Junior Design Project Report

CSE 299 (Section: 14**)**

Web App For Transportation And Carpooling Management

Submitted By

Townim Faisal Chowdhury (1721327042)

Faria Karim (1620424042)

Muhammad Jawadur Rahim (1711715642)

Supervisor

Dr. Ahsanur Rahman (Ara2)

Assistant Professor

ELECTRICAL AND COMPUTER ENGINEERING

NORTH SOUTH UNIVERSITY

SUMMER 2019

Agreement Form

We take great pleasure in submitting our senior design project report on "Web App for Transportation and Carpooling Management". This report is prepared as a requirement of the Junior Design Project CSE299 which is a one semester long design course. This course involves multidisciplinary teams of students who build and test IOT devices, websites, mobile apps or engineering processes. Design projects are selected from proposal submitted by the students, or recommended by the course instructor, or text book design problems.

We would like to request you to accept this report as a partial fulfillment of Bachelor of Science degree under Electrical and Computer Engineering Department of North South University.

Declared By:

……
Name: Townim Faisal Chowdhury
ID: 1721327042

……
Name: Faria Karim
ID: 1620424042

……
Name: Muhammad Jawadur Rahim
ID: 1711715642

Approved By:

……

Supervisor
Dr. Ahsanur Rahman
Assistant Professor, Department of Electrical and Computer Engineering
North South University, Dhaka, Bangladesh

.....

Dr. K.M.A. Salam
Professor & Chair, Department of Electrical and Computer Engineering
North South University, Dhaka, Bangladesh

Web App for Transportation and Carpooling Management

Abstract:

Technology is rapidly growing in the world. But still people are suffering for transportation in our country. Issues related transportation is major problem in any people's life. Traffic accident and traffic congestion are common incidents in our country. Every day we suffer from these two problems. Traffic accident takes our lives and traffic congestion takes our time and wealth. Though there are different mode of transportations, but still we face these difficulties. These problems can be reduced by using current web technologies. In this project we have proposed to develop a web app which can be used to register daily vehicle enlisted with the driver by the vehicle owners. Also the registration process of driver and vehicle will be integrated in this app. This service ensures who are the real culprit behind accident and necessary legal steps can be taken by government. Also we have proposed a carpooling service which means sharing of car journeys that will be integrated in our app. This service will reduce traffic congestion due to excessive number of vehicles on the road.

Table of Contents

List of Tables

List of Figures

CHAPTER 1

INTRODUCTION

1.1 Project Statement:

Traffic congestion and road accident are our daily life problems. We are designing a web app which can gather and collect all information of vehicles, drivers in one platform. All types of vehicle registration, driver's license registration services will be provided via web app. We are building a management system via web app where the vehicle owners will register their bus to a driver every day, which will help traffic police and citizen to check who the real driver of that vehicle on that day. Citizen can easily search the vehicle which occurs the accident by their vehicle number or can search the driver's information. For reducing vehicle shortage problem and traffic congestion, we are integrating a carpooling service in the web app.

1.2 Motivation:

In our country, transportation problems are our daily life occurrence. From traffic congestion to road accidents, we are the only sufferer. We found daily many news about road accident inside the newspaper. Sometimes citizens do not know who the real culprits behind the accident are. A report of Bangladesh Passengers Welfare Association said at least 7,796 people were killed and 15,980 were injured in 6,048 accidents in the land, water, and air ways across the country last year, this includes 7,221 deaths in road accidents [1]. This statistic shows us that we are not safe on the road though we need to use the roads daily for our own necessities. In our country, all vehicles are registered and drivers get a license from BRTA. These data of drivers and vehicles do not gather centrally and do not manage the data properly by our government. Also, people do not have clean information about the culprit's information. We can easily manage this data to reduce accidents and ensure our safety.

