PARKING STREET :
KNOW YOUR PARKING

A PROJECT REPORT
BY

TEAM NO. 89

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SUBMITTED TO

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DECLARATION

We hereby declare that the work which is being presented in the report entitled “Parking Street : Know Your Parking”, is an authentic record of our own work carried out during the period from August, 2020 to November, 2020 at Department of Computer Science and Engineering, Bennett University Greater Noida.

The matters and the results presented in this report have not been submitted by us for the award of any other degree elsewhere.

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ACKNOWLEDGEMENT

We would like to take this opportunity to express our deepest gratitude to our mentor, **Dr. SHAKTI SHARMA** for guiding, supporting, and helping us in every possible way. We were extremely fortunate to have him as our mentor as he provided insightful solutions to problems faced by us thus contributing immensely towards the completion of this capstone project. We would also like to express our deepest gratitude to VC, DEAN, HOD, faculty members and friends who helped us in successful completion of this capstone project.

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ABSTRACT

Parking street is a web-based application that focuses on elements of administration needs of businesses having large parking spaces and simultaneously solves problems for the customers having trouble parking their vehicle. This customizable integrated system is designed to manage all the operations related to parking of a business entity such as parking history, registering and managing employees, billing. It also has visual elements to show the traffic on a particular day and other customizable elements to categorize data.

The hotel administration is linked with their employees to manage their queries and communicate with them. Parking street also offers a valet parking system mode where the customers are given a QR code at the entrance of the parking and are aided to scan the QR code before leaving so that the car can be fetched before they arrive at the gate.

Parking-Street is essential for all business entities having a parking space and heavy traffic. The main goal is to computerize all the details. Registering with Parking street results in administrative functions, analyzing the market and hence better customer services and even better returns.

Parking-Street organizes the stable functioning of every parking interaction. Parking Street keeps track of all the actions performed. The hotel administration is allowed to collect all its information in one place. This data is further processed to make it classified and accessible only to authorized users.

1. INTRODUCTION

Parking is an emerging problem. The search for a parking space is becoming more and more frustrating for people. Factors like lack of sufficient parking space and a constant increase in the number of vehicles only add to the difficulties. Hotels, restaurants, malls and other such localities which provide the facility of parking, have a hard time managing their parking lots. The current method used by them is entirely manual and time consuming.

Smart parking system can resolve almost all the drawbacks of the traditional parking system. It will completely digitalise the whole process. It has been concluded, through various surveys and researches, that it is a great idea. But it is still in its growing stage and needs both, more work and more recognition by society.

1.1. Problem Statement

In the traditional parking system, we have to perform some highly focused maneuvers in order to park our vehicles. Whether it is the searching for a spot with the continuous honking behind us or the hassle of moving to a whole new location just to park the vehicle. The issue of a crammed parking space is very common, due to the absence of an alert system regarding the occupancy of the parking spaces. The owners of the vehicle have no information about the parking spaces of their opted destination prior to reaching that place.

With traditional valet parking systems, the customers have to wait at the exit for quite some time before the arrival of their vehicles. All these problems were a result of the lack of user-friendly management systems for the vehicles parked in the parking lots.

Our project, Parking-Street, aims at solving these problems.

2. BACKGROUND RESEARCH

Various articles have been written about smart parking and its impact on the current parking system. Several researches and surveys have also been conducted in this field. All these articles, research papers and surveys all talk about how smart parking is the future. How, even though it still has a long way to go, its importance and impact on society will only increase with time.

An article on 'Vehicle Parking System' by E.M Tamil, N.M. Noor, Y. Y. Leng, Z. Razok and M. Y. I. Idris states that with the continuous increase in the amount of cars/vehicles on the road, parking and issues related to parking were sure to exist, and that a sharp and smart system for parking will help the current vehicle parking facilities and transportation facilities, in coping with the inrush of vehicles.

Ryan Citron's Forbes article discusses the advancement of a smart and mindful parking industry and how the future, it is relied upon to be essentially affected by the appearance of mechanized vehicles (AVs). It states that around the world, various cities have begun trials for vehicles that are self-parking, specialized tools for automated vehicle parking, and valets that are robotic for parking. They are also recognizing that the infrastructure of smart systems (i.e., communication networks and sensors) can be leveraged to help in enabling the vehicles of the future to park themselves. All these developments are predicted to result in an expansion of the smart parking industry.

'A Survey of Smart Parking Solutions' is a paper that considers smart and shrewd parking as a tactical idea to work on, from not just an analytical point of view, but also for monetary welfare.

G.M Khan, H. Zafar, M, Rahman, S. A. Mahmud and Faheem wrote a paper called 'A Survey of Intelligent Car Parking System' where they talk about several smart parking systems that could decrease issues emerging due to nonexistence of contemporary, efficient and dependable parking systems.

Links for some other reviews related to smart parking.

1. https://guidehouseinsights.com/reports/smart-parking-systems
2. https://scialert.net/fulltext/?doi=itj.2009.101.113
3. https://www.forbes.com/sites/pikeresearch/2017/01/26/smart-parking/#6a94e4b662f6
4. https://www.elsevier.es/en-revista-journal-applied-research-technology-jart-81-articulo-a-survey-intelligent-car-parking-S1665642313715803
5. http://urbanmobilityindia.in/upload/conference/f37401ef-affe-4786-935a-39480ee3579c.pdf
6. Parmar, Janak & Das, Pritikana & Azad, Farhat & Dave, Sanjay & Kumar, Ravindra. (2019). Evaluation of parking characteristics: a case study of Delhi.
7. Revathi, G. & Dhulipala, V.R.Sarma. (2012). Smart parking systems and sensors: A survey. 2012 International Conference on Computing, Communication and Applications, ICCCA 2012. 10.1109/ICCCA.2012.6179195.
8. http://www.urbanmobilityindia.in/Upload/Conference/a3ee2c08-747d-45b3-b7fb-97395eda4455.pdf

2.1. Proposed System

This project aims at converting the existing parking system into a smart parking system. By using the concept of real-time data acquisition, we hope to put forward a platform which would not only make it easier for the public to find a parking spot but will also allow hotels, malls, restaurants and other localities with parking spaces to manage their incoming traffic in a much more efficient way. Our platform would also provide tools to tackle the problems faced in a traditional Valet parking system.

