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Vehicles Parking System Using Android Platform

Muhammad Adeel Mannan[1], Faizan Hussain[2], Iqbal Uddin Khan[3] and Syed Daniyal Nadeem[4]

[1, 2, 3, 4] Hamdard University, Faculty of Engineering Sciences and Technology (FEST), Karachi, Sindh, Pakistan

[1]adeel.mannan@hamdard.edu.pk,[2]faizanhussain535@outlook.com, [3]iqbaluddin.khan@hamdard.edu.pk, [4]syeddany@yahoo.com

ABSTRACT

In this paper, a model or solution is presented towards the main issue and problems of vehicle parking in places as the resources such as vehicles have been popular among the people along with its usage. Due to the population, several resources, technologies, and entities are on its peak from which vehicles are more in common for day to day activity. People face the problem in order to find an appropriate place while they are parking their vehicles in places where they go, visit, and enjoy. This paper is presenting a solution towards this issue by using the emerging technique Mobile Phones using the platform of Android so the system can be automated eco-friendly and efficiently used by the end-users.

Keywords: *Vehicles, Android, Mobile Phones, Parking, End-Users, Usability, Ease, UML.*

1. INTRODUCTION

In this paper, the researchers have proposed a system or mechanism that is helping in the provision of vehicle parking security, reservation, and maintenance in a private car parking field so the issue regarding the parking places or slots can be solved easily. Such intervention help managing, maintaining and saving three essential facets such as time, fuel, and cost. Moreover, the proposed mechanism will assist the end-users, especially in the current modern era in order to become more efficient and updated. The solution is presented using the android application and smartphones as the technology was gaining momentum and rapidly attaining the significance among the people. Technology and techniques are common in order to provide ease to the end-users, and several artefacts have been developed, and still, numerous aspects are in developing face to provide a convenient and efficient platform to the end-users. Extensive usage of different entities is rapidly increasing because of the growth in population and the substantial enhancement and advancement in the technology and different applications. Furthermore, due to this many resources are getting used and increases its ratio on a day to day scale among the people so as vehicles. It has been observed that more usage of vehicles causes the traffic overcrowding on the street, highways, roads, shopping malls, buildings, public centres and several other places which eventually have a substantial impact on the people in finding a secure and appropriate place, and maintained to park their vehicles. Moreover, finding a free parking slot takes more time and fuel consumption that leads to aggression in human behaviour as it. However, to solve this problem there should be a model, mechanism, platform or solution which helps to find the empty slot in the vicinity without any difficulty. The researchers proposed a solution by using the technology and underline that there should be a unique system in the parking area which helps in finding the space and show the info to the people who are looking for space in order to park their vehicles. In addition, to develop an effective and efficient level of understanding among the readers related to the proposed mechanism. The researchers have taken the support of UML diagram to highlight each facet of the proposed model so the readers could easily understand the functional behaviour of the proposed system. The layout of this paper is in such a way that section 1 is all about the introduction, section 2 is underlining the relevant literature, section 3 is discussion the working of the proposed model, section 4 is signifying the significance of the proposed model with the help of UML diagram that helps in the provision of an adequate level of understanding for the readers and the end-users, and section 5 is all about the conclusion and future recommendation.

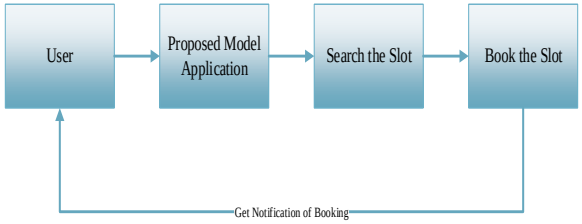

Fig. 1. Batch and Sequential flow of Vehicle Parking System

2. RELATED STUDIES

This particular section of this research is related to the literature review that has been conducted from 2009 to

