

**SMART CARPOOLING SERVICE**

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This Report Presented in Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Science in Computer Science and Engineering.

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**DECEMBER 2021**

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**Chairman**

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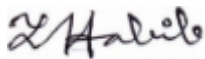
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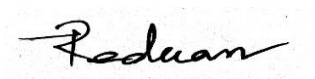
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## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mr. Dewan Mamun Raza, Senior Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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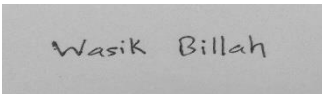
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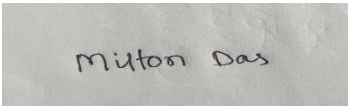
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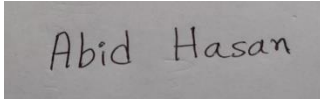
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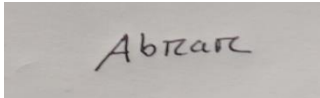
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Finally, we must acknowledge with due respect the constant support and patients of our parents.

## **ABSTRACT**

Carpooling has become a very practical and popular way of transportation nowadays. It is such a transport system where one person shares his/her private transportation with others while going to the same destination. As the traditional transportation becoming very costly so people are starting to love this carpooling system. It is a mutual cost benefits for the riders and the passenger(s). Also, it is good for the environment as well as reducing traffic congestion because it reduces the number of vehicles in the roads. As there are barely any carpooling services available in our country so, we intend to develop a carpooling platform in this project. Here people will find their desired carpooling vehicles on their desired route at minimal cost. One can set the number of seats they want to share. Other people can start their ride any point between the starting and destination point of the journey. And the total cost will be based on distance and time to complete the ride and the total cost will be divided among the passengers. Even one can reserve a ride for future. There will some security measurement like emergency SOS, position tracking by GPS and so on. People can meet new people and make new friends. For further work we extend our platform in iOS and android application. And we would like to use machine learning to monitor riders and passenger's behavior and match the ride with the person having same characteristics.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

The carpooling system (also referred as car-sharing or ride-sharing) is a smart way of transportation. The demand of carpooling system has increased and it gained a lot of popularity as carpooling is cheaper than the traditional transportation system as well as it is environment friendly.[1] It reduces the number of cars in the road so it reduces energy consumption, lower the carbon emissions and lower the traffic congestion. [1] So, this carpooling system is recommended everywhere. But in our country the traditional ride-sharing platform works in some boundaries. We are building this platform beyond the boundaries so people will easily find their desired transport in their desired route at any time at minimal cost.

### 1.2 Motivation

We live in a time and place where transportation is a huge problem in our daily life. Getting to places have become both time consuming and tiring because of traffic jams and expensive private ride fairs. There are a lot of personal ride-hiring platforms in our country but all of them are far too expensive. It's nearly impossible for most the people in our country to use in a daily manner as most of us who are looking for a ride are from middle class families. So, our goal with this project here is to solve that problem. We want to make it possible so that anyone in need of a ride can get one without thinking of the fair or the availability. With this carpooling system we hope to achieve a lot more than just that. It can reduce congestion, emissions and parking space needed by utilizing empty seats and increasing maximum vehicle occupancy.[2] By sharing private car seats there would be less cars on the road which would also reduce traffic jams which is a huge problem in our country.

### 1.3 Objective

- Making a user-friendly platform where users can find their desired rides and then they can book them.
- Minimizing the cost of transportation.
- For users and drivers creating a live chat option.
- Ensuring the security for the car owner and the passengers.

- Helping in reducing traffic congestion in the roads by reducing the number of cars in the roads. [2]
- Creating a shared platform that both the drivers and the passengers may utilize to achieve their objectives.
- Creating a platform where people will meet new people and new friends
- Establish a solid approach for the system.
- The project's documentation should be created.
- Attempt to create a bug-free and secure system.

#### **1.4 Expected Output of This Project**

After completing this whole project, this platform will help people finding a ride to their requested destination through the most convenient route. This system will make a way to allow people travel at very low cost than the regular transportation. One will be able to meet new people and establish new connections. And ultimately this system will help to reduce traffic in road in the long term by reducing the number of vehicles in the road.

#### **1.5 Report Layout**

##### **Chapter 1: Introduction**

The first chapter states about the overview of the entire project. It gives a brief description of our work and this chapter is divided into followings: introduction, motivation, objective, expected outcome of the project. Followed by the report layout.

##### **Chapter 2: Background Study**

This chapter describes about the study we did on the related systems, systems that are conceptual or implemented. This part also talks about the restrictions and limitations of the systems and the proposed solutions of the problems.

##### **Chapter 3: Specifications, Requirements**

The third section talks about the logical description of the project. The BPM, ER diagram, Use Case diagram and their description is added in this chapter. Also, the requirements to develop this project is discussed.

##### **Chapter 4: Development and Testing**

In this chapter we briefly talked about the development process. How we designed the front-end and how the database is structured etc. Then we mentioned some test case we test on our application.

## **Chapter 5: Features and Design**

Here we show and describe the UI of our project and how the users will use different features of this site. The screenshots of different pages and brief description is also attached here.

## **Chapter 6: Conclusion and Future Work**

And in the final chapter we discuss about some limitations and future of this project. This chapter also describes about the future development of this project.

## **CHAPTER 2**

### **BACKGROUND STUDY**

#### **2.1 Related Work**

This section describes current applications and previous research on the subject of car sharing. Although their model and ours is a bit different but the main objective of these various applications and services are the same as our project. Currently there are many transport services that are available for hiring for the busy crowd of Dhaka, Chittagong and many other major cities of Bangladesh. The taxis and 4-stroke rickshaws introduced in 2003 did not provide satisfactory service. The government has set taxi and rickshaw fares several times, but drivers rarely use meters. They also often refused to go to certain places. That's where this kind of ride sharing apps and services come into play to solve these major problems in an always busy city like Dhaka. With the gradual increase of ride sharing in other developed countries, Bangladeshi company PATHAO established a similar company in Dhaka in 2015. UBER, an American company, began its journey here the following year. Then, OBHAI, OBON, LILY, SHOHOZ. OBON and LILY are run only by women. These are the more widely known applications and services in Bangladesh. On some ride-sharing opportunities, the use of automatic rickshaws was also permitted. SHOHOZ and PATHAO also serve as courier services for e-commerce companies. According to the Bangladesh Road Transport Authority (BRTA), there are 24 carpool services that support thousands of urban dwellers. According to a June 2018 business review by IDLC Finance Ltd, an estimated 500,000 commuters chose a hail trip through the app in November 2017. [4]

These are the applications that are mostly used in this country:

- PATHAO
- UBER

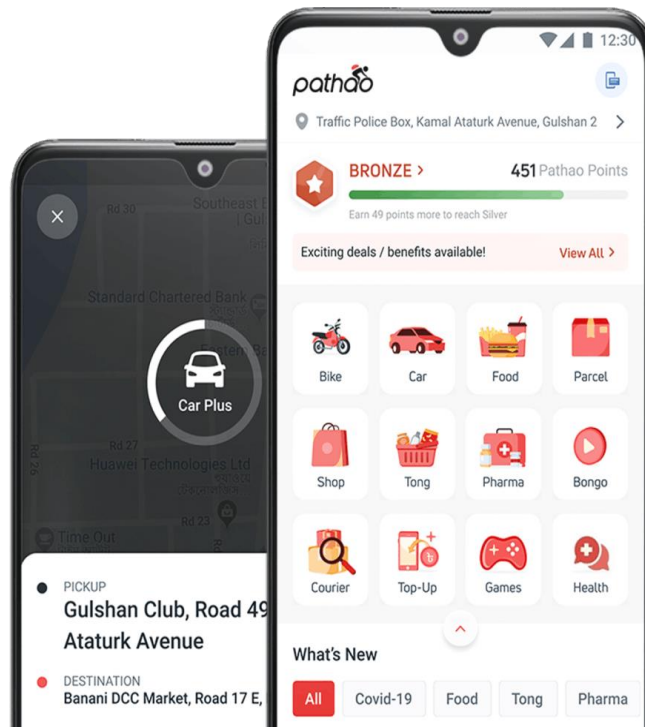
- OBHAI
- SHOHOZ
- MUV

#### **PATHAO:**

PATHAO is one of Bangladesh's most famous ride-sharing platforms and also the most successful one at that. In a short period of time, PATHAO gained a lot of popularity due to its huge driver and cool new discounts. The technique is the same. You point out your pick-up and pick-up location, find and confirm the estimated fare, get a call from the driver who picks you up, and that's it. Get in and drive to your destination. PATHAO also offers bike and car options, available currently only in the major cities of Dhaka, Sylhet and Chittagong. PATHAO also offers other transportation services such as parcel and food delivery. This is a great option for shipping packages in the city. PATHAO also uses cyclists to deliver packages. The PATHAO delivery service also allows you to order food in less than an hour at your favorite restaurant. Tracking the driver through a GPS tracker provides you with the complete freedom and security you deserve. [5]



**Figure 2.1:** Screenshot of PATHAO android app.



**Figure 2.2:** Screenshot of PATHAO android app.

## UBER:

Uber is Bangladesh's only universal ride sharing app. It's also widely known app all over the world. Uber is currently serving in Dhaka and Chittagong, launching in Dhaka in 2017 and growing in popularity instantly. And the process is simple and also hassle-free. As a user, first download the UBER app from google play, enter your name, contact number, and email ID to sign up into the app for the first time. Next, set two locations, a pickup point and a destination. After that an estimated fare will be displayed by the application to help you understand the potential cost of your trip. Now you just have to confirm and then the nearest available ride will see your request for the trip and your exact location. After arriving to your location, the rider will call you to reach exactly where you are. He

will pick you up from there and drop you off at your destination. The Uber has both car and bike options. You can always use your promo code to get exciting new discounts on board. [6]

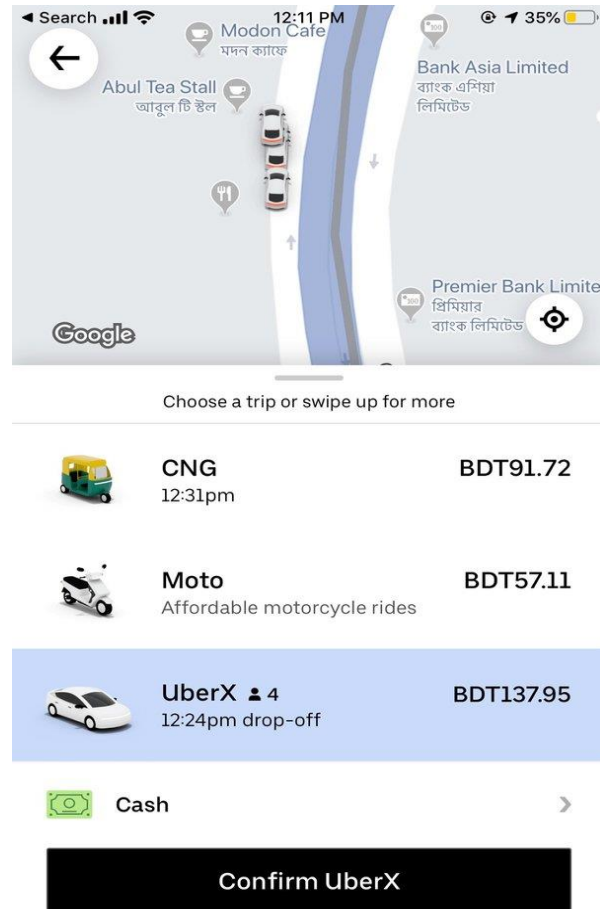
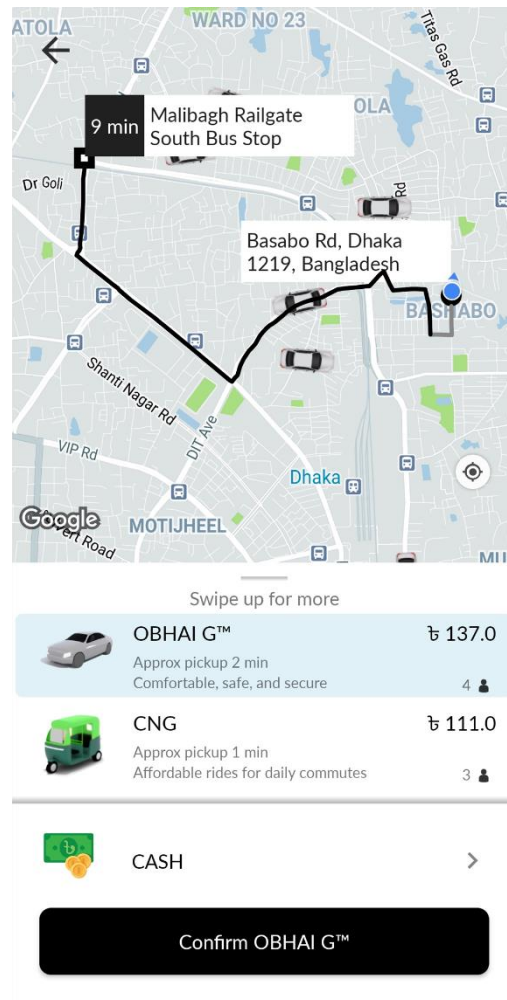


Figure 2.3: UBER android app.

### OBHAI:

According to a press release from the organization, OBHAI is the first ride-sharing company to launch services in cities (Jessore, Cox's Bazar and Khulna) other than the big three. OBHAI was launched in early 2018 to make the lives of urban dwellers in Dhaka more convenient. OBHAI has always been a pioneer in innovation since its creation, developing a variety of services, including the addition of CNG and OBON, in addition to MOTO, which is already widely used in many other ride-sharing. OBHAI's feature, OBON,

is a special female-only service that allows one passenger to ride with another. Since its launch, OBHAI has consistently provided reliable and efficient service to all customers through various unique functions. VTS (Vehicle Tracking System) is installed on all vehicles, and the app has an SOS button. Both features were introduced with maximum security in mind for our customers. OBHAI currently has more than 500,000 users and registered drivers of 150,000. Customers can use OBHAI's services through the app (available on the Google Play Store and iOS App Store).