2.2. Goals and Objectives

Table 1:

Goal and Objectives

#	Goal or Objective
1	Creating a web application where the customer would be able to see the current (real-time) status of parking lots.
2	Making a good interface for the web application - it should be clear, concise, efficient and attractive.
3	Making a system which manages the data with full security.
4	To have fun working on the project.

3. PROJECT PLANNING

3.1. Project Lifecycle

The team will use an acute approach to tackle the problems. Our team will gather all the necessary details, data that is required and will create a high level development plan for the project and then implement the things as such to make the final product. The team will follow a fast and effective way with an emphasis on frequent meetings and collaborate wherever and whenever required.

3.2. Project Setup

Table 2:

#	Decision Description
1	Windows 10, HTML,CSS, PHP ,Mysql,. Git, Github etc.
2	Using visual studio to coordinate with team members to code simultaneously
3	Open source releases, confidentiality structures, advantages required for unique access, etc
4	Using the XAMPP server as the localhost for our website to run and phpmyadmin that contains the database for the website.

3.3. Stakeholders

Table 3:

Stakeholders

Stakeholder	Role
Shakti Sharma	Mentor
Tarussi Shailendra Singh	Team Member
Shourya Mupparupa	Team Member
Swapnil Agrawal	Team member

3.4. Project Resources

Table 4:

Resources

Resource	Resource Description	Quantity
Database Server	MySQL would be used as a database server for this project.	1
Project Team	Tarussi,Swapnil and Shourya will be the primary developers of the project.	3
Dr. Shakti Sharma	Our mentor who will provide us with technical assistance.	1
Visual Studio	Visual Studio would be used as the main platform for all the programming.	1
Windows OS	A laptop with windows OS would be used to develop and test the functioning of our web application.	3

3.5. Assumptions

Table 5:

Assumptions

#	Assumption
A1	Our team and mentors will be able to meet face to face twice a week.
A2	Team will try to implement the basic front-end within the first week to get a glimpse of how the final product will look like.
A3	Team members will try to familiarise themselves with the knowledge of PHP and MySql.
A4	Team will have sufficient time to complete a working model to present it by the end of the semester
A5	Team members will try to implement the things to get the values in real time.

4. PROJECT TRACKING

4.1. Tracking

Table 6:

Information	Description	Link
Code Storage	Project code will be stored in a Github repository.	Link
Project Documents and Assignments	Weekly reports, specification and design documents, etc. will be stored in our Google Drive.	

4.2. Communication Plan

Table 7:

Regularly Scheduled Meetings

Meeting Type	Frequency/Schedule	Who Attends
Discord Meeting	Daily	Team members
Conference Call Meeting	Weekly	Project team
Review Meeting	Weekly in class	Project team and Dr. Shakti Sharma (Mentor)

Table 8:

Information To Be Shared Within Our Group

Who?	What Information?	When?	How?
Team Members	Update on everything done so far	Weekly	Team meetings, listing in Project Specification.

Table 9:

Information To Be Provided To Other Groups

Who?	What Information?	When?	How?
Dr. Shakti Sharma (Mentor)	Final deliverables	At completion of the project	Project Report, Code, Video, Blog, Twitter Post and PowerPoint presentation
Dr. Shakti Sharma (Mentor)	Weekly report	Weekly	Demo in class

Table 10:

Information Needed From Other Groups

Who?	What Information?	When?	How?
Dr. Shakti Sharma (Mentor)	Requirement changes	Monday and Tuesday of every week	On Microsoft Teams

4.3. Deliverables

Table 11:

Deliverables

#	Deliverable	Links
1	Code-	https://github.com/swapnilag78/Parking_street_final
2	Final Report	
3	Blog	https://mshourya9.medium.com/parking-street-a-smart-parking-system-1a77d57f3a
4	PowerPoint Presentation	
5	Video	https://youtu.be/Hv06nypKCsY
6	Twitter Post	https://twitter.com/mshourya9/status/1329442668364050436?s=21

5. SYSTEM ANALYSIS AND DESIGN

5.1. Overall Description

This project is an attempt at converting the traditional parking system into a smart parking system. It is a web based application that provides different features to its different users. There are mainly three different types of accounts which can be created on this platform.

The first type of account is a Business account, which can be created when a business (with a parking space), wishes to use this platform to manage their parking lots. In order to create a business account, they would first have to submit details about their business as well as their parking lots. Once their business details have been verified, they would be able to use the platform to manage their parking lots. A business account is further divided into two different types of login - Admin login and Employee login. An Admin login is used by an employee of the business who is responsible for managing both the parking lots and the other employees. An Admin would also be able to pre-book a parking lot for someone. An Employee login is for the employees who would be managing the parking lots, they can change the status of any particular lot and details about the vehicle occupying the lot. They can also generate a bill for the customer based on the duration of their stay.

The second type of account is a Customer account, which can be created by the general public (end-users) to check the availability of the parking lot of a particular place or to pre-book a parking lot.

The third and the last type of account is the admin, this account is for the developers or the or the platform owners who will manage the overall functioning of the web application. They verify each business account and keep a track of all the activities taking place on the platform.

5.2. Users and Roles

Table 12:

Different Types of Users of the Platform

User	Description
Developers / Web Application Owners	The team that is responsible for managing the data of the platform, verifying the businesses which would register with the platform and replying to the queries of the customers.
Customers / End-Users	The general public who would use the platform to check the availability of the parking lots and pre-book a lot.
Business Administration	The Business admins would be people who would register a business account on the platform, manage all the employees as well as the parking lots. They would also be able to pre-book a parking lot as well.
Employees of a business	These are the employees of a business which is registered with the platform, they can manage the parking lot of that business.

