PROJECT REPORT ON

AUTOMATED PARKING SYSTEM USING WEB APPLICATION

SUBMITTED IN PARTIAL FULFILLMENT FOR THE
DEGREE OF

BACHELOR OF ENGINEERING (ELECTRONICS ENGINEERING)

Submitted by

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CERTIFICATE

This is to certify that following students

1. **Aditya Gaikwad**
2. **Ankit Pratihast**
3. **Pranit Kumbhar**

have satisfactorily completed their term work of project entitled "Automated Parking System using Web Application " undertaken at Datta Meghe College of Engineering, Airoli, in partial fulfillment of requirement of University of Mumbai for the student of B.E. Degree (CBSGS course) in SEM-VIII of Electronics Engineering during academic year 2018-19.

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PROJECT APPROVAL

This project entitled "Automated Parking System using Web Application" submitted by following students

1. **Aditya Gaikwad**
2. **Ankit Pratihast**
3. **Pranit Kumbhar**

Is approved for the term work in partial fulfillment of requirement of University of Mumbai for the student of B.E. Degree (CBSGS course) in SEM-VIII of Electronics Engineering during academic year 2018-19.

Date:
Place:

Name and Signature of Internal Examiner:-

Name and Signature of External Examiner:

DECLARATION

I declare that this written submission represents my ideas in my own word and where other ideas forward have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data /fact/source in my submission. I understand that my violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from that sources which have thus not been properly cited or from whom proper permission has not been taken when needed

Aditya Gaikwad _____

Ankit Pratihast _____

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DATE-

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ABSTRACT

As we Know, now-a-days population has increased, it also caused to increase Vehicle Population. So, more spaces are required to park our Vehicle. In this project we are introducing a new parking system called Automated Parking System using Web Application. This System gives us efficiency to end vacant slots to park a vehicle in parking area. A user can see if parking slot is available or not using any web application. In short, this system helps us to save our time to nd vacant place to park our vehicle. The application contains the data of all existing vehicles in parking area, the reserved park area, a vacant place to park vehicle etc. The proposed system is made up of a less human dependent interaction. It helps user to nd a parking slot using a short distance algorithm. In our project we use EM 18 module to sense RFID reader, RFID reader to know the status of our parking system. i.e. which car is on which place in parking slot. This system also proposed e-wallet method. This system also includes multilevel parking. We will get to know all these features in brief in our project in detail.

Keywords: Automated parking, Web application, Multi-level parking, e-wallet system.

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1. Aditya Gaikwad
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Chapter 1

Introduction

In today's developed world man is living a comfortable life. As this development is a boon for humans at the same time, sometime it can create problems. The number of vehicles that has been used in daily life have increased drastically as it provides a great comfort to individuals but at the same time the common problem faced by everyone is the parking issues. Parking is a major problem faced which in turn results in the wastage of a big amount of time. Today car parking is present inside the premises i.e. inside buildings. Even after all the development and progress achieved still manual parking management is seen.

The method followed in parking system is that the parking premises simply have sign board which provides the drivers with the basic in-formation like the directions and if there is di erent parking slot for two wheelers and four wheelers. With the increase in the number of vehicles being used nowadays the number of vehicles that enters the

parking area have also increased. Due to everything being manual the drivers does not have much idea about the parking availability, like is there any parking space available if available then is it available for two wheeler or four wheeler. The vehicle driver needs to drive through the whole parking area in order to get a place for his vehicle to park and the availability of place is also not sure, there may be time when the drive go through all of the parking area and then come to know that there is no place available to park his/her vehicle. After everything is done while leaving the driver needs to pay the parking fee which is collected manually. This when done during peak hours results in long queue. Such kind of problem is being faced in the existing parking system. Hence to overcome all these problems we are using this system.

1.1 Problem Statement

Parking facilities in various cities/countries has become a huge prob-lem. There is lack of proper free spaces for parking due to increased unplanned housings, buildings in many places of the capital. There has been increase in the number of vehicles, but without su cient park-ing spaces. Such growing number of vehicles have created mess in the city including the increase in tra c jam. Another challenge due to the increased number of vehicles is undisciplined driving, which created ob-stacle for the tra c management system. To improve all these, there is a need to well systemized parking spaces.

Hence, we have constructed a Web Application which helps every

customer to provide e cient car parking system. By using this appli-cation, we can get parking details from anywhere and anytime. Our system also has E-wallet method which helps people to save his time to do payment by standing in a queue. Overall it is less time-consuming process and is a less Human Dependant process.

1.2 Aim and Objective

The aim of this project is to create a web application using which drivers can get information about the parking place from anywhere all that they need is a device which is connected to internet. The web application will show all details regarding the parking place such as if parking slot is available or not. With the help of this project the old manual parking system would be converted to a completely automated parking system. As all details would be available all the time, drivers would not have to travel the whole parking area to nd a vacant parking space which would eventually save the time. Also, e-payment method is being implemented using this project so there won't be any long queue as the driver would be able to pay from his e-wallet.

For getting everything automated we will be making use of RFID reader, which would be installed at the entry gate. With the help of RFID reader all data shall be maintained for existing users and the vehicles which are not registered shall go under visitors category. The use of RFID is done as it would be economical for any and every parking area be it for any shopping malls, multipurpose buildings or housing

society the cost of it would not be extravagant. As this project is a web application it is completely platform independent and all it would need is any device which is having active internet connection. It would provide e cient parking slot as the parking place which is available at that particular time and which is closest to the driver shall be allotted to them with the help of the shortest path algorithm.

The objective of this web application is to provide easy and e cient car parking allotment, without having to wait in long queues. To facili-tate advance overview of the entire parking area and navigate the car to its allotted slot. To provide Quick and proper payment facilities online thereby reducing the chaining of vehicles and chaos.

1.3 Application and Scope

This Web Application is a way to allocate parking space without any human intervention. It's not just a replacement for human intervention but at the same time it is also a replacement to sensor-based parking system. RFID cards and reader are the technology which we are using as a replacement for these sensors. This in turn results in lowering the expenses. This is not a static application that is if in case the number of parking spaces are increased then it won't cause any problem to our web application. Our target entities are Malls, O ce Place, SEZ complex, Residences. This Web Application ultimately ends up saving time and optimizing available spaces in an e ective manner.

Chapter 2

Literature Survey

The development of this project prototype can act as way- nder to guide car driver inside the car park to parking slot available inside car park and guides car driver to go there. It is a PIC microcontroller-based project. It uses the infrared sensor to detect the vacancy of each parking slot at a level of car park, sending signal to microcontroller to process and display total of available parking slot on 16x2 LCD displays. At the same time, an arrow also used to show the location of these available parking slots [1].

