

# City Bus Tracking System

by

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Submitted in partial fulfillment of the requirements for the degree of  
Bachelor of Science in Computer Science and Engineering



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**SONARGAON UNIVERSITY (SU)**

November 2020

# APPROVAL

The thesis and project titled “**City Bus Tracking System**” submitted by Than Aung Kyow (CSE1603009009) to the Department of Computer Science and Engineering, Sonargaon University (SU), has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents.

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# DECLARATION

I, hereby, declare that the work presented in this report is the outcome of the investigation performed by me under the supervision of **Mohammad Naderuzzaman**, Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. I reaffirm that no part of this Thesis and thereof has been or is being submitted elsewhere for the award of any degree or diploma.

Countersigned

Signature

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**Supervisor**

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Than Aung Kyow  
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# **ABSTRACT**

We all are busy in modern world. One of the wasting event occurred when most of us are waiting for transport vehicles which are arrived in inconsistence period. People who are official employer suffer a lot for lacking of proper vehicles arrived. Among the huge number of vehicles it's painful to track and choose appropriate one at busiest period. Waiting on road for arrival of transport vehicles wasted our time and focused away on our main responsibilities in daily life. It also crowded the road side areas and sometime blocks the roads. So, it needs such a system which can notify passengers when their required vehicles are approaching, the current states of vehicles, is this public transport or sitting service etc. In this paper, I will try to solve the painful issue behind the transport vehicle services. Now a days, majority of the working population usage the smart phone especially android phone. It could be most acceptable if I build up a system which can solve the transport system in a while by using an app.

# ACKNOWLEDGMENT

At the very beginning, I would like to express my deepest gratitude to the Almighty Allah for giving me the ability and the strength to finish the task successfully within the schedule time.

I am auspicious that I had the kind association as well as supervision of **Mohammad Naderuzzaman**, Assistant Professor, Department of Computer Science and Engineering, Sonargaon University whose hearted and valuable support with best concern and direction acted as necessary recourse to carry out my project.

I are also thankful to all my teachers during mywhole education, for exposing me to the beauty of learning.

Finally, my deepest gratitude and love to my parents for their support, encouragement, and endless love.

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# CHAPTER 1

## INTRODUCTION TO CITY BUS TRACKING SYSTEM

---

### 1.1 Introduction

City bus tracking system helps passengers to get desire bus for destination without knowing the bus and route before. It will reduce the suffering of passengers to wait on road to get bus and also remove the crowding situation besides the road. Passenger can do their daily activities effectively without wasting time for waiting to the bus arrival to ride on it. This system only required a smart phone (Android OS right now) and mobile data connected. Automatically it will show all nearby bus stands where buses are moving. They can choose preferred bus stand and then destination to go on. All buses will be visible on the map in real time which are tends to go from that route. Passenger can also choose preferred bus service from the bus list of that route. When bus will arrive to the bus stand which passenger choose to get ride on the bus, system will notify passenger about the bus arrive. And when the destination approaching it will notify too.

### 1.2 Project Top View

Project Id	CBTS-01
Project Name	City Bus Tracking System
Project Manager	Mohammad Naderuzzaman
Project Quality Facilitator	Than Aung Kyow
Client Name	City Bus Tracking System
Project Category	High
Platform/ Technology Description (Operating system, database, language, front-end, etc.)	Platform-Android OS, Technology-Android Studio, Database-Firebase, Language – Java
Project Start Date	
Estimated Project End Date	
Total Estimated Calendar Days	
Total Estimated Size (say, QSU)	
Total Estimated Effort	

Table 1.2: Project top view

### 1.3 Objectives

- View all buses graphically on the map which are nearby passenger's standing location.
- Can view graphically where required buses are placing now.
- Notify buses are fully loaded or not.
- Can view buses graphically depending on the destination where they are wish to go!
- Only show the buses in map for specific destination.
- Can identify is the bus local or sitting service.
- Can hide own-self from map which could be viewed by driver.
- Notify passengers when the bus arrive to the waiting station.
- Notify passengers when the destination is approaching.
- Can choose preferred bus from the bus list.

# CHAPTER 2

## PROJECT REVIEW

---

### 2.1 Project Management

Project management skills are most important to successfully develop a project. This is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management focuses on achieving the objectives by applying five processes presented in the figure below.

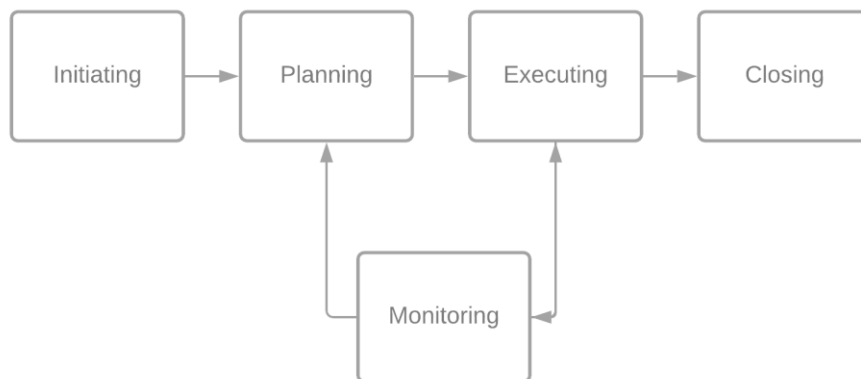


Figure 2.1: Project development phases

### 2.2 City Bus Tracking System

This system is beneficial for both passengers and drivers. Also beneficial for bus authorities. It consists of most important features and functionalities to turn the idea into real world project. Bus authority has the huge responsibilities to maintain their bus service within the system.

#### Components

- Passenger features
- Driver features
- Super admin features
- Admin features
- Bus authority features

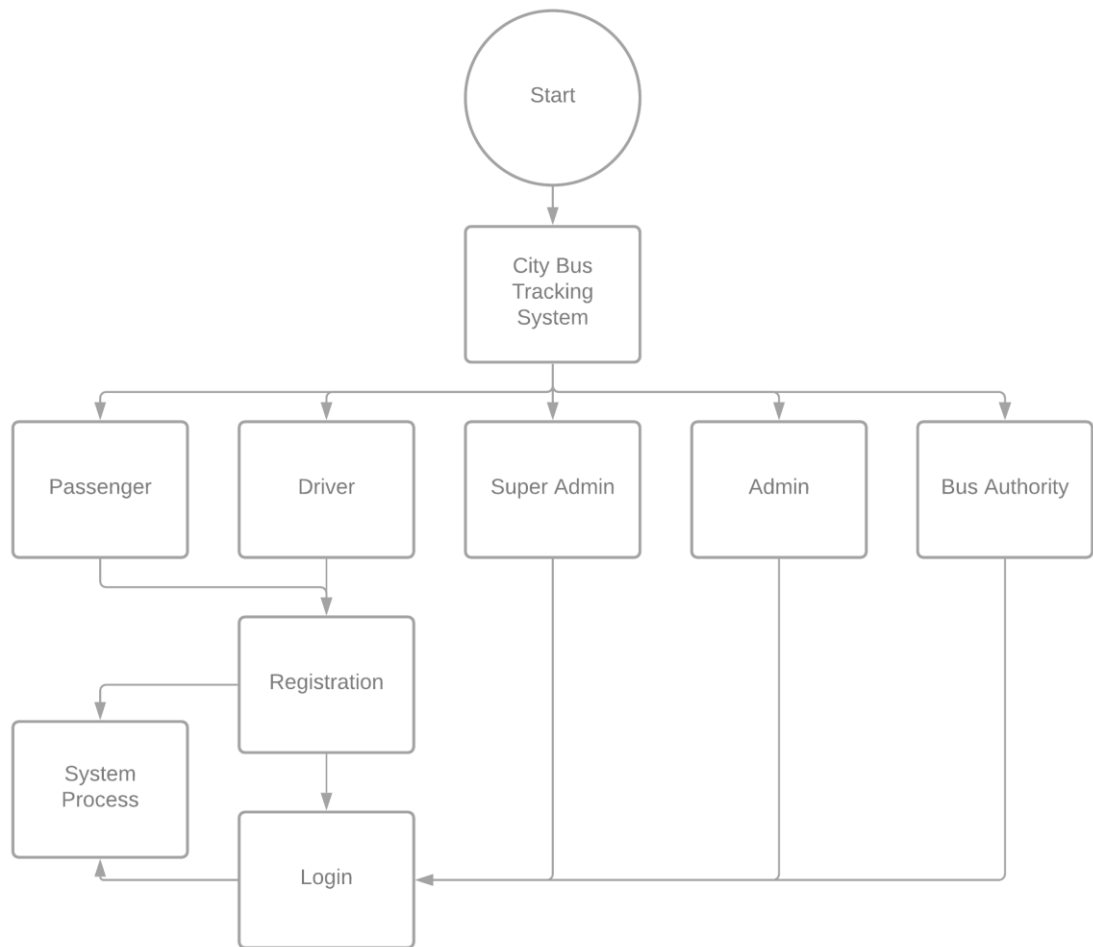


Figure 2.2.1: Data flow diagram for City bus tracking system's components

### Roles or Features

- Location access
- Manipulation on google map
- Notification
- Visibility passenger/driver
- Bus stand selection
- Driver management
- Bus management
- Bus stand management
- Bus route management
- Tracks daily income
- Tracks daily total passengers
- Super admin management
- Admin management
- Bus authority management

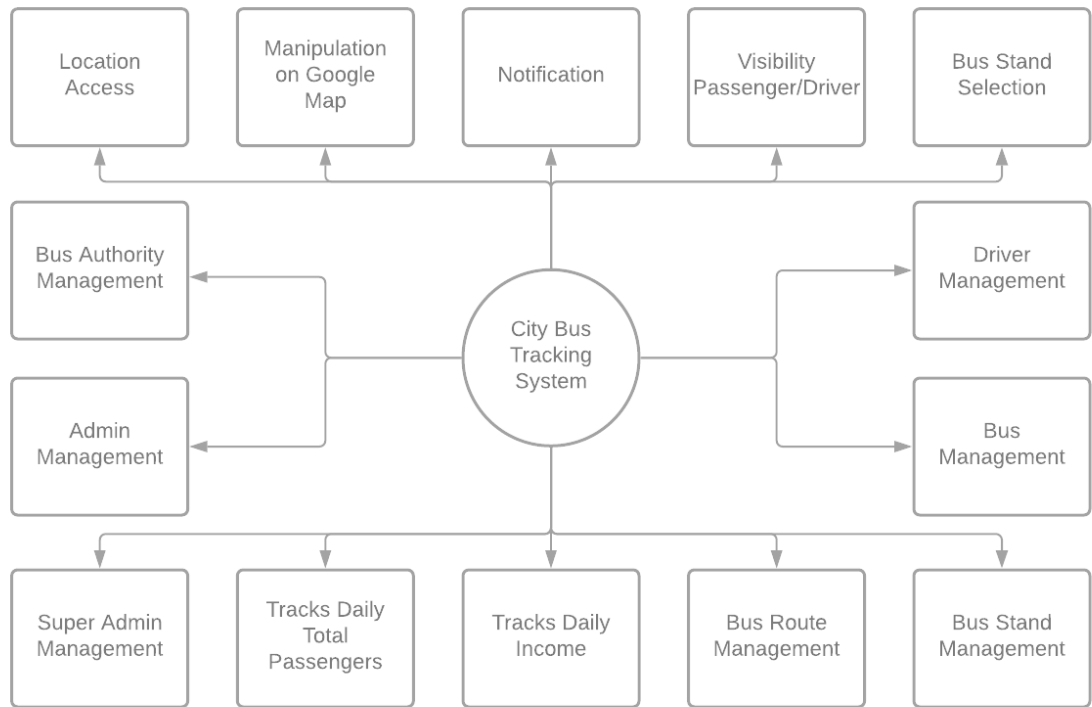


Figure 2.2.2: Data flow diagram from CBTS's roles or features

### Passenger Features

- Location access
- Manipulation on google map
- Notification
- Visibility
- Bus stand selection