Traffic congestion is the main problem in urban areas also. With the growth of economic development in an urban area, the needs of transportation are exponentially increased, meanwhile brings various threats. These threats, mainly the rise of oil prices, air pollution, and urban traffic congestion, are not only worsening people's quality of life but also overwhelming natural and human-centered ecosystems. In our city Dhaka, there is more citizen than this city holds. Dhaka's 2019 population is now estimated at 20,283,552 [2]. People face the problem for the shortage of vehicle and traffic congestion every day. In addition, the use of public transportation is relatively inconvenient than the use of private one in rush hour. In that case, carpooling system can reduce traffic congestion as the use of private vehicle is more in rush hours. This system also reduces the number of vehicles on road, increases vehicle occupancy, reduces parking requirement, saves cost and decreases in pollution.

1.3 Background Research

We do not find any existing system like our transport management system in our country which is used by vehicle owners and BRTA. There are currently some carpooling apps which are used in our country. Uber [3] is currently available in Dhaka city. The limitation of this app is people outside Dhaka cannot use this app. In our carpooling system, we do not give any limitation of cities or areas.

Another most popular app is Pathao [4]. It gives services to Dhaka, Chittagong, and Sylhet. It also not covers all of our cities. So we will make the service available in every city in our country.

In Avila Antao's research article [5], they made an Android-based application for carpooling service. It allows passengers to sign in and then make a journey with other users. In their app, they do not use any location picker. So we want to solve this problem by using map API.

In Mrs. Chaitrali Dangare1's paper [6], their proposed system was for taxi cabs. It did not include private cars. So we include any kind of private cars including cabs in our system.

In N. M. Nale's paper [7], they proposed implementation of their system. They proposed a system where registration was based on the government's provided user's pan card number. It made security trustworthy. Also, they made this app based on android because every android device has GPS. This GPS can track the vehicle and ensure safe of a rider. But we do not found any implemented app's figure or code anywhere in the paper.

In Yuvraj Nalawade's paper [8], their application is fully based on android. In their application, the user must request for ride and vehicle owner will also create a request for share his ride. According to match the source, destination and starting time vehicle owner can share his ride to a user. They prescribed about login page but they did not mention any registration procedure. We can register the driver through the data of vehicle and driver information from our transportation management app.