5.3. Design diagrams/ UML diagrams/ Flow Charts/ E-R diagrams

5.3.1. Activity Diagrams

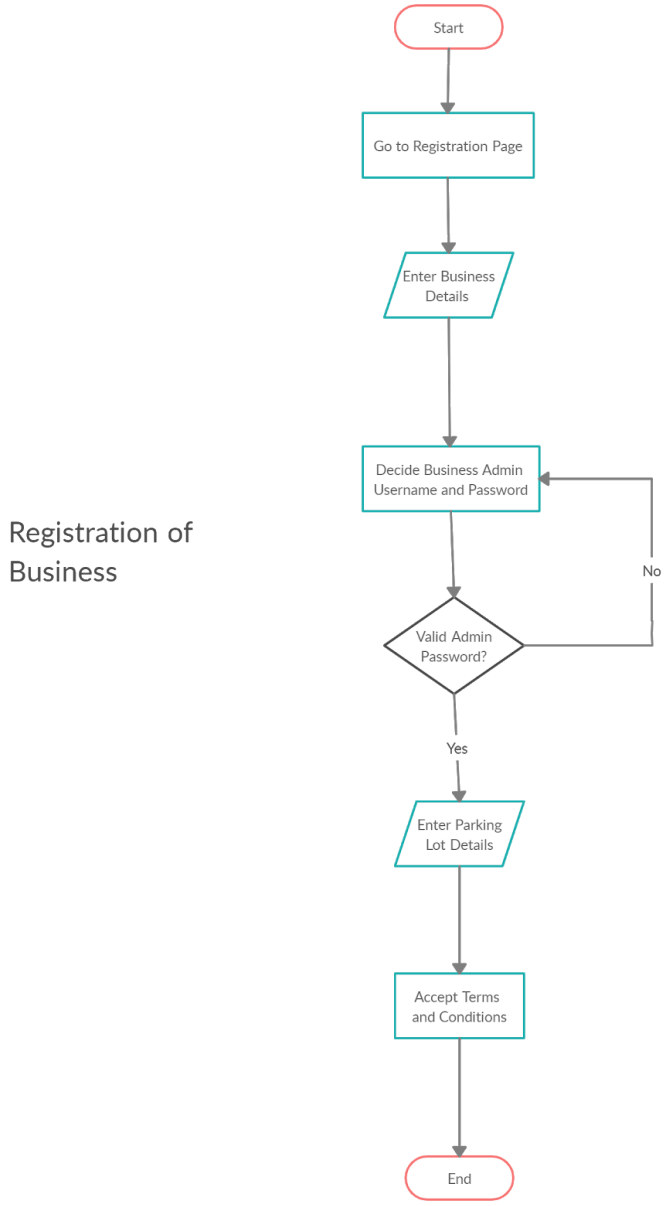


Figure 1: Activity Diagram for the process of registration of a business account on the platform

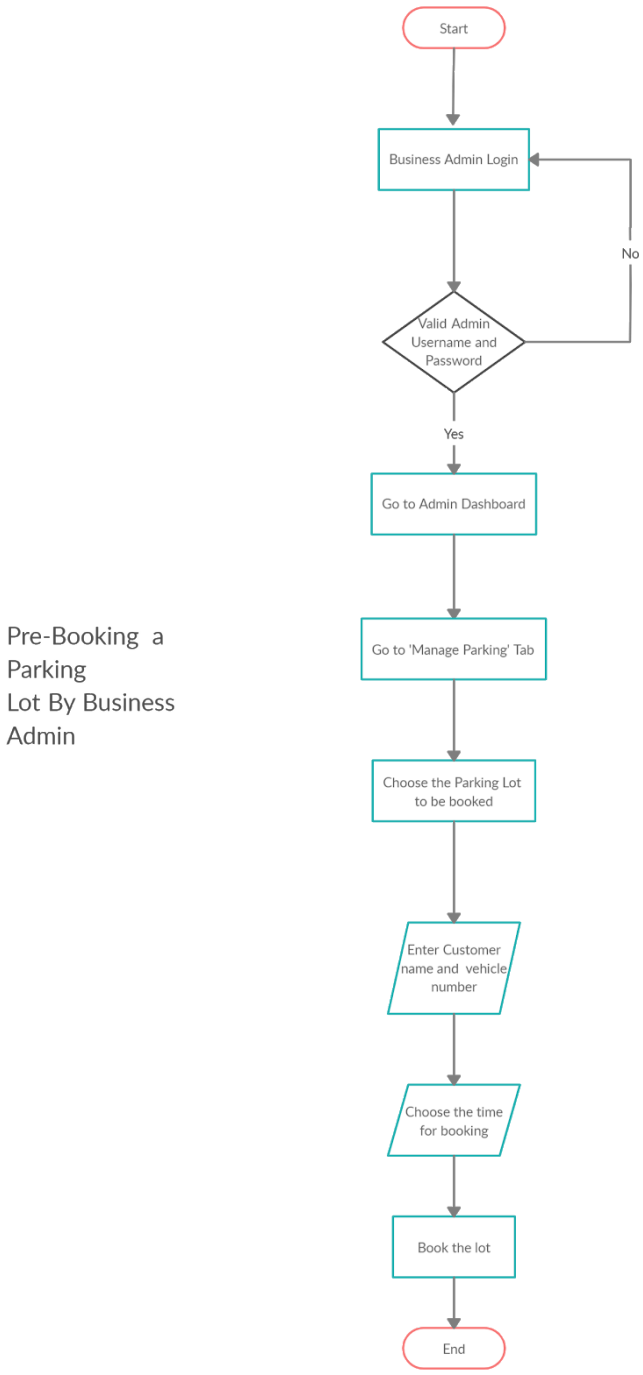


Figure 2: Activity Diagram for the process of pre-booking a parking lot by a registration of a business admin

