ParkCar

Minor Project I

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December 2022

ACKNOWLEDGEMENT

The time we spent on this minor project was a memorable one for us as it was rich in experience sharing and helped us to discover our potential. We had so many experiences and opportunities that we believe will forever shape and influence our professional skills while fostering personal growth and development.

With a sage sense of gratitude, we acknowledge various people who directly or indirectly contributed to the development of this work and who influenced my thinking, behavior & acts during training. I express my deep sense of gratitude to **Dr. Himanshu Agrawal** for her technical support and constant supervision which contributed immensely to our development. We also thank her for her guidance which was a remarkable force that enabled us to complete the minor project.

We would like to thank our parents and our friends whose love and guidance are with us in whatever we pursue. Nobody has been more important to us than the members of our family and friends.

We also express my sincere gratitude to **Dr. Mukta Goyal and Dr. Varsha Garg**, for their stimulating guidance, continuous encouragement and evaluating us on this project.

DECLARATION

We hereby declare that this minor project report entitled "**ParkCar"** submitted to **Jaypee Institute of Information Technology, Noida** is the bonafide record of the work done by us in the due course of fifth semester and the contents and facts prepared and presented by us without any bias and are authentic to the best of our knowledge. We also declare that it has not previously formed the basis of an award for us for any degree/ diploma, fellowship or other similar titles of any institute/ society.

Place: Noida
Date: 3 December 2022

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CERTIFICATE

To whomsoever it may concern

This is to certify that the work titles **"ParkCar"** Shubham Singh (Enrollment no. 9920103111), Prakhar Pratap Singh (Enrollment no. 9920103124), Aditya Prakash (Enrollment no. 9920103220) students of B. Tech. in Computer Science & Engineering from Jaypee Institute of Information Technology have successfully completed the minor project under the supervision of Dr. Himanshu Agrawal from 12th August 2022 to 30th December 2022.

I wish them all success in the future.

Dr. Himanshu Agrawal

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Sector-128, Noida, India, 201304

ABSTRACT

Managing Prakings is a big task and involves a lot of “man power”. We have made a web application to manage everything digitally. Our web application scans every car and gives them a unique ID using Quick Response code (QR). The web application lists every car and calculates their ‘In time’ when the car arrives and ‘Out Time’ when the car leaves the parking. Parking spaces will have IOT enabled devices which will keep track of the number of cars entering the parking lot and the number of spaces left. Using this feature, we can replace people with smart machines.

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Chapter 1: Introduction

1.1 General

In modern times, time is what matters the most to people. Everything we do is directly or indirectly an effort to spend less time on daily things and more on personal and professional growth. People wait in lines for parking and face a lot of discomfort while dealing with the manual entry and exit section of the Parking. It's the need of the hour to have a proper digitized parking management system for the better use of time and 'people power' also efficient utilization of the digital world.

Here, in this we explore the parking management system web application's basic features like scanning the car, adding the counter for entry of the car and storing everything in database along with the real time.

1.2 Problem Statement

In today's world everything is being digitized except for parking spaces. In addition, a lot of men's work is required for this operation, which requires a lot of expenditure. Therefore, it is necessary to create a system that shows clearly which parking space is available in any lane. Smart Parking is now the most well-liked Smart City concept.

To reduce traffic and parking hassles, a number of Smart Parking projects have been launched in numerous cities throughout the world. Smart Parking is regarded as the low barrier option because to its simple installation, scalability, efficiency, and flexibility. It is ideal for contemporary cities that want to use the power of IoT to potentially benefit their residents.

Due to two key trends—increasing urbanization and a rise in car ownership—secure parking spots are in increasingly high demand. The drivers' parking experience is being negatively impacted by the rising number of vehicles on the road. Drivers that use the conventional parking system suffer significant losses in terms of money, productivity, and time spent looking for parking spaces in heavily populated locations.

PROBLEMS IN THE CURRENT SCENARIO:

1. A surge in the demand for secure parking spaces has been observed due to two major trends, which are increasing urbanization and an increase in car ownership.
2. During the pandemic it was observed that the contactless payment system was very much necessary and at that time none was available.

3. Human and computational errors: many errors enabled by the system due to tedious computations required during data processing. Modification generates dirty and unpresentable reports.