**Figure 2.4:** Screenshot of OBHAI android app.

## SHOHOZ:

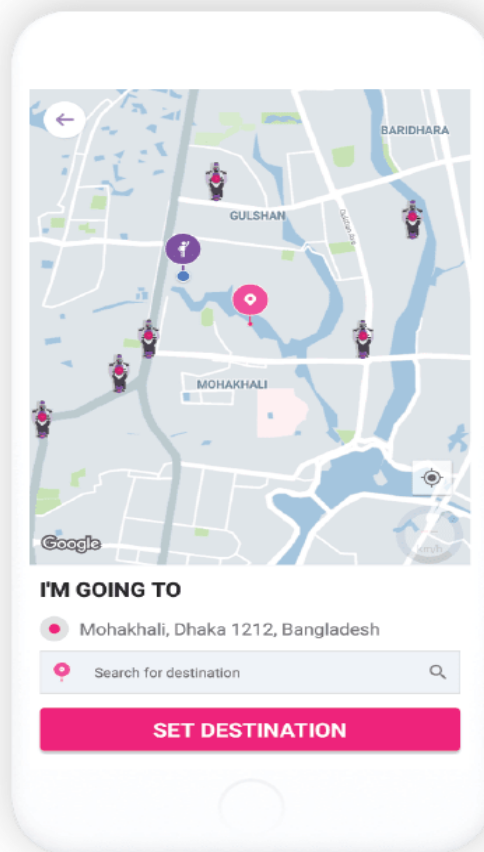
Since 2014, SHOHOZ is popular with travelers for the excellent online ticketing service for long-distance travel by public transport and freight vehicles such as buses, trucks and launches. Currently, SHOHOZ has developed a ride sharing app that allows you to conveniently travel around the city. This service is for cycling only and is as simple as any other ride sharing app. As with any motorcycle calling service, the SHOHOZ app allows passengers to reach their destinations by bicycle. All you have to do is download the app and enter the pick and drop location. Get in and drive to your destination, and when you get off, pay the driver in cash. When you arrive at your destination, you can pay in cash or in your bKash wallet. With the SHOHOZ rides app, you'll always get attractive discounts on every ride. [7]



Figure 2.5: SHOHOZ android app.

## MUV:

MUV launched a ride-sharing service in Dhaka in 2016. This on-demand ride-sharing service aims to help resolve traffic crises in the Bangladesh capital. By downloading and installing the MUV app from the Google Play store, passengers can specify their pick-up points and destinations and send requests to the nearest roaming MUV biker. This mobile software-based motorcycle calling service has begun operations in Bangladesh on behalf of ZP Technologies Limited, a technology company that develops on-demand software to improve people's lifestyles. MUV also offers on-demand grocery delivery and courier services. The MUV offers the cheapest fares in Dhaka. MUV travel expenses are counted at the first distance of BDT 49 and the fare drops to BDT 12 from the next km. The MUV system only calculates BDT 0.49 per minute. The base charge is added to the distance cost. In addition, passengers can enjoy exciting discounts with coupons.



**Figure 2.6:** MUV android app.

**2.2: Comparative Charts of other available ride-sharing services with our application [8] (amount in BDT):**

| <b>Applications</b>      | <b>Initial Fee</b> | <b>Cost per Minute</b> | <b>Cost per KM</b> | <b>Seat Sharing</b> | <b>Service Fee</b> |
|--------------------------|--------------------|------------------------|--------------------|---------------------|--------------------|
| SMART CARPOOLING SERVICE | 25                 | 2                      | 15                 | Yes                 | 0                  |
| PATHAO                   | 25                 | 0.5                    | 12                 | No                  | 0                  |
| UBER                     | 40                 | 3                      | 18                 | No                  | 0                  |
| OBHAI                    | 40                 | 4                      | 25                 | No                  | 0                  |
| SHOHOZ                   | 40                 | 4                      | 20                 | No                  | 0                  |
| MUV                      | 45                 | 3                      | 22                 | No                  | 0                  |

**Table 2.1:** Comparison table.

**2.3 Restrictions on carpooling systems**

- The whole system is dependent on the number of cars available in the area. Not only that but also at least one available car needs to go to our desired location or through the specified route. [9]
- As we already know carpooling's main objective is to establish a group of users who wish to travel to a certain geographic location; in each group, each member, in turn, provides his or her vehicle, according on its capacity, to travel to a shared destination by picking a route that passes by every other user in the pool. If the group consists of five users, each of them uses his or her vehicle once per five days (daily trips to the destination location). Because each site relates to a generic geographic region, the carpooling adopted model consists of multiple users placed in their origin locations and orientated to reach the same destination point according

- to time and topographical limitations. The user must arrive at his or her previously specified and in the given time.[9]
- Though we may have all the information about the users and drivers we could have, but if any occurrence is staged then it might get difficult to catch the culprit and this is a serious issue that exists in any carpooling system. [10]
  - All passenger needs should be served. So, it is now no longer viable to depart one or extra organizations of call for unserved.
  - There is a central administration that oversees the entire carpooling system. It is necessary to find the best carpooling strategy in order to reduce the total cost of transportation.
  - There are different traffic rules in different cities and some of the rules may conflict with the carpooling system.[11]
  - Each pick-up point of the whole group has to be visited precisely once at least one time.
  - All the users must have the same destination and same schedule.

## 2.4 Our Proposed Solutions

There has always been a lot of problems in Carpooling system. So many concerns about security and enough vehicle availability for all the passengers. But in case of just enough cars or vehicle of the passengers, it will be a bit of a problem at first as this project is a new one and the number of vehicles and passengers going to the same route would be less than average but as the time passes this problem will solve itself eventually as there would be more and more users and providers as the time passes. And for the problem of people going to different places from a single place or nearby places we have to use a system or route selection so that everyone in that vehicle can arrive to their desired destination without much of a detour. And in doing so we can avoid of time loss, decreasing the vehicle used and increase the usage of every vehicle properly available. For better communicating with all the passengers and the driver of the vehicle the application will have feature for texting so they can converse freely and clearly. And as for the security of the both parties both of them is required to submit original documentation of their identity while signing up in the application with a authenticate phone number so that no forgery and cheating can be done, the information will all be cross verified also. So, if any party does anything outside the proper rules and regulations, they can be accounted for properly. And also, as an extra security dash cams can be installed in all the vehicles so that if any party does anything there would be a definitive proof of their guilt. As most of the major cities here have the same rules and regulations there would be no conflict between them or would be harder for the users to follow them. Whenever there is a pickup request in the in route of a particular

vehicle they would stop and pick up the passenger as they pass by the area but if there are no request of pickups or any of the current passengers desired place is the upcoming station or point there is no need for that particular vehicle to stop at that place, this will save them time and also it will decrease the traffic too as most of our traffic cause by the by standing vehicles in our small and narrow busy roads. Even if the passenger of a single vehicle does not share the same destination a shortest path can be found while covering all the dropping points of all those passengers.