CHAPTER 2

PROJECT PLAN

2.1 Timeline:

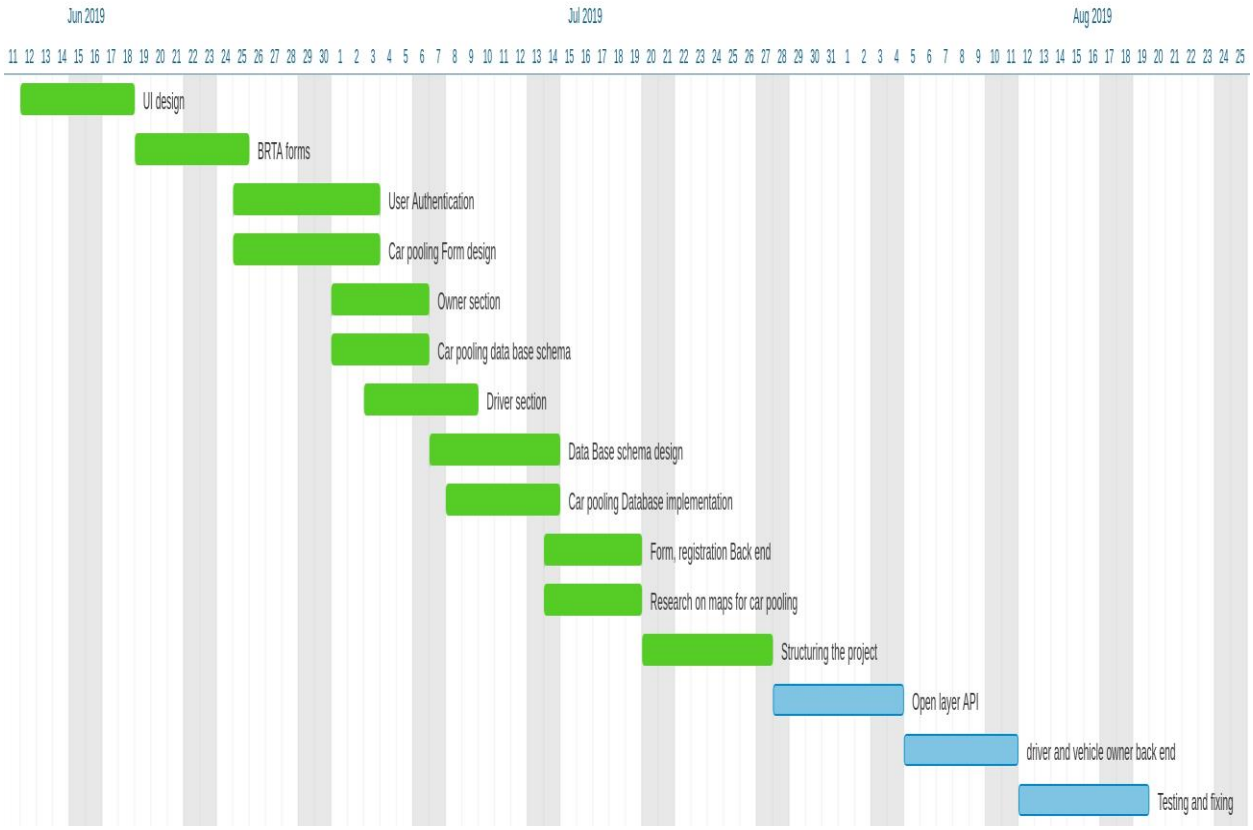

Figure 2.1: Gantt chart of timeline

2.2 Division of Work:

This is a rough distribution of work. Though everyone has own major individual responsibility for a particular section, we have tried to do every part of the project as it will help us to gain knowledge of every section of this project. Therefore, the transport management system is building by Townim Faisal Chowdhury and Faria Karim. We both have divided this system's work including both frontend and backend. Townim Faisal Chowdhury will be responsible for the section of homepage, vehicle owner and Faria Karim will be responsible for the section of BRTA and driver. Muhammad Jawadur Rahim will be responsible for carpooling service. He will build this web app as a standalone app. This app will be integrated to transport management system.

Table 1.1: Rough Division of work

Name	Work
Townim Faisal Chowdhury	Home Page, Vehicle Owner section, Database design
Faria Karim	Section of BRTA, Driver
Muhammad Jawadur Rahim	Carpooling

Above table is described our rough division of work. The more elaborate individual distribution of work will be found in Appendix B section.

CHAPTER 3

PROJECT DESIGN

3.1 Tools Used:

As our project is basically a web app, we have used some software tools. Here, as software tools, we have basically used framework and template to make our task easier. We have also used database system to store our required information. We will try to use openLayer for the interface of our map and pgRouting and PostgreSQL as the backend of the map API for detecting the shortest path and possible route for carpooling.

Table 2.1: Description of Tools

Tool	What it does	Other similar Tools (if any)	Why selected this tool
AdminLTE	We have used AdminLTE as our front-end template. Some front-end codes are already implemented in this template. We can easily use these codes and modify them according to our requirement.	Coreui, Themeforest etc.	AdminLTE is free of cost and has no bugs. But some of the free templates have bugs and other templates are not cost free. The design of AdminLTE is quite simple and user friendly which is required for our project. So, we have decided to use this template.
Laravel	Laravel will be used for the back-end of our project.	Django, Flask, Codeigniter etc.	Laravel is php-based framework. We think this framework will be more appropriate than others because of its scalability and usability. We have previous work experience with php. So, it will be easier to implement Laravel than any other programming language-based framework. Laravel is also easy to integrate.
MySQL	MySQL is a database system. To store the information of drivers, buses, accidents, we need database system in our project.	MongoDB, PostgreSQL, MariaDB, Firebase etc.	As it will be helpful to use relational database, so MySQL will be the best option to be used in our project.
Xampp	Xampp is a shadow server of Apache	Wamp	Xampp server is commonly used and free for windows.
OpenLayer	OpenLayer will be used for the	Google map	We select openLayer because