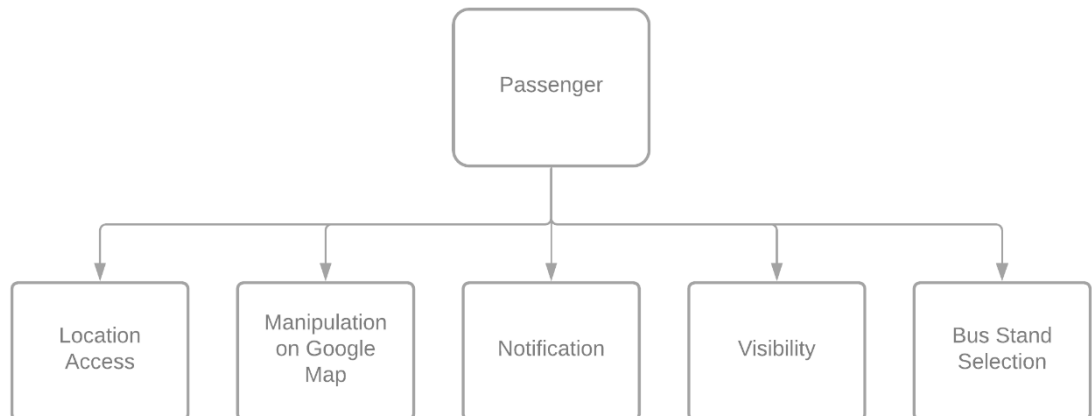


Figure 2.2.3: Data flow diagram for passenger features

### Work process:

- Firstly, passenger needs to login the system. System will automatically registered that passenger if he/she hasn't account yet.
- Needs to enable GPS location to use this system.

- System will detect the nearby bus stands of passenger current location from where he/she needs to choose preferred bus stand to ride on the bus.
- After choosing nearby bus stand map will show all buses on that bus stand.
- After choosing destination map will show only relevant buses on that bus route.
- System will also enable to choose preferred bus service from that bus route.
- Notify user when buses are approaching to them and to the destination.
- Will allow to hide themselves from map to show on there.

## Driver Features

- Location access
- Manipulation on google map
- Notification
- Visibility

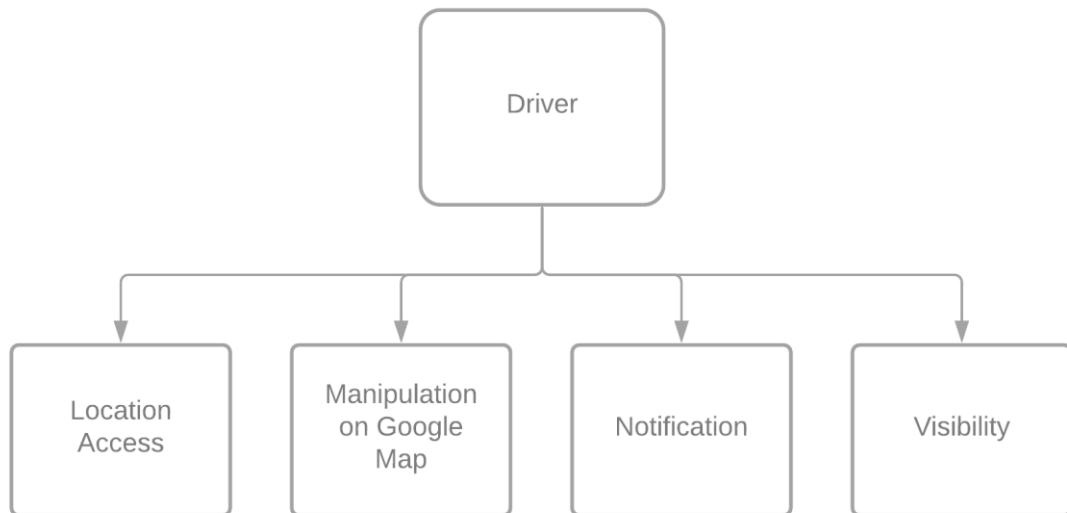


Figure 2.2.4: Data flow diagram for driver features

## Work process:

- Firstly, driver needs to login the system. System will automatically detect it and show appropriate screens for that driver.
- Needs to enable GPS location to use this system.
- Show all passengers on map whose are nearby the bus or chooses to the same route to go to the destination.
- Notify driver if passengers are approaching to the bus.
- Notify if bus stand is approaching.
- Able to hide to see passengers on the map.

## Super Admin Features

- Admin management
- Bus authority management

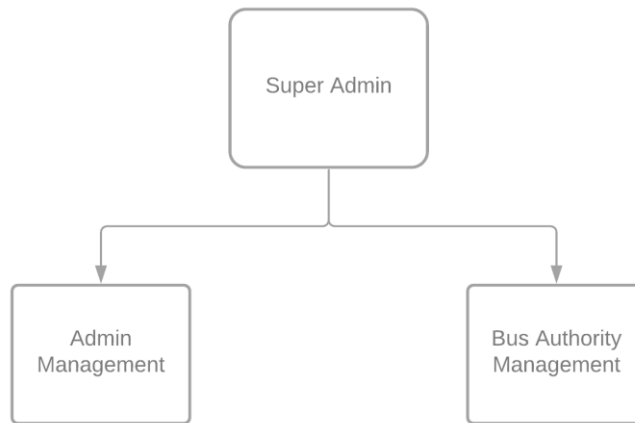


Figure 2.2.5: Data flow diagram for super admin features

Work process:

- Firstly, super admin needs to login the system. System will automatically detect it and show appropriate screens for that super admin.
- Search the account and turn this as admin or bus authority.
- Has ability to remove admin or bus authority.
- Tracking admin activities.

### Admin Features

- Bus stand management

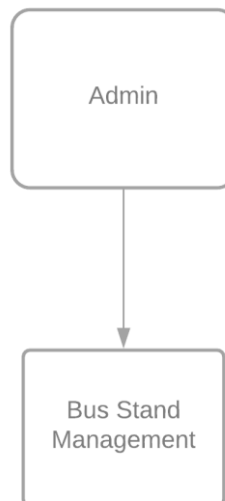


Figure 2.2.6: Data flow diagram for admin features

Work process:

- Firstly, admin needs to login the system. System will automatically detect it and show appropriate screens for that admin.

- Search the bus stand on relevant city which will visually show on the map and insert it into the database by simply pressing a button.

## Bus Authority Features

- Driver management
- Bus management
- Bus stand management
- Bus route management
- Tracks daily income
- Tracks daily total passengers

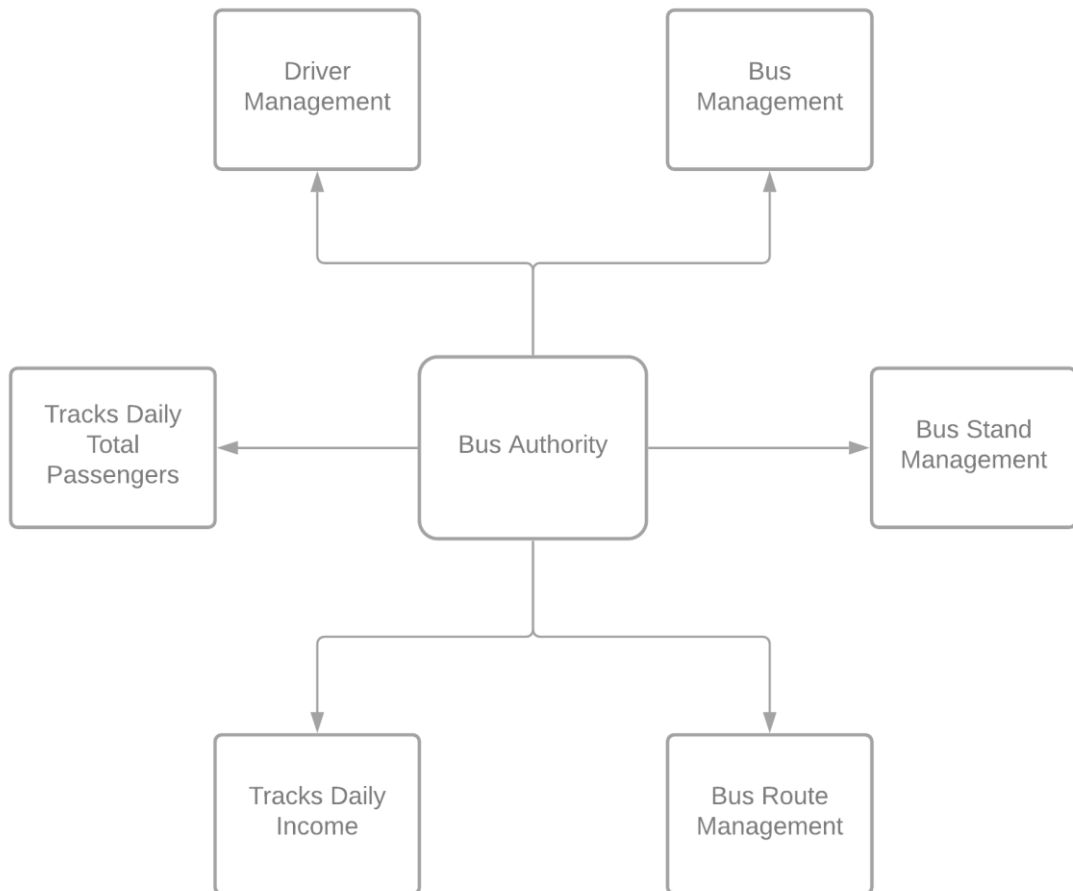


Figure 2.2.7: Data flow diagram for bus authority features

### Work process:

- Firstly, bus authority needs to login the system. System will automatically detect it and show appropriate screens for that authority.
- Turn the account into driver account.
- Ability to remove driver account.
- Add bus for their bus service.
- Ability to modify and remove the bus among their bus service.
- Assign or remove driver to/from a particular bus.
- Create bus route for their bus service.