Carpooling is an easy way to set up to help your solution. Various problems that continue to plague urban areas, including energy demand pollution due to traffic congestion. Carpooling is becoming more and more popular, in reality, participant matching results still come from inefficient results. A manual approach that can lead to worse solutions. In the past, a pooling investigation has been conducted and the issue has been treated as a work issue. (From different source addresses to the same destination) or return problem (from the same departure to a different destination). However, this study uses a spatiotemporal network flow method for developing models of multiple many-to-many carpooling problems vehicle type and race.

## 2.5 Challenges

- Developing a new kind of platform in this age is not easy at all because of high number of innovations and competitors.
- The most challenging part of building this platform is to make people adopt this new service while there might be some other services available in the market.
- There will also be other companies who will reproduce our project and we have to compete with them.
- Not only that but also developing and maintaining this website is also very complex work.
- Development problem like
  - Connecting google map API.
  - Connecting different user input forms with the backend.
  - Handling huge number of client request on server etc.
- Verifying the user and rider's credentials.

## CHAPTER 3

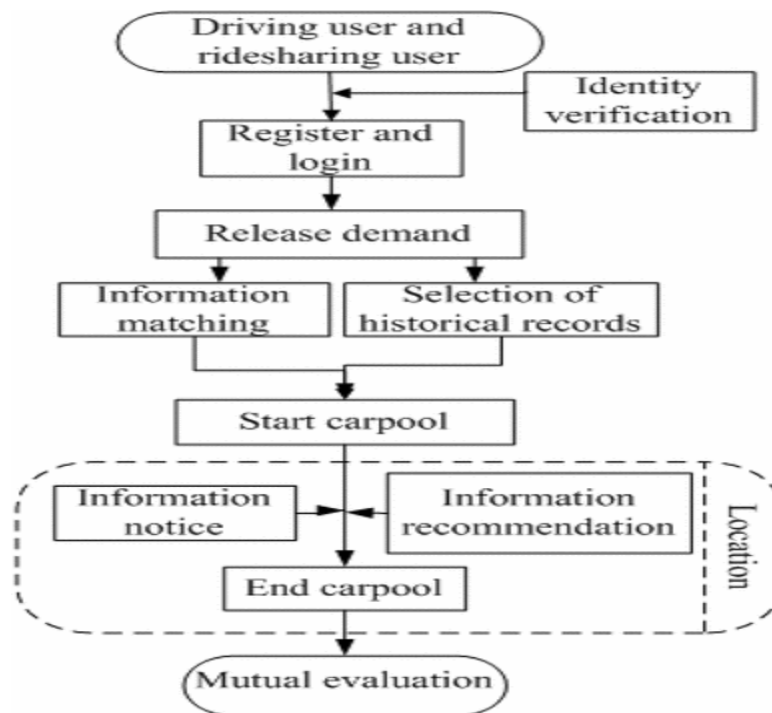
### SPECIFICATIONS, REQUIREMENTS AND DEVELOPMENT

#### 3.1 Introduction

In this chapter, we discussed the most important part of our project. The logical structure and the development of this project will be discussed. We will discuss about the proposed models, ER diagram to show an overview of the project. We will also state the requirements and development process of this project.

#### 3.2 Business Process Modeling

BPM (business process modeling) is a modern technique and process which activity reflected the improvement or analysis of a system engineering enterprise. The current situation a system's workflow can be simply represented using Data Flow Diagram. Here, we're attempting to use a data flow diagram to represent the business model for our project. A data flow diagram depicts the movement of data across a system or project. The data flow diagram is one of the most useful diagrams for displaying a company's process system. It's simple and straightforward in any workflow, work that we do the data flow diagram for the proposed system is shown in following figure.



**Figure 3.1:** Data Flow Diagram

### 3.3 ER diagram

Entity Relationship or ER diagram represents the structure of the entities of a database and shows the relationship among them. In our carpooling model there are several entities like user, driver, car etc. The following figure describes more.

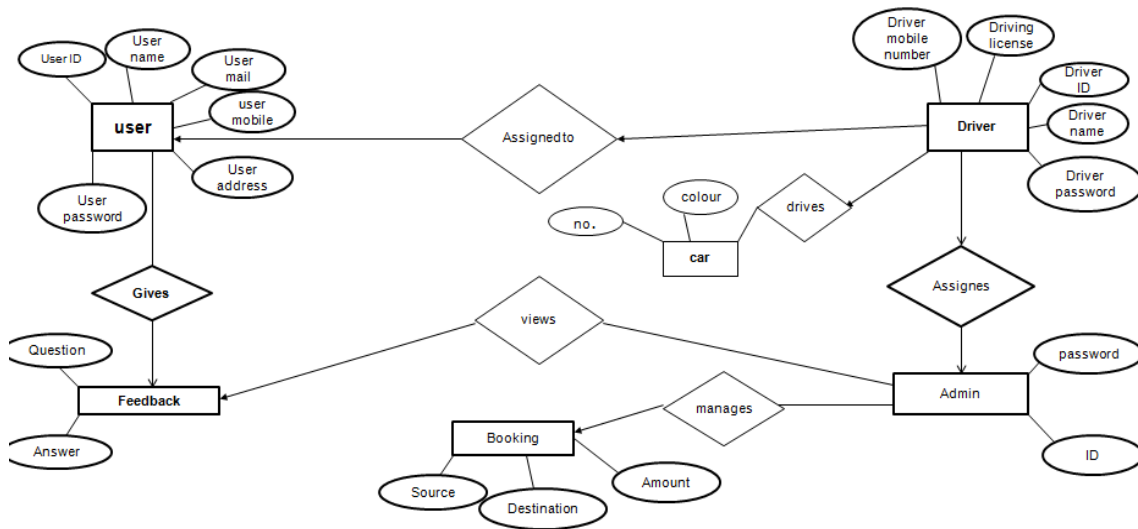
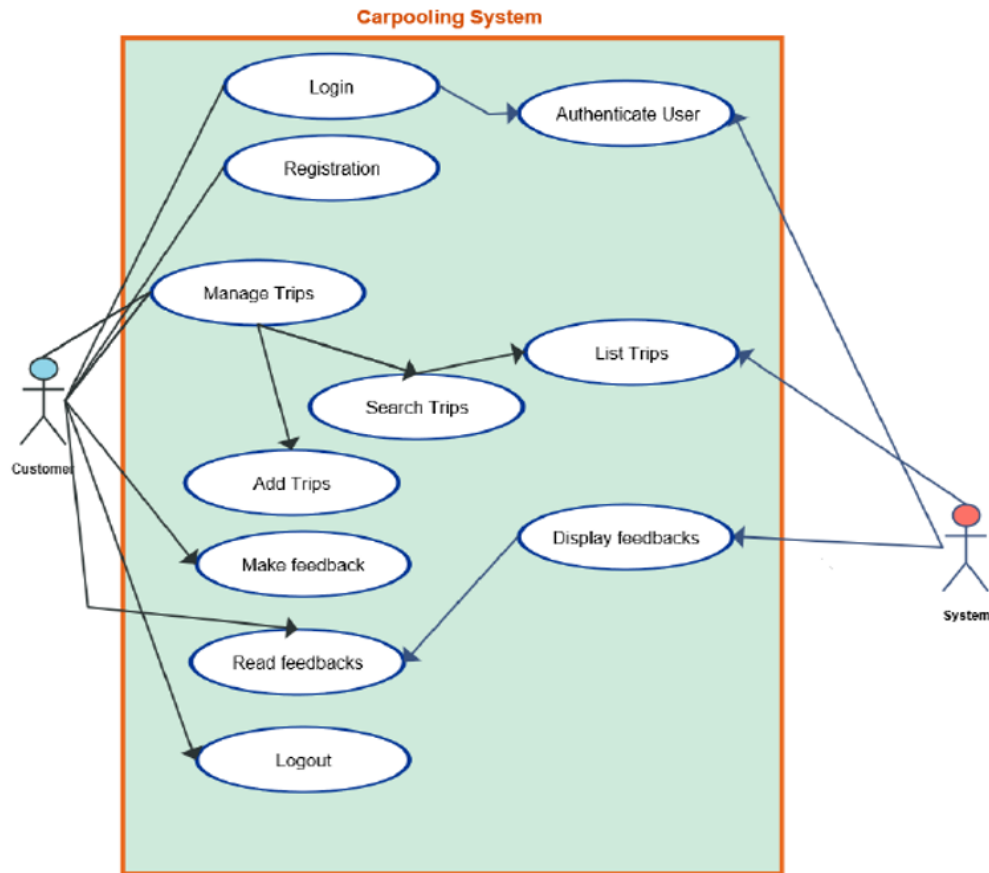