	interface of map		it is free of cost.
pgRouting	It will be used for calculating shortest path		We select pgRouting because it is open source, it dynamically calculate shortest path and it is free of cost.
postGIS	postGIS is extension of PostgreSQL		PostGIS provides spatial objects for the PostgreSQL database, allowing storage and query of information about location and mapping.

Table 2.2: Sources of Tools

Tool	**Source**	**Cost (if any)**
AdminLTE	https://adminlte.io	Free
Laravel	https://laravel.com	Free
MySQL	https://www.apachefriends.org	Free
OpenLayer	https://openlayers.org/	Free
pgRouting	https://pgrouting.org/	Free
postGIS	https://postgis.net/	Free

3.2 Technical Design

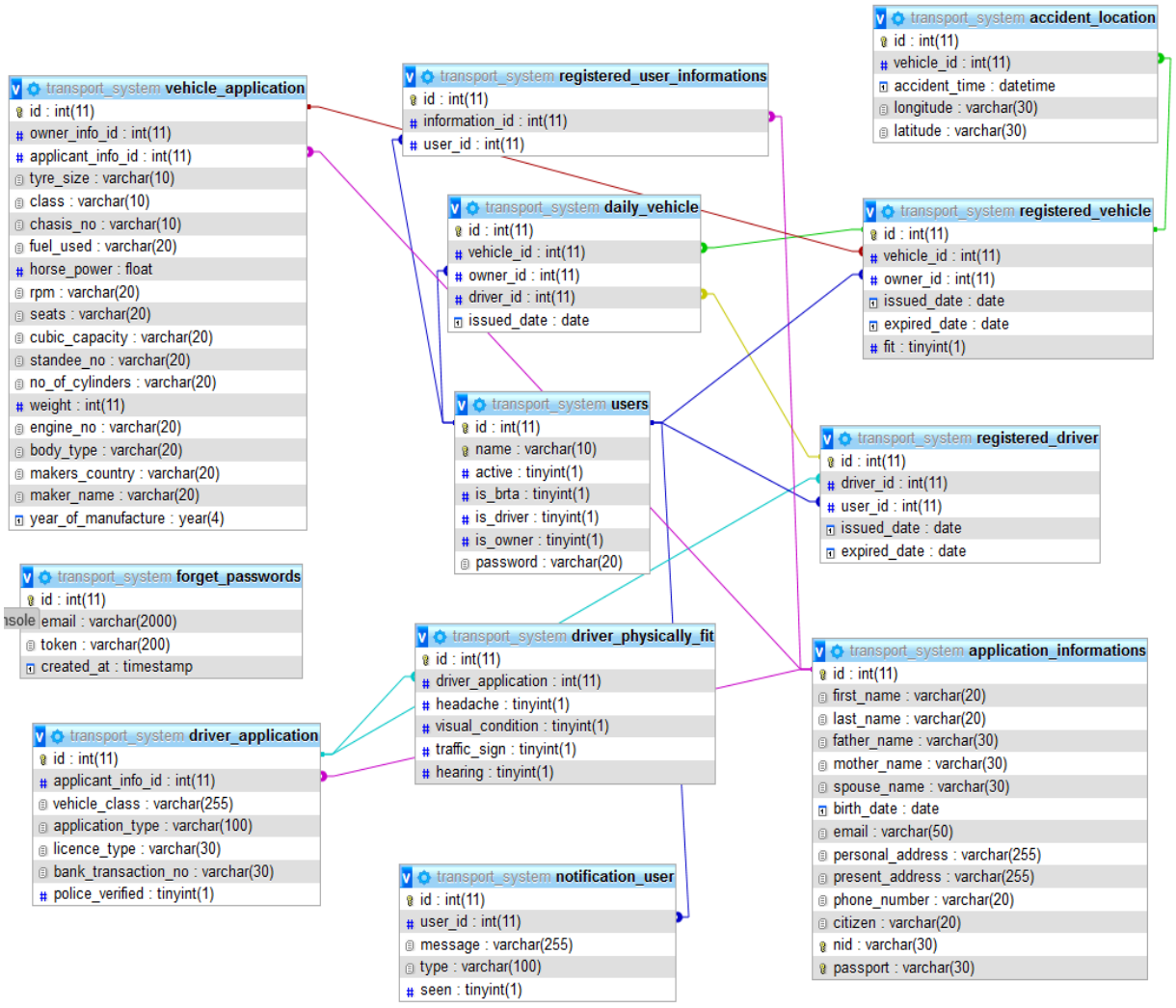

Figure 3.2: Schema diagram of database of transport management system

From this diagram we can see that the application_information table contains some basic information about the applicants of driving license and vehicle registration. In our system there are basically two input forms. They are: vehicle registration form and driving license form. The application_information table will store the basic information from both of the input forms. In the diagram it is shown that this table has relation with driver_application table and vehicle_application table. The driver_application will contain theimportant information which are only required for driving license. So, to get more information about the driving license it is required to have the relation between application_information table and driver_application table. On the other hand, vehicle_application table will contain some specific information related to the vehicle registration form. As the application_information contain the basic information about vehicle registration from so to get more detailed information about the form there must be relation between application_information table and vehicle_application table. The application_information table is also connected to the registered_user_information because the registered_user_information table only contains the id of the user but the detail information is available in the application_information table. The registered_user_information table will store id of all registered users.

Registered vehicles will be selected from the list of vehicle registration forms. So, registered vehicles are kind of subset of all the vehicles which have been already applied for. That's why, the registered_vehicle is connected to the vehicle_application table.

On the other hand, registered drivers will be selected from the list of driving license forms. So, registered drivers can be considered as the subset of all the drivers who have applied for driving license. That's why, there exist relation between the registered_driver table and the `driver_application table.