- Modify or remove bus route from their bus service.
- Assign or remove bus to/from their bus route.
- View total passengers and total income on a particular bus in daily bases.

# CHAPTER 3

## RSOURCES

### 3.1 System Development Life Cycle

Systems Development Life Cycle (SDLC) is the most common process adopted to develop a project and not surprisingly, this project is following this model too. To be precise, waterfall model is being applied. Waterfall model is a sequential model process where the input of a phase actually results from the previous phase.

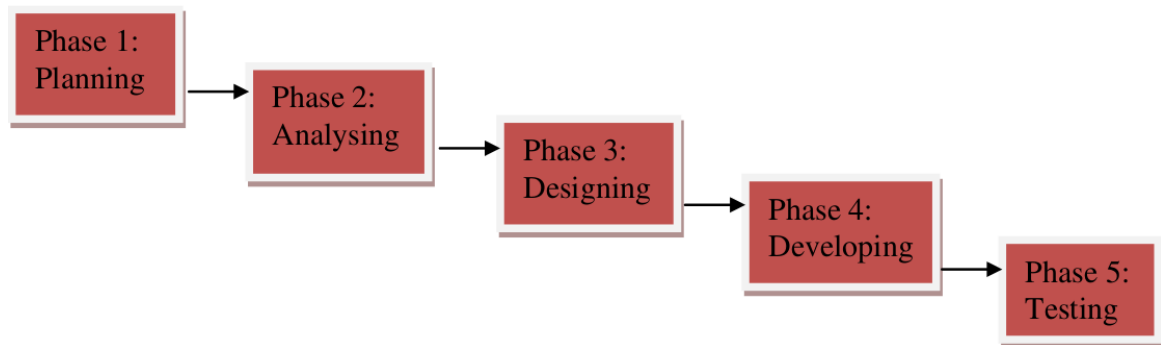


Figure 3.1: SDLC Phases

There are five phases in this model and the first phase is the planning stage. The planning stage determines the objectives of the project and whether the project should be given the green light to proceed. This is where the proposal submission comes into picture. After obtaining the approval, the next phase is analysis. Gathering and analyzing the system and user requirements is essential for entry to the design step.

With the user requirements gathering completed, there is a need to prepare the resources for the project. Be it software or hardware components, careful consideration and selection is to be taken care at this stage. The decision on the appropriate resources to be used is further elaborated under the subsections below. The next step is to design the system and database structure.

Results from the analysis and preparation that were concluded from the previous stage are put into action. With the user requirements in mind, the flow of the system is planned and the user interface is designed to suit their easy navigation needs. In addition, the number of tables, attributes, primary and unique keys of the database is listed.

After completing the design, actual coding begins. Database is created and codes are written. Some of the codes required amendments and improvement to it so these are being developed at this fourth stage of the waterfall model. With the development completed, testing will begin. The codes and database are tested to ensure the results obtained are as intended. More time is spent on both development and testing stages because it is inevitable to have errors and issues and buffer time is allocated for troubleshooting.

# CHAPTER 4

## SYSTEM ANALYSIS AND DESIGN

### 4.1 Use Case Analysis

In order to provide a clear idea about the functionalities of City Bus Tracking system, I've provided use case analysis for both Passenger/Driver and Admin Panel app.

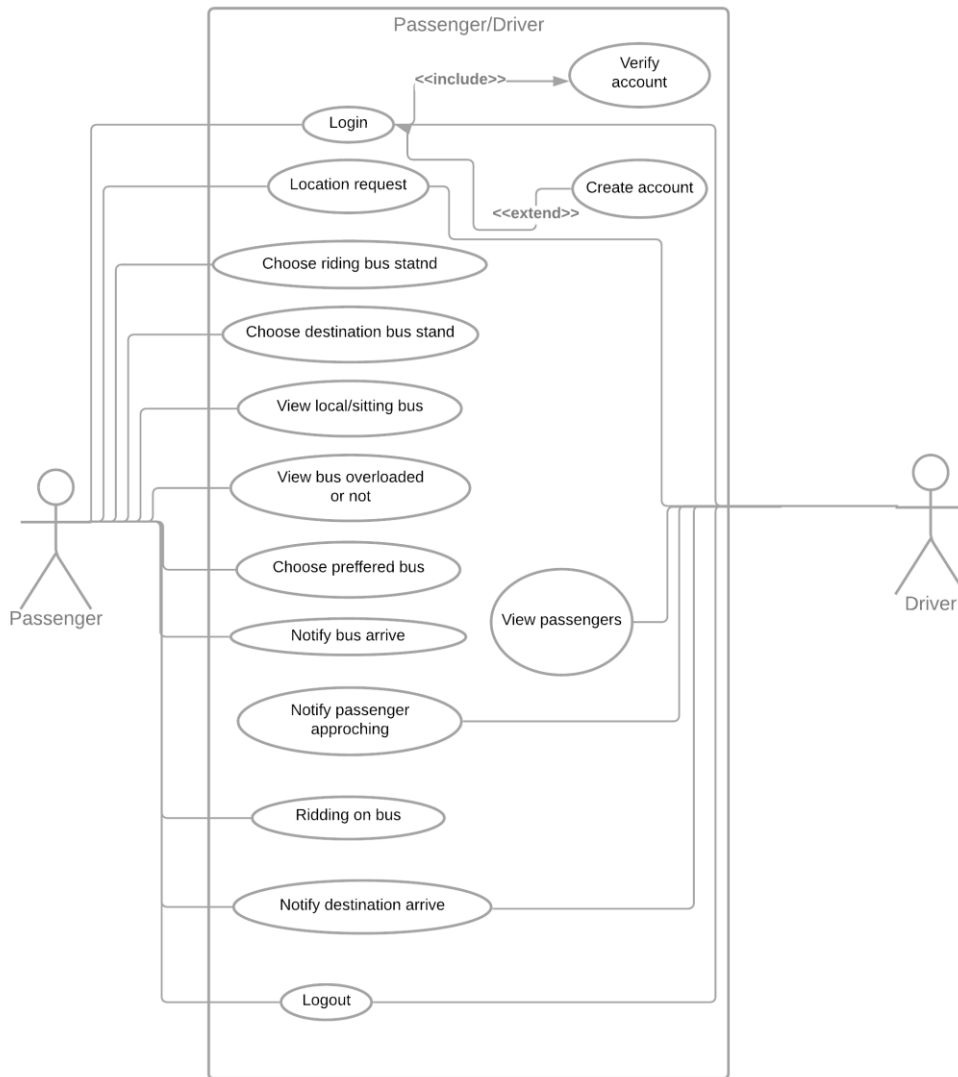


Figure 4.1.1: Use case analysis for passenger/driver app

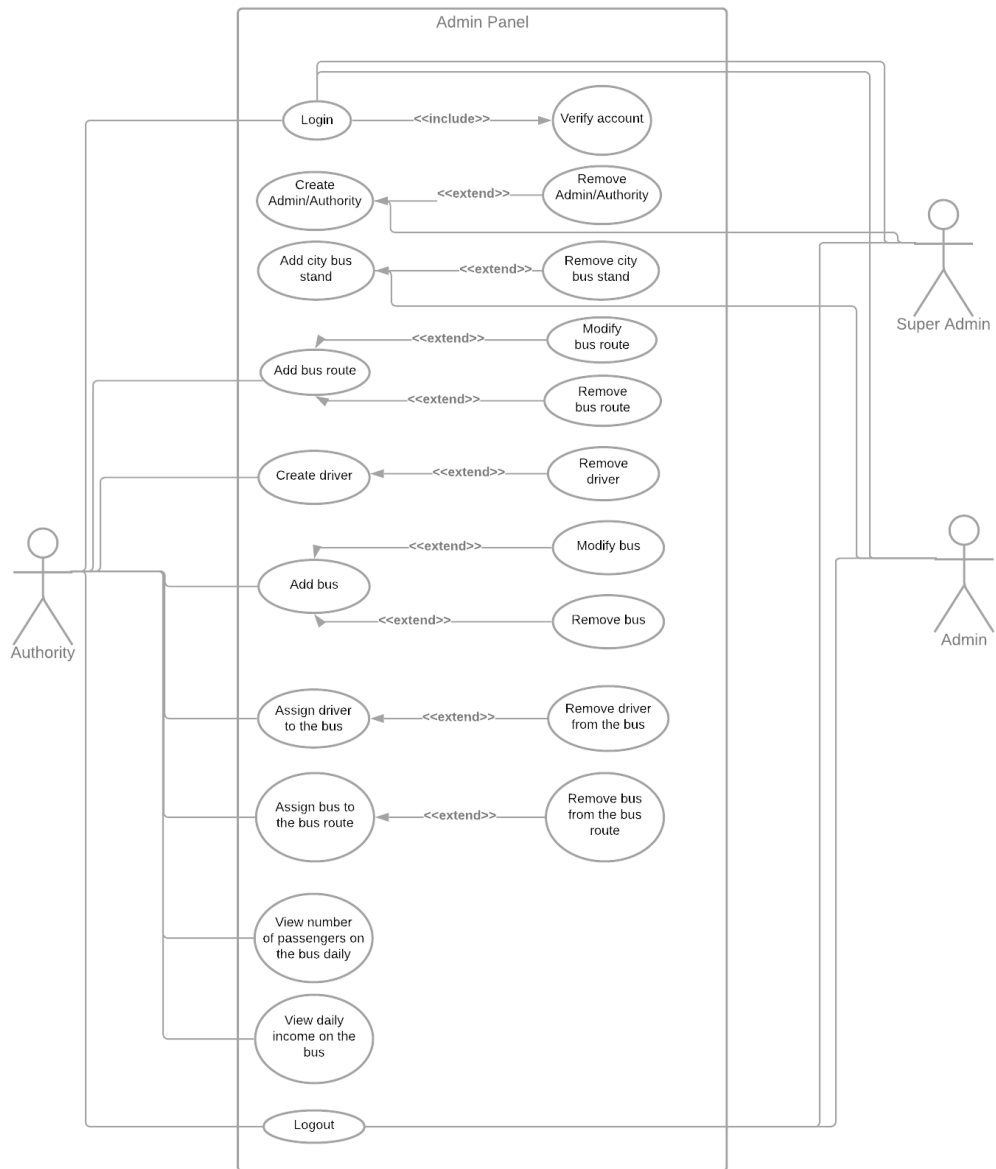


Figure 4.1.2: Use case analysis for admin panel app

## 4.2 System Design

### Common Features





## Welcome to City Vehicles

Your Mobile Number

[Create new an Account](#)