4. Poorly generated records: poorly generated records encourage omission of some important data by the employees.

1.3 Expected Outcome

The expected result of '**ParKCar**' is to maintain a user-friendly web application by which the car parking process becomes easy for both the car owners and the parking owner.

Chapter 2: Project Objective

THE BASIC OBJECTIVES OF THE PROPOSED SYSTEM:

1. To enable users, park their car safely
2. To enable automated data entry.
3. Ensure efficient and reliable application
4. Avoid data entry errors by use of machines and computers
5. Enable easy authorized modification of data.
6. Enable fast and easy retrieval of user records and data for fast reference activities.
7. Enable a contactless parking and payment system

Chapter 3: Project Description

3.1 Features

This project will help users park their cars using a nontraditional, more of a digital way. Admin can also see the details and the number of cars parked which reduces margin of error. Some of the features of this web application are:

i. Login and signup option for user
ii. Keep track of the cars parked.
iii. Give every car a unique Id using QR codes
iv. Display the details of the car which is currently present in the parking
v. Remove the car when it leaves the parking
vi. Admin can see the time of entry as well as exit of each and every car.
vii. Users can add their information in their respective id (like photo of the car, name of the car.

3.2 Software Requirement

Operating System: Windows/MacOS. Browser: Google Chrome/Microsoft Edge NODE JS INSTALLED
JavaScript
Node.js
React
MongoDB
Express.js

Chapter 4: Design Specification

4.1 Frontend

The Frontend part is the core of any web application project. The frontend part of this project is made using HTML, CSS & JAVASCRIPT. The frontend part is written using functional components of React JS.

Client Frontend UI:

Login Page

(Fig 4.1) depicts login page of the web application this page facilitates user to fill in his/her credentials and pass the initial security layer.

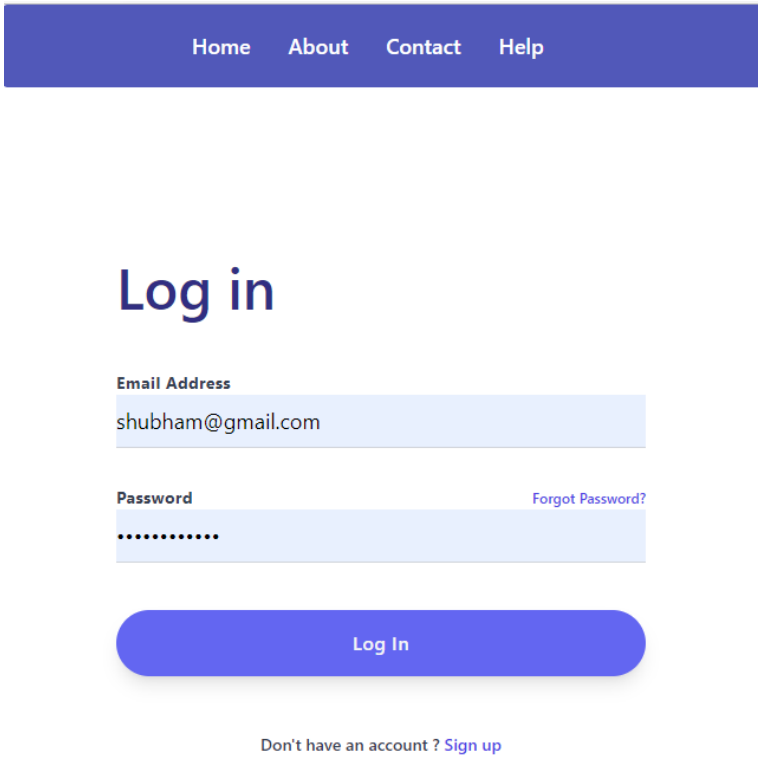

Fig 4.1 *(Login Page of the Web Application)*

Sign Up Page

Users can register themselves if they are already not registered through the sign-up page shown in *(Fig 4.2)*. User has to fill his/her details which includes car owner's name, his/her email ID, and password for protection of his ID.