In our system, the two important users are the registered drivers and registered vehicle owner. Any unregistered driver or vehicle owner cannot be the user of our system. So there is a relation between user table and registered_driver table and also between user table and registered_vehicle table.

When the user will log in to the system, the system will detect the role of the user by matching the user id of the registered_user_table with the user id of the user table. So, these two table must have relation.

As the required notification will be sent to the logged in user, so there exists relation between users table and notification_user table.

The accident_location table will contain the information about accident and vehicle which has faced accident. So, the accident_location table and the registered_vehicle is connected.

As only the registered driver will get the access to drive only the registered vehicle on day basis so daily_vehicle table has relation with both registered_vehicle and registered_driver tables.

As the physical fitness of drivers are the part of all the drivers who has applied for registration or driving license so there exists connection between the driver_physically_fit and the driver_application table.

As the user will get the service of forgetting password if and if only the user forgets his password so this table is independent.

CHAPTER 4

PROJECT DESCRIPTION

4.1 Availability:

The project is available in gitlab. The repository is public now. The link of gitlab repository is https://gitlab.com/townim_bs23/transport_system

4.2 High Level Description

We have designed a technology which can gather and collect all the information of vehicles, drivers, vehicles' owner and accident occurrence data in one platform. We have provided a management system via web app where the vehicle owners will register their bus to a driver every day, which will help traffic police and citizen to check who the real driver of that vehicle on that day. Citizen can easily search the vehicle which occurs the accident by their vehicle number or can search the driver's information. All types of vehicle registration, driver's license registration will be provided via web app. We have also provided the service of carpooling through our web app. People can request for a ride via the carpooling service. To get the carpooling service both driver and rider have to set origin and destination. If their origin and destination are same or in between then they both will be notified. If driver accepts the request then the rider can get the service.

