand changes in the front-end applications. For example, zip codes and license plates in some countries consist only of numeric while in other countries letters are present, too. Furthermore, the whole payment system has to be integrated. Additionally, a field test in a small city or area would test the feasibility of the implemented prototype and probably reveal new and changing requirements.

V. CONCLUSTION

The outcome of this Master Project is a prototype Parking Allocation System. The key feature of the system is to deliver parking availability on a map, based on the data provided by the users and parking inspectors (PI). The developed prototype of the PMMS consists of two front-end applications and a backend system. The end-user application is able to show unavailable parking spots on a map, show the local parking regulations and lets the user park his car. Moreover, a payment mock-interface was developed for demonstration purposes. The controller application is able to check if a vehicle is parked legally by scanning an NFC-tag, QR-code or by entering the license plate manually. If the vehicle is parked illegally, the PI may send a fine to the holder of the vehicle which is automatically sent by an email. To assess the developed system, a simulation to evaluate the parking spot utilization was modelled and conducted. The results of this simulation show that the search of a parking spot with a system that shows parking spot availability is approximately 3 times faster than a random search. In conclusion, the main goal of the Master Project to create a prototype PMMS was accomplished. The existing prototype satisfies all given requirements and provides additional features like a user profile and a car management, too. The evaluation of the system shows the car drivers and the parking inspectors benefit from the Parking Allocation System. Although, no data about occupied parking spots were available, the system is able to work with manually entered parking spots from the available data set for disabled people. After the completion of this Master Project, three Master Thesis' will extend and scientifically strengthen the Parking Allocation System. The first thesis will improve the parking prediction of the system by implementing a prototype device in the car which handles the parking status automatically. The second thesis will identify techniques that would decrease cruising for parking through a parking spot availability prediction model. Lastly, the third thesis will provide a tool that facilitates an easy management of public parking spots and provide optimization techniques concerning

the public parking spots distributions respecting city's and canton's regulations and registered cars density in a given location.

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