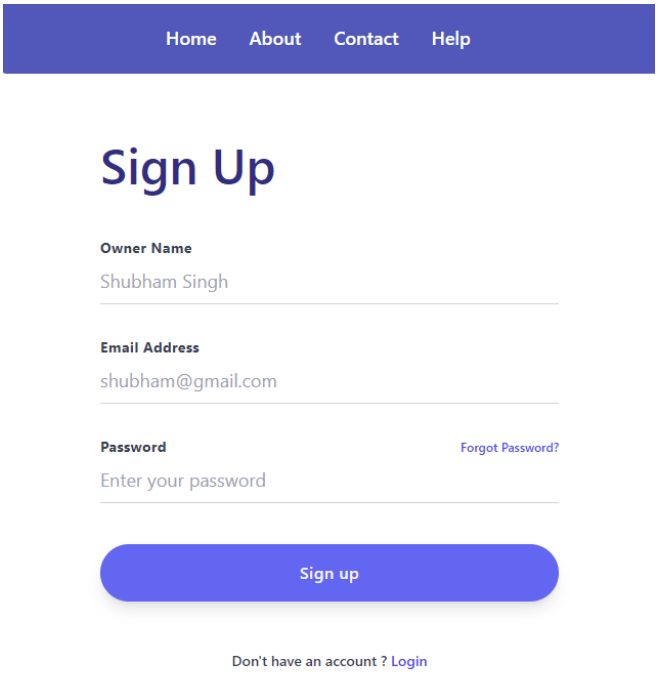

Fig 4.2 *(Sign Up page of Web Application)*

Dashboard

Website also contains a dashboard as shown in *(Fig 4.3)* where Parking Owner can see the information of all the cars parked currently no car is parked as it is clearly visible.

Fig 4.3 *(Dashboard of the Web Application)*

Profile

Registered users can see their profile as shown in *(Fig. 4.4)* where their name is displayed along with photo of their respective cars. User can also see the time he/she has parked the car, number of parking and rating which has been provided to them by the parking owner

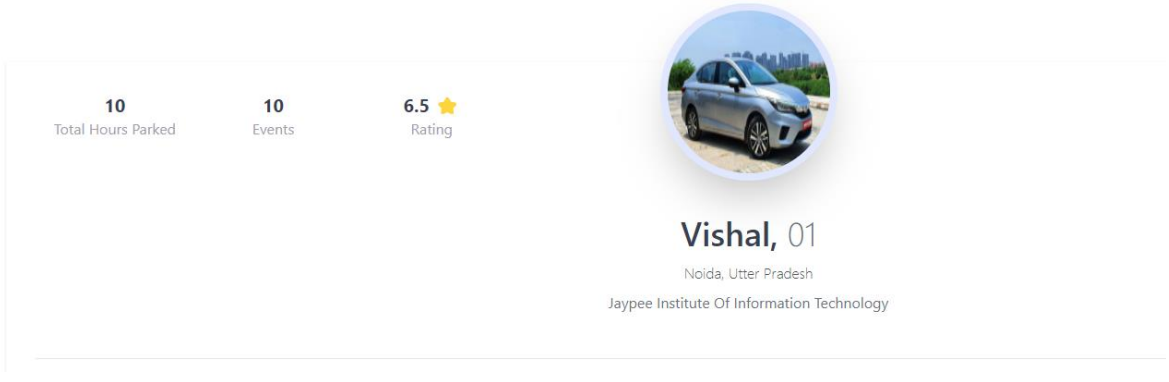

Fig 4.4 *(Profile of the user who are signed up)*

Scanner

User has to scan the QR which has been given to him/her on the web application as shown in *(Fig. 4.5)*. As soon as user scans the QR his/her car gets registered in the parking and 'In time' gets noted.

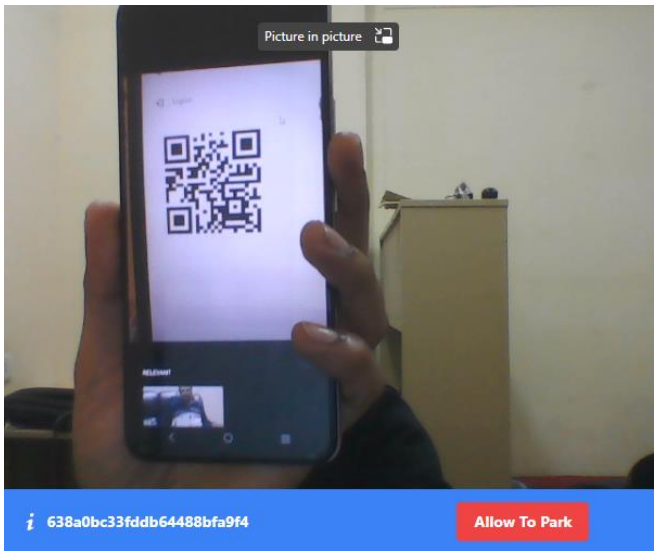

Fig 4.5 *(Scanner which scans the QR)*

Users Information along with QR

User has multiple options which pops from the left side of the web application and it offers option of Profile which redirects to user's profile, History which shows history of car parking, it also has a logout option which logs user out and takes him/her back to the login page as shown in *(Fig. 4.6)*.