4.3 Key Features:

The important features of our project are:

1. Vehicle registration form and driving license form will be filled up by this app.
2. Driving license renew notification will be sent to the driver.
3. Vehicle fitness retest notification will be sent to the vehicle owner.
4. BRTA will give permission to the driver and vehicle owner for the vehicle.
5. Every vehicle owner will register their vehicle every day to the driver by the app when they give permission to use their vehicle.
6. Traffic police and citizens can check the condition of the vehicles and the driver information by using vehicle number.
7. Traffic police and citizens also can complain to BRTA and vehicle owner i.e. company.
8. Users can get the service of ride sharing via this web app.
9. There will be searching option. People can search by vehicle registration number or driver's license number or driver name. This option is open for everyone.

CHAPTER 5

PROJECT SUMMARY

5.1 Results and Comparison:

We have created a survey of our project. The link is https://tiny.cc/transport299

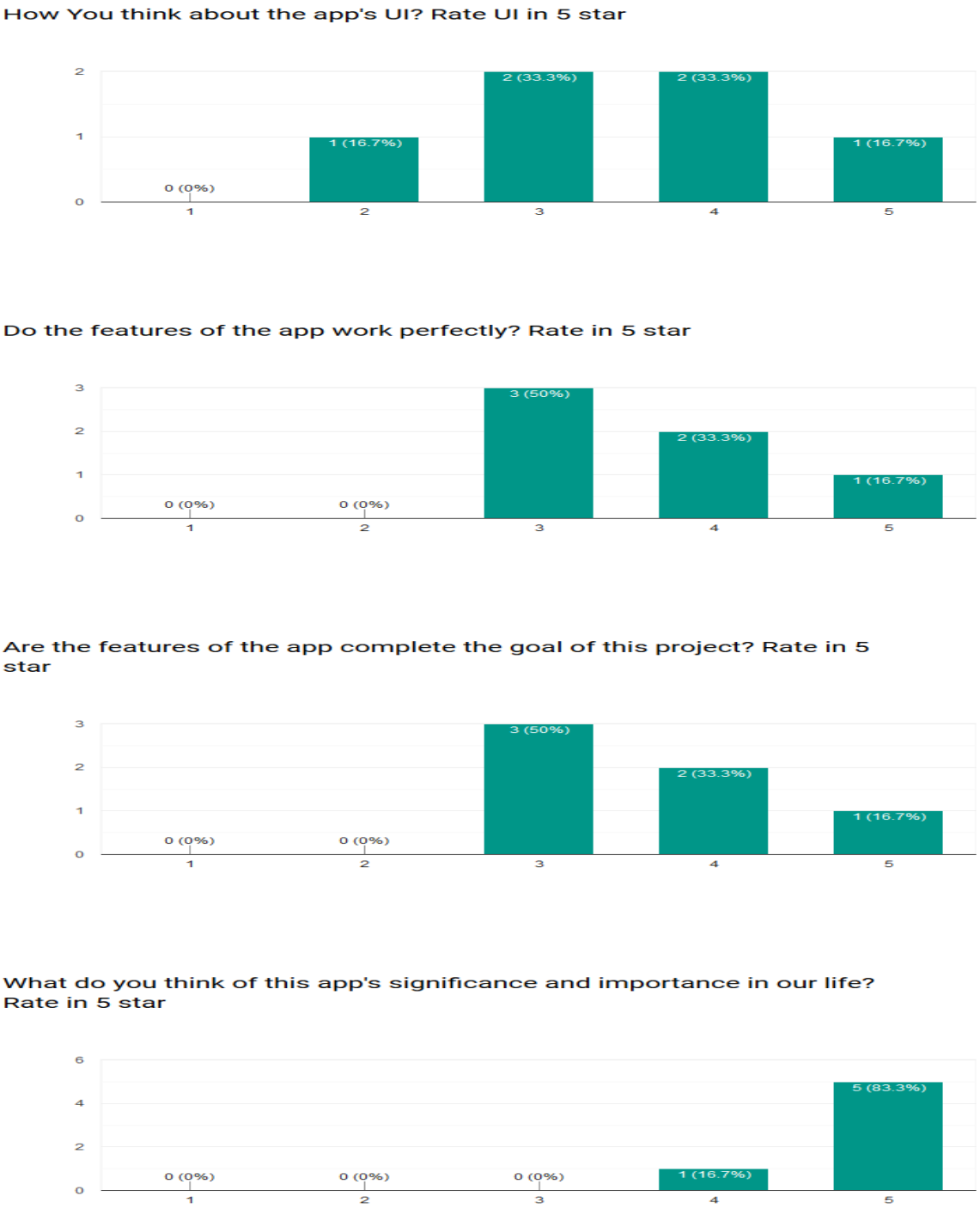

Figure 5.1: Survey Result

The above snapshot is the survey result of our project with 4 questions. The following questions measure app's UI, completeness, significance and perfection in 5star rating. It shows that our project serves average service but has great importance in our life.

5.2 Non-technical Issues and Solutions:

Currently, we do not face any non-technical issues but there will be some non-technical issues that we may face in the future. Already many drivers and vehicles were registered through BRTA. So there is a database of BRTA which is not publicly open for the citizen. To implement 'daily vehicle registration' feature, we firstly need the current data of vehicles, owners, and drivers. Therefore, implement our project in real life, we need to access that database through our web app. Also, we must convince BRTA to use their all kind of registration and administrative works with our web app by implementing future necessity of them.

Our web app's main feature is to track driver and vehicle by everyone. So the owner must register his vehicle daily. But there is no legal issue or obligation for owner to register daily. So it must take a legal step from BRTA to make sure the registration must be done.

