

KLE Society's
KLE Technological University



A Mini Project Report

On

SMART PARKING RESERVATION SYSTEM

submitted in partial fulfillment of the requirement for the degree of

**Bachelor of Engineering in
Computer Science and Engineering**

Submitted By

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SCHOOL OF COMPUTER SCIENCE & ENGINEERING

CERTIFICATE

This is to certify that Mini Project entitled SMART PARKING RESERVATION SYSTEM is a bonafied work carried out by the student team Ms. Bhadra K. Shah – 01FE15BCS043, Ms. Deepika Bagrecha – 01FE15BCS054, Mr. Divyansh Srivastava – 01FE15BCS056, Mr. Elluru Pruthvi Sai – 01FE15BCS057, in partial fulfillment of completion of Fifth semester B. E. in Computer science and Engineering during the year 2017 – 2018. The project report has been approved as it satisfies the academic requirement with respect to the project work prescribed for the above said programme.

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Name of the Examiners

Signature with date

- 1.
- 2.

ABSTRACT

In metropolitan areas, the parking management influences time that is spent for searching the parking space, parking revenue and traffic congestion, the congestion that is caused majorly due to the vehicles involved in searching the parking space.

The vehicles are parked after searching the space for parking manually by the drivers which is time consuming and difficult especially during the rush hours. The main difficulty arises from not knowing where the available spaces may be at that time; even if known, many vehicles may pursue very limited parking spaces to cause serious traffic congestion.

The proposed methodology includes automating the manual system to effectively find, reserve the vacant space and update the spaces for other drivers. The proposed reservation-based parking system has the potential to simplify the operations of parking systems, as well as alleviate traffic congestion caused by parking searching.

Keywords: metropolitan areas, parking management, parking revenue, reservation-based parking system, alleviate traffic congestion

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1. Introduction

1.1 Overview

Searching for a vacant parking space in a metropolitan area is the daily concern for most drivers, and it is time-consuming. It commonly results more traffic congestion and air pollution by constantly cruising in certain area only for an available parking space.

To overcome these problems, a system is been designed in way that is used only by authorized users. The **Smart Parking Reservation System (SPRS)** verifies whether the user is authorized or not. It allows the user i.e. driver to select and book the parking space. The system updates the following information and sends the confirmation message to the user. The system can also be able to cancel the booking.

1.2 Motivation

The problem being addressed is unavailability of slots for parking. A recent survey, shows that on an average, 30% of total traffic is generated by vehicles involved in searching parking spaces in the cities. According to reports presented through Millennium Development Goals 2015, global emissions of carbon dioxide have increased by over 50% since 1990. The air we breathe now has great impact on our lives.

Delhi has been majorly affected by air pollution due to vehicle traffic. So, the government has come up with “Odd-Even Scheme” to control pollution. This scheme has reduced carbon dioxide emission up to 10-15%. In addition to this, if smart parking technology is brought into action, the emissions may get reduce by 25% on average.

This has motivated us to address the problem of unavailability of parking spaces and provide a smart solution i.e. **Smart Parking Reservation System (SPRS)**. This system or technology would help drivers to quickly and easily find a parking space, based on location and time limit.

1.3 Objective

The objective of **Smart Parking Reservation System (SPRS)** is to reserve the parking space for the authorized user and cancel the booking.

1.4 Problem Definition

A reservation based Smart Parking System that allows drivers to efficiently find and reserve the vacant parking space based on location and time limit.

2. Proposed System

2.1 Description of the Proposed System

The proposed system i.e. **Smart Parking Reservation System (SPRS)** verifies from the database whether the user is authorized or not. After the user is logged in, he/she could be able to click a Book option. The user receives the information regarding the available slots from the cloud system. After selecting the convenient slot, the system updates the following information and sends the confirmation message, OTP (One Time Password) i.e. it can used after reaching the destination and Booking ID. The system can also be able to cancel the booking. To cancel the booking the user must provide the Booking ID and submits to the system. The system then sends the cancellation message to the user after cancelling the booking. A simple block diagram of the proposed system is shown in the Figure 2.1.

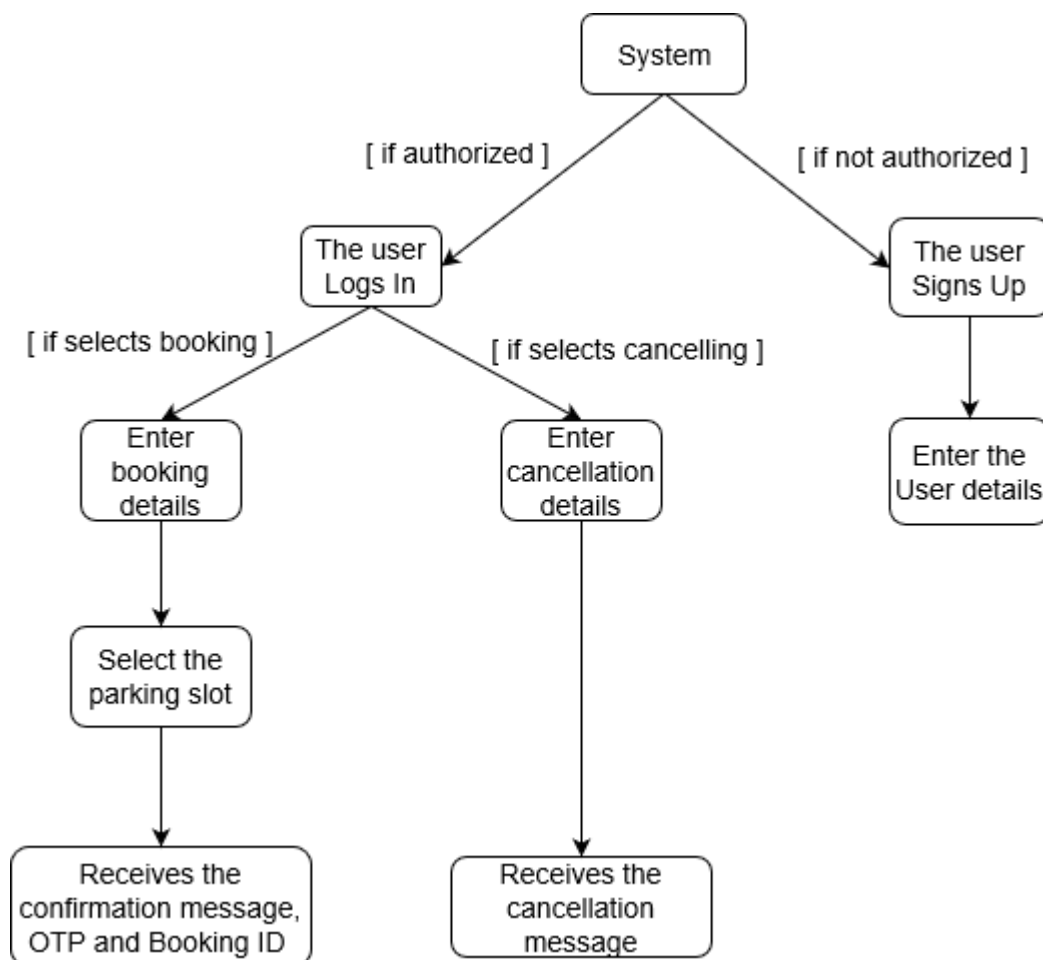


Figure 2.1: Simple Block Diagram of the proposed system.

2.2 Description of Target users

This project is focused to help the employees of the corporate sector for hassle free parking of their vehicles in their respective allotted parking spaces of their respective companies, for staffs and students of colleges and schools, for customers of the shopping mall to avoid time wastage in parking and in looking for vacant spaces and for residential societies to book a space for each of the resident family.

2.3 Advantages / Applications of Proposed System

2.3.1 Advantages of Proposed system

- The parking is optimized: Users find the best spot available, saving time, resources and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.
- The traffic generated due to vehicles caused during the search of the parking space is reduced.
- The pollution is also reduced which is caused due to the vehicles burning the fuel i.e. vehicle emissions during searching the vacant parking space.
- The manual Labor cost also decreases.

2.3.2 Applications of the Proposed System

- Corporate sectors. (Companies, Firms, Start-Ups)
- Educational Institutions.
- Shopping Malls and Complexes.
- Housing Societies.

2.4 Scope

The scope of the proposed system is referred as the limitations or boundary of the system. The proposed system is only designed for the authorized users. The user can visualize only those parking areas where the system is embedded.

3. Software Requirement Specification (SRS)

3.1 Overview

System Requirement Specification (SRS) is a document created by system analyst after the requirements are collected from various stakeholders. SRS defines how the intended software will interact with hardware, external interfaces, speed of operation, response time of system, portability of software across various platforms, maintainability, Security, Quality, Limitations etc.

The requirements received from client are written in natural language. It is the responsibility of system analyst to document the requirements in technical language so that they can be comprehended and useful by the software development team.

3.2 Requirement Specification

3.2.1 Functional Requirements

3.2.1.1 User Level Requirements

- The user shall be able to Sign Up / Login.
 - The user shall be able to enter Sign Up details if not authorized else enter username and password.
- The user shall be able to book a parking space.
- The user shall be able to select a parking slot.
- The user shall be able to receive the confirmation message, OTP (One Time Password) and Booking ID.
- The user shall be able to cancel the booking.
 - The user shall be able to enter the booking ID provided and receive a cancellation message.

3.2.1.2 System Administrator Level Requirements

- The system admin shall be able to Login.
 - The system admin shall be able to enter username and password.
- The system admin shall be able to view details of the user, parking slots and booking.

3.2.2 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

As shown in Figure 3.1, there are 2 actors namely User and Admin. The ellipse indicates the functional requirements of the system. Each actor possesses the following requirements. Each requirement is then described using the different templates. E.g. Pressman Template.