## Join With City Vehicles

Your Name

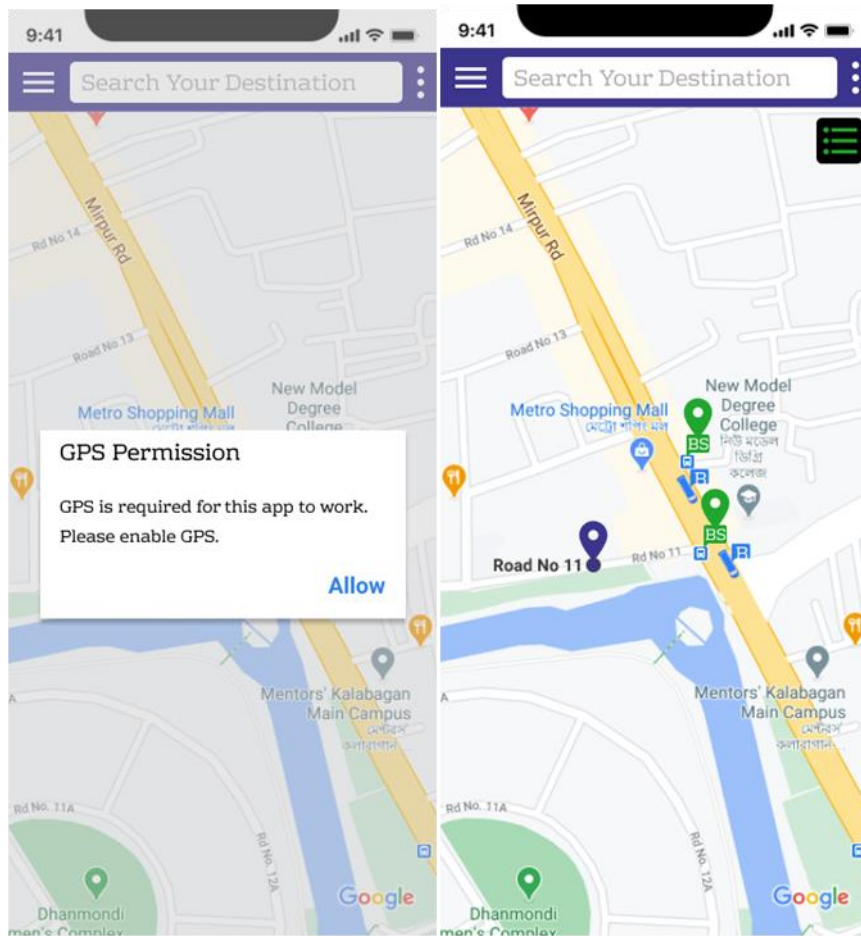
Your Mobile Number

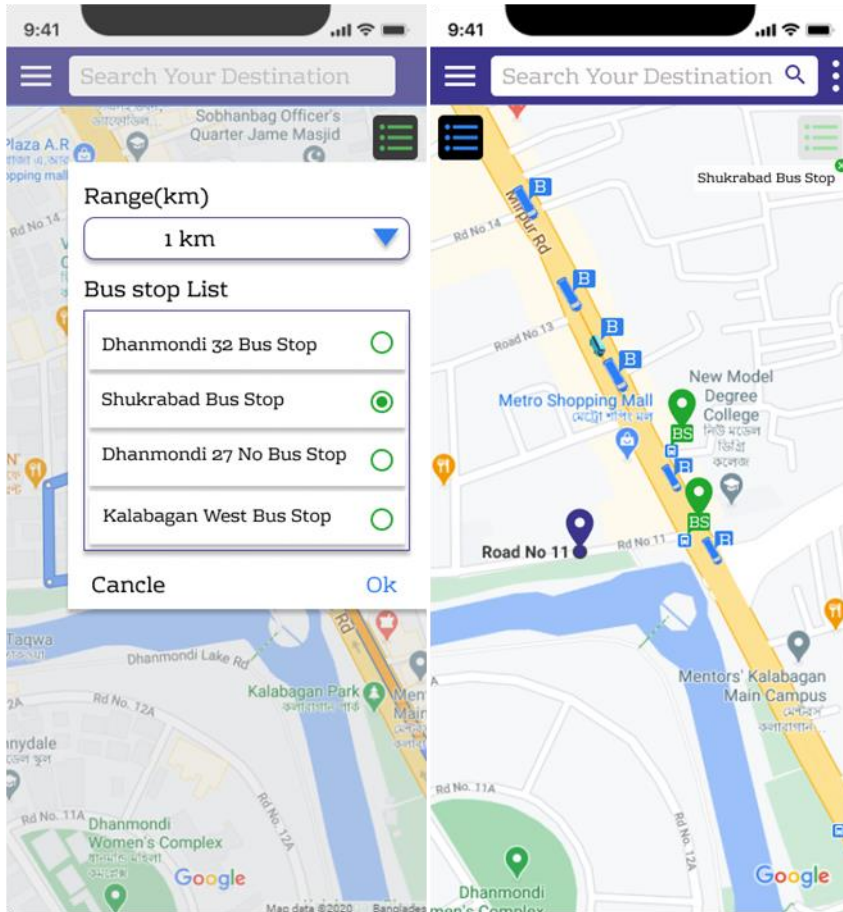
 

Enter OTP Code

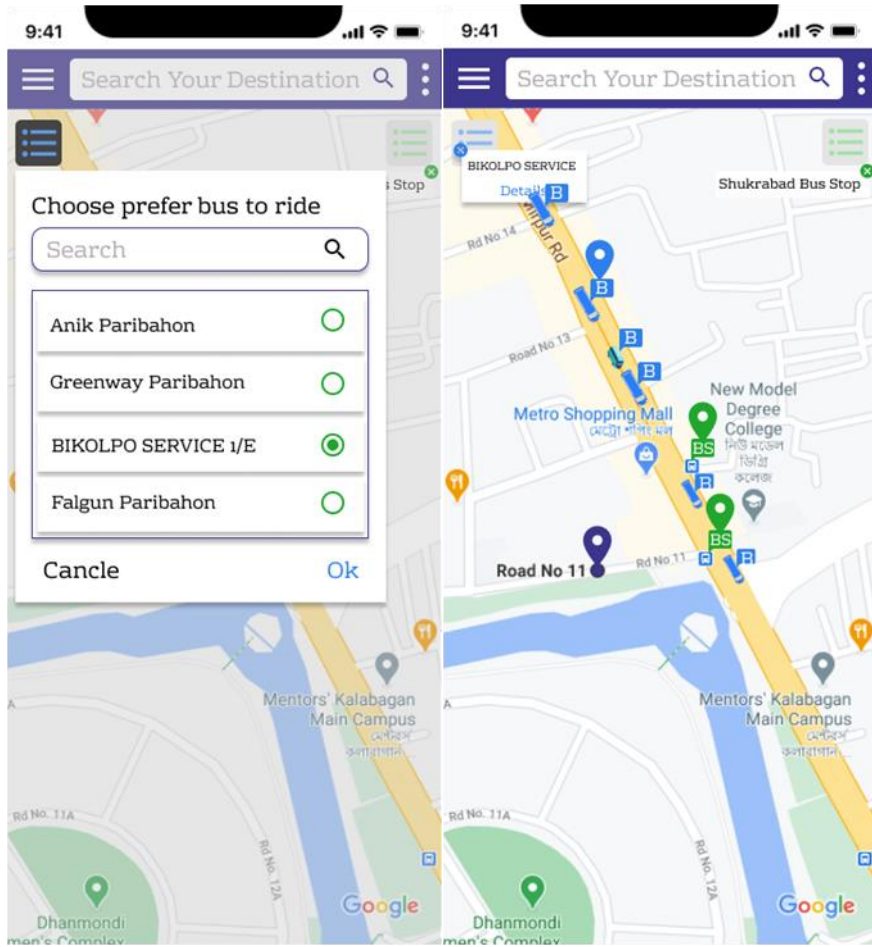
Already have an account? [LogIn](#)