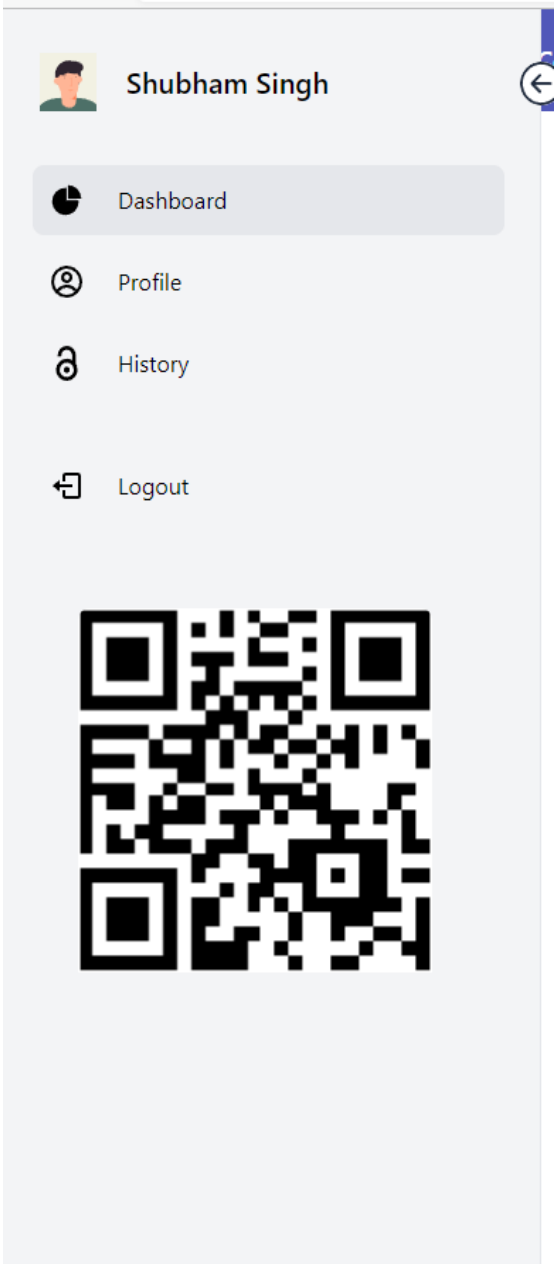

Fig 4.6 *(Users Information and QR provided)*

Admin's Frontend UI

Cars parked in the parking

Parking Owner who is also the admin has access to the information such as QR code of the car and duration of the car in the parking as shown in *(Fig. 4.7)*.