Figure 3.2: ER Diagram

### 3.4 USE CASE DIAGRAM

The use case diagram is used to describe the functions of the users of a system or how the users interact to the system. It shows what the program does and how the user of the program use the features of the system. In our system a user can create an account, make login to the system, can give feedback, makes payment and other tasks. The following figure describes our system-user interaction:



**Figure 3.3:** Use case diagram

### 3.5 Software and Technology Requirements

The following topic describes the software tools and technology we used to develop this project.

We tried our best to make this platform user friendly as well as secured.

Frontend: HTML5, CSS3, JavaScript.

Backend: Django.

Database: SQLite3.

Operating System: Windows 10 Pro.

IDE: VS Code(V:1.62), PyCharm (V:2021.3).

## **CHAPTER 4**

### **DEVELOPMENT AND TESTING**

#### **4.1 Implementation of Front-end Design**

It is really a good challenge to develop a gorgeous front-end design that will be attractive to users. For developing a design for web application, all the time we have to consider to make the front-end design simple, attractive, and user-friendly. Because front-end design is the first impression of a user. For the interactive design and making the pages responsive, we used the Bootstrap framework. In the home page there is a map that is built with the help of MAPBOX API. We also try some other materials and tools design for making and creating attraction to the user.

#### **4.2 Implementation of Database**

We have used the SQLite database server as a data manager to store our web application data. This database provides a flexible, expression-based rules language. When integrated with Django Authentication, we can define who has access to what data, and how they can access it. As a SQL database, this database offers different optimizations and capabilities than a non-relational database. We designed the user's database in such a way that it will automatically recognize the user if it logs in as a rider or driver. There are different databases made for user data, ratings and others separately.

#### **4.3 Implementation of Django**

Django is the leading web development framework that helps developing and maintaining quality web applications. In a Django application, the views are the core of the application. Most of the authentication and other core part of the code is stored in views.py file. We use PyCharm and VS Code for our interface design as well as Django code to connect with each other and with database. We used different Django functions to implement different tasks.

## 4.4 Test Case

Table 4.1: Test case for Carpooling

| Test Case                 | Test Input                                                                                                                  | Expected Outcome                               | Obtained Outcome                               | Result  | Tested on  |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------|---------|------------|
| Login                     | Login                                                                                                                       | Successfully login                             | Successfully login                             | Succeed | 02-12-2021 |
| Registration or sign up   | Registration by email                                                                                                       | Successfully registration                      | Successfully registration                      | Succeed | 02-12-2021 |
| Email                     | Blank or incorrect email                                                                                                    | To warn that correct email must be entered     | Showed the warning instant                     | Failed  | 02-12-2021 |
| Password                  | Blank or incorrect password                                                                                                 | To warn that correct password must be entered. | Showed the warning instantly                   | Succeed | 02-12-2021 |
| Profile update for driver | Input full name, phone number, gender, present address, permanent address, vehicle type, vehicles model and vehicle number. | To updated driver profile information          | Update driver profile information successfully | Succeed | 02-12-2021 |
| Help and Feedback         | Enter the response as text                                                                                                  | To be received the entered text                | Received the response successfully             | Succeed | 02-12-2021 |
| Search destination        | Input starting and destination name                                                                                         | To show the route and available vehicles       | Showed the route and vehicles instantly        | Succeed | 02-12-2021 |
| Logout                    | Click on the logout button                                                                                                  | To logout from that account                    | Logged out successfully                        | Succeed | 02-12-2021 |

#### **4.5 Test Results and Reports**

Test report is needed to reflect the result of testing the application in a formal way. It is a document that, records data obtained from a determined, experiment in an organization manner, describe the environment or operating systems conditions and shows the comparison of test results with objectives, which are so important for any types of database application.

In table (4.1), we showed the test case, test input, expected outcome, obtained outcome and finally we find our expected results for our implemented application. The test result was quite successful. The user satisfies to using our application. Our expectation will be that user can easily & simply use and understand our application as a better user interface.

## CHAPTER 5

### FEATUES AND DESIGN

The front-end of an application is the interface by which the users interact with the application. A user only can view the front-end part of an application. So, it is very important to make the interface/front-end very user friendly because the success of an application is highly dependent on it.

#### 5.1 Front-end design

The following section shows and describes the interface of this project.

##### 5.1.1 Front Page

When a person enters into our website, this page will be opened. If the user already has an account, he can choose that option otherwise he may enter registration page.