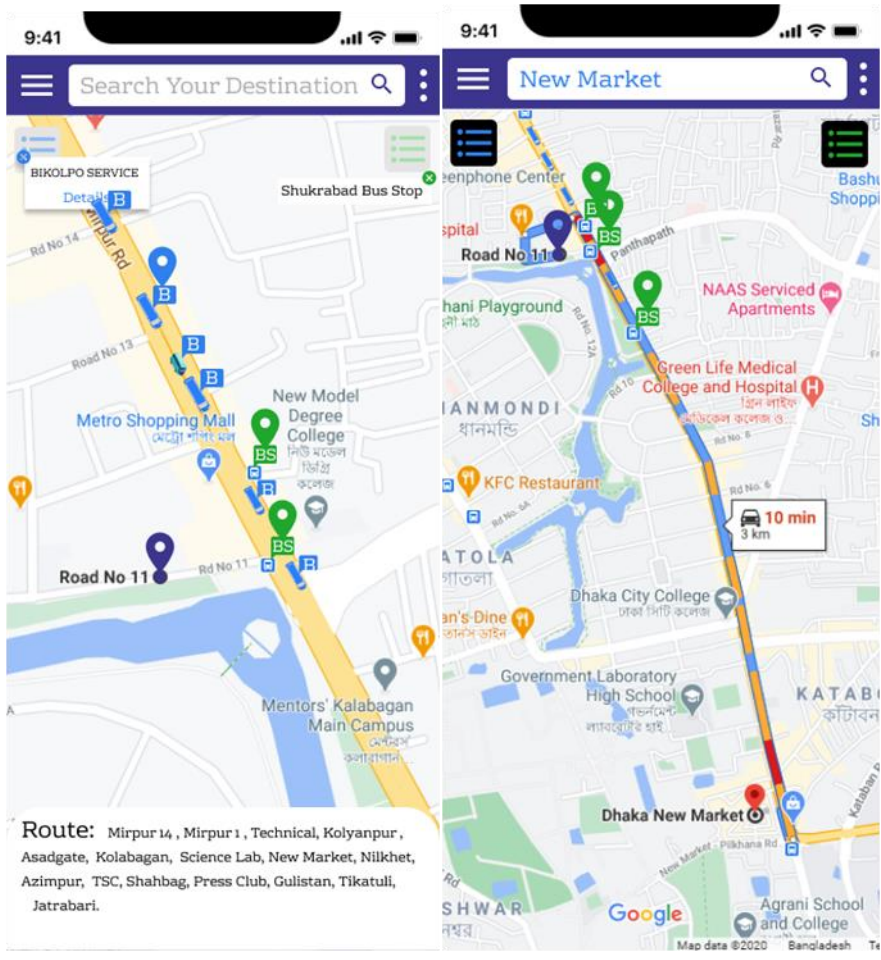
# Passenger Features



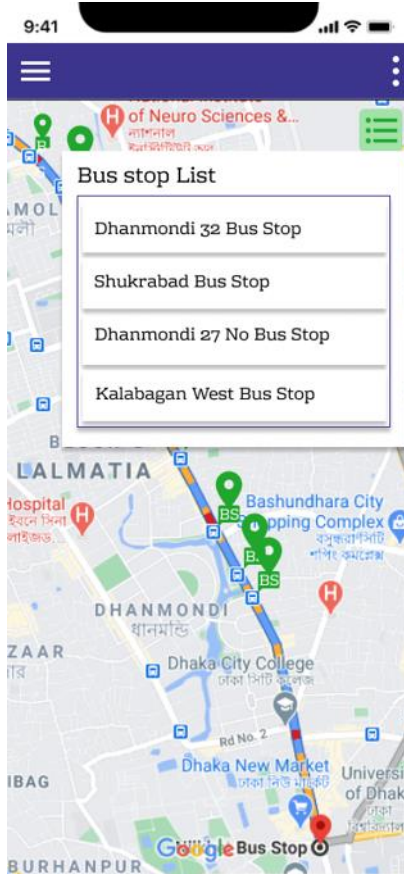
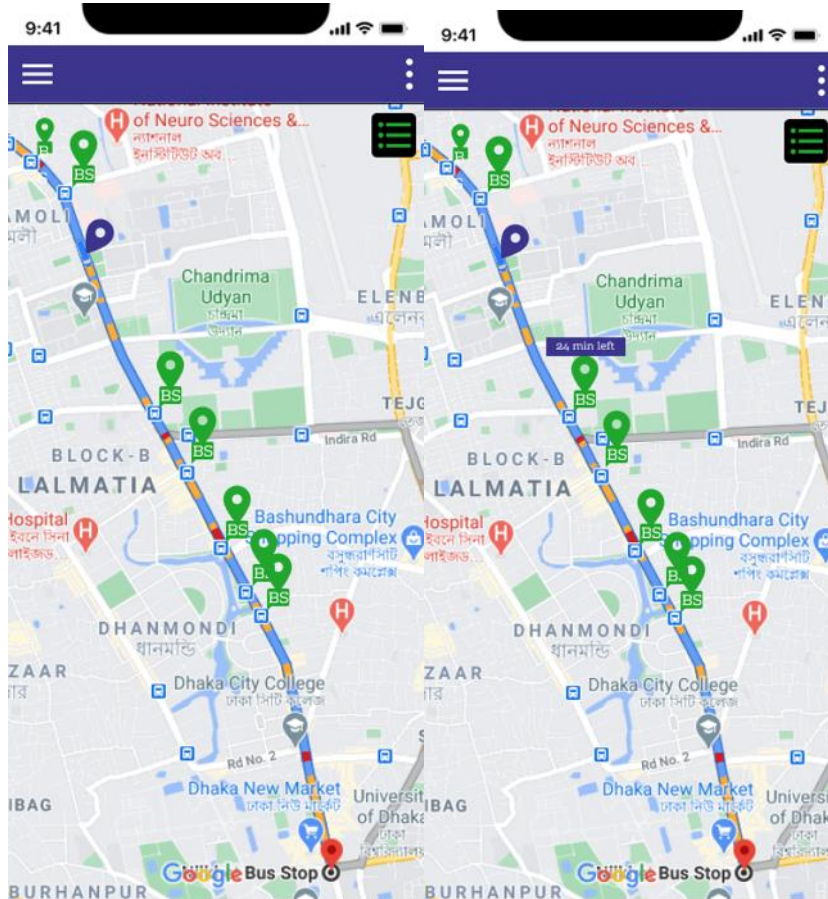