2019. To highlight the significant aspects that have been developed and proposed discussed by numerous researchers in the past related to the proposed mechanism has been discussed in this section. According to [1] it has been observed in that the researchers have presented a particular system considering the urban environ that is related to the system or mechanism which is related to the smart parking security maintenance and reservations specified to the commercial car parking area. Moreover, the researchers of this paper have primarily focused that is related to the action of user reservation, and hence the driver can only reserve the parking slot which is based on the parking function. It has been identified in a similar paper that instead of well-organised and effective car parking the users need special security functions or option to park the vehicle safely. For such action, the barrier gate control security system (BGCSS) aspect is supporting the model for attaining the better and adequate level of security. Such action is associated with another facet which is an embedded process control unit (EPCU). In addition, different lighting scheme mechanism (DLSM) has also associated with the proposed model of [1]. It has been evaluated that the parking system of [1] is quite difficult for those people who do not have enough understanding related to such facets. There should be an accessible level for all the users so they can easily attain the solution with satisfaction regarding their problem. There is lack of ease factor in [1] for the end-users, and for such main action the researchers of this particular paper are more emphasised on the ease, usability, useful, look, and feel factor so, the people can easily interact and operate the platform to attain high-quality outcomes. Moreover, according to [2] it has been examined that a parking system has been presented by the researchers that are mainly based on intelligent resource allocation, pricing, and reservation. The discussed structure is focused on solving the problem related to parking in such a way that offers the reservation in parking with the low cost and less searching time for the free slots to park the vehicles.

Moreover, [2] they also focused on the highest utilisation of resources and revenue for parking managers. In addition, the researchers of this particular paper have identified that although the system in effect in less utilisation of time and cost but it is based on the web site platform. The researchers of this particular research are providing the solution that is based android platform because the usage of the android platform is easier to use them in public places as compared to the web platforms. Furthermore, in the paper of [3], it is identified that proposed structure is focused on the reservation and allocations of a best and ideal space on the cost function of driver that syndicates the proximation to parking cost and destination. The new aspect that has been proposed by the researchers of this paper is related to the Arduino, VPS, and QR code that is the unique factor in reservation and allocation of the place. QR code help in allocation and reservation of the space of the person is booking the particular slot from their homes, and this will ultimately help the users in the usage of fuel and time. They arrived at their place, and they scan their QR code using android phones and able to park their vehicles. Moreover, such aspect will also help in reducing the overcrowding of vehicles. In the paper of [4], a parking application is developed that help the end-users to park their automobiles by searching the free parking slot with the help of the android platform. Along with this, they can directly park their vehicles with the help of embedded hardware.

However, in the study of [5], a model or prototype has been presented which is reservation-based Smart Parking System (RSPS) that permits the users to effectively reserve and find the available slots to park their vehicles. The researchers have added a unique factor in their proposed mechanism that is related to the parking from home. The embedded hardware will be effectively developed, which is primarily based on VPS, QR code, and Arduino that help in reservation from home and will generate a QR code to the user android mobile phone. When the user goes to their place, they scan the QR code and easily park their vehicle. Further, it is examined in the study of [6] that in order to deliver a high-quality and adequate level of understanding for the end-users UML diagram are essential for such consideration. It helps understand the step by step process, procedure, the functionality of the models and systems. There are several types of UML diagram, and each of the diagrams has their uniqueness and level of novelty that make them more unique and exclusive for an understanding factor. According to [7] it has been identified that for profound investigation and analysis of the models and infrastructure UML diagrams are beneficial to develop high-quality learning for the systems that are aimed towards the implementation in realistic environ.

3. WORKING OF THE PROPOSED MODEL

The working of the proposed model is discussed and presented using UML diagrams [6]. Vehicles Parking System (VPS) is a solution towards one of the significant problems in the era due to the population and its growth. The system is presented in fig. 2 that how it will interact and work for the end-user. As shown in Fig 1 user will firstly go for the android application and do the registration process then the information will be shared with the server system and stored in the database. Moreover, the database is also responsible for the slots which are available at the desired place where the VPS is