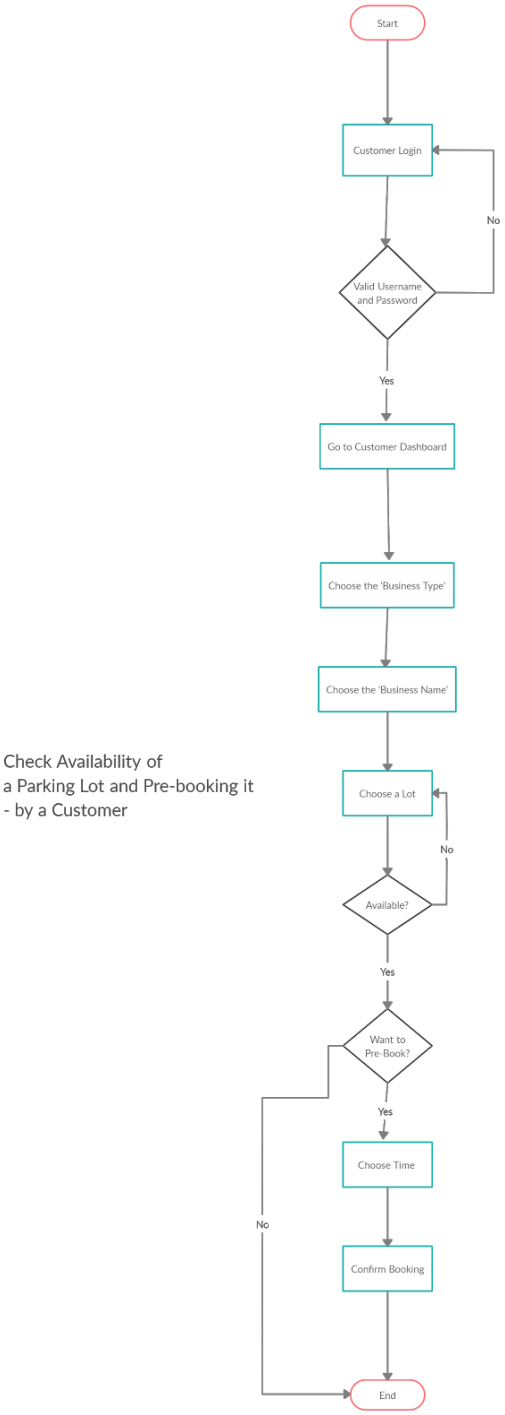


Figure 3: Activity Diagram for the process of checking a parking lot as well as booking it by a customer

Manage Employee
- by Business admin

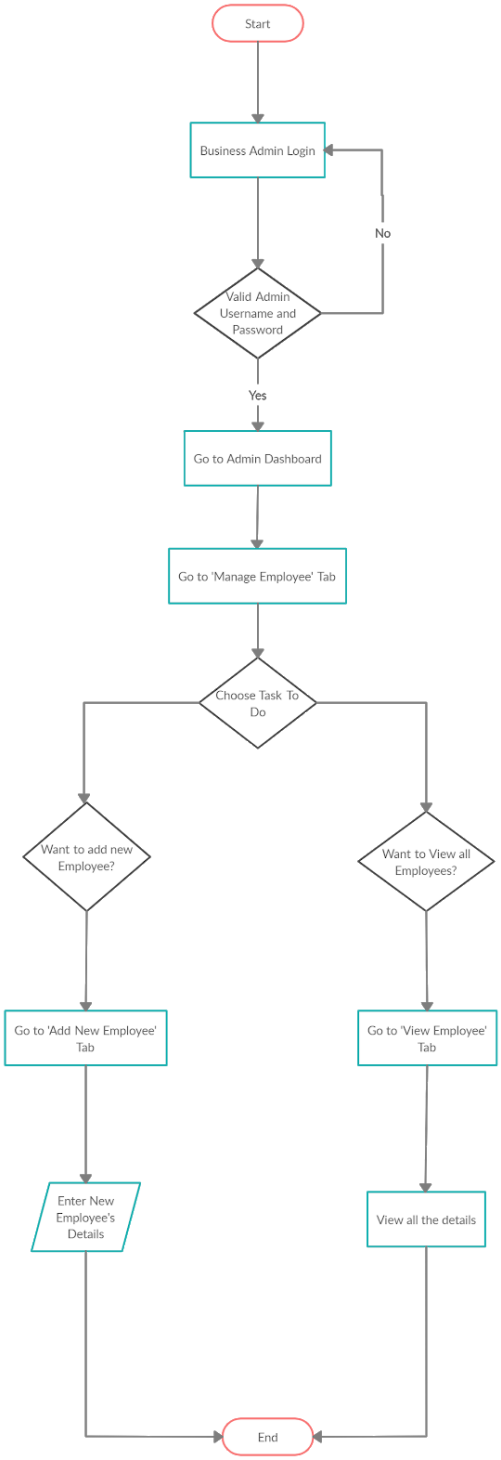


Figure 4: Activity Diagram for the process of managing employees by a business admin