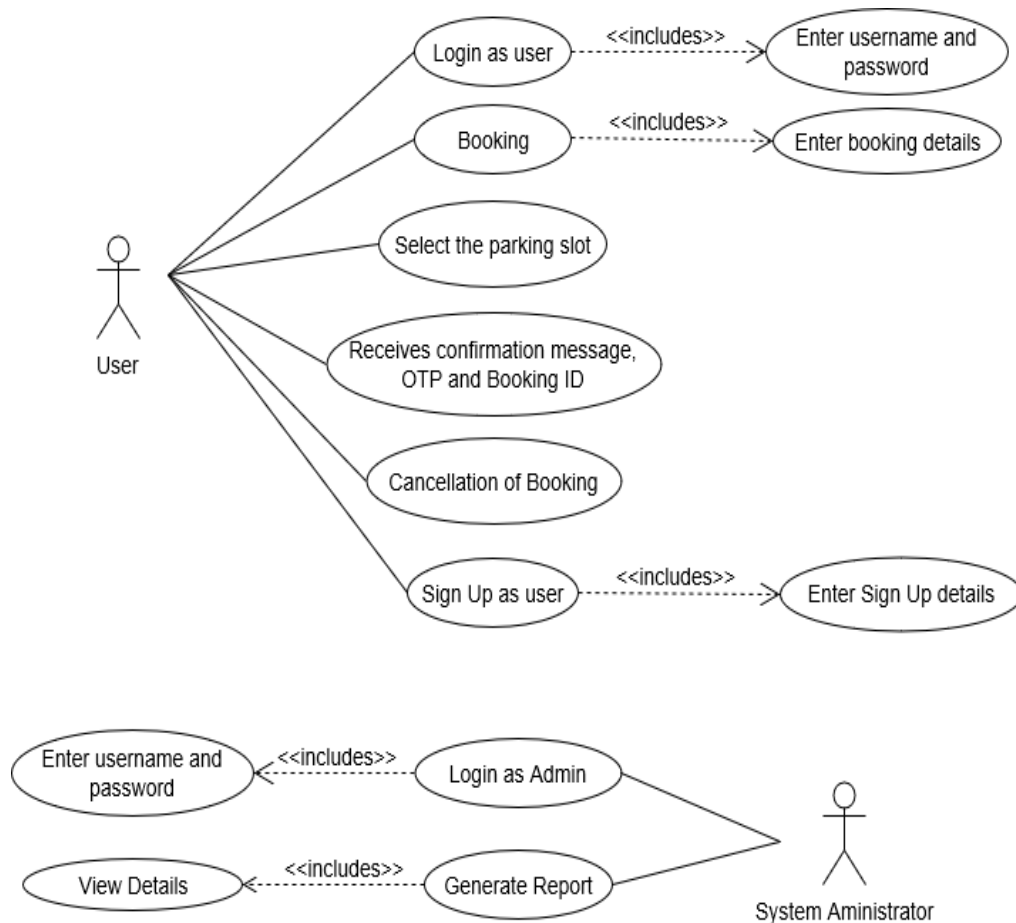


Figure 3.1: Use Case diagram of Functional Requirements.

3.2.3 Use Case Description (Pressman Template)

Table 3.2: Use Case Description for Login.

Use Case	Login
Actors	User, System Administrator
Pre – Condition	a) The user should have valid username and password that is stored in database. b) The system should be able to accept username and password.
Post – Condition	a) The user has valid username and password. b) The system accepts username and password.
Success Scenario	a) Begins when the user opens the website. b) User enters username and password. c) System verifies the username and password. d) User successfully enters the next page.
Exception Scenario	a) If user authorization failed, display an error message. <ul style="list-style-type: none"> i) Password or username is incorrect. ii) Not a registered username.

Table 3.3: Use Case Description for Booking.

Use Case	Booking
Actor	User
Pre – Condition	a) The user should be successfully logged in. b) The user should select the book option.
Post – Condition	a) The user has successfully logged in. b) The user has selected the book option.
Success Scenario	a) Begins when the user reaches the booking webpage. b) The user selects the book option.
Exception Scenario	-

Table 3.4: Use Case Description for selecting a parking slot.

Use Case	Select the parking slot
Actor	User
Pre – Condition	The user has to select the parking slot.
Post – Condition	The user has selected the parking slot.
Success Scenario	a) Begins with the information of available parking space. b) The user selects the parking slot. c) The user submits the selection of the slot information.
Exception Scenario	If no parking slot is available, then display an error message.

Table 3.5: Use Case Description for Receives confirmation message, OTP and Booking ID.

Use Case	Receives confirmation message, OTP (One Time Password) and Booking ID.
Actor	User
Pre – Condition	a) The user should submit the details of the selection of the slot. b) The system should send the confirmation message, OTP and Booking ID.
Post – Condition	a) The user has submitted the details of the selection of the slot. b) The system has sent the confirmation message, OTP and Booking ID.
Success Scenario	a) Begins with the display of the confirmation message. b) The system generated OTP and Booking ID is received by the user.
Exception Scenario	If the user has failed to submit the information of the selection of the slot, then it fails to send the confirmation message.

Table 3.6: Use Case Description for Cancellation of Booking.

Use Case	Cancellation of booking
Actor	User
Pre – Condition	a) The user should be successfully logged in. b) The user should have the booking. c) The user should enter the booking ID.
Post – Condition	a) The user has successfully logged in. b) The user has the booking. c) The user has the booking ID.
Success Scenario	a) Begins when the user reaches cancellation webpage. b) The user has to select the cancel option. c) The user enters the booking ID which is generated by the system. d) The user receives the cancellation message.
Exception Scenario	Invalid booking ID will generate an error message.

Table 3.7: Use Case Description for Sign Up.

Use Case	Sign Up
Actor	User
Pre – Condition	a) The user should not have any account. b) The user should be able to enter the sign up details like email ID, Contact number, password and vehicle details.
Post – Condition	a) The user does not have any account. b) The user has entered the sign up details like email ID, Contact number, password and vehicle details.
Success Scenario	a) Begins when the customer reaches the starting webpage. b) The user has to enter the details for registration. c) The system stores the details in database after clicking SUBMIT button.
Exception Scenario	If username provided is already is used, then displays the error.

3.2.4 Non-functional Requirements

3.2.4.1 Performance Requirements

- The user/system admin shall be able to receive the response from system within fraction of seconds.
- The user shall be able to book parking space 15 minutes prior before reaching the destination.
- The user shall be able to receive the confirmation message and Booking ID within 15 minutes.

3.2.4.2 Security Requirements

- The user shall be able to receive OTP (One Time Password) within 15 minutes.
- The user shall be able to use OTP within 15 minutes.