Various methods are prevalent for development of autonomous or intelligent parking systems. Study of these systems shows that these require a little or more human intervention for the functioning.

FREE PARKING SYSTEM

One of the systems for car parking has been proposed by making use of free parking system. In this system the people park their cars or vehicles in the parking area for this they cannot pay any charges for the parking. And also they can't park their vehicles in proper manner in parking area. So they create a trouble for the other people who want to exit the parking area or enter into parking area. This is the major problem occur in the free parking system.

Free Parking System

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Data Based System

Another system is car parking based on data-based system. This system is not free parking system. That means people have to pay the charges of the parking with help of computer. For this parking system permanently one human is required to keep the record of entire vehi-cles. That human kept the record of vehicles/cars numbers and entry and exist timing. For this system customer pay the charges at the rate of per hours. This system is not human free system. That means per-manently one human are required to keep the record of cars or vehicles

and this is the major disadvantage of the system.

Billing System

One more system is billing system and is similar to data-based sys-tem. This system is also required one permanent guard who kept the entry and exit record of vehicles manually. The rate of this parking system is xed. So the people are paying the charges at the rate of three hours. (Example: for three hours thirty rupees) And if the hours of parking are getting increased then customer has to pay the extra charges for that.

SHOW VACANT SLOT

This type of car park normally poses a parking guidance system that primarily based on the use of message signs to give drivers information regarding parking availability inside the car park. The availability of parking lot inside car park normally is obtained from the sensors that count the number of cars entering and exiting or in other cases, by comparing the tickets issued at machines. This information of parking lot availability inside car park is generally expressed in terms of full or empty on display board at the entry of car park. The actual number of parking availability inside car park is rarely given. Therefore, it is di cult to nd out an empty parking slot. Inside most local car park, car drivers still need to nd out empty parking slot themselves. They will de nitely waste a lot time for searching an empty parking slots if they do not know where they are, especially when there are only a few

of empty parking slot available at each row of parking slot. Therefore, it is important to have an e ective empty parking slot tracking system to display empty parking available at each row of parking slot and guide car driver to there. The development of this project prototype can act as way- nder to guide car driver inside the car park to parking slot available inside car park and guides car driver to go there. Thus, we aim to propose a car parking system that represents a fully automated model with minimum human intervention and overcome the limitations of existing system.

ANDROID SYSTEM

In this project a new parking system called car parking system an android approach is proposed to assist driver to nd vacant spaces in a parking in a shorter time. Di erent technologies are reviewed and compared to determine the best technology for developing this system. We create the separate application on the smart phone and by using this application we nd shorter and easier path to reach the destina-tion with the help of Bluetooth module. Features of car parking system an android approach includes vacant parking space detection, display and give direction on smart phone application to move toward vacant parking slot. This project also describes the use of a parking system in proper and e cient manner from the entrances into a parking area until the nding of a vacant parking slot. This prototype of car parking system an android approach will help car owners to improve their facilities inside car parking area to e ectively guide car driver to vacant parking slot inside car parking area. This system architecture de nes the es-

sential design features such as location of sensors, required number of sensors and LCD display board.

2.1 Intelligent Car Parking System

Due to new developed technology man is leading a comfortable life. Though new technology helps to live comfortable life, sometimes it be-comes troublesome. For e.g. no of people using their own car increasing day by day. so the car parking become an immense issue. To park car automatically and to reduce e ort of driver it is necessary to introduce such a system that localize car automatically. Several methods have been proposed in years to solve the problem of localizing an autonomous mobile. Such kind of mobile robots can be remotely controlled semi-autonomous or autonomous. Localization is a key technology to address how the robots localize themselves in the operating environment and how they know their individual poses with respect to formation team. Di erent techniques are presented in literature for localization of robot. Such robots are used in an indoor environment such as hospital, air-port, shopping mall and also in industrial storage plants or automatic parking decks. This paper proposes a model-based technique that has shortest planned path and tracking control algorithm to localize system automatically. This paper consists of user interactive interface, image processing, path planning and path tracking for localize the robot. The intelligent car parking system works in the following two parts:

Identi cation Of Space Model

In this work the robot is marked with red marker attached to the white plates. There is high level di erentiation between red colour of the marker and white supportive plate. Camera is placed in such a way that it is perpendicular to the oor. The use of red mark is for processing for pose evaluation to simplify very successfully.

Automatic Localization Model

The proposed system is designed in the form of a distributed embed-ded system based on FPGA. Camera is attached to PC. The captured image is processed in MATLAB as explained in part 1. After image processing the tracking signal is transferred from PC to FPGA through RF protocol. The main communication between PC and FPGA takes place through RF protocol. The range of RF protocol is 30m and its frequency is 2.4 GHz. The data transferred from PC to FPGA is in the form of string. String is of 8-bit length.

Development Of A Multi-Level Car Parking System

Multi-storied car parking system will help in parking large number of vehicles in a smaller area. This Automatic Car Parking System enables the parking of vehicles, oor after oor and thus reducing the space used. Also automating this will help in less manual intervention and thus will lead to fewer problems[8]. Such a system has been proposed

and designed in this project. Additions are made to the existing systems to ensure maximum space utilization. To serve this purpose, parking slots are assigned inside the multi storied structure depending on the size of the car. Implementation of the design was carried out in AU-TOCAD with hardware being introduced at input and output stages. Programming in AUTOCAD is done in a way which is user friendly and can be handled by an inexperienced operator. The need for a solu-tion of a car parking system for various reasons such as; e cient use of space of land, lack of time consumption, secure, environmental friendly and comfortable for the drivers has been discussed. The proposed solu-tion for this problem, is an automated multi- level car parking system. The vehicle parking areas will be elevated to a certain level. A system as such would be inexpensive compared to the normal parking, since the value of land to be used for normal car parks would add expense to its total cost, this is because the value of land increases as days go by.

2.2 Existing System

Tra c congestion is one of the major problems in several developing countries due to the lack of an e cient tra c management system. Car parking is a key factor in addition to the congestion problem. Parking spaces are not maintained properly, and the end-users are not guided e ciently to park their vehicles. All such issues can be resolved with the help of parking motioning systems.

A parking sensor system monitors the storage availability in a park-ing facility and also noti es motorists about the parking availability.

Wireless Sensors in Parking Systems:

Parking systems having wireless sensor networks consist of di erent type of sensors that sense and gather information and transmit this information back to a base station or control centre. In a wireless parking sensor, the sensor nodes communicates the information about the position of each parking slot to a nearby node. The status is then transmitted to the next nearest node. This process continues until the data reaches the base station. The status of the parking slot is indicated by a binary value, either 0 or 1. The value '1' denotes the car is been parked, and the value '0' denotes an empty slot. This information is then updated at the base station. End-users linked to a parking management system via the internet can then be updated about the status of the parking slot.