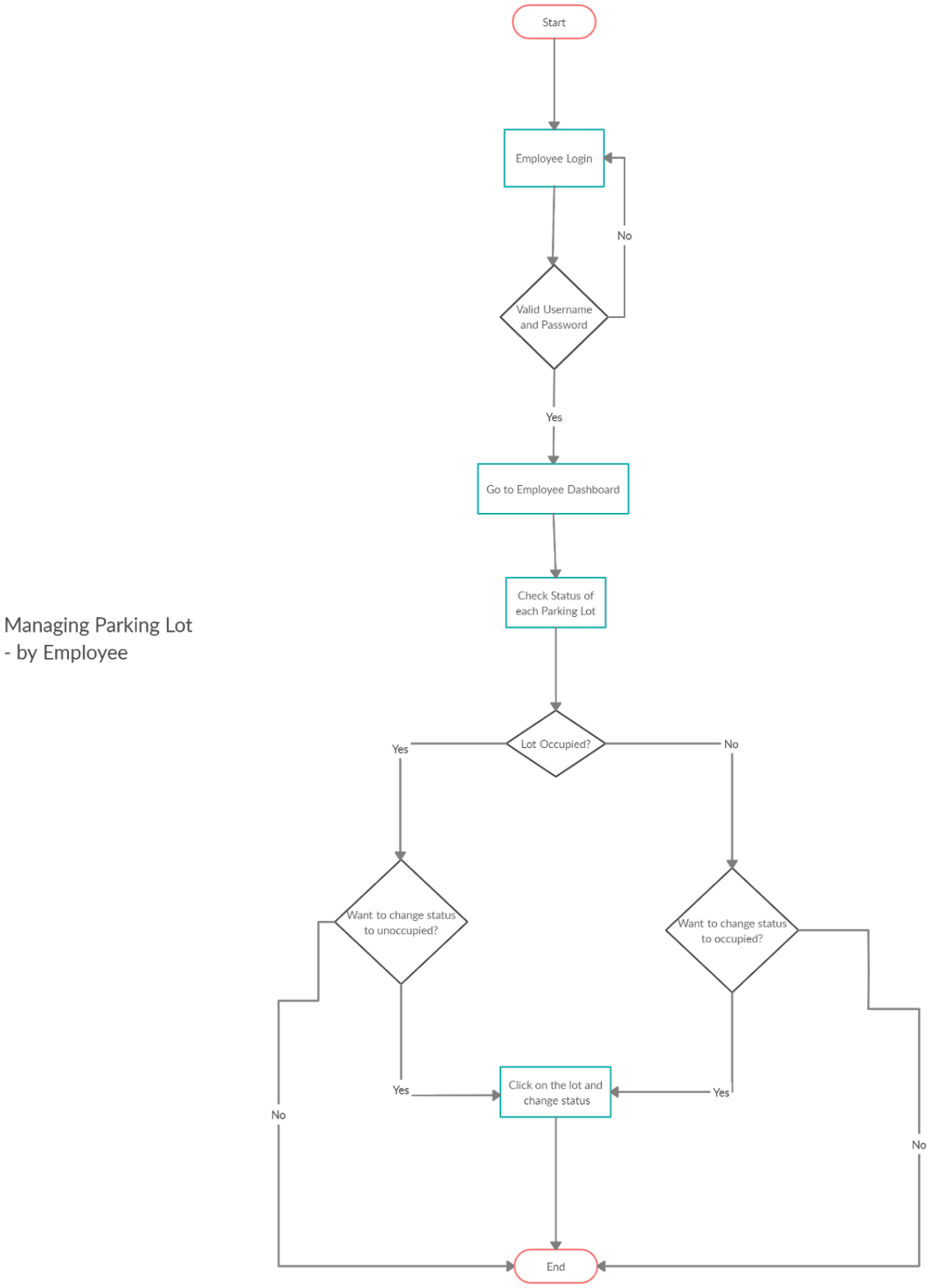


Figure 5: Activity Diagram for the process of managing a parking lot by an employee