3.3 Software Requirement Specification

- XAMP Server
- Python Idle

3.4 GUI of the proposed system

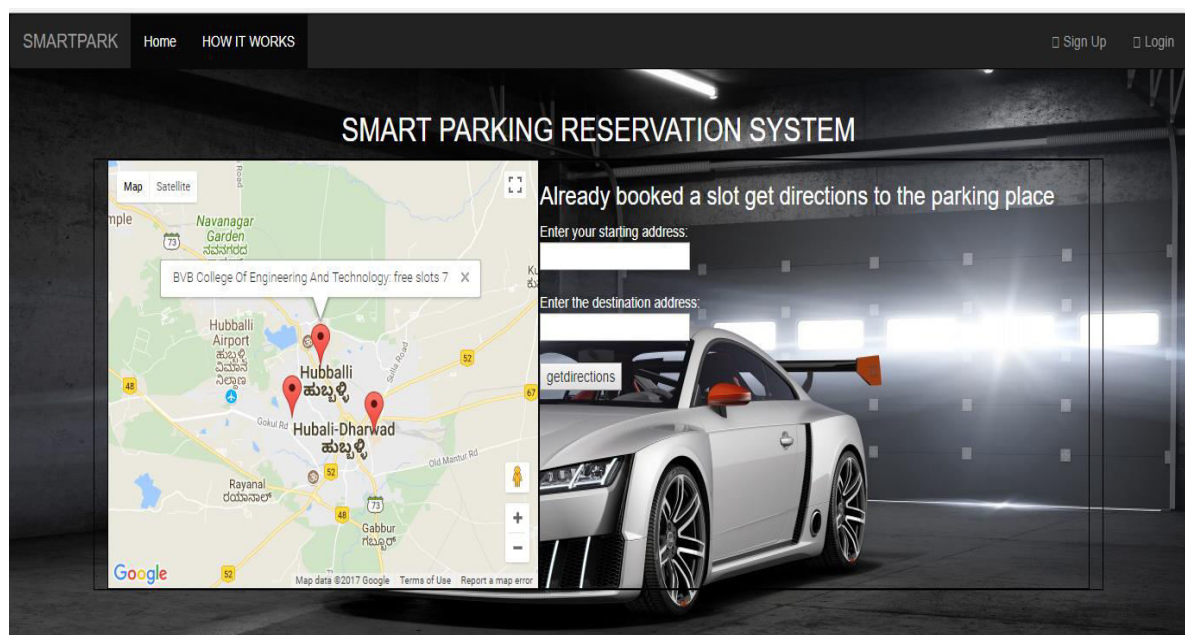
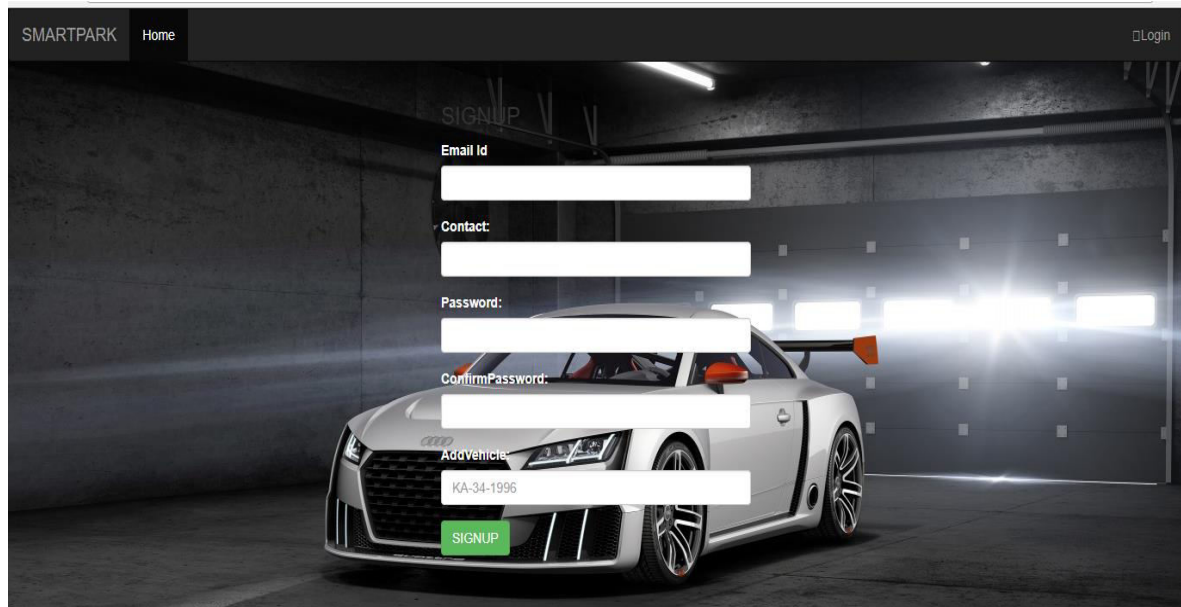
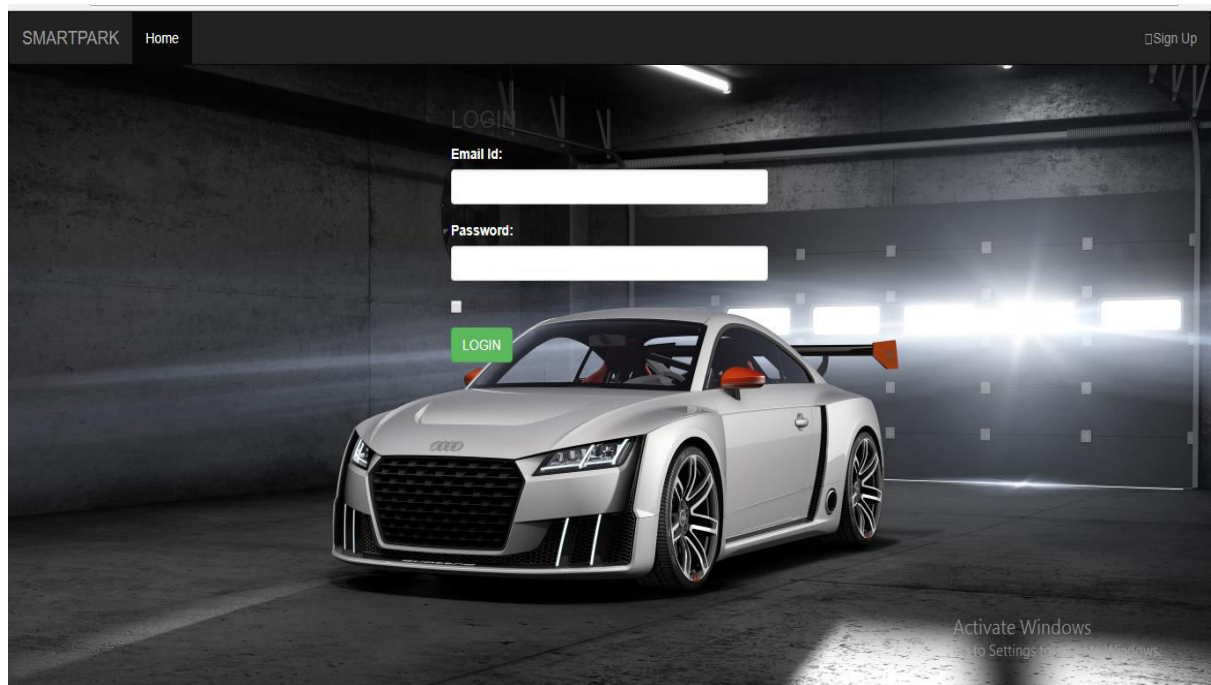


Figure 1.8: Navigation page shows route from current location to the destination.



The image shows the 'Sign Up' page of the Smart Parking Reservation System. The page has a dark header with 'SMARTPARK' and 'Home' on the left, and a 'Login' link on the right. The main content area features a background image of a white sports car in a dimly lit garage. Overlaid on this is a 'SIGNUP' form with the following fields: 'Email Id', 'Contact', 'Password', 'ConfirmPassword', and 'AddVehicle'. The 'AddVehicle' field contains the text 'KA-34-1996'. A green 'SIGNUP' button is at the bottom of the form.

Figure 3.9: Sign Up page.



The image shows the 'Login' page of the Smart Parking Reservation System. The page has a dark header with 'SMARTPARK' and 'Home' on the left, and a 'Sign Up' link on the right. The main content area features a background image of a white sports car in a dimly lit garage. Overlaid on this is a 'LOGIN' form with the following fields: 'Email Id' and 'Password'. A green 'LOGIN' button is at the bottom of the form. In the bottom right corner, there is a watermark that says 'Activate Windows to Settings to Windows'.

Figure 3.10: Webpage of the website where the user can Sign up or Login.

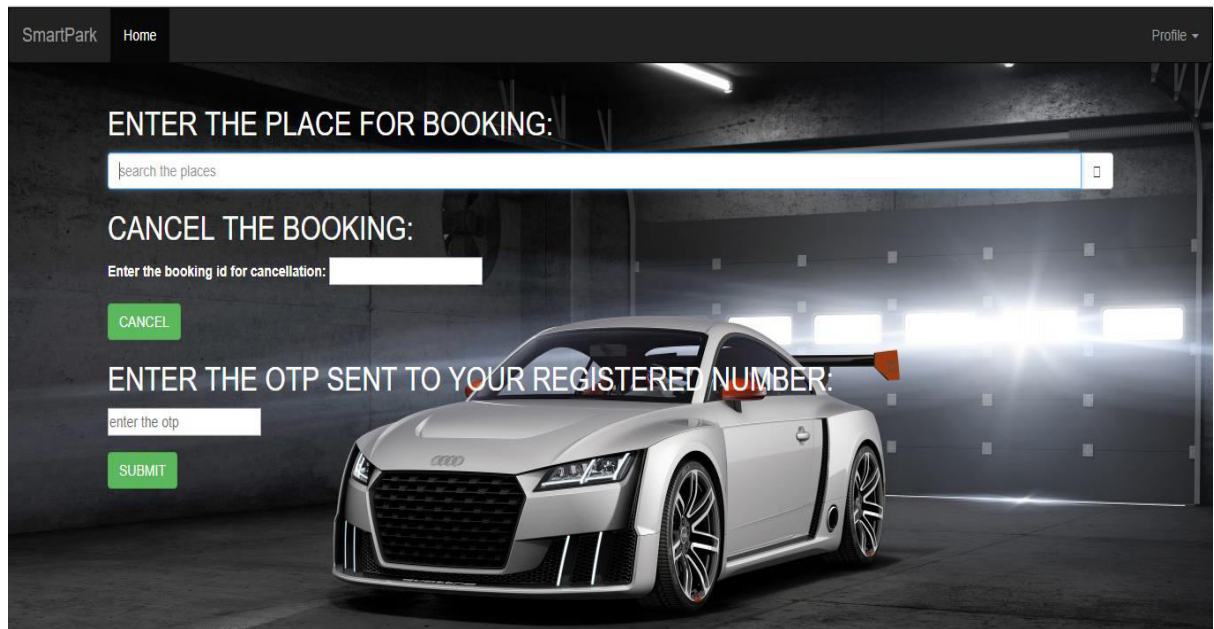


Figure 3.11: Webpage where the user the user can book or cancel.

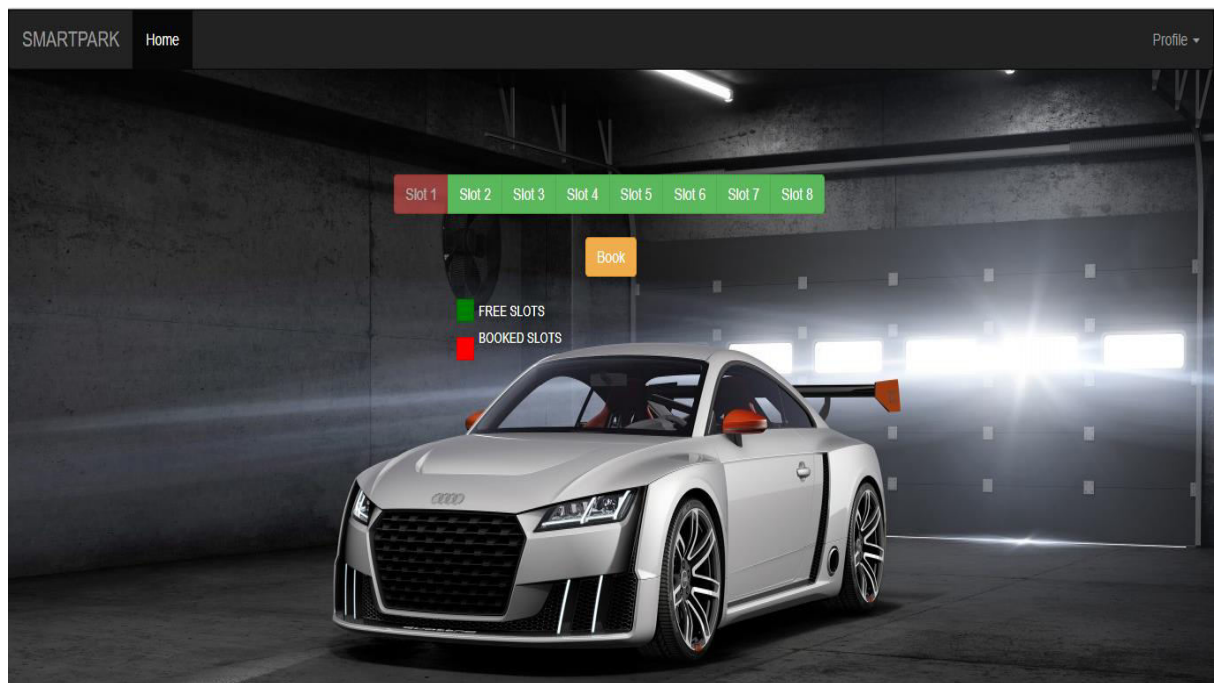


Figure 3.12: Webpage that displays availability of the slots.