embedded or use for the ease. The server manages the activity of parking slots and continuously updating all the activity and admin is responsible for making this in synchronized and managerial flow so the user will use the process efficiently and effectively and notifications process will be shared with the users so the user can easily be updated and sync with the place and its availability. End-user can use the android application to book or for the reservation propose with regards to the parking slot for their desired place at the moment when user books space a QR code will be generated to the application which is used by the user to be authorised and authentic person for that particular place. The QR code is also shared with the database of the VPS system for the scan and authentication process. Moreover, with QR code, the end-user will be able to access their parking place or slot and easily park their vehicle without facing any difficulty and the extra time and fuel. QR code helps the end-user while they are going for the reservation process of their parkin slot either at the place or from home or any other place within a specific range of the targeted place. In parking place their the Arduino UNO based and ultrasonic based mechanism. Arduino Uno is used for maintaining and managing the entry gate and ultrasonic sensor. For detecting the car position ultrasonic sensor has been used. Apart from this when end-user arrived at the place where he/she want to park their vehicle they will scan the QR code which is available at two place one at the time of reservation QR code has been available in the end-user android mobile phone, and one is available at the place where the vehicle should be park or has been reserved by the end-user by using the android application. Moreover, when the end-user scans the QR code they can pay for a specific time duration which has been mentioned by the end-user at the time of booking. In addition, if any critical circumstance occurred or end-user has to make some additional modifications regarding the parking system a web-based platform has been developed for the admin or management of parking that can help the end-user in any critical situation. Such a double approach is beneficial for the end-users in terms of usability, and ease which is the primary concern for the researchers to attain. Further, admin and management of parking can manage and maintain a synchronised environ at the parking locations along with the data of the end-user so any adverse circumstance could be resolved at the moment without having any difficulty for the end-user. This design of the system is very eco-friendly simple, user-friendly, and effective.

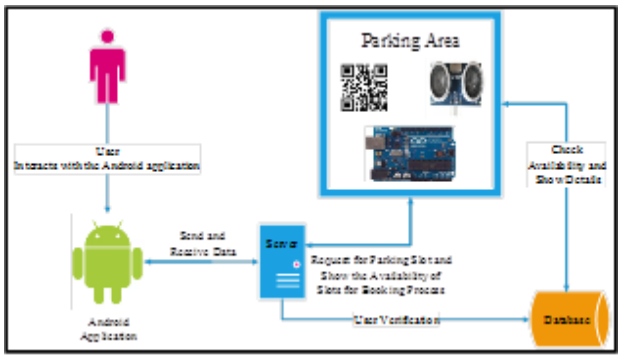

Fig. 2. Working of Vehicle Parking System

3. REPRESENTATION USING UML DIAGRAMS

UML stands for United Modelling Language [8][9], and it helps to understand concept, idea more deeply and efficiently from several aspects. UML diagrams consist of behaviour and structural diagrams [8] which has sub diagrams to understand and t present the concept more clearly and deeply. Structural diagrams consist of class, object, component, deployment and behaviour diagram use case diagram, sequence, collaboration, state-chart, and activity diagram [8][9]. The representation of the vehicle parking system is presented using some UML diagrams mentioned below which helps the user to easily identify and know the model conveniently.

3.1 Representation using Sequence Diagram

Sequence diagram helps to know the flow between the objects arranged in time sequence, from this diagram the understanding level in clearer and more concise [10]

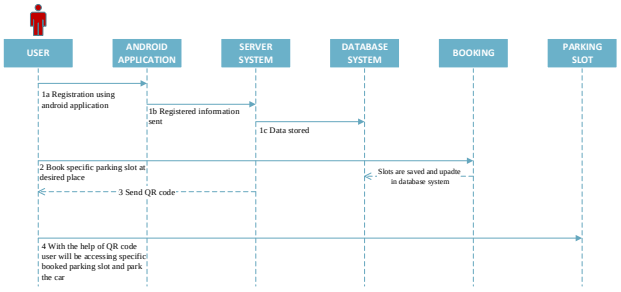

Fig. 3. Sequence diagram of Vehicle Parking System

3.2 Representation using Component Diagram

The component diagram is one of the UML diagrams, which is very different from other representations ways and techniques, and it represents the components which are used to perform a specific functionality or activity [11].