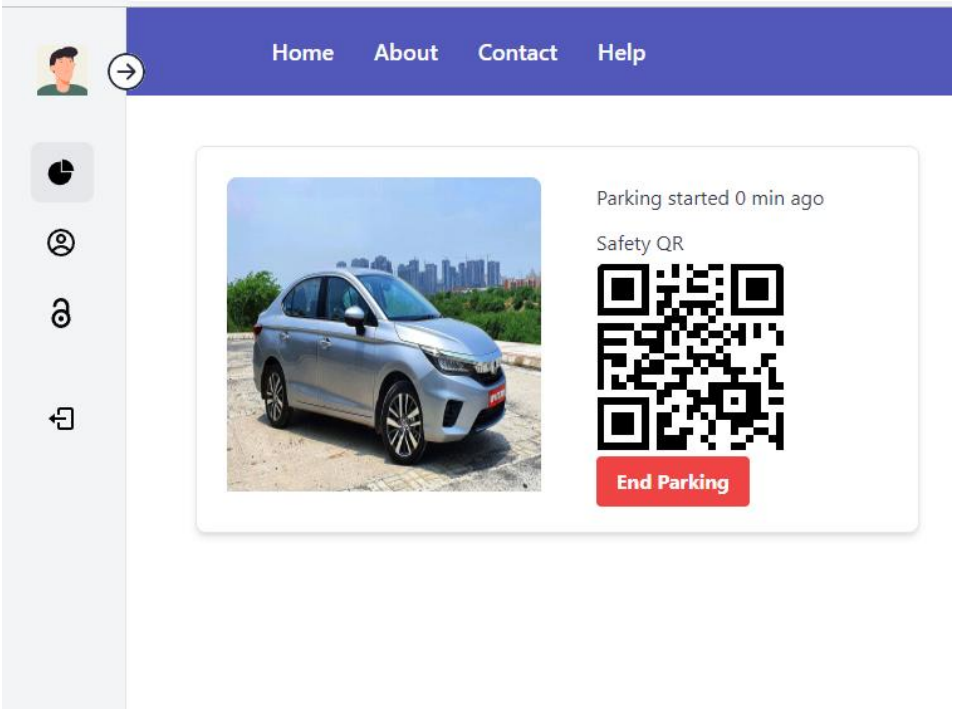

Fig 4.7 *(Information of cars parked)*

4.2 Backend

Back-end acts as a web application structure and facilitates the use of web application dynamically. This part of the project is written using JavaScript's web framework Node.js and module Express.js.

Different modules implemented at backend are as follows:

4.3 Webpages

4.3.1 Login Page

Login Page enables user to register himself/herself in the web application. It facilitates user to fill in his/her credentials and pass the initial security layer. This has been elementally depicted in *(Table 4.1)*.

Table 4.1 *(This table elaborates login page)*

Description	The registered user can login and then park their cars
Inputs	Username and Password
Processing	Check for the user if it is present in the database
Outputs	If username and password are present in the database then it will login.

4.3.2 Sign Up page

Users can register themselves if they are already not registered through the sign-up page. User has to fill his/her details which includes car owner's name, his/her email ID, and password for protection of his ID. This has been elementally depicted in *(Table 4.2)*.

Table 4.2 *(This table elaborates user sign-up option)*

Description	Signup option for user
Inputs	Username, Email and Password.
Processing	Check for the user if it is present in the database.
Outputs	If username and password are not present in the database then the user will sign up/register.

4.3.3 QR Generation

This web application gives every user a unique identity using Quick response codes, users as well as admin can use this identity to track information. QR codes are generated using an inbuilt feature of Node Js. This has been elementally depicted in *(Table 4.3)*.

Table 4.3 *(This table talks about how QR is generated)*

Description	QR is generated using user info
Inputs	User ID
Processing	QR is generated and unique hash is created for each QR
Outputs	Unique QR is displayed in user's dashboard

4.3.4 QR Saving

Every QR that has been created needs to be saved in the backend so that it can be referred when required and can be used to authenticate the user at the time of exit. These QRs are the Identity of users so they need to remain intact. QR saving has been elementally depicted in *(Table 4.4)*.

Table 4.4 *(This table describes the QR saving this is used to provide every car with a unique identity)*

Description	QR is saved at the backend with details of the user.
Inputs	User info
Processing	It will process user's ID
Outputs	Forwarded to the page where if shows parking status

4.3.5 Entry and Exit Time

Entry and Exit time of User is noted using QR codes. As soon as user scans the QR technically user has entered the Parking so Entry time becomes the time of scanning of the QR. User has an option to exit the parking when user opts for the same the time is noted and the timer which is calculating the total time stops.

This has been elementally depicted in *(Table 4.5)*.

Table 4.5 *(This table describes about entry and exit of the car in and out of the parking)*

Description	At the time of entry, the web application will note the IN time and at the time of exit it will note the OUT time.
Inputs	QR is taken as input
Processing	It will add and remove cars from the database.
Outputs	It will add and display IN time and remove the car and display OUT time.

4.4 Giving All the Cars a Unique Identity

We have added various unique features for ensuring fast and contactless parking which ultimately leads to trust, satisfaction and convenience of a user.

4.4.1 Generating a unique QR code

We will generate a unique code and will provide that code to the user.

4.4.2 Scanning QR

The Unique QR code will be scanned by the web application and will be mapped.

4.4.3 Saving QR

QRs are saved in the backend after being mapped to the user. Saved QRs are used to identify the users by giving them a unique identity.