Zigbee communication is another important wireless communica-tion technology that uses a higher level of communication protocol. This system operates based on IEEE speci cations to allow data transmission over wide frequency ranges.

Radio frequency identi cation (RFID) technology employs radio frequency signals for transmitting data. RFID tags are xed to objects and are automatically identi ed and detected. Other wireless technologies include vision-based technology that employs cameras for image processing, in order to detect vacant slots within the parking

zones.

Embedded internet access technology employs TCP/IP protocol with respect to a HTTP web server in order to perform various func-

tionalities such as detection of parking space and enhancement of park-ing management in the tra c guidance system.

2.3 Other Technologies

Generally, the process of parking a vehicle for drivers in automated parking systems remains the same regardless of the technology used: it's just the methodology of moving the vehicles to and from the park-ing module that di ers. The types of technology used in automated parking systems can be divided into six main categories: AGV systems Crane systems Puzzle systems RGC systems Shuttle systems Silo sys-tems Tower systems

CANE SYSTEM

Crane parking systems utilize a single mechanism to simultaneously perform the horizontal and vertical movements of the vehicle to be parked or retrieved in the parking system. The simultaneous horizontal and vertical movements allow the vehicle platform to move to and from one parking spot to another very quickly. The crane mechanism moves

horizontally on rails, typically located on the oor and ceiling of the parking system and has a vertical elevator platform tted where vehicles to be parked and retrieved are placed. This means that a oor- to-ceiling opening in the centre of the system is required for the crane(s) to operate.

The crane mechanism can move in line with the normal direction of a vehicle (a longitudinal system) or orthogonal to it, i.e. sideways (a transverse system) depending on the site constraints. If higher through-put or redundancy is required, crane systems can also have two cranes running parallel to one another should the site constraints allow it. As there is typically only one mechanism for the parking and retrieval of vehicles the system redundancy is potentially low but back-up motors, switches, etc. can be installed to increase the system's redundancy. Turning devices can be tted under the vertical elevator platform should this be required.

SHUTTLE SYSTEM

Shuttle systems utilize autonomous shuttles and elevators to park and retrieve vehicles. The number of shuttles in the system is typically exible and is based around the client's throughput and budgetary re-quirements. The shuttles move horizontally in a shuttle lane, which is either a recess in a solid oor or a set of rails in a steel or concrete structure, to a designated location. A robot, or pallet exchanger, or conveyor belts, located on the shuttle then park or retrieve a vehicle at the designated location by moving the vehicle from or to the shuttle

and the parking space.

Typically, there is a single row of vehicles either side of the shuttle lane but for increased parking density a second row of vehicles can be added. The retrieval process for the second row of vehicles is slower than for the rst row as the robot has a longer distance to travel to retrieve the vehicle and there may be a vehicle parked in the front of the vehicle to be retrieved, which has to be removed before the vehicle in the second row can be retrieved. A third row of cars can be added but the retrieval process is very slow.

When a vehicle is required to be moved from one level of the system to another there are two options for achieving this, one with vehicle elevators and the other with shuttle elevators.

When vehicle elevators are used a shuttle moves adjacent to a vehicle elevator and deposits the vehicle on the vehicle elevator platform. The vehicle elevator then moves the vehicle to the designated parking level and another shuttle collects the vehicle from the vehicle elevator. In this option shuttles remain on their assigned levels, therefore at least one shuttle is required per parking level which can make redundancy an issue if only one shuttle is used per level. The system throughput can be very high when vehicle elevators are used in this con guration.

TOWER SYSTEM

Tower systems typically consist of a vehicle elevator with a parking space either side of the elevator shaft. This con guration is repeated over a number of levels to complete the parking tower. Typically, there is a parking module located on the ground oor, where the vehicle is

turned, and the vehicle elevator simple raises to one of the parking levels of the tower and deposits the vehicle sideways into a parking space. This process is reversed to retrieve a vehicle. As there is a single mechanism to park and retrieve vehicles system redundancy is an issue with tower systems.

Chapter 3

System Design

3.1 UML DIAGRAMS(Use case, sequence, class diagram)

USE CASE DIAGRAM

A use case describes a system's behaviour as it responds to a request that originates from outside of that system. In other words, a use case describes \who" can do \what" with the system in question. The use case technique is used to capture a system's behavioural requirements by detailing scenario driven threads through the function requirements. A de ned purposeful, interaction between a system and a human of non-human actor that is playing a specify role outside the system