5.3.2. Data Architecture

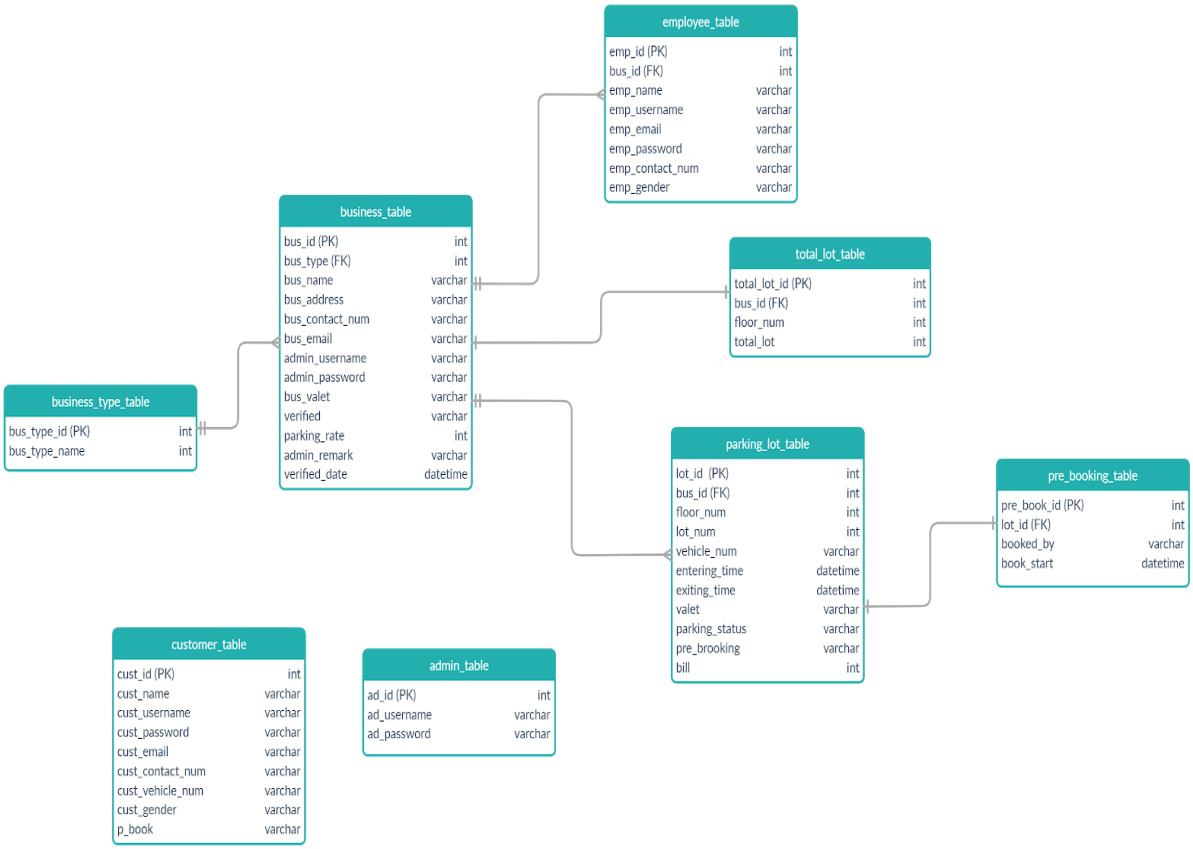


Figure 6: Data Architecture Diagram

6. User Interface

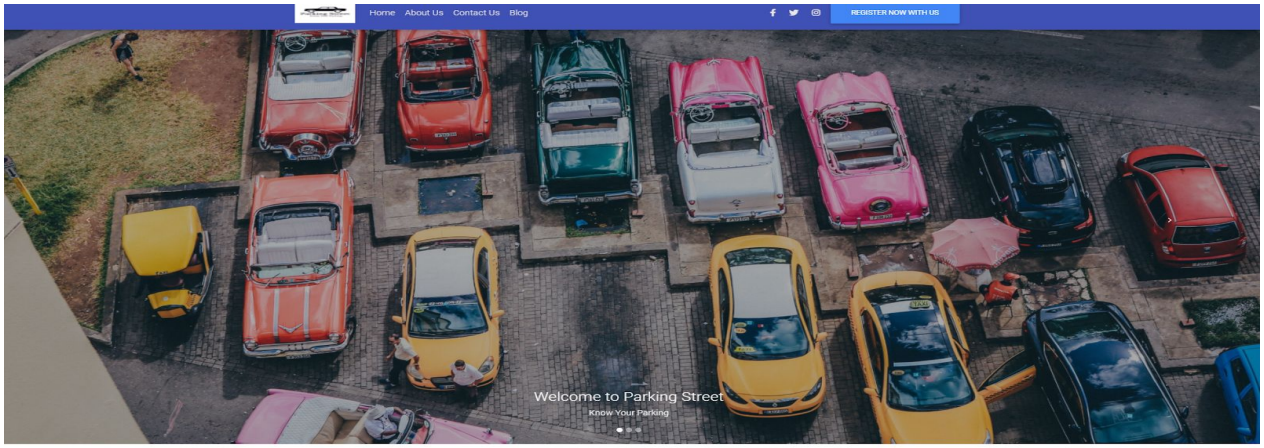
6.1. UI Description

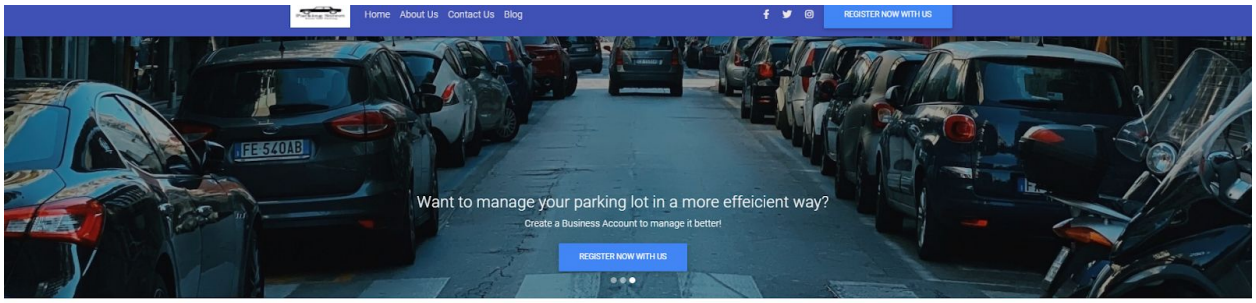
We are creating a web application with different interfaces for different types of users. A good user interface should be clear, concise, efficient and attractive. Our User Interface Design fulfills all of these criteria. Our interface has user-friendly features with visual appeal which makes it attractive and enjoyable to use. Clarity is an important feature of any user centered design, our UI design enables the user to interact with the platform in a very simple manner. They would not face any trouble trying to figure out how the platform works or where they should go next. It's also very concise, so they would also save a lot of their valuable time. Our UI is very efficient as it allows the users to use different features of the application faster and with less effort.

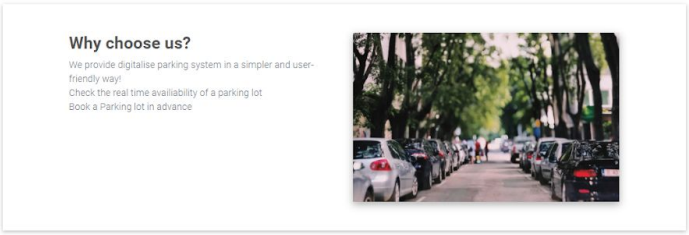
6.2. UI Mockup

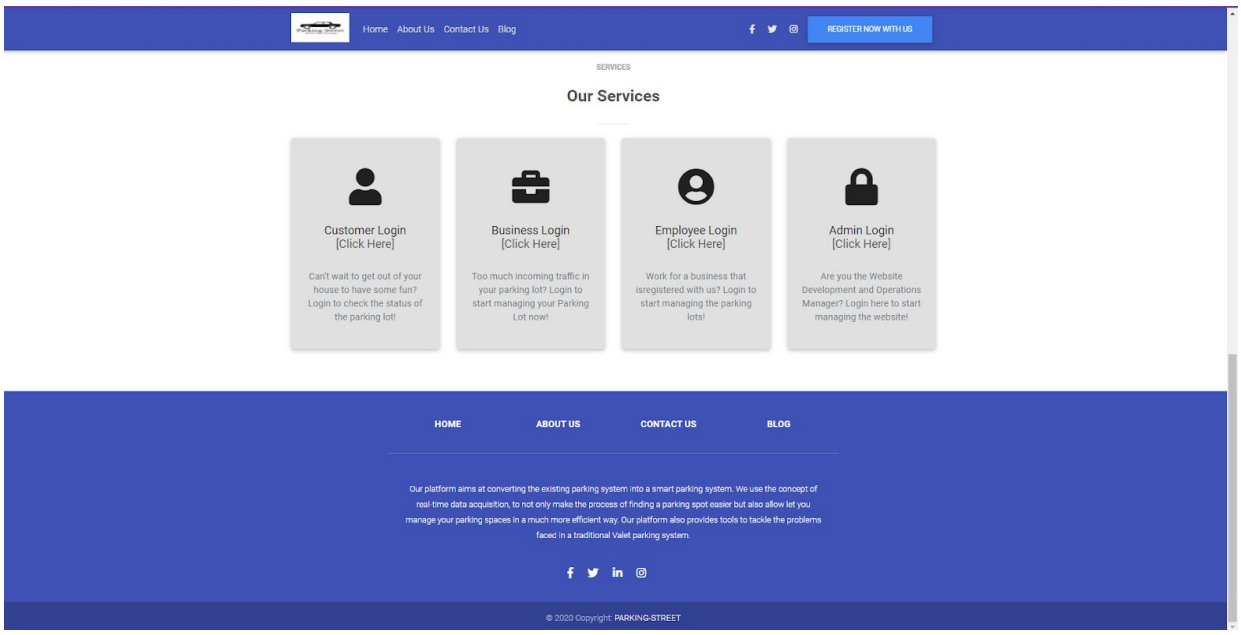
Figure 7:

Screenshots of the Home page of the Web Application




Home About Us Contact Us Blog
REGISTER NOW WITH US
FE 540AB
Want to manage your parking lot in a more effeicient way?
Create a Business Account to manage it better!
REGISTER NOW WITH US


Why choose us?
We provide digitalise parking system in a simpler and user-friendly way!
Check the real time availiability of a parking lot
Book a Parking lot in advance