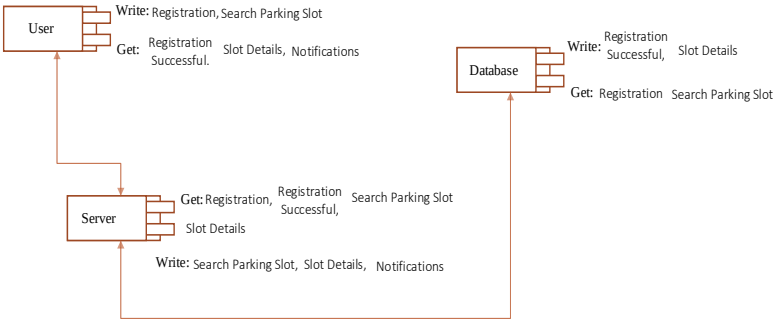

Fig. 4. Component diagram of Vehicle Parking System

3.3 Representation using Activity Diagram

Activity Diagram is the graphical flow or representation of stepwise action or activity used to define the processes or activity of the models. It is a flowchart which helps to represent the flow from one activity to another the activities are the operation of the models or systems [12].

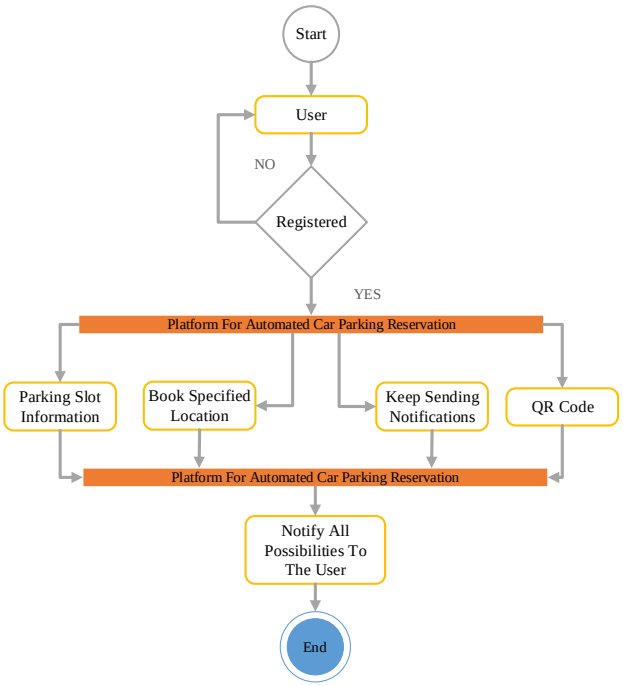

Fig. 5. Activity diagram of Vehicle Parking System

3.3 Representation using Deployment Diagram

Deployment diagram address the architecture of the system which ultimately help readers in comprehending the system deploy concerning to the discussed model profoundly. These techniques help to know the Deployment Diagram architectural flow of the objects or systems [13].

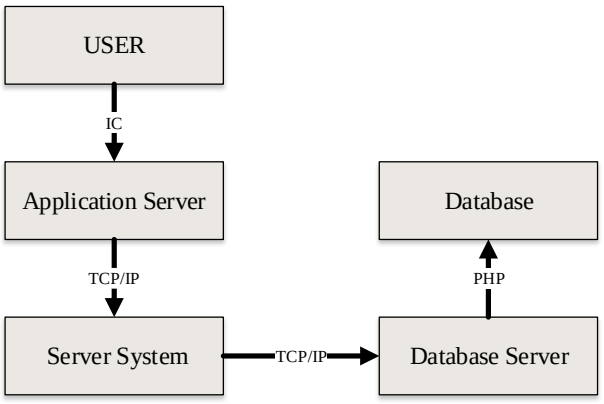

Fig. 6. Deployment diagram of Vehicle Parking System

4. CONCLUSION AND RECOMMENDATION

The solution proposed in this paper is for the issue almost everyone faces of parking their vehicle in their desired place. The solution VPS is an android application and developed due to the android users in this era. There is a considerable amount of population which uses the android platform. The processes of VPS are also presented and discussed using the UML diagrams so the person can easily understand every aspect to provide quality and valuable product to the end-user. This model will also help to save the tie, cost, fuel of the vehicle by allocating or booking the space to park their vehicles in their desired place using just VPS application. In future, the platform could be enhanced by going from android to iOS and also by improving its applications using more valuable and efficient features as the time passes and technology get an increase, and any other issue regarding the parking will occur.

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