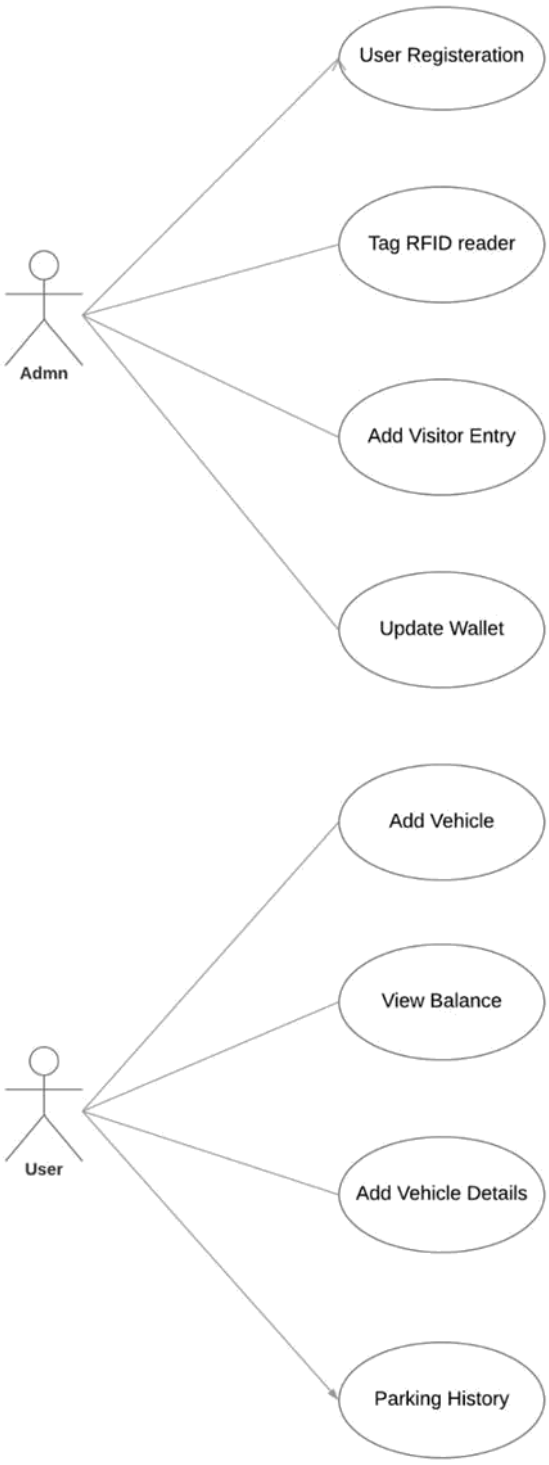

Figure 3.1: Use case diagram

SEQUENCE DIAGRAM

Sequence Diagram is a kind of interaction diagram that show hoe process operate with one another and it what order and are used to represent or model the ow of messages, events and actions between the objects or components of a system. Time is represented in the vertical direction showing the sequence of interactions of the header el-ements, which are displayed horizontally to the top of the diagram. The diagrams are used primary to design, document and validate the archi-tecture, interface and logic of the system by describing the sequence of actions that need to be performed to complete a task or scenario. UML sequence diagrams are useful design tools because they provide a dynamic view of the system behaviour which can be di cult to extract from static diagrams or speci cations.

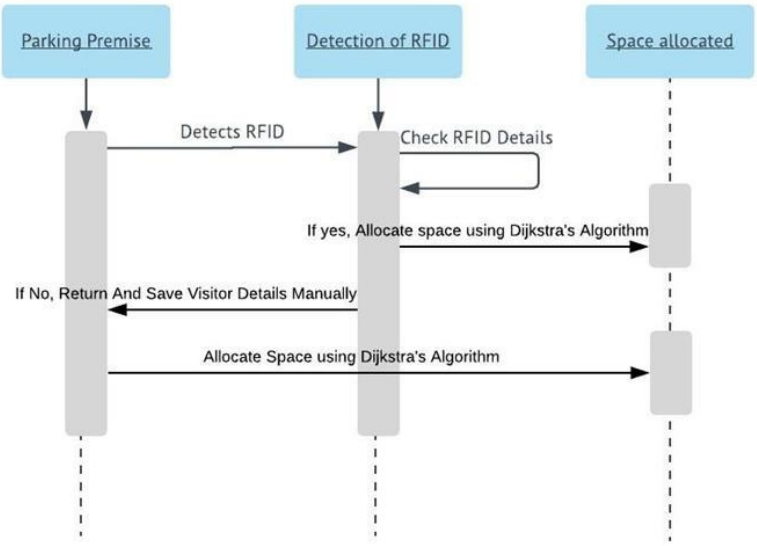

Figure 3.2: Sequence Diagram (For Entry)

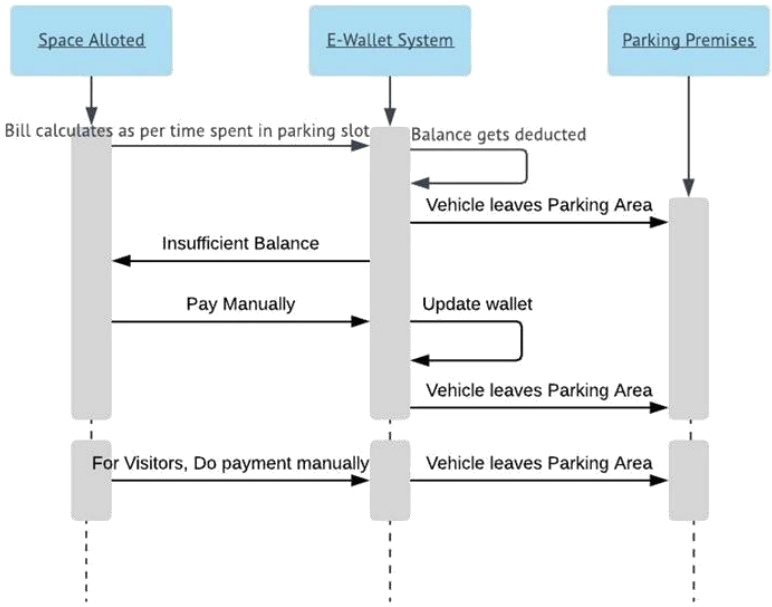

Figure 3.3: Sequence Diagram (For Exit)

CLASS DIAGRAM

The Uni ed Modelling Language can help you model various sub-sets of diagrams, including behaviour diagrams, interaction diagrams, and structure diagrams. Class diagrams are a type of structure dia-gram because they describe what must be present in the system being modelled. They are typically used by engineers to document software architecture.

A class diagram is at the heart of UML. It represents the core pur-poses of UML because it separates the design elements from the coding of the system. UML was set up as a standardized model to describe an object-oriented programming approach. Since classes are the building block of objects, class diagrams are the building blocks of UML. The

diagramming components in a class diagram can represent the classes that will actually be programmed, the main objects, or the interaction between class and object.