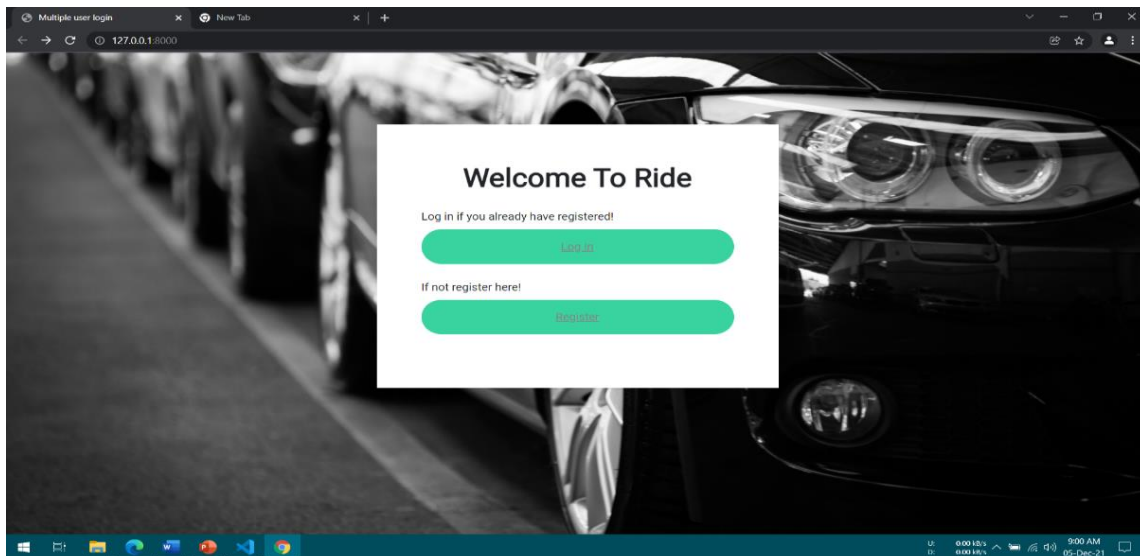


Figure 5.1: Front Page

##### 5.1.2 Login and Registration Page

To make an account, a person has to enter three basic credentials: the username, email and phone number. Though the phone number section is hidden for now because it will send OTP as a text. Then the user has to set alphanumeric password for his/her account. When creating an account, the user can select if he/she want to join our system as a rider or as a driver. After successfully creating the account, the user can login to the system providing the valid information.

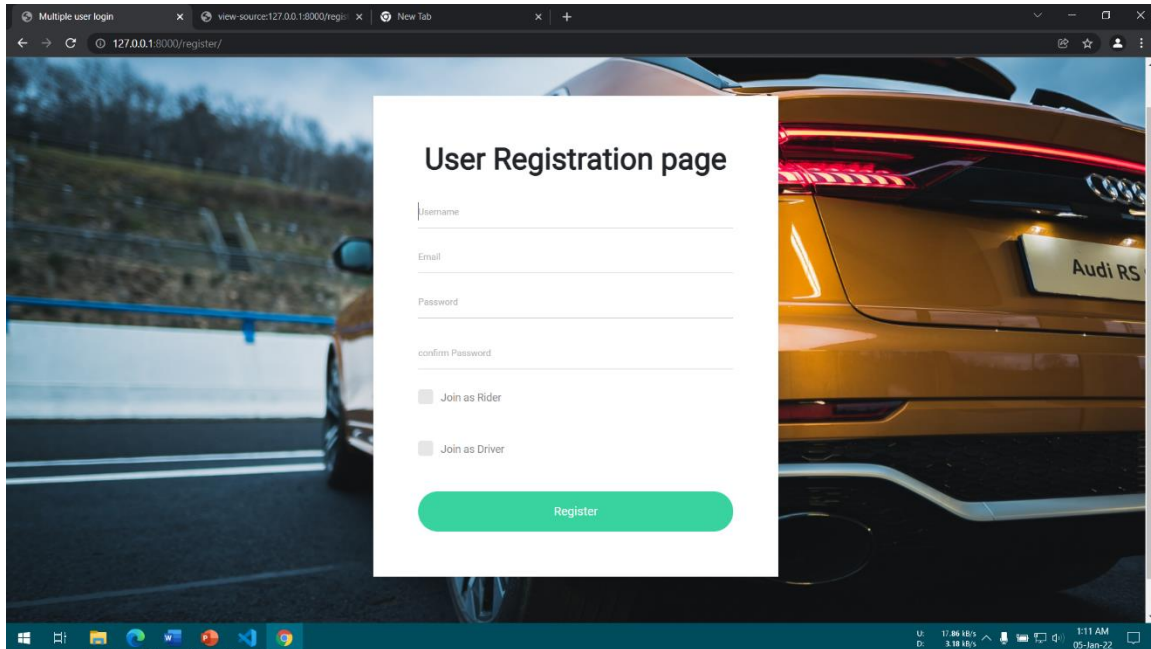


Figure 5.2: Registration Page

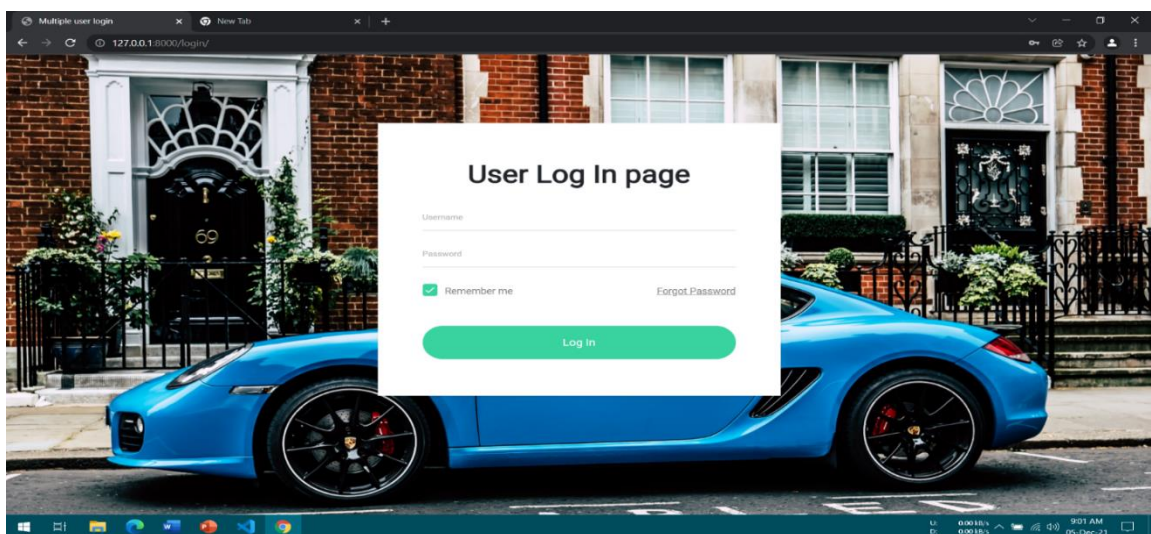


Figure 5.3: Login Page

### 5.1.3 Home Page

After a successful login to the system, the user will be able to enter in this beautiful home page. The system will automatically detect a user if it is a rider or a driver. In the top right corner, there is a drop-down menu from where the user will find profile, settings, activity log and logout button. In the left side of the home page there are different options to select.