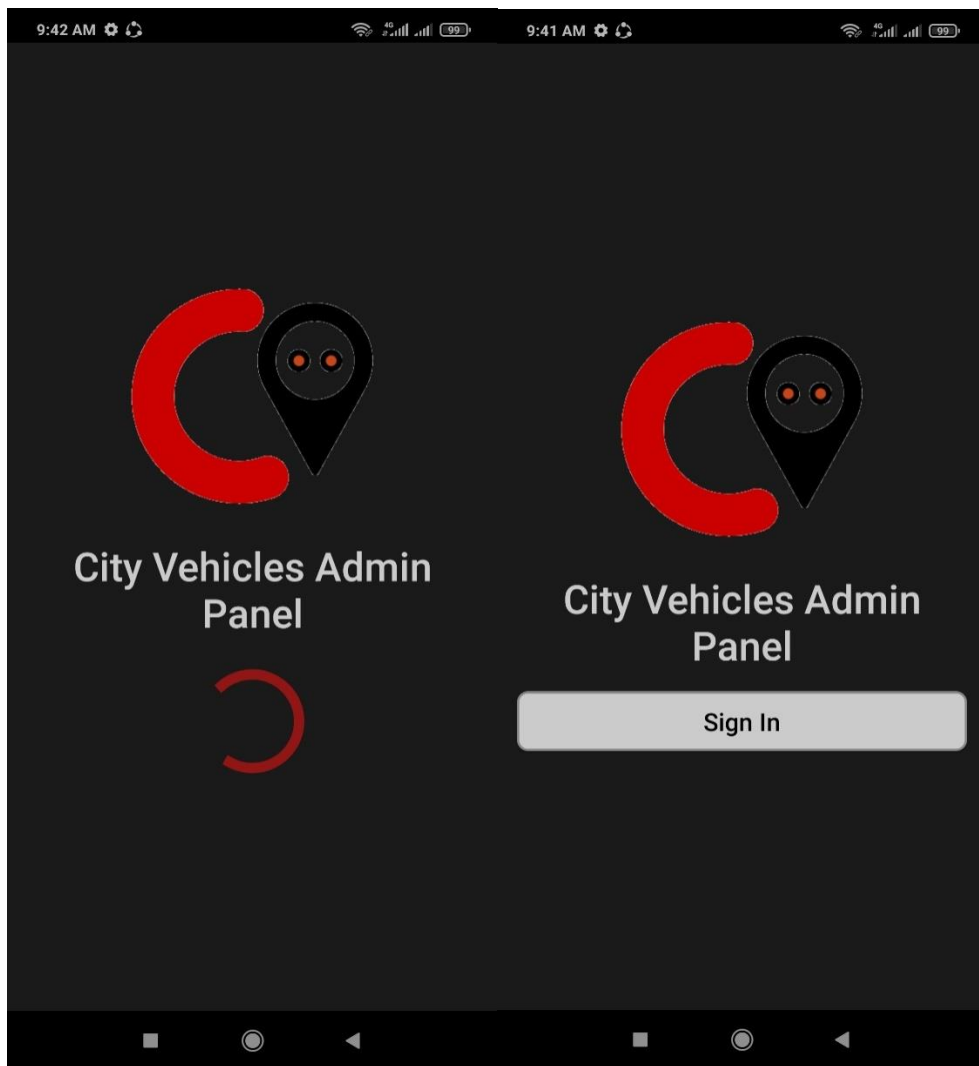


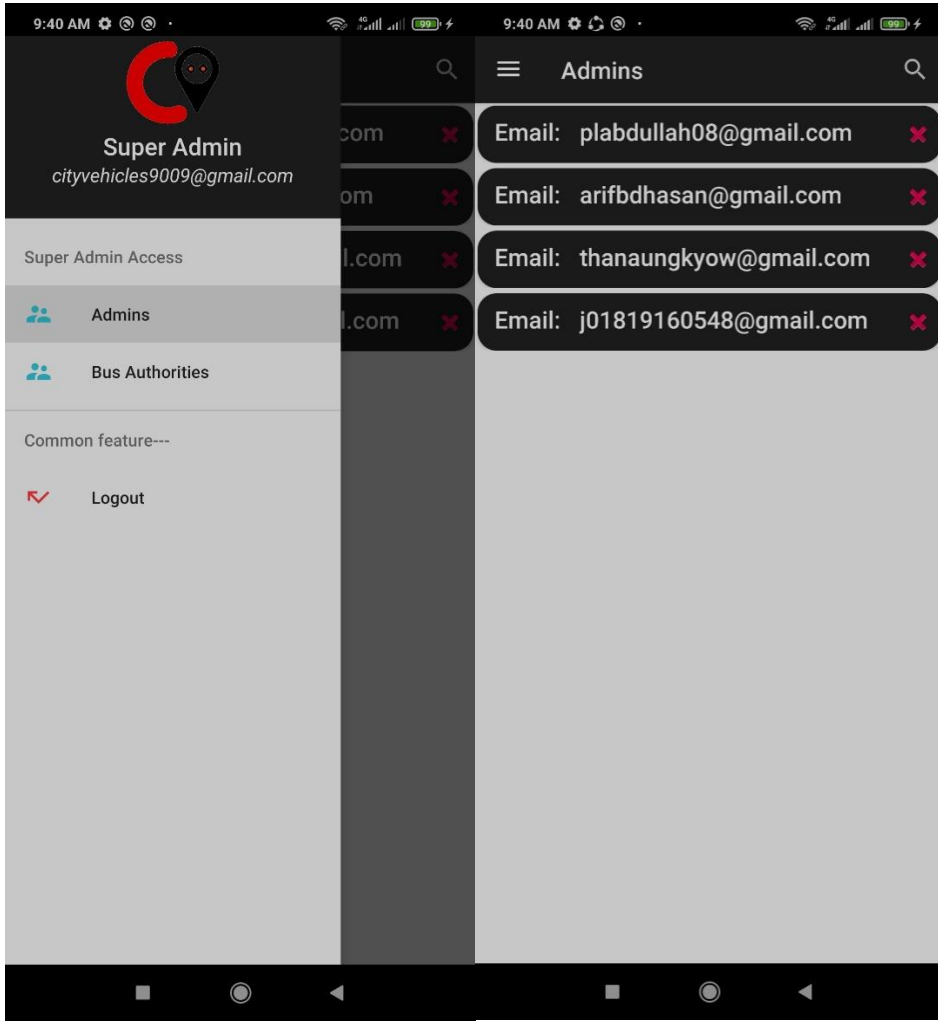


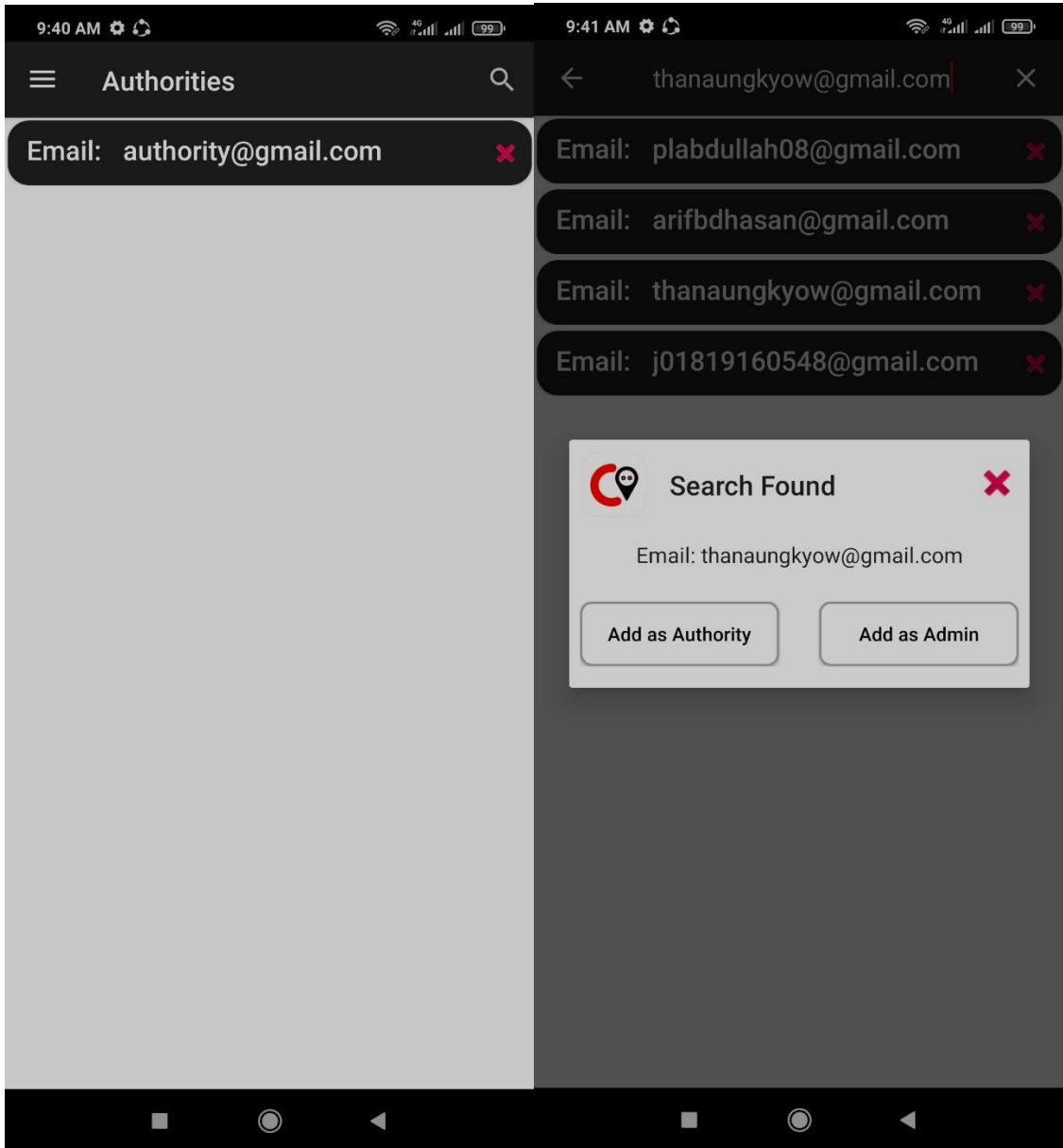
Driver Features



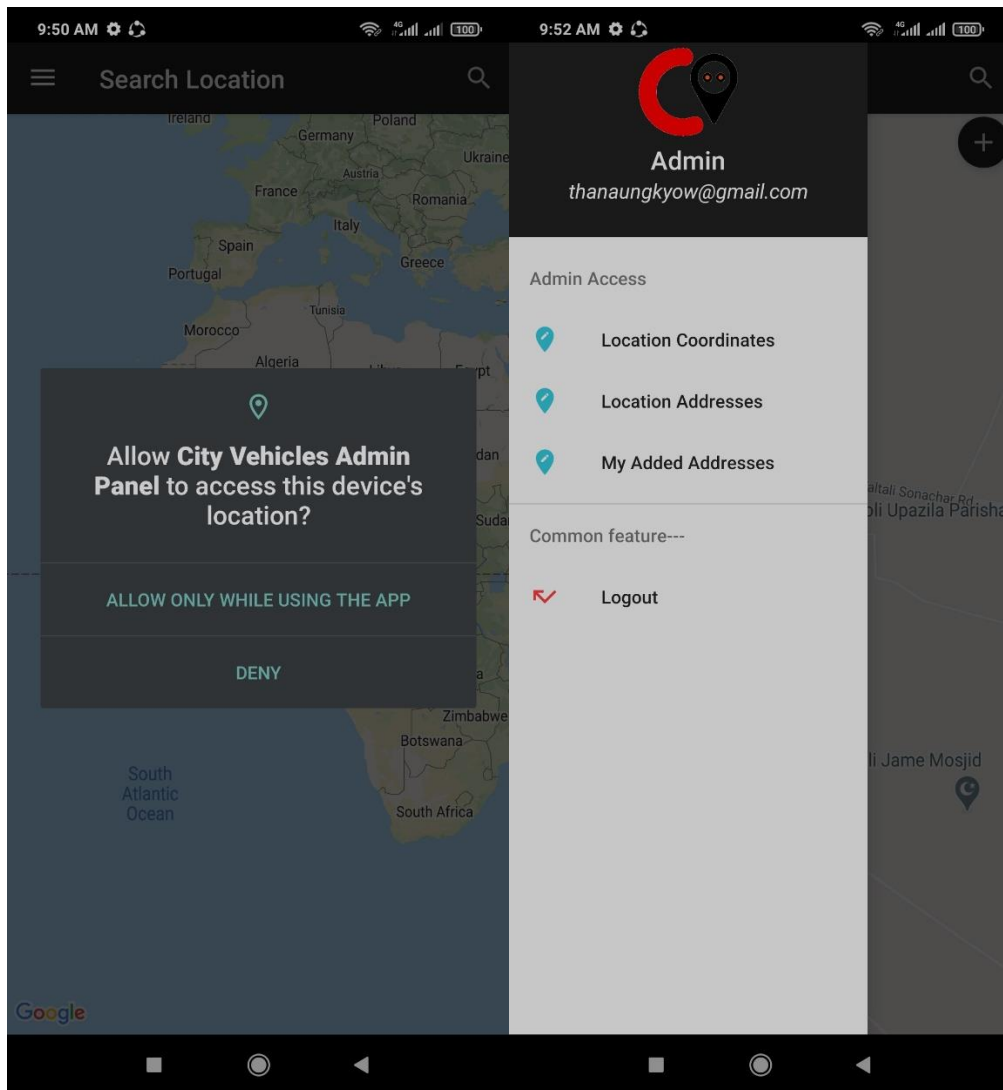