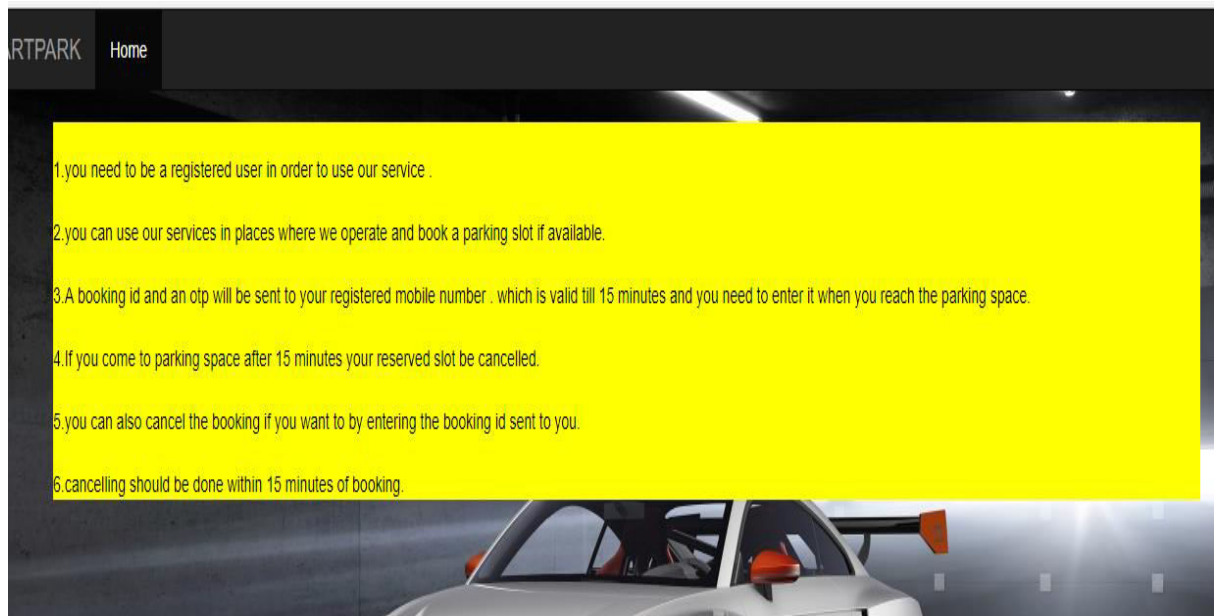


Figure 3.13: Webpage that displays the description of the working of the system.

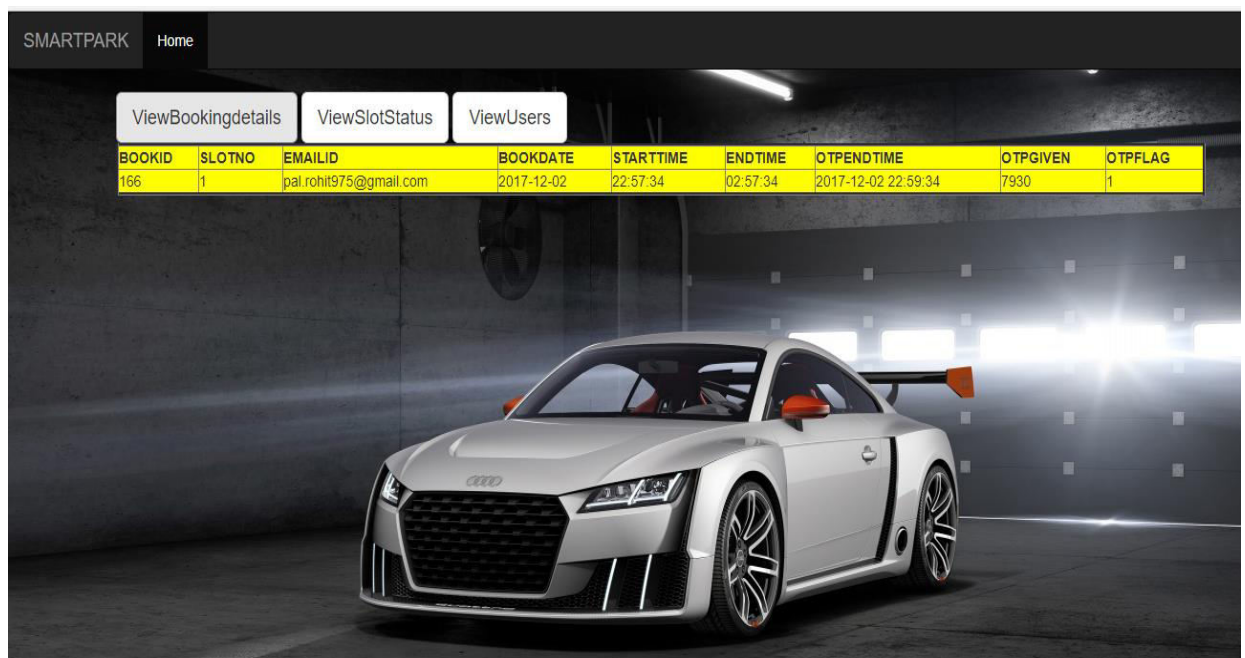
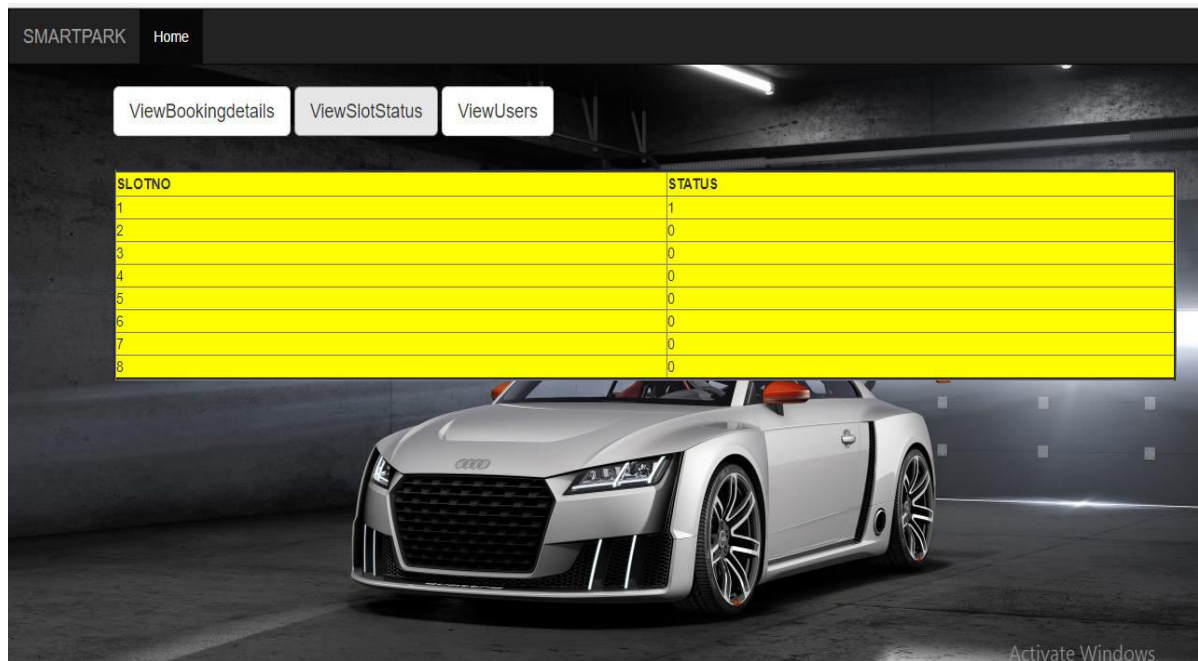


Figure 3.14: Webpage that displays the details of the booking.



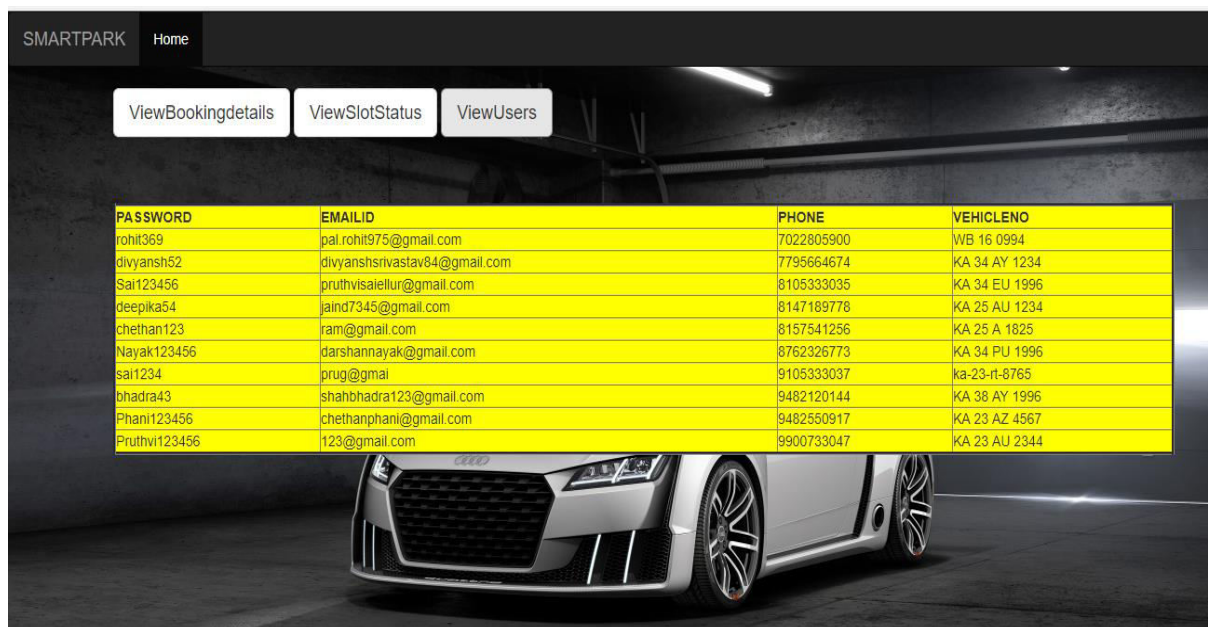
SMARTPARK Home

ViewBookingdetails ViewSlotStatus ViewUsers

SLOTNO	STATUS
1	1
2	0
3	0
4	0
5	0
6	0
7	0
8	0

Activate Windows

Figure 3.15: Webpage that displays the details of the slots status.