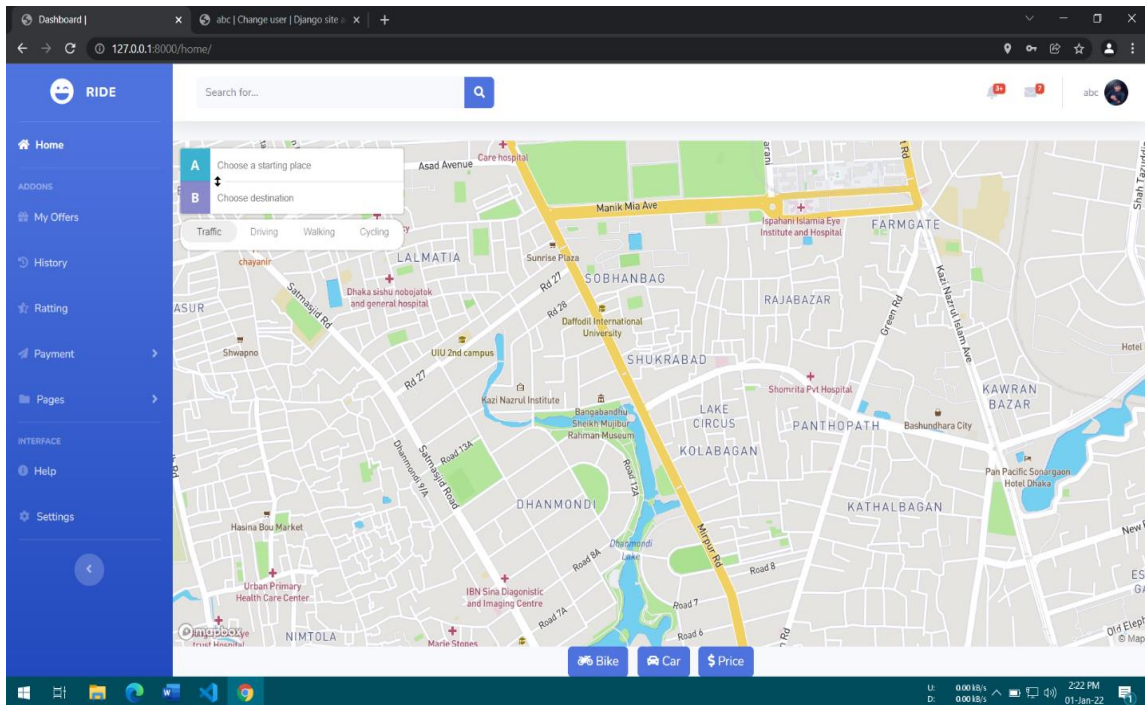


Figure 5.4: Home Page

### 5.1.4 Profile Page

In this page the user can see the information about him/her. There is also a way to update the information.



Figure 5.5: Profile Page

### 5.1.5 Search Option

In the home page, the user can search for the ride. A rider can search the transport by entering the starting point and the destination of the trip and how many seats he wants to spare. He can also select the type of vehicle.

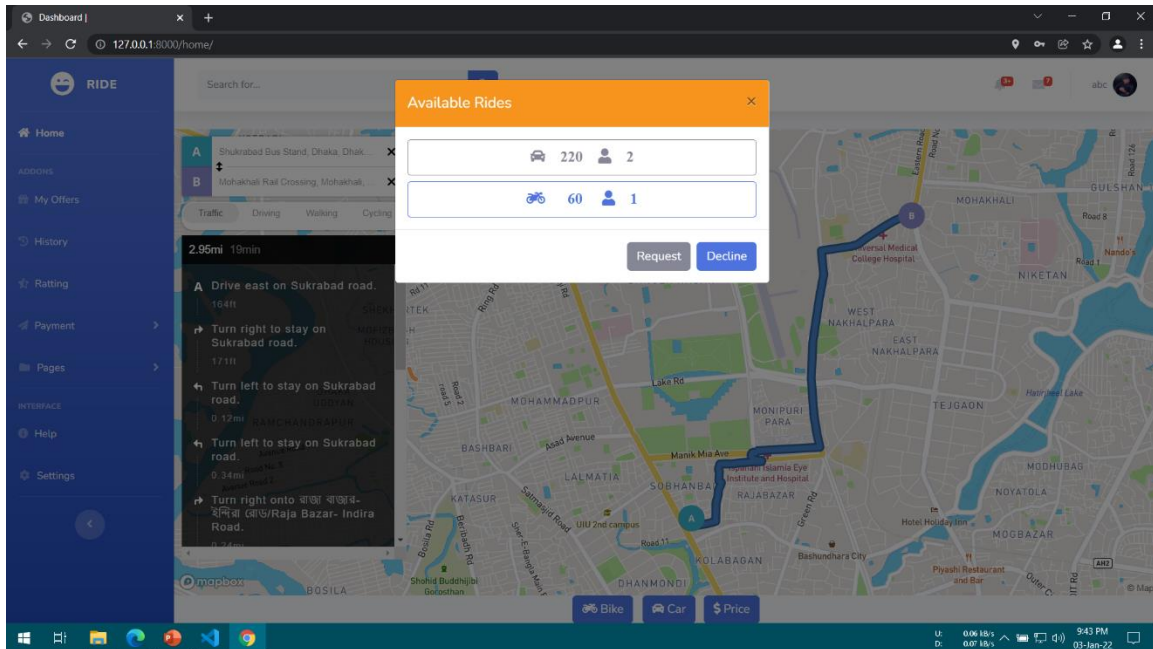


Figure 5.6: Ride searching Page

### 5.1.6 Ratings

After a successful trip the rider and driver both can rate each other from one star to five. He can also describe his own word the rating section.

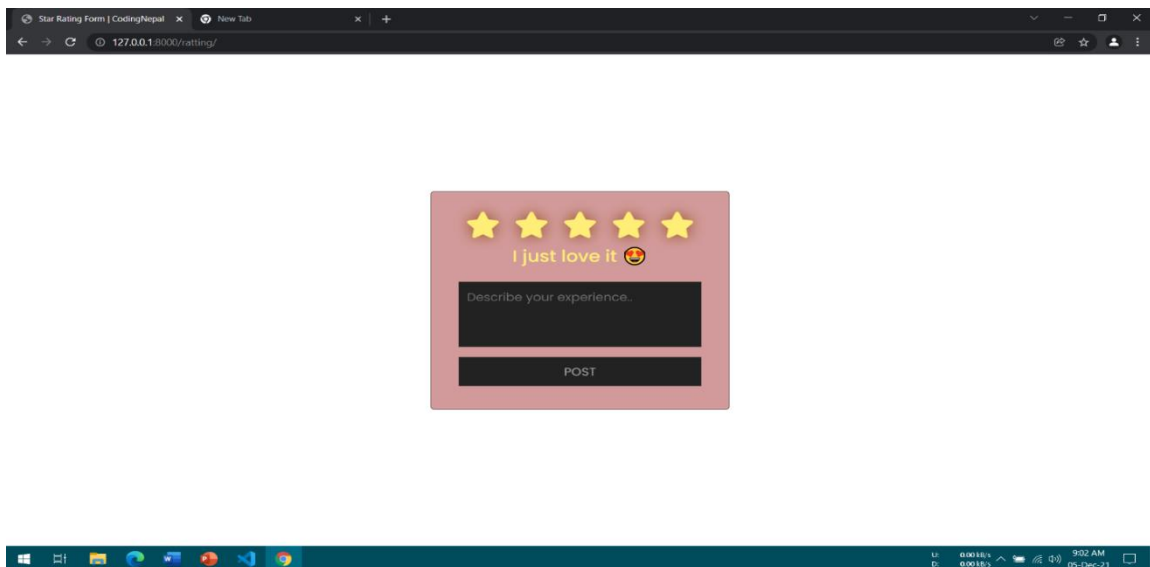


Figure 5.7: Rating Page

### 5.1.7 Help

Here user will get help if they face any problem using our application.