Chapter 5: Implementation

5.1 Frontend

The frontend of the web application is the thing the user sees and it should be user friendly and beautiful. Frontend part of this project is implemented using The Hypertext Markup Language or HTML. It is the standard language which is used for documented designing of the web browser. It can be assisted by technologies such as CSS or Cascading Style Sheets and scripting languages such as JavaScript. Majority part of the web application UI is implemented using React.js and is used to build web application dynamic. React is a free and open-source front-end JavaScript library for building user interfaces based on UI components.

5.2 Backend

The backend of this web application is implemented using Node.js and Node.js framework Express.js. Node Js is an open-source web development, cross platform JavaScript based runtime environment. Node js and Express Js help to connect with the database. Parser is used for the encoding and decoding of the string and objects.

5.3 Database

The database of this project is implemented using mongo db. In this project mongo dB cloud service is used called mongo Atlas. Mongo Atlas helps the user to deploy data on the mongo cloud which makes it easy for the developer to upload data.

5.4 Additional features

We will generate a unique code and will provide that code to the user. The Unique QR code will be scanned by the web application and will be mapped. QRs are saved in the backend after being mapped to the user. Saved QRs are used to identify the users by giving them a unique identity.

Chapter 6: Skills Developed

The languages learned and implemented during the project were React JS, Node JS, Express JS and MongoDB.

React Js is a JavaScript library used to build user interfaces. It contains some predefined functions. React is a front-end web technology. For the backend, we learned & implemented Node JS and Express JS modules. As we know, backend is the core of any web development project. Node JS is widely used for the same. Node.js allows the creation of Web servers and networking tools using JavaScript and a collection of "modules" that handle various core functionalities.

Node.js is an open-source server environment. Node.js allows you to run JavaScript on the server.
Node JS gets a response and gives a reply in every query. That is how the backend connects with the frontend.

Express is a minimal and flexible Node.js web application framework that provides a robust set of features to develop web and mobile applications. It allows setting up middle wares to respond to HTTP Requests. It dynamically renders HTML Pages based on passing arguments to templates.

Chapter 7: Results

Finally, we have a web application which facilitates user to login himself/herself and get registered. If the user is not already registered then he/she can do so by signing up from the Sign-Up page. After the initial layer of security is passed then a Unique QR code is generated for the user, this QR code plays a very crucial role in identification of the user and many other essential tasks. Once the QR is scanned by the web application the user gets a parking slot in the parking and his/her time of parking starts from 0. At this point his/her in time is duly noted. When user Exits the parking lot by clicking on the exit option, out time is noted and total time of parking is also displayed which can further be used to calculate fare of the user for parking. Now talking about the admin, he/she can view information of all the cars that have been parked in his parking lot. Admin can also see users which recently left the parking and what were there in and out timings along with the fare. This has been elementally depicted in *(Table 7.1)*. In the end we are ready with the application which facilitates us with effective car parking.

Table 7.1 (*This table elaborates the result we get from the web application)*

Feature	Input	Output	Expected Output
Login	USERID and password	User will login	If the username and password is correct it will log in else not
Sign Up	Owners Name, Email Address and Password	User is signed up.	New user is successfully registered.
Add the car	QR code is used to scan	QR code scanned and saved	The QR code is generated and then saved and IN time is noted.
Exit Parking	Exit button	QR is released	The OUT time of the car is noted.

Chapter 8: Conclusion

A complete parking management system which enables users to park their car without any human intervention is being implemented. This web application lets user get themselves registered. Then Unique ID of the user is being stored in the form of Quick Response Codes. In due course of parking the parking time is noted by taking IN and OUT time in consideration. The User is able to see his car parking details as well as his IN and OUT time. User and admin are also provided with total time of the parking. This is used to calculate fare of parking by the admin. Admin is also given some powers, he/she can view all the information of the cars which are currently parked cars which were parked recently as well. Admin has the power to remove any car from the parking. In the end we are ready with the application which facilitates us with effective car parking.

Future Scope

This project can be connected with IOT devices and thus can fully be automated without any use of scanning the QR code. Payment Interface can be made and payment can be easily decided by the calculation of time stayed in the parking. Payments can be deducted from your e-wallet accounts like Fast tags. Multiple Car parking Management systems can be integrated and thus users will be able to search for nearest parking and use the facility provided.

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