SMARTPARK Home

ViewBookingdetails ViewSlotStatus ViewUsers

PASSWORD	EMAILID	PHONE	VEHICLENO
rohit369	pal.rohit975@gmail.com	7022805900	WB 16 0994
divyansh52	divyanshsrivastav84@gmail.com	7795664674	KA 34 AY 1234
Sai123456	pruthvisaiellur@gmail.com	8105333035	KA 34 EU 1996
deepika54	jaind7345@gmail.com	8147189778	KA 25 AU 1234
chethan123	ram@gmail.com	8157541256	KA 25 A 1825
Nayak123456	darshannayak@gmail.com	8762326773	KA 34 PU 1996
sai1234	prug@gmail	9105333037	ka-23-rt-8765
bhadra43	shahbhadra123@gmail.com	9482120144	KA 38 AY 1996
Phani123456	chethanphani@gmail.com	9482550917	KA 23 AZ 4567
Pruthvi123456	123@gmail.com	9900733047	KA 23 AU 2344

Figure 3.16: Webpage that displays the details of the Users.

4. System Design

4.1 Architecture of the system

System architecture is the conceptual model. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. It can comprise system components, the expand systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe, i.e. architecture description languages (ADL's).

As shown in Figure 4.1, the user through website requests to book a parking space to which the database responds which keeps the track of booking status, Parking area and slots along with user information. The database provides the slots to book and after the OTP (One Time Password) is generated by the database, the OTP and Confirmation message is sent to the user. The booking status is saved in the database.

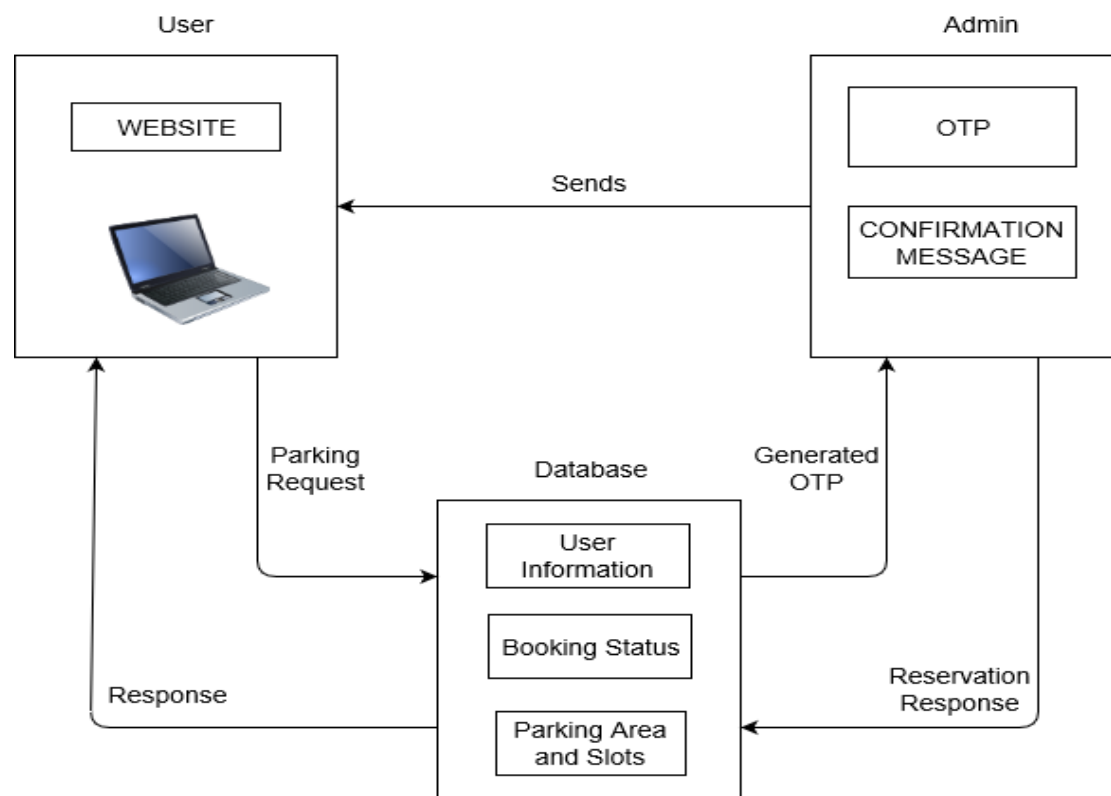


Figure 4.1: Architecture of the System.

4.2 Level 0 DFD (Data Flow Diagram)

Data Flow Diagrams are also broken up into levels. You begin with a Level 0. Based on how many inputs and outputs (processes) a system may have will determine how many levels a user will have to go to get a detailed enough design of the software system.

As shown in Figure 4.2, if the user is not authorized, he/she requests for sign up, enter the sign up details and submits. The details are stored in the database. During the login the username and corresponding password is verified. Further he/she can requests for booking or cancelling.

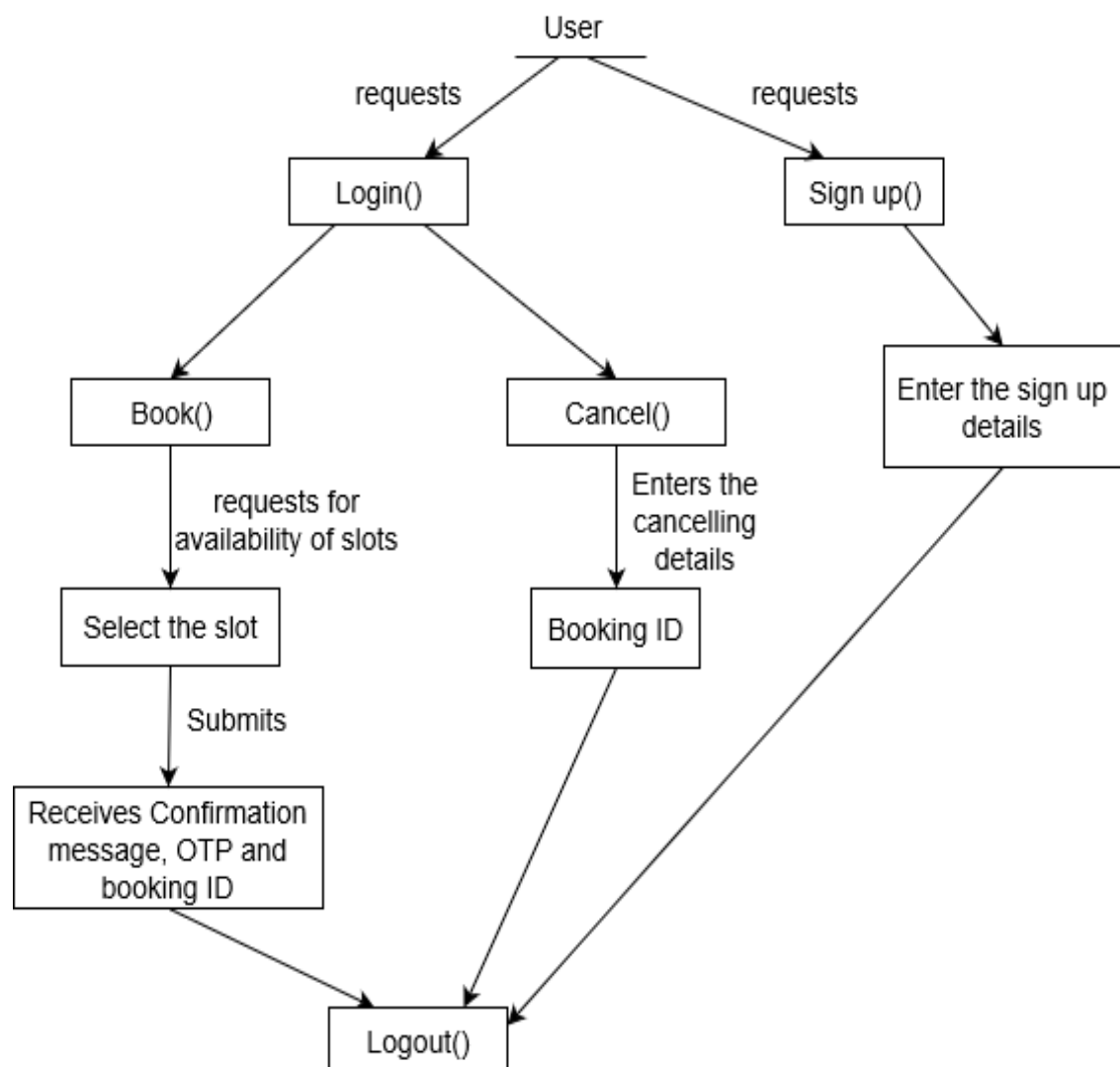


Figure 4.2: General Data Flow Diagram level 0.