Home About Us Contact Us Blog
REGISTER NOW WITH US
SERVICES
Our Services
Customer Login
[Click Here]
Can't wait to get out of your house to have some fun? Login to check the status of the parking lot!
Business Login
[Click Here]
Too much incoming traffic in your parking lot? Login to start managing your Parking Lot now!
Employee Login
[Click Here]
Work for a business that isregistered with us? Login to start managing the parking lots!
Admin Login
[Click Here]
Are you the Website Development and Operations Manager? Login here to start managing the website!
HOME
ABOUT US
CONTACT US
BLOG
Our platform aims at converting the existing parking system into a smart parking system. We use the concept of real-time data acquisition, to not only make the process of finding a parking spot easier but also allow let you manage your parking spaces in a much more efficient way. Our platform also provides tools to tackle the problems faced in a traditional Valet parking system.
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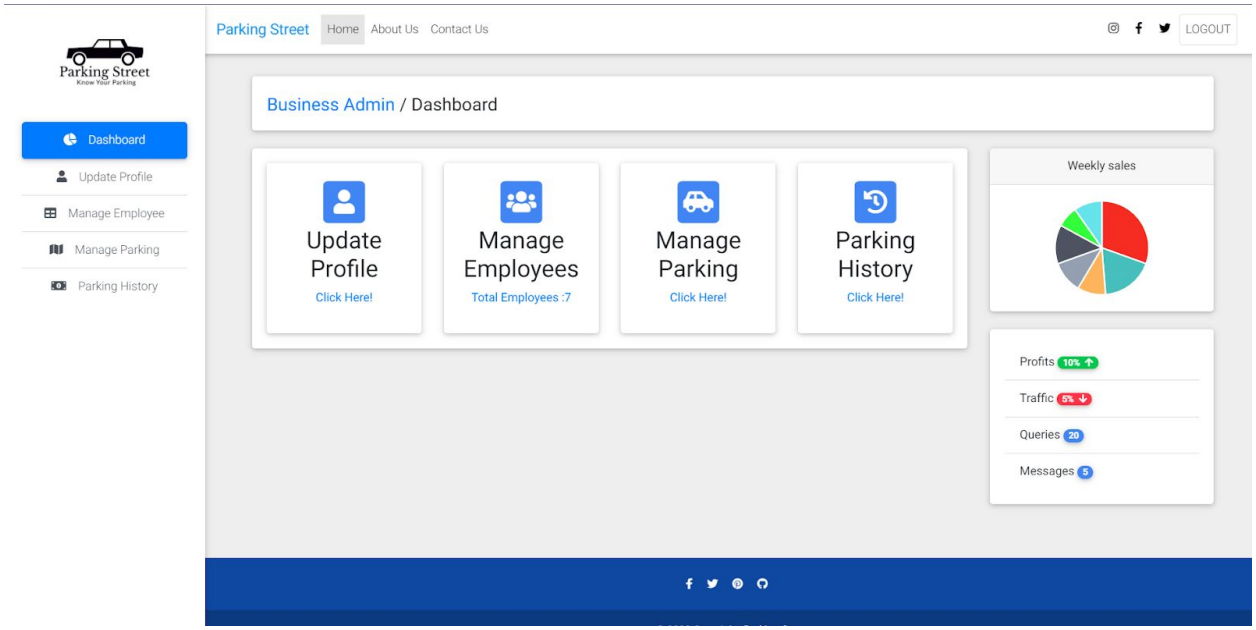
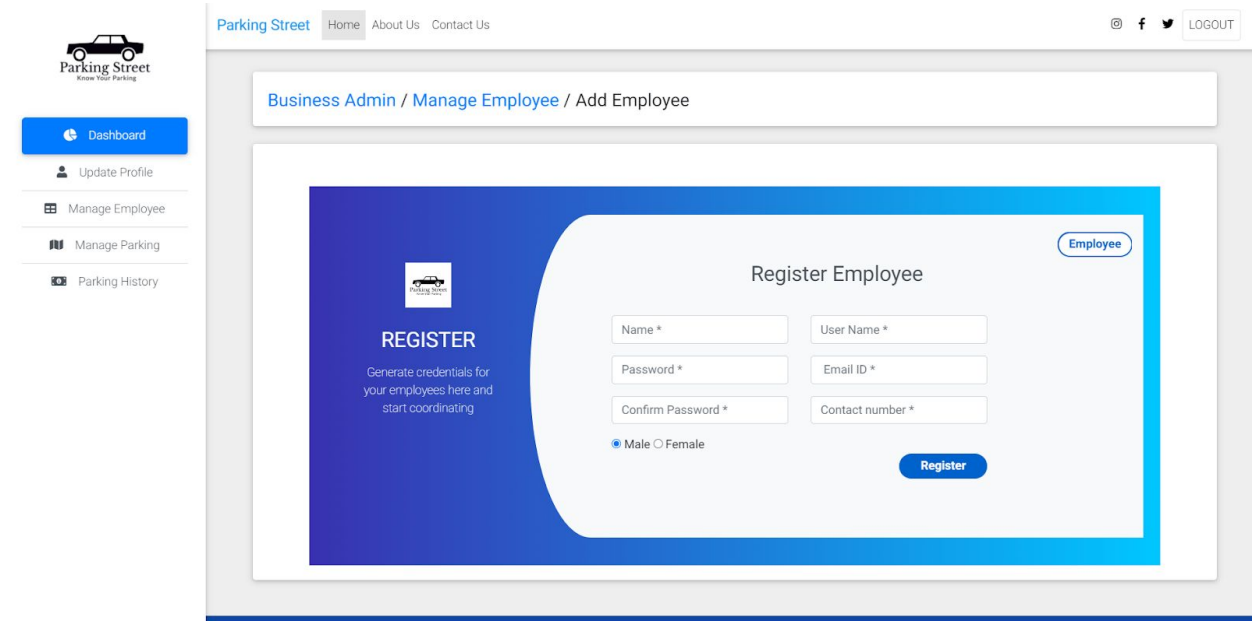
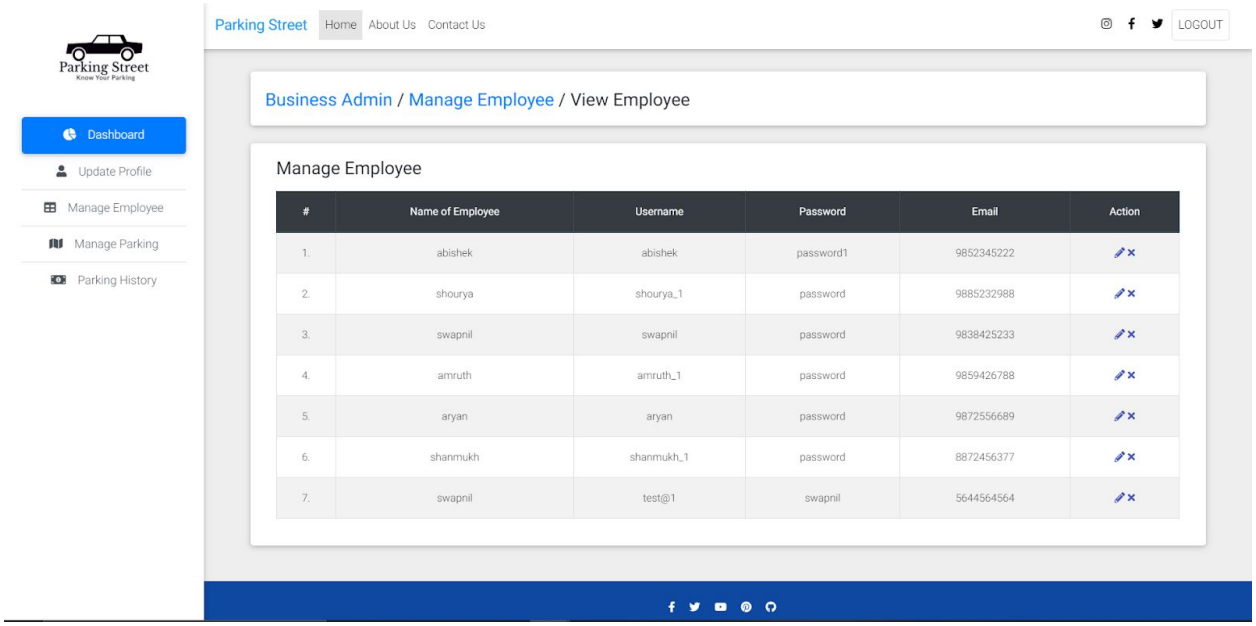
Screenshots of ‘Business Admin Dashboard’