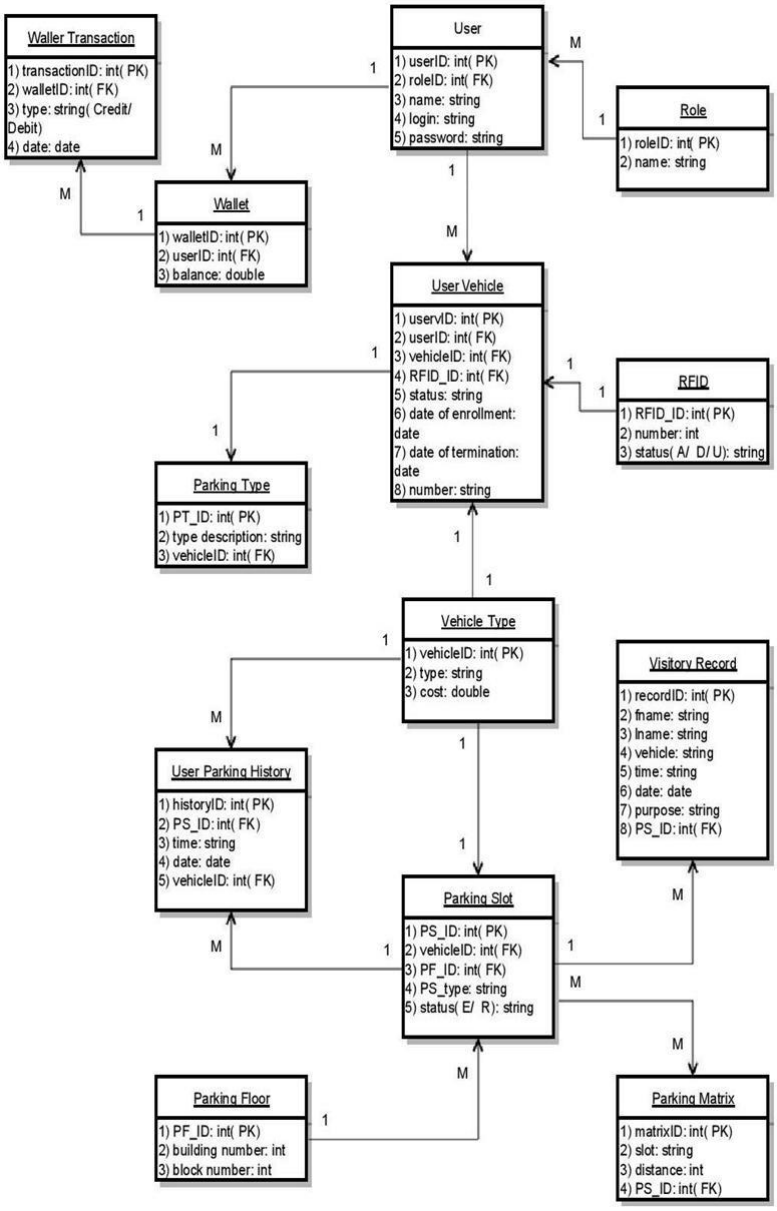

Figure 3.4: Class diagram

3.2 Data Flow Diagram

A data ow diagram shows the way information ows through a process or system. It includes data inputs and outputs, data stores, and the various subprocesses the data moves through. DFDs are built using standardized symbols and notation to describe various entities and their relationships.

Data ow diagrams visually represent systems and processes that would be hard to describe in a chunk of text. You can use these diagrams to map out an existing system and make it better or to plan out a new system for implementation. Visualizing each element makes it easy to identify ine ciencies and produce the best possible system.