4.3 DFD detailed diagram

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. DFDs can also be used for the visualization of data processing (structured design).

As shown in the Figure 4.3, if the user is not authorized, then the user has to sign up and the sign up details are stored in Database. But if the user is authorized, then he/ she can log in and book/cancel the parking slot and corresponding confirmation message, OTP, Booking ID or cancellation message is sent to the user generated by the Database through Admin.

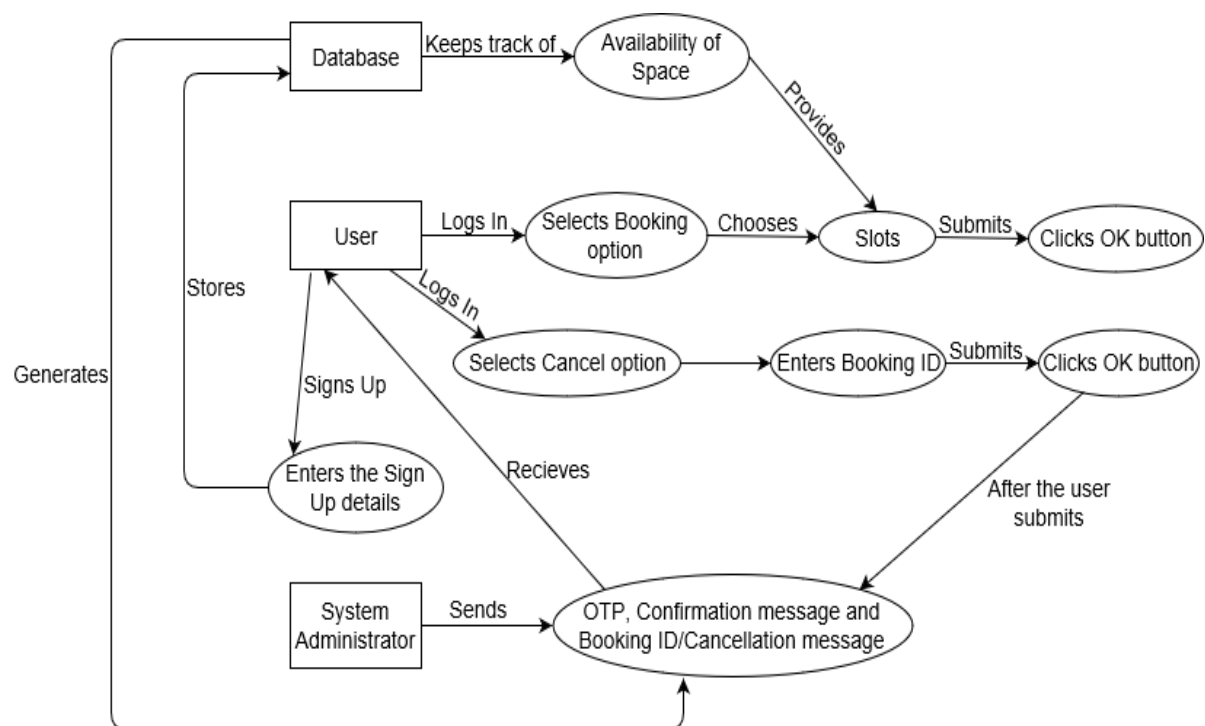


Figure 4.3: Detailed Data Flow Diagram.

4.4 ER (Entity – Relationship) Diagram and Schema

An **ER model** describes inter-related things of interest in a specific domain of knowledge. An ER model is composed of entity types and specifies relationships that can exist between instances of those entity types.

In figure 4.4, the rectangle indicates entities, the ellipse indicates the attributes of that particular entity, the underlined attribute indicates the primary key and the rhombus indicates the relationship between the two entities.

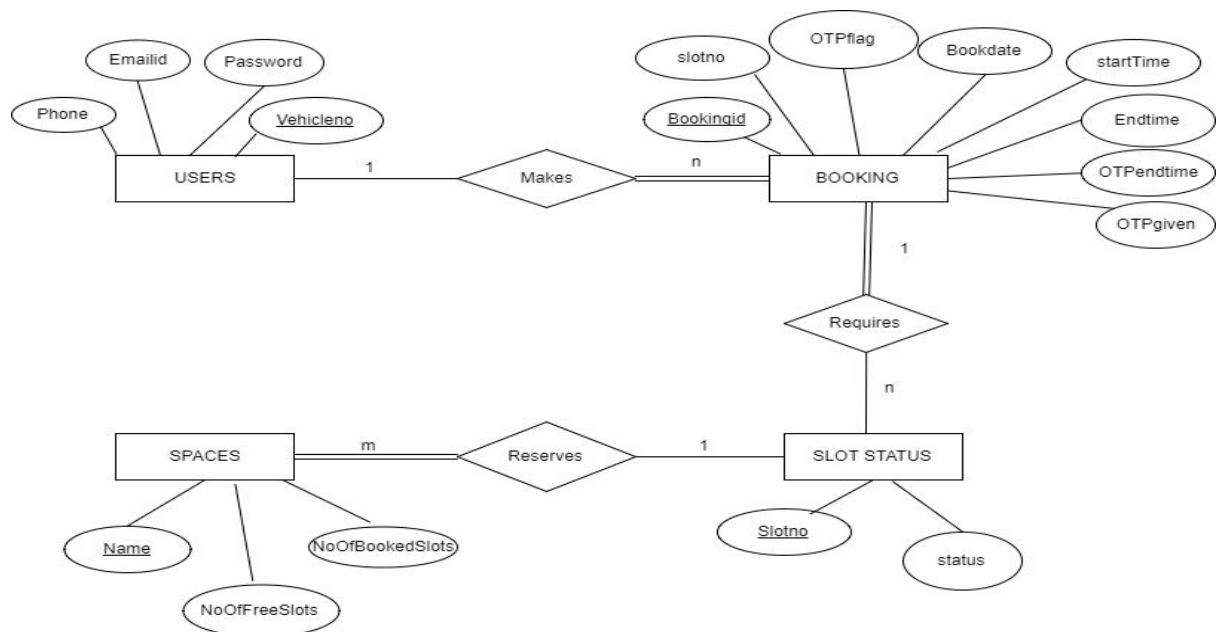


Figure 4.4: ER (Entity-Relationship) Diagram.

The **database schema** of a database system is its structure described in a formal language supported by the database management system (DBMS). As shown in figure 4.5, the each entity i.e. users, booking, slot status and spaces have primary key i.e. vehicle number, booking ID, slot number and name respectively that are underlined and may behave as foreign key in other entity table.

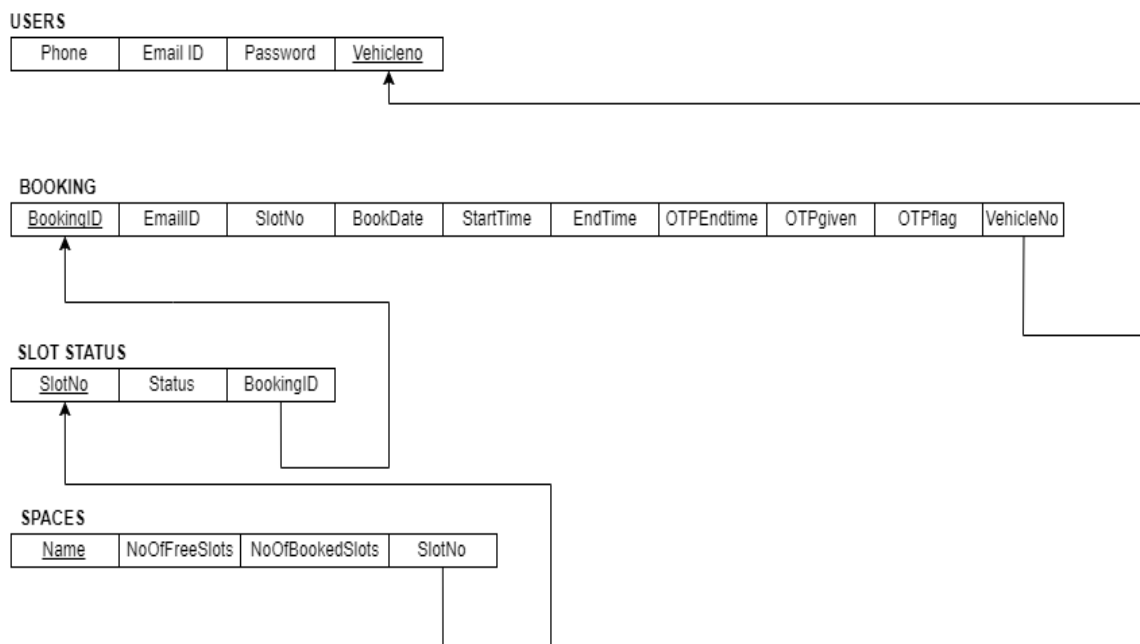


Figure 4.5: Database schema of the system.

4.5 Sequence Diagram

A **sequence diagram** is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart.

Sequence diagrams are typically associated with use case realizations in the Logical View of the system under development. Sequence diagrams are sometimes called **event diagrams** or **event scenarios**.