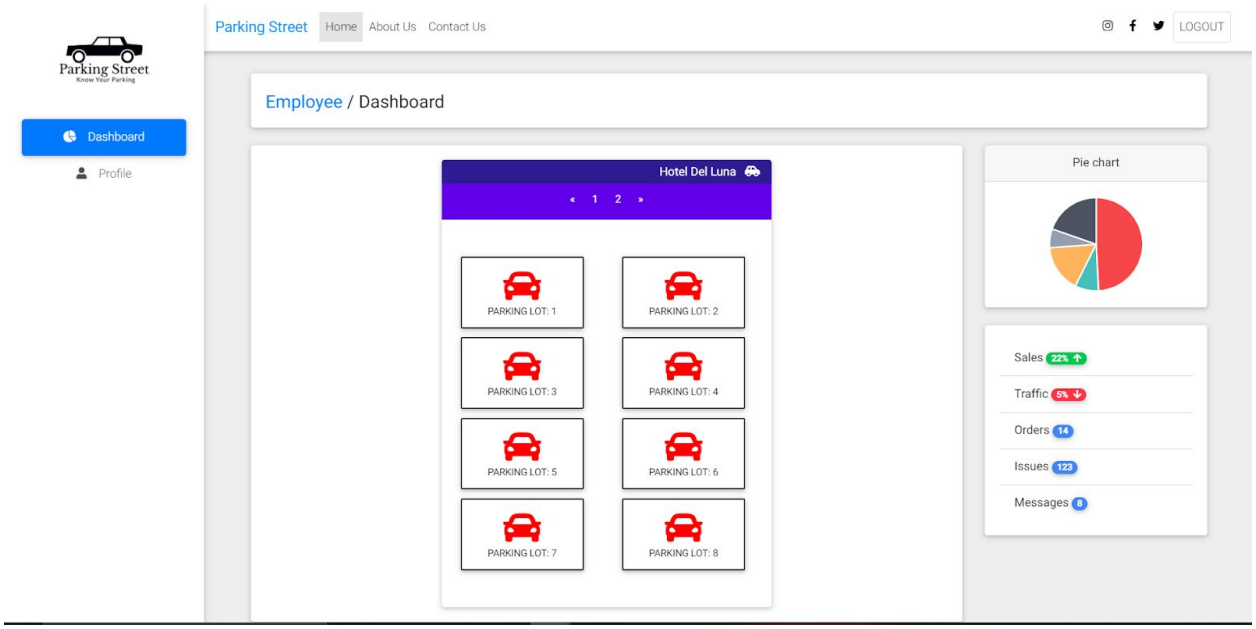
Screenshot of ‘Add Employee’ page from the Admin Dashboard



Screenshot of ‘Manage Employee’ page from the Admin Dashboard



Screenshot of ‘Employee Dashboard’



7. PROJECT CLOSURE

7.1. Goals / Vision

Our goal for this project was to create a simple, fast and efficient UI for the customers and Hotels to get their parking done in an efficient way possible that will reduce the time that the traditional valet parking usually takes. Firstly, the hotels are being registered with us and based on the information given, a number of parking lots are being generated and customers may be able to book the parking lot according to their choices and also the hotel employee can select the parking lot and they will be provided with the QR code when entering to avoid any difficulty in fetching the vehicle for a particular user.

7.2. Delivered Solution

Our final product which is a web-app is a fully functional website that has four components which consists of Customers, Business, Hotel Employees and the Owners of the website (as overall admin of the website). Every component has different features which makes it more user friendly and moreover customer has a different dashboard where he/she can select the particular hotel and then they can select the parking lot accordingly.

7.3. Remaining Work

Further, for future implementation, we are planning on introducing a feature through which our project will be integrated with the GPS and be able to find nearby parking lots.

We will be making our application more user friendly by machine learning. Since the domain of the project is a business entity, there are many events that are repeated either monthly or yearly. We will be using machine learning where in the linear equation the tangents can be date and time, and the customer will be notified before the event that was supposed to happen. and a prediction model from the data of the parking lots, to manage their parking in a more efficient way and know their market.