# Super Admin Features

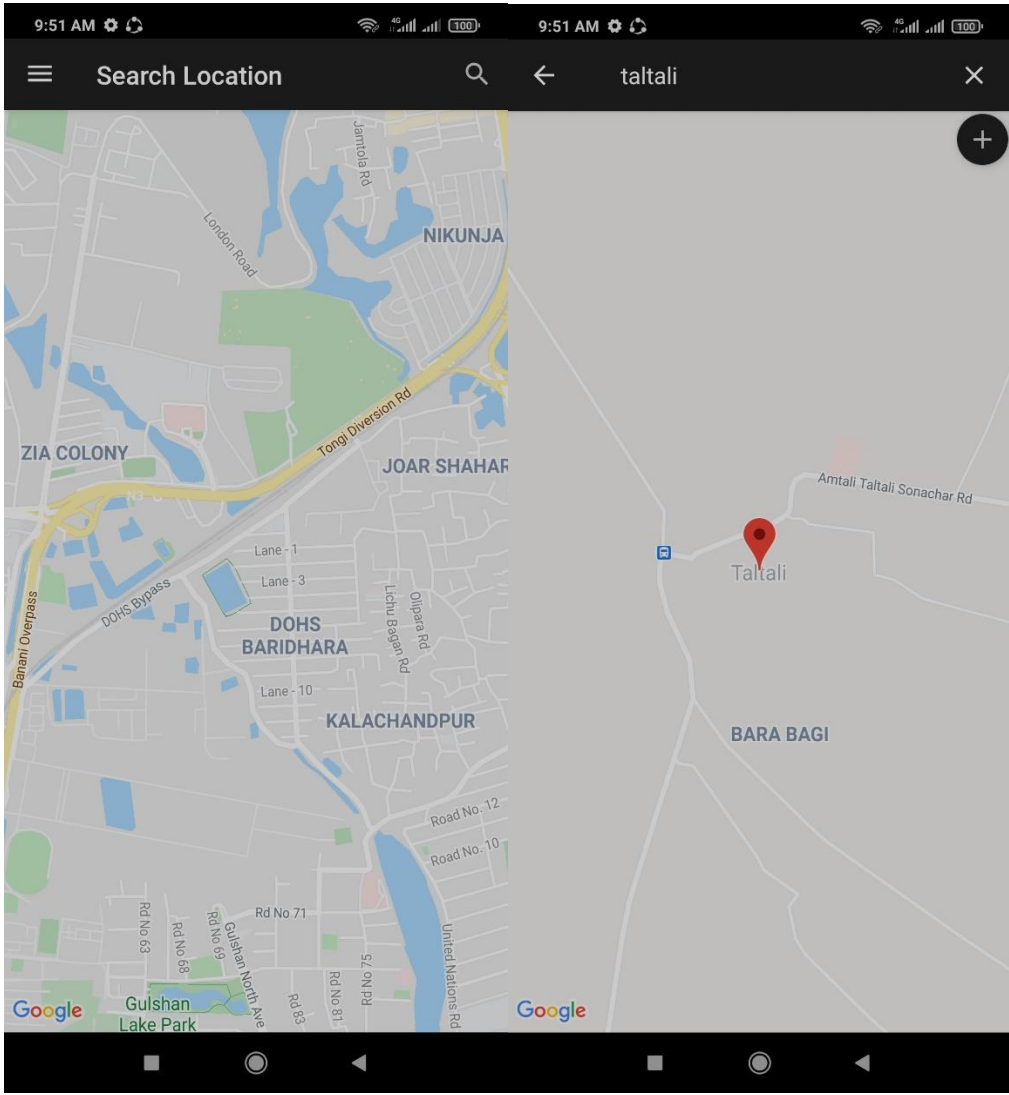




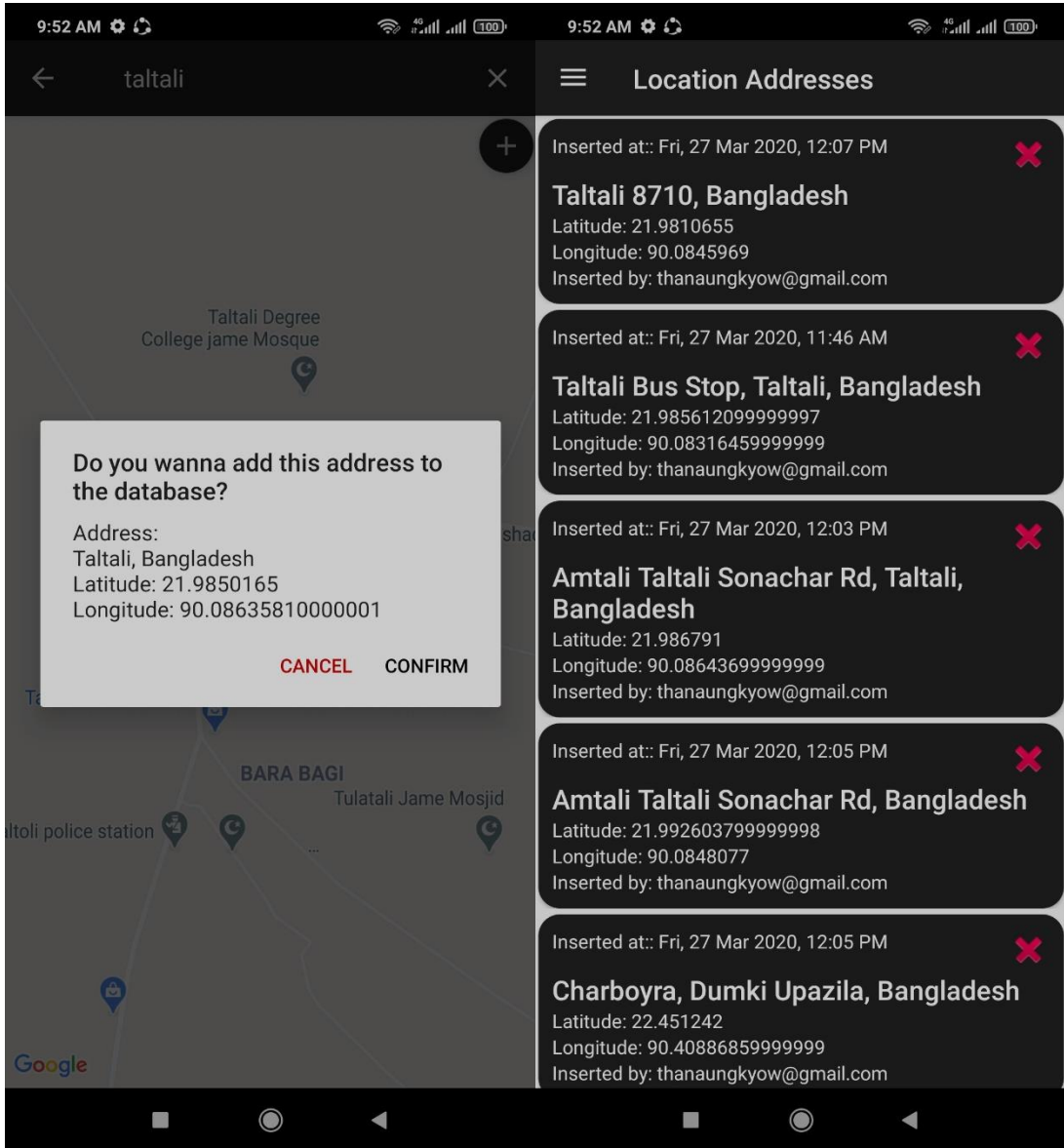


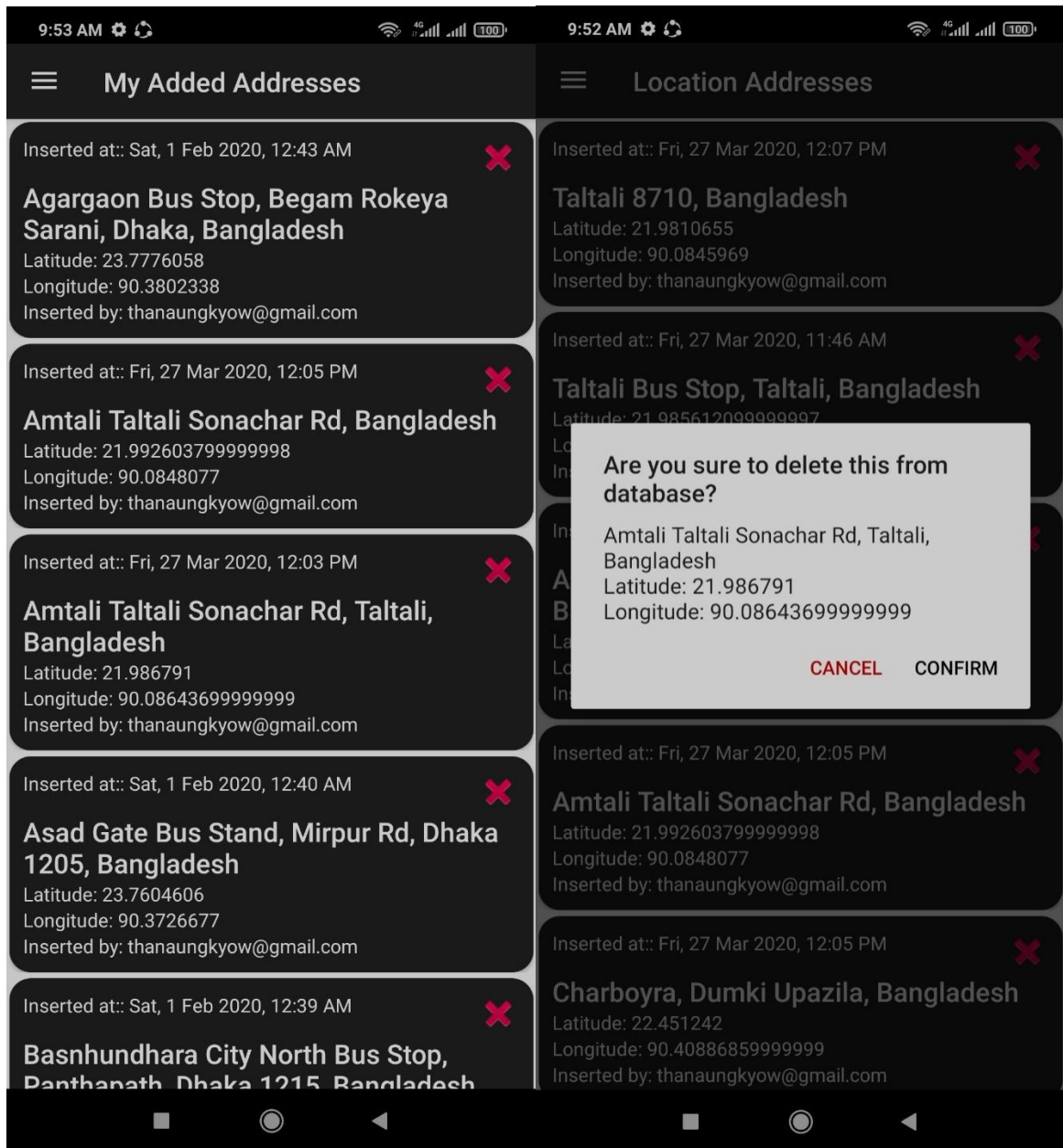
# Admin Features



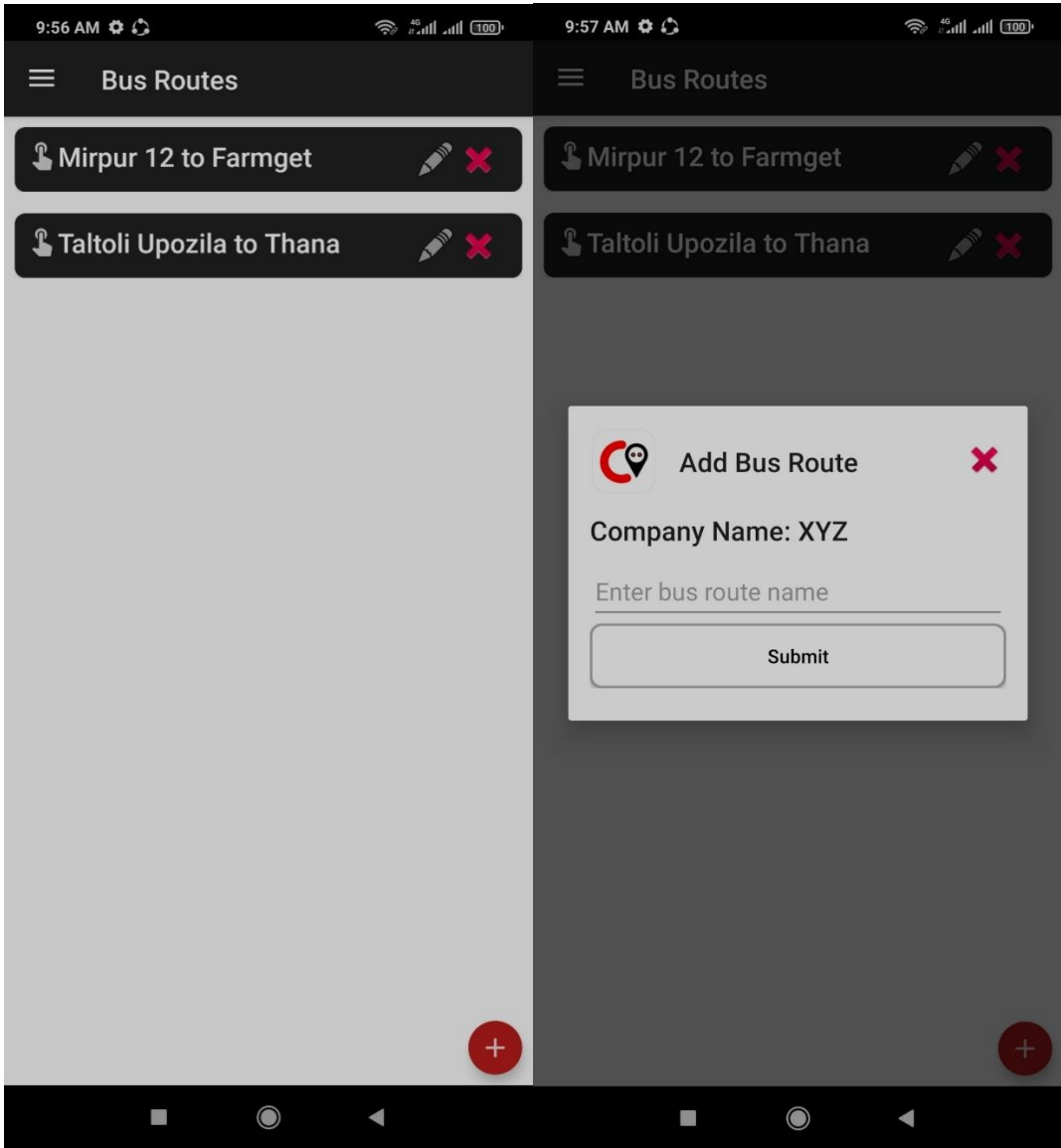