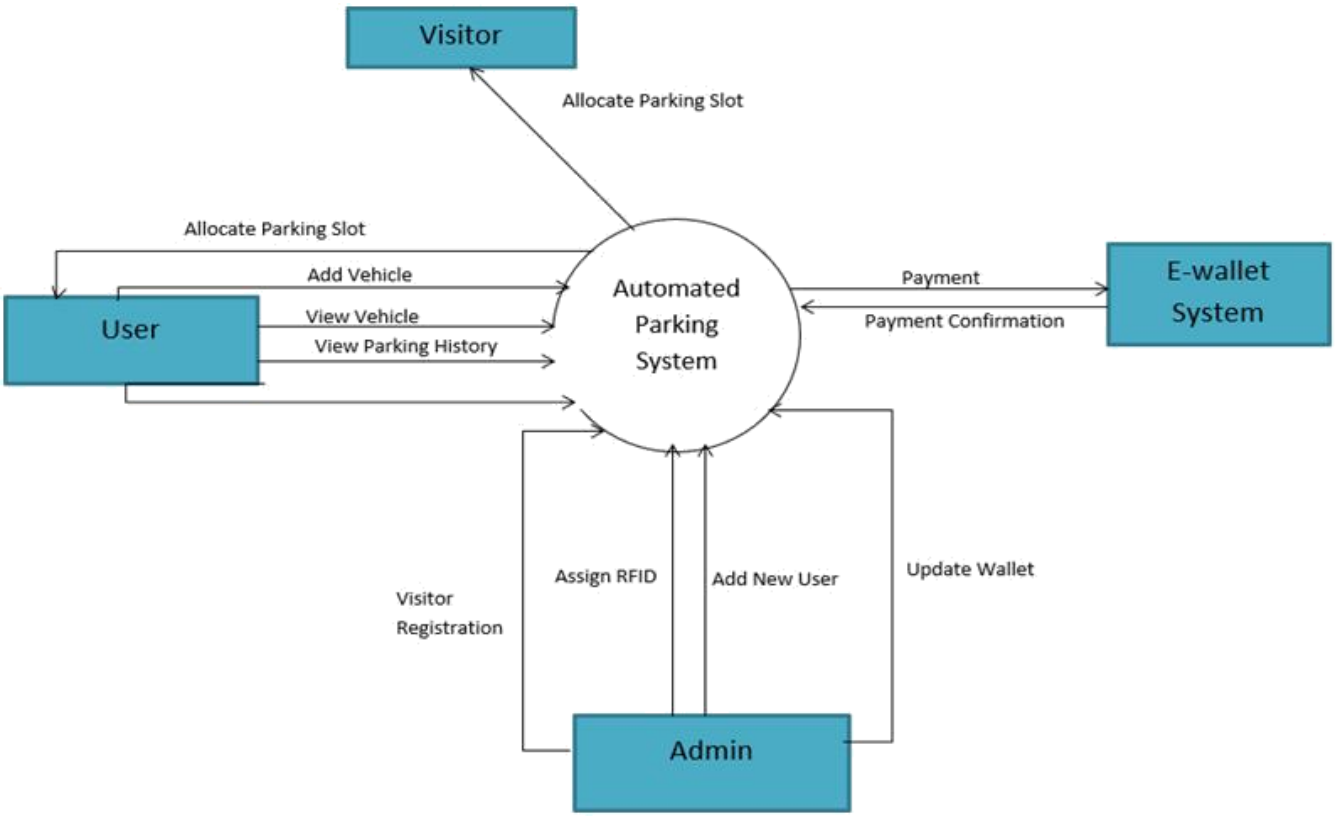

Figure 3.5: DFD Level 0

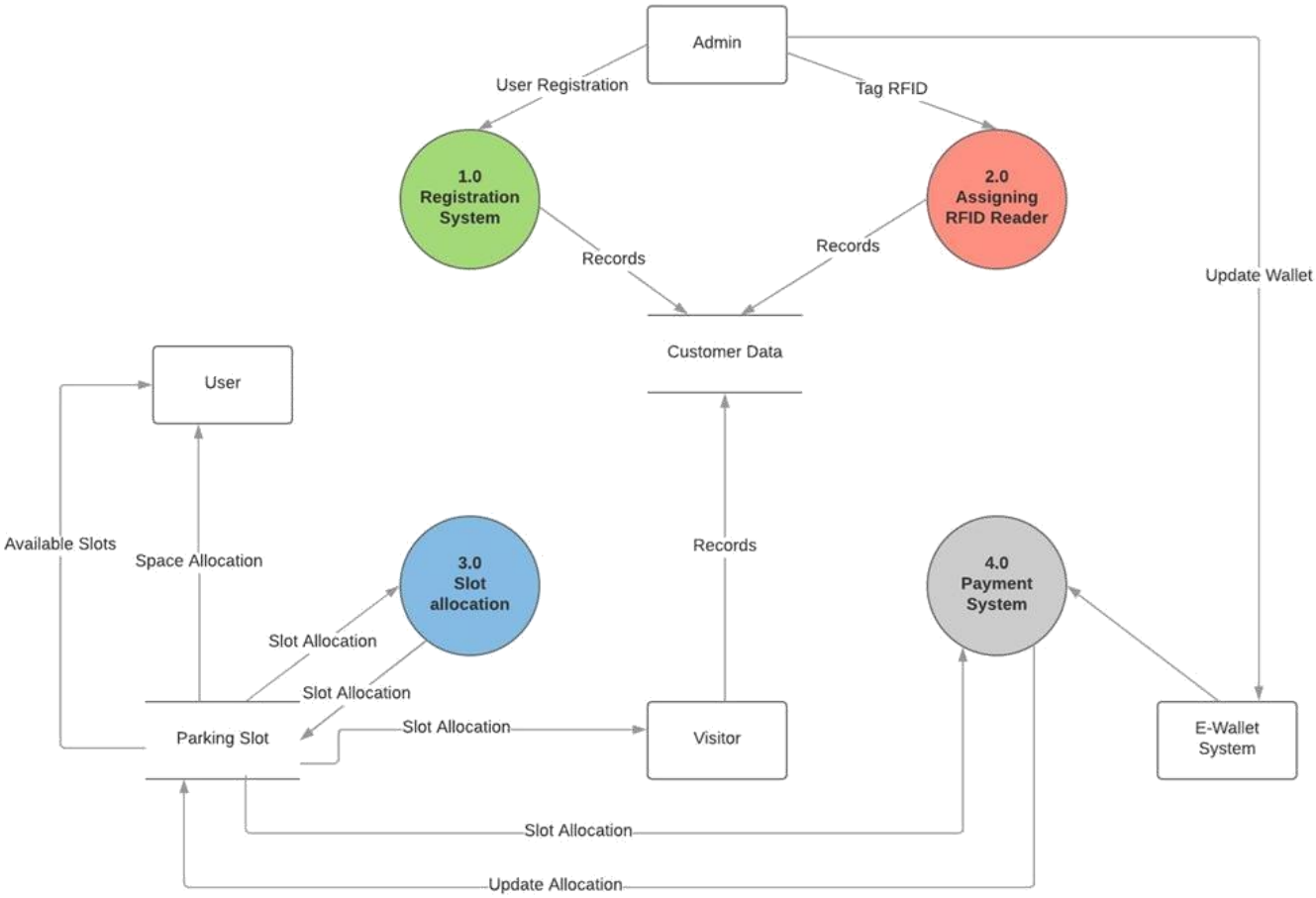

Figure 3.6: DFD Level 1

Chapter 4

Hardware And Software Used And Implementation

4.1 Hardware Speci cation

Sr. No.	Component	Speci cation
1.	Application Sever (TOMCAT)	7.0.68
2.	Memory	2 GB RAM
3.	RDBMS	MySQL5.6
4.	RFID Reader	EM18

Table 4.1: Hardware Speci cations

4.2 Software Speci cations

Sr. No.	Component	Speci cation
1.	JDK 7	-
2.	Eclipse	Mars
3.	Database { MySQL 5.6	-
4.	Platform { Windows 7/ 8/ XP	-

Table 4.2: Software Speci cations

4.3 Implementation

4.3.1 System Block Diagram

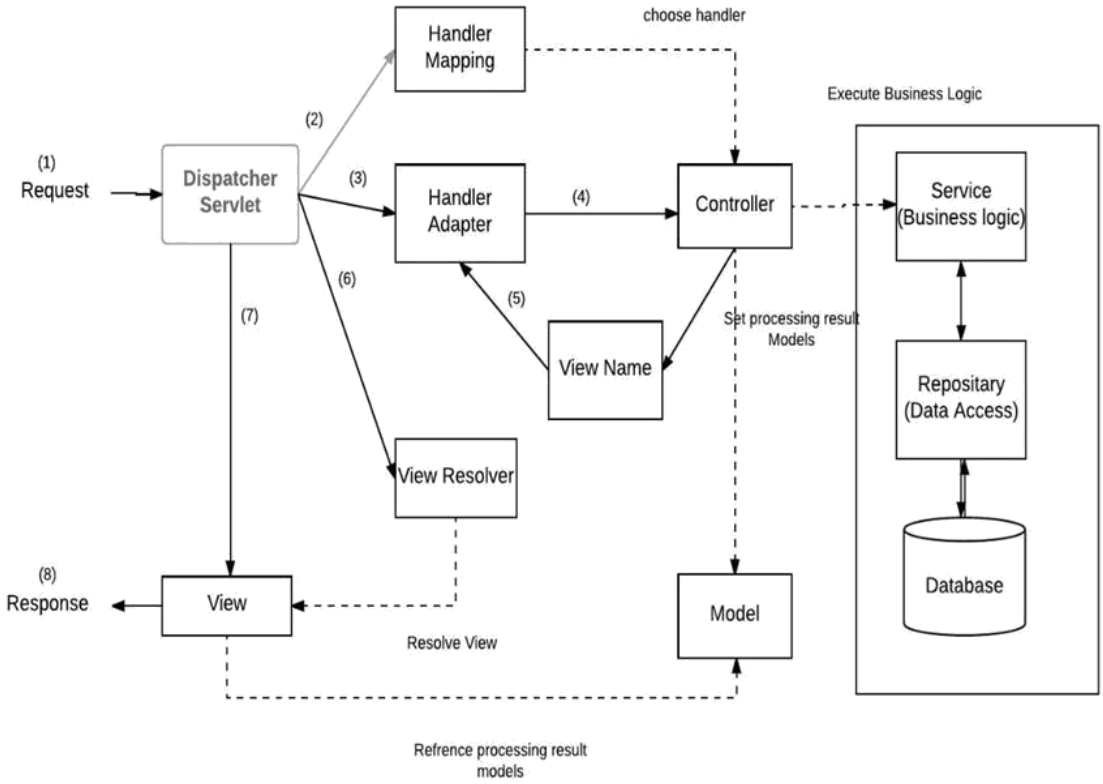

Figure 4.1: System block diagram of Automated car parking system

The block diagram contains following components:

1) Dispatcher Servlet: Dispatcher Servlet takes the user request and forwards it to the Handler Mapping and Handler Adapter.

2) Handler Mapping: Handler Mapping decides who will serve the request.

3) Handler adapter: Handler Adapter will decide what action should

be taken to serve a request.

4) Controller: Controller acts as an intermediator between various components.

5) View Name: which component to show which search le and loads.

6) View Resolver: nd the le from directory which we want to load and sends response back to the user.