Sequence Diagram

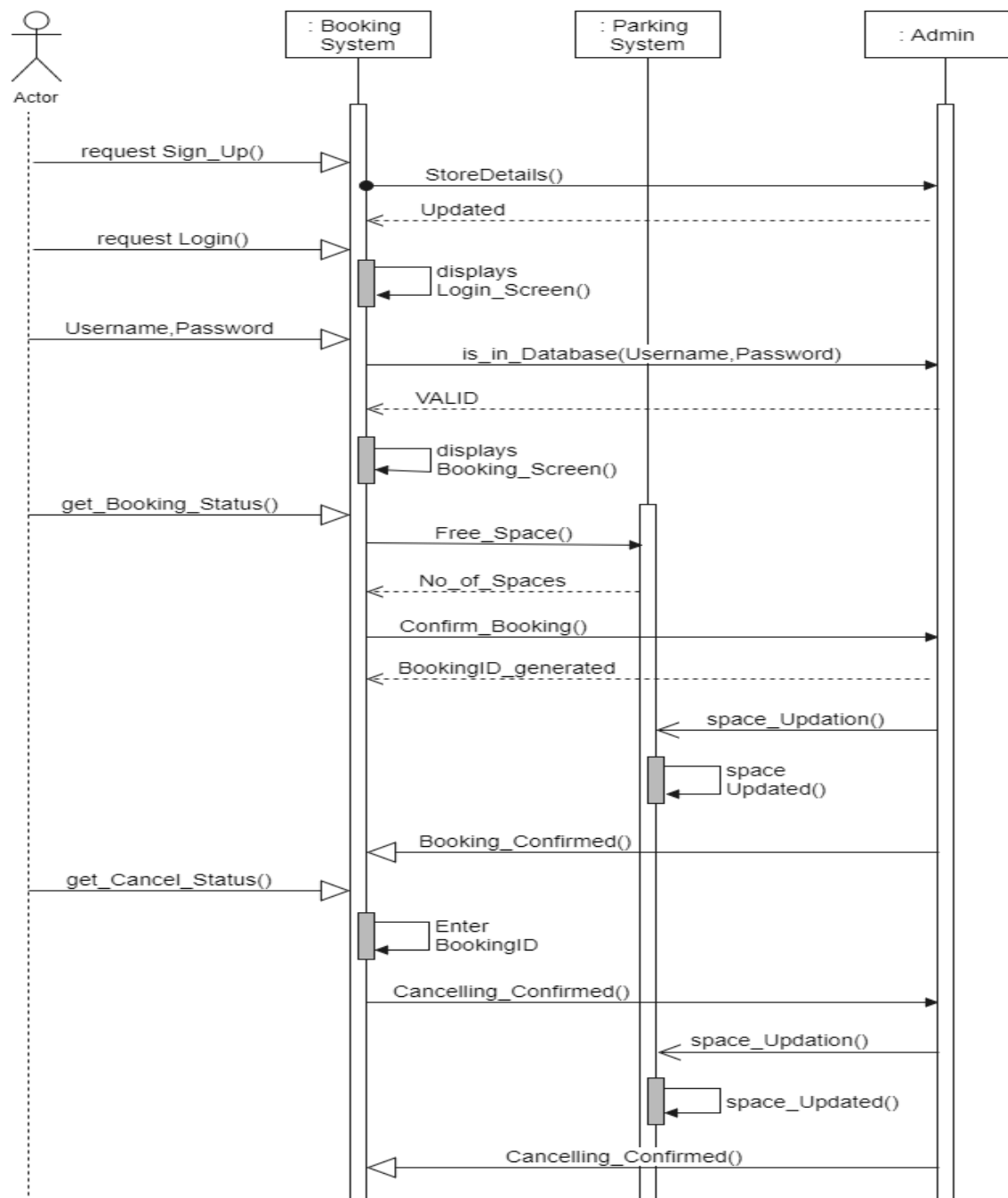


Figure 4.6: Sequence Diagram.

4.6 State Transition Diagram

A state diagram is a type of diagram used in computer science and related fields to describe the behavior of systems. State diagrams require that the system described is composed of a finite number of states; sometimes, this is indeed the case, while at other times this is a reasonable abstraction.

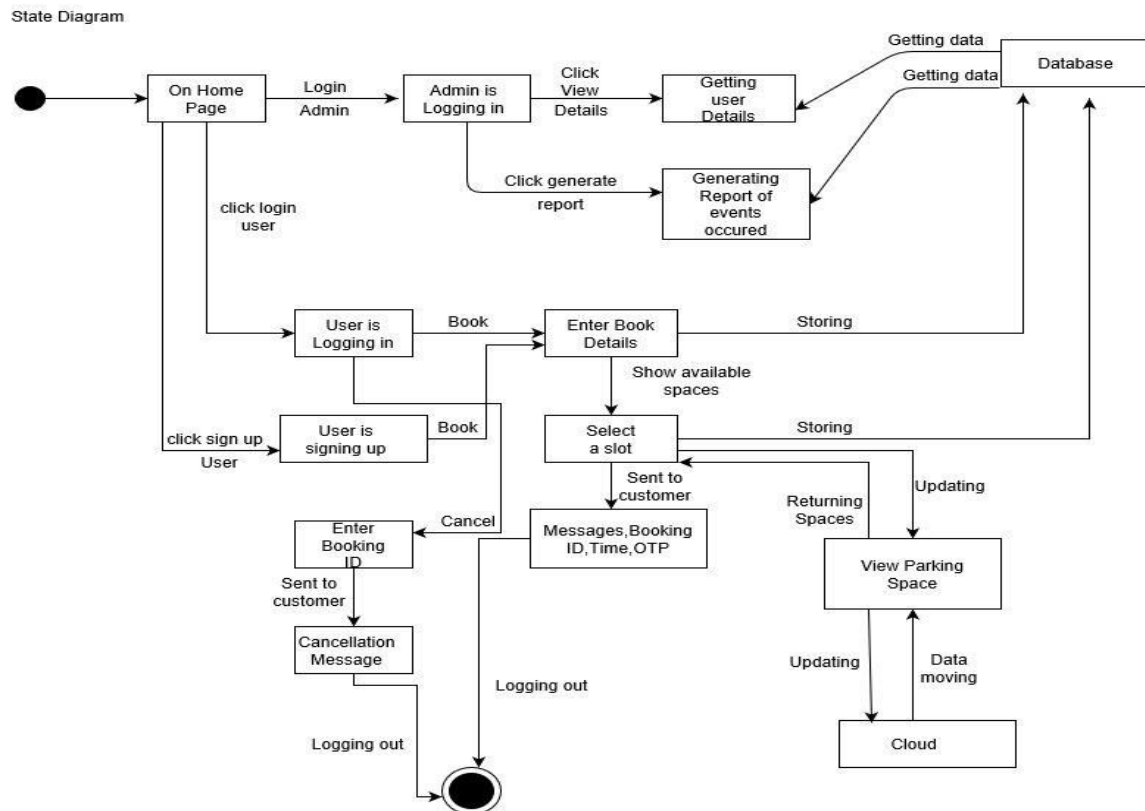


Figure 4.7: State Transition Diagram.

5. Implementation

5.1 Proposed Methodology

In the development of car parking spaces, this smart parking system is built for easy booking and cancellation of parking spaces by the car owners. This system is built using the application of image processing and PHP. This system fetches the number of parking spaces which are free in LHC parking and sends the number of cars to the webpage. This value is used by the webpage to display the number of slots that are vacant. The user can easily book any slot and gets notified through a SMS and Mail.

This system is accessing the number of cars parked in a locality (here, LHC parking) from a CCTV footage planted in that particular locality using applications of Image Processing (Cascade Classifier) which takes input from the videos frames. The video in the python script divides the video into frames. In each frame the Cascade Classifier locates the number of cars if there are any and gives the number of cars as output. We have a car XML file which is used to compare with the frame and locate the car. It then makes a rectangular boundary around the detected car and increments the counter variable by one. The python script gives this value i.e. the number of cars as the python script output.

The webpage which is built using PHP takes the input from this python script to show the slot tabs whether booked or vacant. The user can book slot by entering his/her personal information to create an account on the webpage database. The user is provided with the OTP on the mobile phone and through mail which is used to confirm the booking. The user is informed about the booked slot which he can reach within 15 minutes of booking else the slot will be automatically cancelled. Also if the user wishes to cancel the slot due to any reason than he can do so by using the booking id provided through mail and SMS.

5.2 Modules

a) Module name: Sign_Up()

Input: Name, email id, phone number, vehicle number and password.

Output: Authorized user.

Code:

```
function checkUnique($email1,$contact1,$vehiclenumber1)
{
    $conn=new mysqli("localhost","root","","user");
    if ($conn->connect_error)
    {
        die("Connection failed: " . $conn->connect_error);
    }
    $sql="SELECT * FROM user1 where EMAILID like '$email1'";
    $result=$conn->query($sql);
    $secheck=$result->num_rows ;

    $sql="SELECT * FROM user1 where PHONE like '$contact1'";
    $result=$conn->query($sql);
    $sccheck=$result->num_rows ;

    $sql="SELECT      *      FROM      user1      where      VEHICLEN0      like
'$vehiclenumber1'";
    $result=$conn->query($sql);
    $vcheck=$result->num_rows ;

    if($secheck>0)
    {
        ?>
        <script>
        alert("Email already exists!");
        </script>
        <?php
    }

    if($sccheck>0)
    {
```

```
        ?>
        <script>
        alert("Contact already exists!");
        </script>
        <?php
    }
}
```

b) Module name: Login()**Input:** Username and password.**Output:** Logged in.**Code:**

```
$result= mysqli_query($con,"SELECT * FROM user1 where EMAILID like
'$emailid' and PASSWORD like '$password'") or die(mysql_error());
$row=mysqli_fetch_assoc($result);
$_SESSION['EML']=$emailid;
$t1=strcmp($row['EMAILID'],'pruthvisaiellur@gmail.com');
$t2=strcmp($row['PASSWORD'],'Sai123456');
if($t1==0 && $t2==0)
{
    ?>
    <script>
    alert("Admin logged in");
    window.location.href='adminlogin.php';
    </script>
    <?php
}

elseif((strcmp($row['EMAILID'],$emailid)andstrcmp($row['PASSWORD'],$pass
word))!=0)
{
```

```
?>
<script>
alert("Login failed");
window.location.href='loginpage.html';
</script>
<?php
}
else
{
    header("LOCATION:parking.html");
}
```

c) Module name: Booking()

Input: Selection of slot.

Output: Confirmation message through and OTP through mobile.