Also in carpooling service, there are many apps like our project but the drivers pay some amount to get the service through that app. But if we need to use any map API which is not free, so we will need financial support to give this service to people.

5.3 Technical Issues and Solutions:

Our project is divided into two parts. One is a transport management app and other is a carpooling system. For transport management app, we have faced these technical issues.

- **Database Design:** There is redundancy of registration from data and registered user data. So we have followed rules of normalization to reduce data redundancy.
- **Project Structure:** As it is a group project, all group member must contribute. So everyone must follow a project structure. For contribution and version controlling we have used git. By opening a repository in a Gitlab, we have contributed all of our project code in there. Also, we have maintained a project structure by following Laravel documentation.
- **Home Page Design:** We have used AdminLTE as our project template. It is a template of the dashboard. For designing the home page, we cannot use it. So we have written some custom CSS to fulfill our purpose.

For carpooling system, we have faced these technical issues.

- **No Free Map API:** For our project, we try to use open-source map API. There are many map API which is paid and have good services that fulfill our purpose like finding shortest k-paths etc. Example: Google map API. So we are trying to use Openlayer as a client-side and pgrouting as a server-side to solve this problem. The problem is not solved yet.

5.4 Future Direction:

The transport management system can be improved by implementing all other services of BRTA. We can add accident detection and prediction in the management system by using IoT and Machine learning. It can reduce the traffic accident more. Also sending notification of accidents and driving in wrong route to vehicle owner can also be integrated in the management system. In carpooling service, if payment is possible, we can add Google map API for better performance. It can do both client-side and server-side work in one platform. If people use this system, the system can collect traffic data and notify the driver about traffic and find out a way which have less traffic congestion.