7) Service (Business Logic): It contains a Java code. It shows which data to be bring and store where in database

8) Repository (Data Access): It contains those classes who have access to database

9) Model: Model converts Table into Object transformed manner

4.4 Working

Firstly, user sends the request which comes to the Dispatcher Servlet. Then Dispatcher Servlet forwards that request further to the Handler Mapping and Handler Adapter. Handler mapping decides who will serve the request and Handler Adapter will decide what action should be taken to serve the request. Then request goes to the controller. It acts as an intermediator between various components. Controller re-

trieves the information from various repositories according to the user's request. Then request comes to the view name. It will decide which component to show which search le and loads. Then the View Re-solver will nd that le from the directory and sends response back to the user.

4.5 Algorithm

In our Project we Use Dijkstra's Algorithm to nd shortest path us-ing matrix. Dijkstra's algorithm is very similar to Prim's algorithm for minimum spanning tree. Like Prim's MST, we generate a SPT (shortest path tree) with given source as root. We maintain two sets, one set con-tains vertices included in shortest path tree, other set includes vertices not yet included in shortest path tree. At every step of the algorithm, we nd a vertex which is in the other set (set of not yet included) and has minimum distance from source. Below are the detailed steps used in Dijkstra's algorithm to nd the shortest path from a single source vertex to all other vertices in the given graph.

4.5.1 Steps

1. Set all vertices distances = in nity except for the source vertex, set the source distance = 0.

2. Push the source vertex in a min-priority queue in the form (distance, vertex), as the comparison in the min-priority queue will be according to vertices distances.

3. Pop the vertex with the minimum distance from the priority queue (at rst the popped vertex = source).

4. Update the distances of the connected vertices to the popped ver-tex in case of "current vertex distance + edge weight < next vertex distance", then push the vertex with the new distance to the priority queue.

5. If the popped vertex is visited before, just continue without using it.

6. Apply the same algorithm again until the priority queue is empty.

4.6 Testing

Software Testing is the process of identifying the correctness and qual-ity of software program. The purpose is to check whether the software satis es the speci c requirements, needs and expectations of the cus-tomer. In other words, testing is executing a system or application in order to nd software bugs, defects or errors. The job of testing is to nd out the reasons of application failures so that they can be corrected

according to requirements. There can be many reasons for defects in the software. The developer can also make an error which may result in a defect or bug in the software source code. Any defect or bug in the software will produce wrong results causing a failure. When a bug or defect causes in software application, testing is done to nd out the cause of defect and to remove the bug. Also, if a part of software de-velops bug, it has to be recti ed so that it does not disrupts the whole process of software program. That recti ed part is again tested to con-rm that it is compatible with the rest of program.

4.6.1 Unit Testing

Unit Testing is a level of software testing where individual units/ com-ponents of a software are tested. The purpose is to validate that each unit of the software performs as designed. A unit is the smallest testable part of any software. It usually has one or a few inputs and usually a single output. In procedural programming, a unit may be an individual program, function, procedure, etc. In object-oriented programming, the smallest unit is a method, which may belong to a base/ super class, abstract class or derived/ child class. (Some treat a module of an ap-plication as a unit. This is to be discouraged as there will probably be many individual units within that module.) Unit testing frameworks, drivers, stubs, and mock/ fake objects are used to assist in unit testing.

4.6.2 Integration Testing

Integration Testing is a level of software testing where individual units are combined and tested as a group. The purpose of this level of testing is to expose faults in the interaction between integrated units. Test drivers and test stubs are used to assist in Integration Testing.

Chapter 5

Result And Conclusion

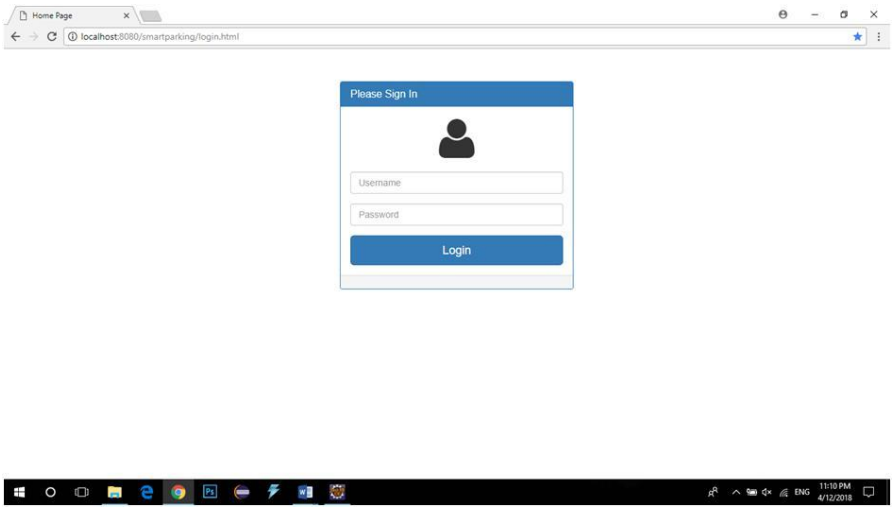

Figure 5.1: Login Page of Web Application

Starting from the Web Application; shows the Login Page of the application where only authorised user and admin can access. Following gure shows the pages after logged in by the admin and by the user.

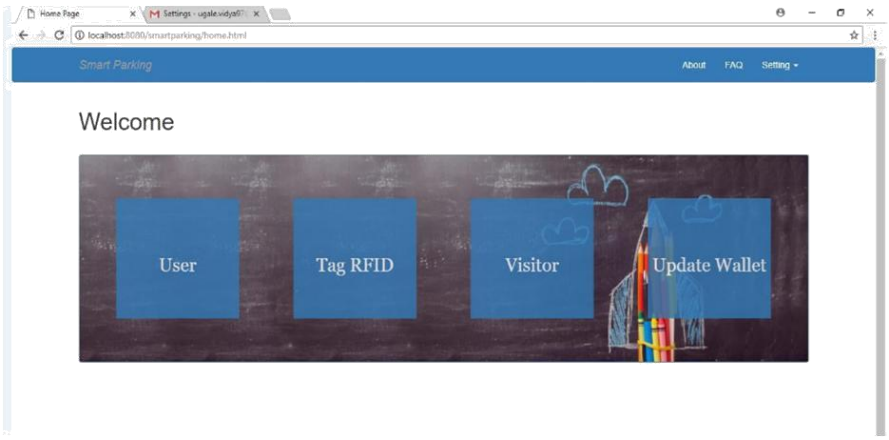

Figure 5.2: Admin side Page after logging in an application

Fig. shows the Admin side page after logging in an application. It further contains four options. In User, admin can create user name and password for user. Using which a user can get log in access in a web application. Second Tag RFID, in this admin can assign a unique RFID reader to user's every vehicle. Third is Visitor, in this if any visitor enters into the parking area admin can update his data in his records/database. And Fourth is Update balance, in this if any user having want to update his wallet, admin has authority to do that.