Code:

```
if(isset($_POST['sub']))
{
    $r=$_SESSION['EML'];
    $selected=$_POST['options'];
    $res= mysqli_query($con,"UPDATE  SLOTSTATUS  set  STATUS='1'
        where SLOTNO like '$selected'") or die(mysql_error());
    date_default_timezone_set('Asia/kolkata');
    $date1=date('Y-m-d');
    $time=date('H:i:s');
    $new_time = date("Y-m-d H:i:s", strtotime('+4 hours'));
    $new_time1 = date("H:i:s",strtotime($new_time));
    $new_timeotp = date("Y-m-d H:i:s", strtotime('+2 minutes'));
    $new_time1otp = date("H:i:s",strtotime($new_timeotp));
    $stampend=date('Y-m-d H:i:s');
    $stampend1=strtotime($stampend);
```

```
$futureDate = $stampend1+(60*240);
$formatDate = date("Y-m-d H:i:s", $futureDate);
$dateotp=date('Y-m-d H:i:s');
$otptimestamp=strtotime($dateotp);
$otptimestampenddisp=$otptimestamp+(60*2);
$otpfinal = date("Y-m-d H:i:s", $otptimestampenddisp);
$result          =          "INSERT          into
        bookingdetails(SLOTNO,EMAILID,BOOKDATE,STARTTIME,EN
        DTIME,ENDTIMESTAMP,OTPENDTIME)
        values('$selected','$r','$date1','$time','$new_time1','$formatDate','$ot
        pfinal')";
if ($con->query($result) === TRUE)
{
        $last_id = $con->insert_id;
}
}
```

d) Module name: Cancellation()

Input: Booking ID.

Output: The booking is cancelled.

Code:

```
$result=mysqli_query($con,"DELETE FROM bookingdetails WHERE
BOOKINGID like '$bookid' ") or die(mysql_error());
$row=mysqli_affected_rows($con);
if($row==0)
{
        $pflag=1;
        $bodyy=" Booking id : $bookid does not exist";
        $by ="<script> alert('".$bodyy."');
        window.location.href='parking.html';
        </script>";
```

```
        echo $by;
    }
    else
    {
        $result= mysqli_query($con,"UPDATE SLOTSTATUS set STATUS='0'
        where SLOTNO like '$sltnum' ") or die(mysql_error());
        $bodyy=" Booking id : $bookid is successfully cancelled ";
        $by="<script>alert('".$bodyy."');
        window.location.href='parking.html';
        </script>";
        echo $by;
    }
}
```



6. Testing


Test plan and Test cases


Test Case ID	Input Description	Expected output	Actual Output
1	Valid Customer and Admin login credentials (That is password matches according the username and has minimum 8 characters and maximum 16 characters including 1 uppercase , 1 lowercase , 1 number and 1 special character)	Logs into website	Logs into website
2	Invalid Customer and Admin Credentials. (That is, Name is digit or password does not match)	Alert about the wrong credentials	Alert about the wrong credentials
3	If no keywords inputted	Alert message popped	Alert message pop
4	Valid email id should be inputted with max 20 characters only alphabets	Logs into booking/cancelling pages	Logs into page for booking parking spaces.
5	Adding invalid email id	Error message popped	Error message popped
6	Vehicle numbers must and should contain 13 characters	OK message popped	Next page is followed
7	Entering invalid vehicle number with lesser number of characters than 13	Error message displaying incorrect details inserted.	Error message displaying incorrect details inserted.


7. Results and Discussion

In this project, we have developed a prototype of Reservation-based Smart Parking System to optimize parking management. In this project, we implemented parking reservation policy to balance the benefit of service providers and user requirements for hassle free booking. Moreover, we have presented the detailed design, implementation and evaluation of the prototype. Based on the obtained results from our study, we conclude that the proposed reservation-based smart parking system can alleviate traffic congestion caused parking, searching and reduce the amount of traffic volume.

Booking details 



pruthvi sai <pruthvisaiellur@gmail.com>
 to Smart 

Dec 2 (3 days ago) 

Booking details	Data
user name	divyanshrivastav84@gmail.com
Booking date	2017-12-02
Booking id	168
Start Time	23:54:52
End Time	03:54:52
OTP	6810

Figure 7.1: Snapshot of the email received by the user after booking including the booking details.

The user after booking slot at their desired time is provided with the details of the time and Booking ID through a auto generated mail and SMS as shown in Figure 7.1.

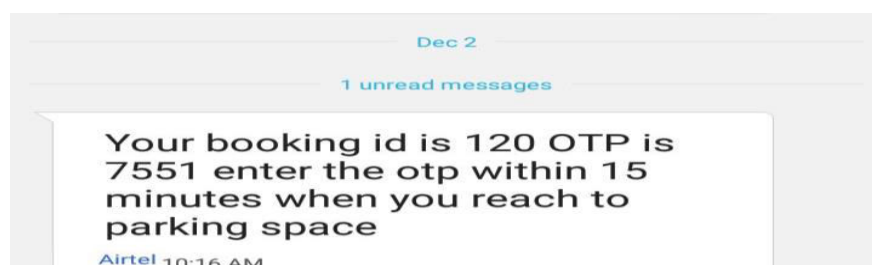


Figure 7.2: Message received by the user through mobile including booking id and OTP.

The Figure 7.2 shows that the user is provided with OTP for confirmation and the start and end time. If the user is not able to reach before the end time than the slot is auto cancelled.

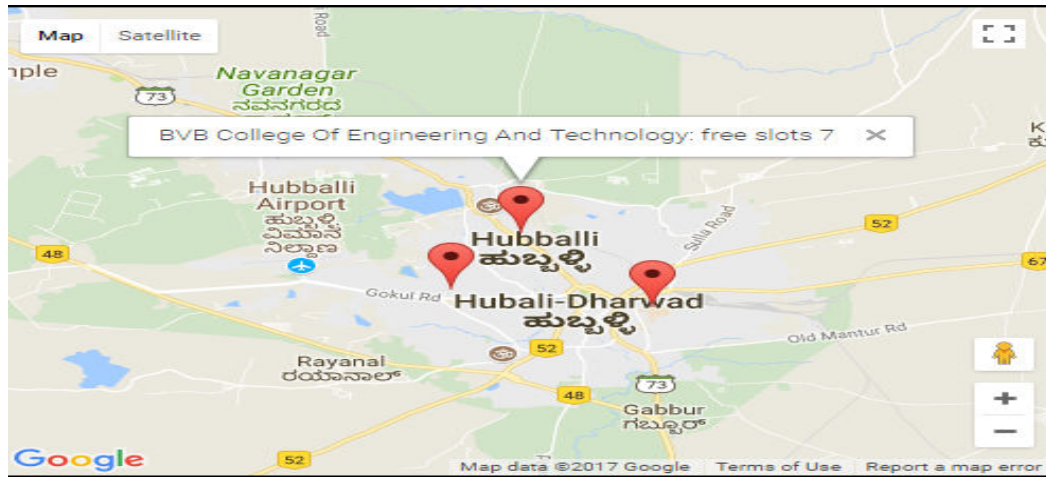


Figure 7.3: Google map locating number of vacant parking spaces in B.V.B. Engineering College.

The Figure 7.3 shows that SPRS provides the web service to the drivers. The system dynamically updates the parking and reservation information on the website according to the data stored in database. The driver is able to obtain the real time parking information and complete the reservation from the web server.

8. Conclusion and Future Scope

This project introduces a Smart parking reservation system using image processing.. The customer can readily determine space availability prior to entering the parking area. The customer can plan for their transit to public transportation with such smart parking systems. The parking operator can use this system data to predict future parking patterns and trends. The parking operator can use this system data to prevent vehicle thefts. The parking operator can reduce the requirements for traffic control within the facility. The system significantly reduces traffic and the resulting vehicle emissions by decreasing the time required for customers to locate open spaces.

The system can be further improved by embedding intelligent components into it. For example the parking scheduling component can help the system to minimize the total and individual car routing time and reduce the car emission. We can embed priority into this system so that it can respond and accommodate emergency situation with the advancement in the field of satellite communication, the use of image processing can be much more improved with the CCTV footage live streaming and the value of number of cars parked being updated regularly.

9. References

- [1] Hongwei Wang & Wenbo He, “A Reservation-based Smart Parking System, University of Nebraska – Lincoln, NE, USA”, <http://cse.unl.edu/~byrav/INFOCOM2011/workshops/papers/p701-wang.pdf>
- [2] Mohit Patil & Rahul Sakore, “Smart Parking System based on Reservation, Department of Computer Engineering, Ramrao Adik Institute of Technology, Mumbai, India”, <http://www.ijser.in/archives/v2i6/SjIwMTMyOTk=.pdf>
- [3] “World’s Largest Web Developer Site, W3Schools is optimized for learning, testing and training”, <https://www.w3schools.com/>

10. Appendix

A. Glossary

- 1. XAMPP server:** Tool used to host a website on a localhost which is open source cross platform web server.
- 2. Python:** Programming language used object detection.
- 3. PHP:** Scripting language used for backend of our project (designing).
- 4. Object Detection:** Object detection is a computer technology related to computer vision and image processing that deals with detecting instances of objects of certain class in digital images and videos.
- 5. Html:** Scripting language used to design our website

B. Description of technology used

Open CV: Open source computer vision is a library of programming function mainly aimed at real time computer vision. The library is cross platform and open source. It can be used for facial recognition system, mobile robotics, object detection, augmented reality etc.

Object Detection: object Detection is the problem of finding and classifying a variable number of objects on an image. Object detection has applications in many areas of computer vision including image retrieval and video surveillance

C. Description of tools used

XAMPP SERVER: XAMPP is an free and an open source cross platform web server solution stack package developed by Apache friends consisting mainly of the Apache HTTP server MariaDB database and interpreters for scripts written in PHP and Perl programming languages. XAMPP is also cross platform which means it works equally well on LINUX, Mac and Windows since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server extremely easy as well.

Python IDLE (Integrated Development Environment): Is an integrated development for python which is used in windows. It has multi window text editors with syntax highlighting, auto completion, smart indent and other.

11. Appendix 2

BLUEPRINT METHODOLOGY