5.5 Conclusion:

The project has been designed to serve a service of reducing traffic accident and traffic congestion. Every citizen has right to have road safety. To ensure road safety this project can provide correct data of driver and vehicle information to the citizen. Web based real time data visualization makes this system more convenient to see all the data in a clean, formatted and user friendly way. So citizen will know who the real drivers and what the condition of the vehicle on that day. Also now a days most people prefer personal vehicle to travel due to delay caused in public transport system and luxuries provided by private vehicles. So carpooling system can be very effective means to reduce pollution and the congestion of vehicles in cities as well as provides an eco-friendly way to travel.

REFERENCES

APPENDIX A

[1] Johura Akter Pritu, "Report: 7,796 deaths due to accidents in 2018", *Dhaka Tribune*, January 25th, 2019. [Online], Available: https://www.dhakatribune.com/bangladesh/nation/2019/01/25/bpwa-7-221-killed-in-road-accidents-across-bangladesh-in-2018. [Accessed August 4, 2019]

[2] World population review, "Dhaka Population 2019", *worldpopulationreview.com*, July 12, 2019. [Online], Available: http://worldpopulationreview.com/world-cities/dhaka-population/. [Accessed August 4, 2019]

[3] "Drive with Uber Dhaka", *Uber*. [Online], Available: https://www.uber.com/en-BD/drive/dhaka/. [Accessed August 4, 2019]

[4] "Pathao," Wikipedia, 21-Jul-2019. [Online]. Available: https://en.wikipedia.org/wiki/Pathao. [Accessed: August 3, 2019].

[5] Avila Antao, Venisha Correia and Savio Gonsalves, "Carpooling Application in Android" In *International Journal of Current Engineering and Technology*, Vol.5, No.2, April 2015.

[6] Mrs. Chaitrali Dangare1, Ms. Gouni Akila, "An Android based application: Cab pooling" In *International Journal of Advanced Research in Computer and Communication Engineering*, Vol. 5, Issue 3, March 2016.

[7] N. M. Nale and S. R. Landge, "Real-Time Carpooling Application for Android Platform," In *International Journal of Engineering and Computer Science*, vol. 5, no. 3, 2016.

[8] Yuvraj Nalawade, Vijay Waghmare and Prasmit Waghmare, "Implementation of Dynamic Carpooling System on Android Platform" In *International Journal of Innovative Research in Advanced Engineering*, Issue 2, Volume 2 , February 2015.

INDIVIDUAL CONTRIBUTIONS

APPENDIX B

Table: Individual Contributions

Name	Project	Mid Report
Townim Faisal Chowdhury	• Background research of carpooling service • R&D of choosing technology of the project • Design of project structure • Authentication i.e. login and registration • Backend and frontend of form registration • Database design of transport management app • Structured other group member's code	• Abstract • Table of Contents • List of Tables • List of Figures • Chapter 1 • Chapter 2.2 • Chapter 5 • Appendix A • Appendix B • Appendix C
Faria Karim	• Frontend of BRTA, Driver and vehicle owner section • UX of transport management system • Backend of BRTA section	• Chapter 3 • Chapter 4
Muhammad Jawadur Rahim	• Design the database for carpooling service • Form for requesting a ride as a user • Form for requesting an empty seat as a driver • Including the location of origin and destination	• Chapter 2.1 • Appendix C

MAPPING WITH COURSES

APPENDIX C

Table: Mapping with BS courses

SI	Course Code	Course Title	Course contents that were used in this project and how
1	CSE 311	Database Design	• Design the ER and schema diagram of database. • Normalization.
2	CSE 327	Software Engineering	• Project management • Design pattern
3	CSE 215	Object oriented programming	• Basic knowledge of OOP.
4	CSE 225	Data structure and algorithm	• Basic knowledge of algorithms and data structures to reduce time complexity in code. • Find the shortest path between two locations.
5	CSE 482	Internet and Web Technology	• Principles and implementation techniques related to the Internet and web technology. • Design and development of Web applications