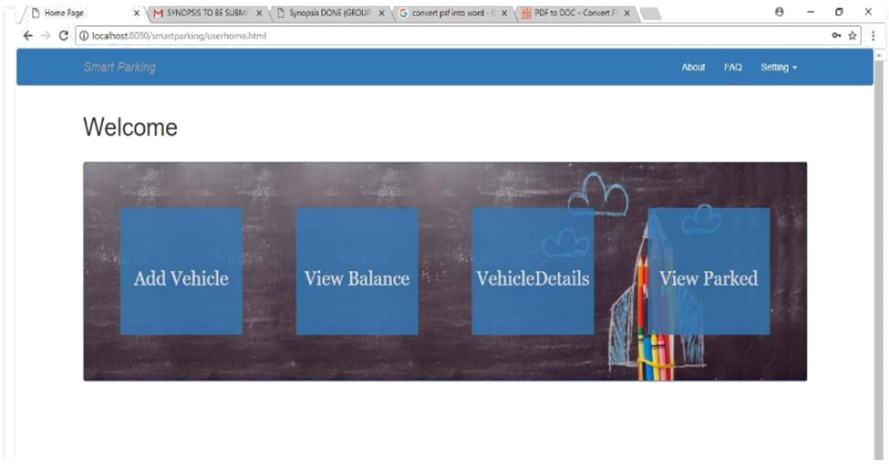

Figure 5.3: User side page after logged in successfully into the web application

Above Figure , shows the user side page after logged in successfully into the web application. This page further contains four features. First is Add vehicle, here user can add his all vehicle details. Second is View balance, here user can see the amount available in his wallet. Third is Vehicle details, here user can see if parking space is available or not. For his/her vehicle. and Fourth is view parked, here user can see his previous parking history.

Above Figure shows the Display Screen shows the details of last ve vehicle with their parking slot. And as a new RFID reader gets read it will show the vehicle number and parking slot assigned for that vehicle. A display screen will get updated in every 4ms.

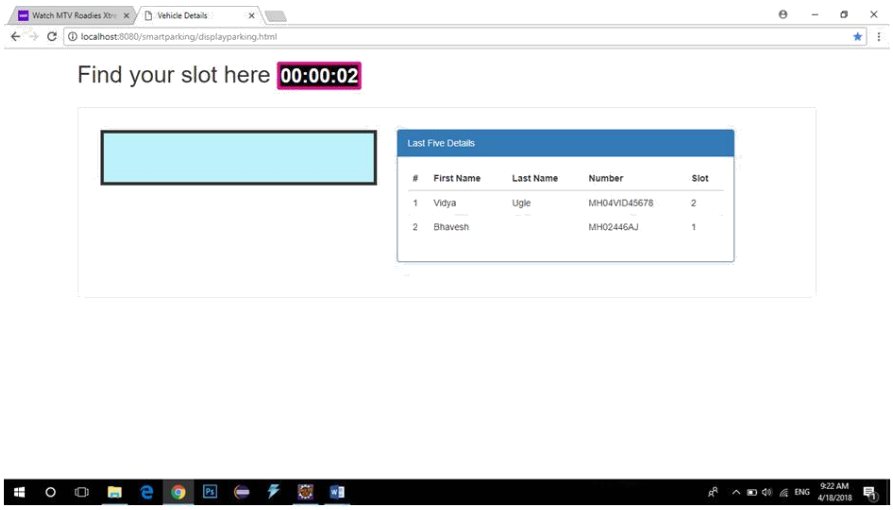

Figure 5.4: Display Screen

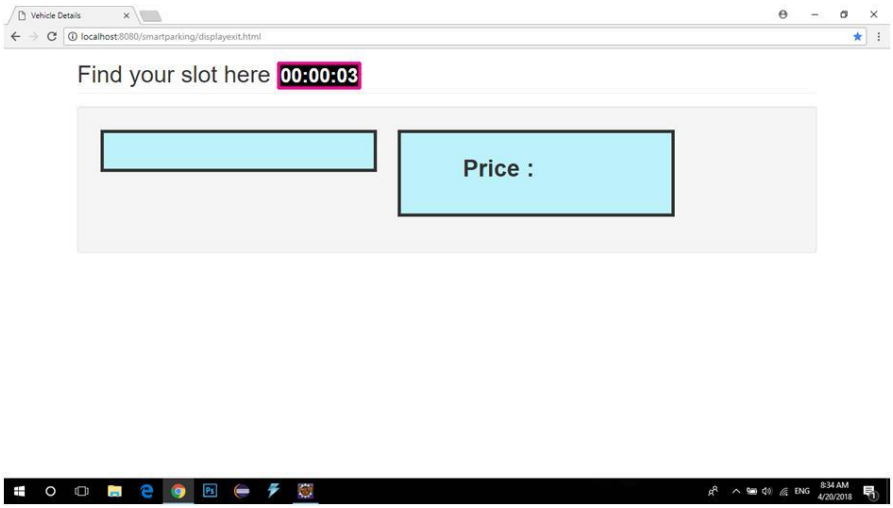

Figure 5.5: Exit Screen

Above Figure shows the exit screen. i.e. details of vehicles leaving parking area with the calculated money as per the time vehicle available in parking area. And that calculated money will automatically get de-ducted from user's e-wallet. If user don't have su cient balance in his e-wallet he will get notify on exit screen and have to pay manually. If a

visitor's vehicle is leaving a parking area he have to pay bill manually only.

5.1 Conclusion

Thus, we propose to develop a web application that would provide a advanced and developed platform to users regarding everything related to parking of vehicles. The proposed parking management system takes into account all possible attributes that is expected from it.

The vacant car parking slots are given by as per priority based. The main contribution of study is to introduce the most signi cant park-ing problem that is nding vacant space and smallest path to reach that vacant space. It helps to give the proper management of park-ing. It reduces instances of single car improperly parking across two spaces. Parking detection system would decrease searching time for vacant slots. It is important to have an e ective vacant parking slot tracking system to display vacant parking available at each row of park-ing slot and guide car driver to there. And therefore it reduces the e ort of the driver to nd vacant slot and also time to reach that va-cant parking slot. We ensure that the database updates are carried at regular interval of time. This web application would help in achieving the idea of completely automated car parking system with least human intervention and would help us nding the slot for parking with almost no problem.

5.2 Future Scope

The web application can further be taken to Android and IOS platforms. Another thing that can be done is the use of IOT, that is using IOT entire parking can be done without a driver. Further big companies can replace the RFID by Sensors to provide a further convenient parking system or to achieve more advancement in the parking system.

Chapter 6

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