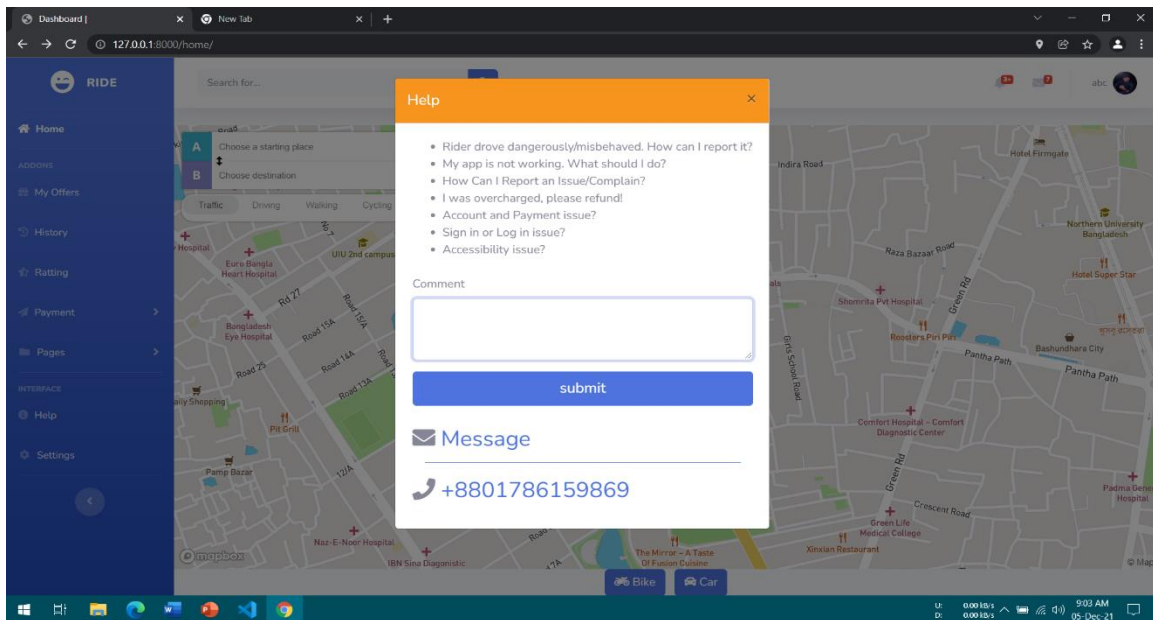


Figure 5.8: Help

### 5.1.8 Payments

From my wallet, the user can make payments. They can also withdraw or deposit money.

## My Wallet

**Balance**  
BDT: 750.00

Transfer

Withdraw

Diposite

Figure 5.9: Payment Page

### 5.1.9 Settings

In the settings page, the user will be able to manage how they want their feed.

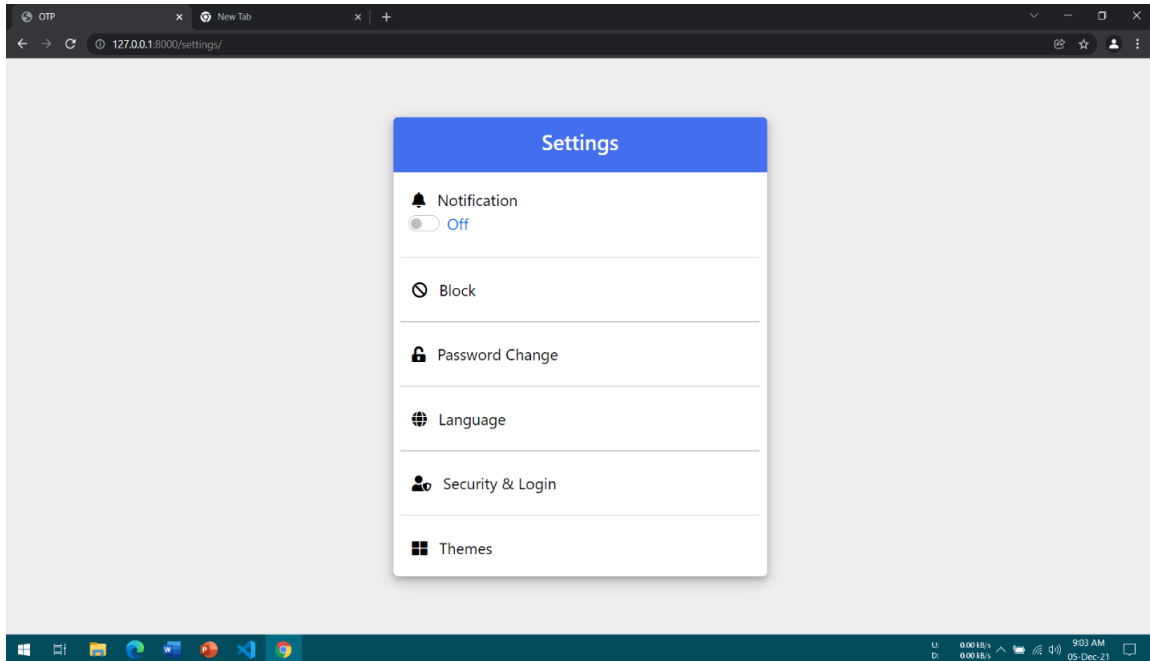


Figure 5.10: Settings Page

## **CHAPTER 6**

### **CONCLUSION AND FUTURE WORK**

#### **6.1 Conclusion**

Carpooling has been a very practical way of transportation nowadays. After completing of this project, this will help people in many ways. We tried to make this platform as friendly and simple as we can. We have learned many new tools and technology while developing this project. We faced some difficult problems during the development and solved those problems thanks to our supervisor. We believe in the era of this technology evolution this project will be able to impact a great value to the society.

#### **6.2 Limitations of our application**

We have tried our best to make this application as perfect as possible. But there have been some limitations in our application. Some of the limitations are mentioned below:

- Not verifying valid email address.
- Not verifying user's credentials.
- Could not fetching real time data from map API.

#### **6.3 Future work**

We have interest to implement Machine Learning to our system to find the rider and driver based on their characteristics that information will be based on the previous ratings. [20] We hope to add some other interesting advanced features to this project. We would like to build android and iOS application of our project. And after successfully establishing our service as an enterprise we would like to work with the collaboration with other regular ride sharing platforms. We also like to extend our service to smart parcel service also. People will be able to send parcel at minimum time and cost.

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