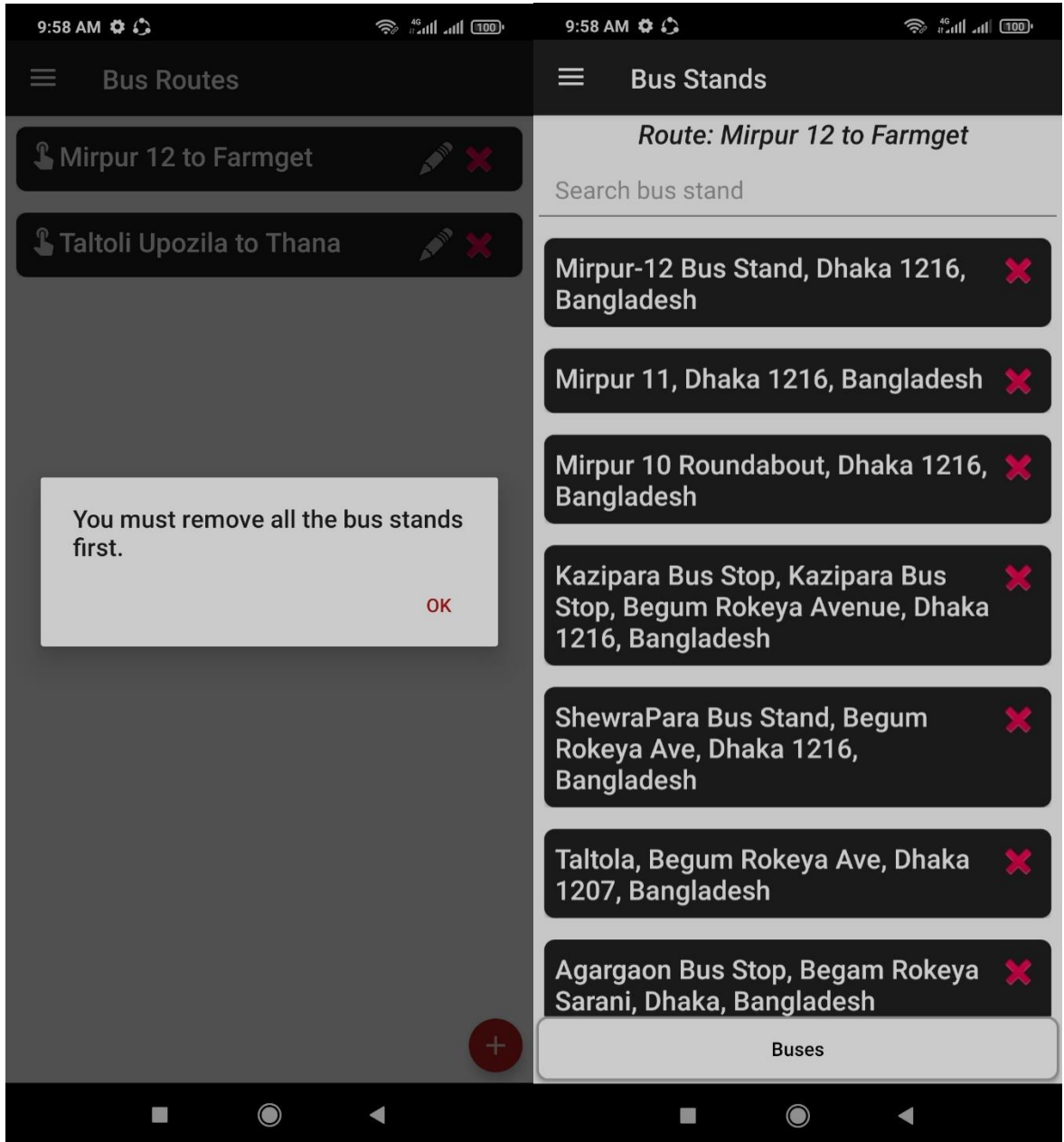


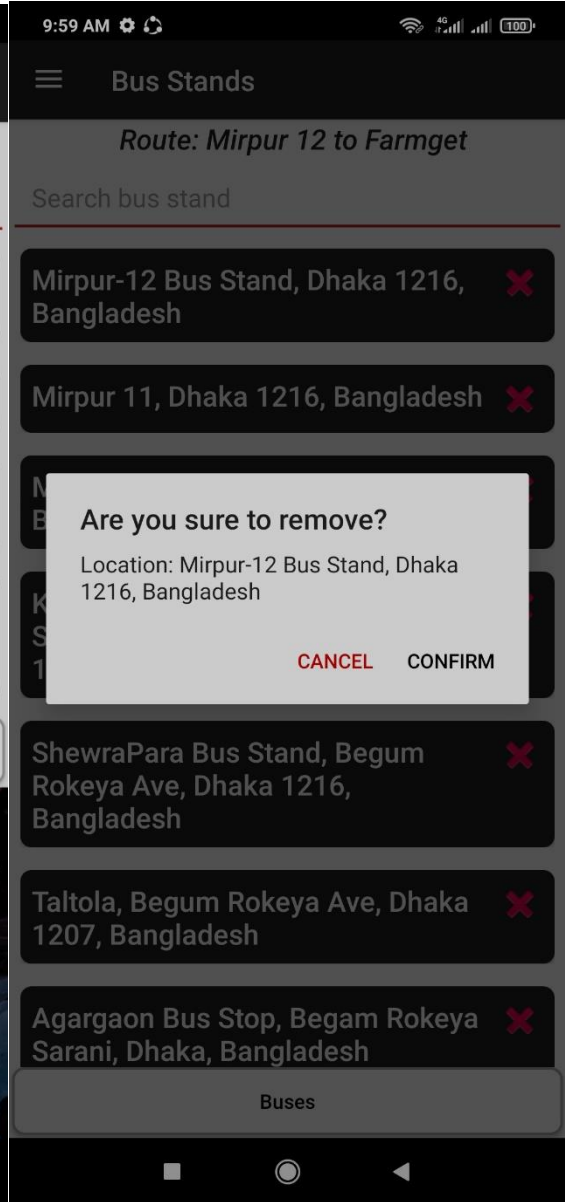
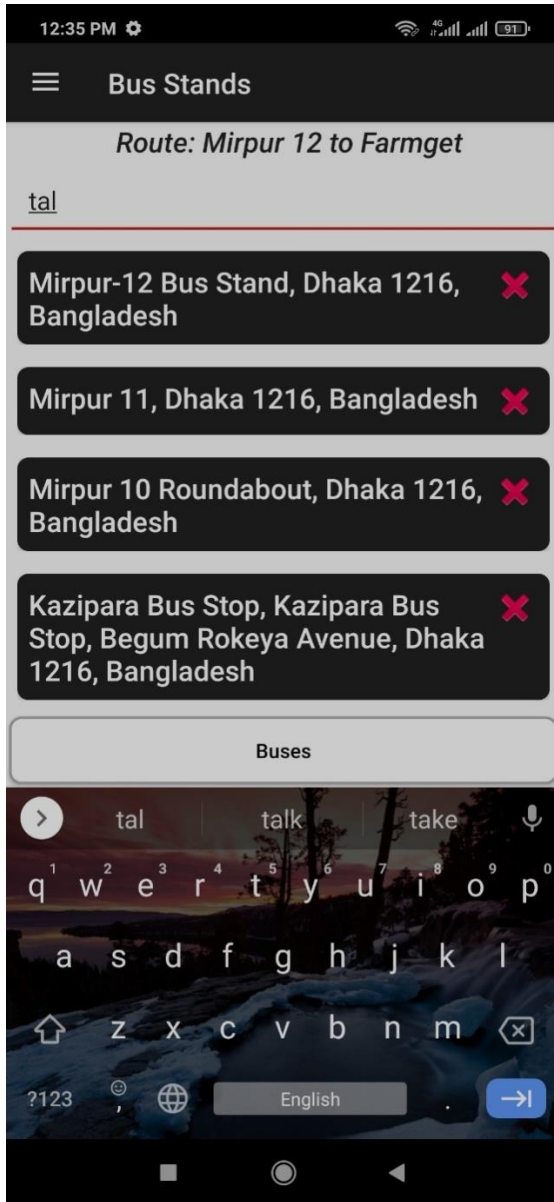


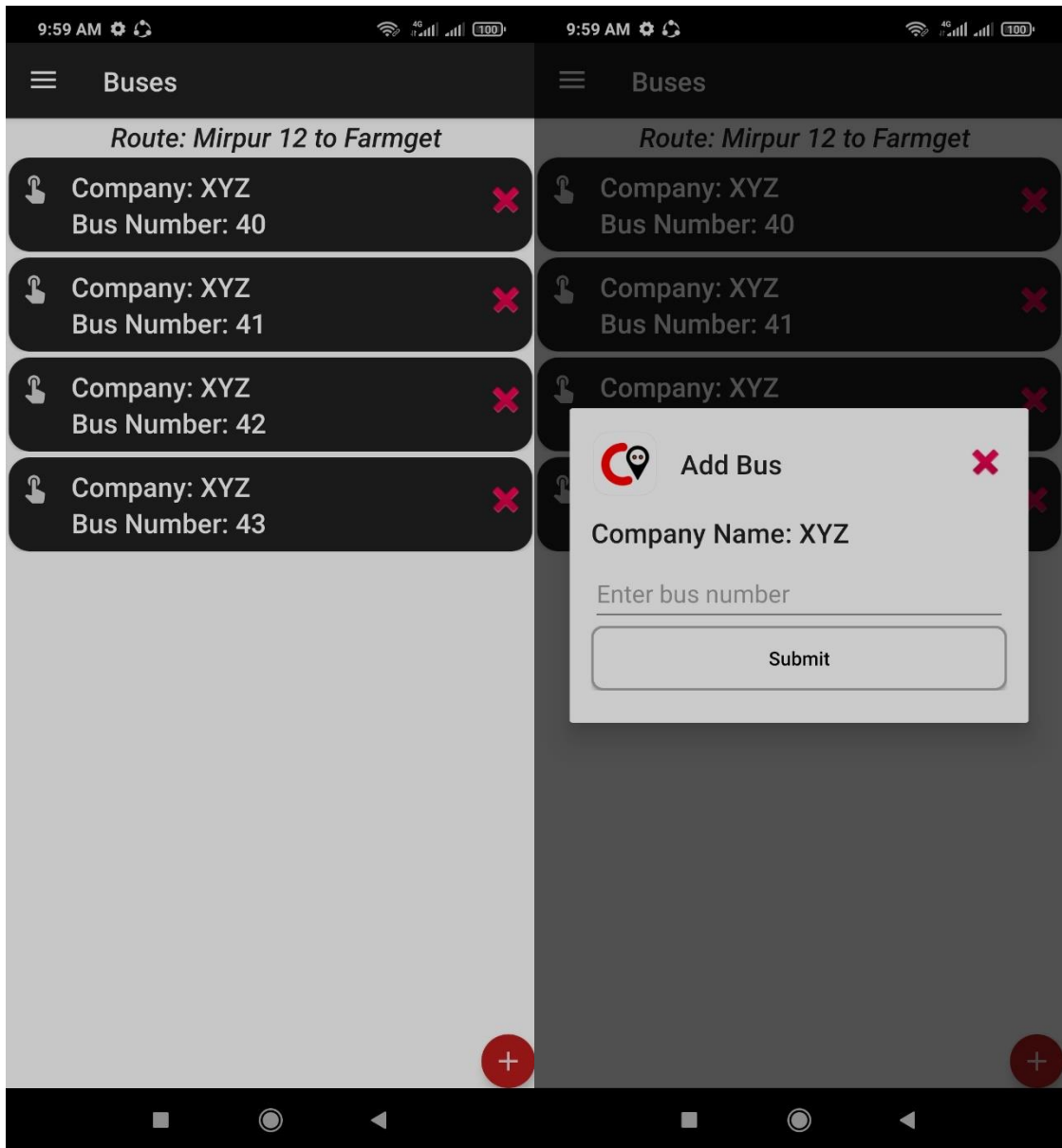


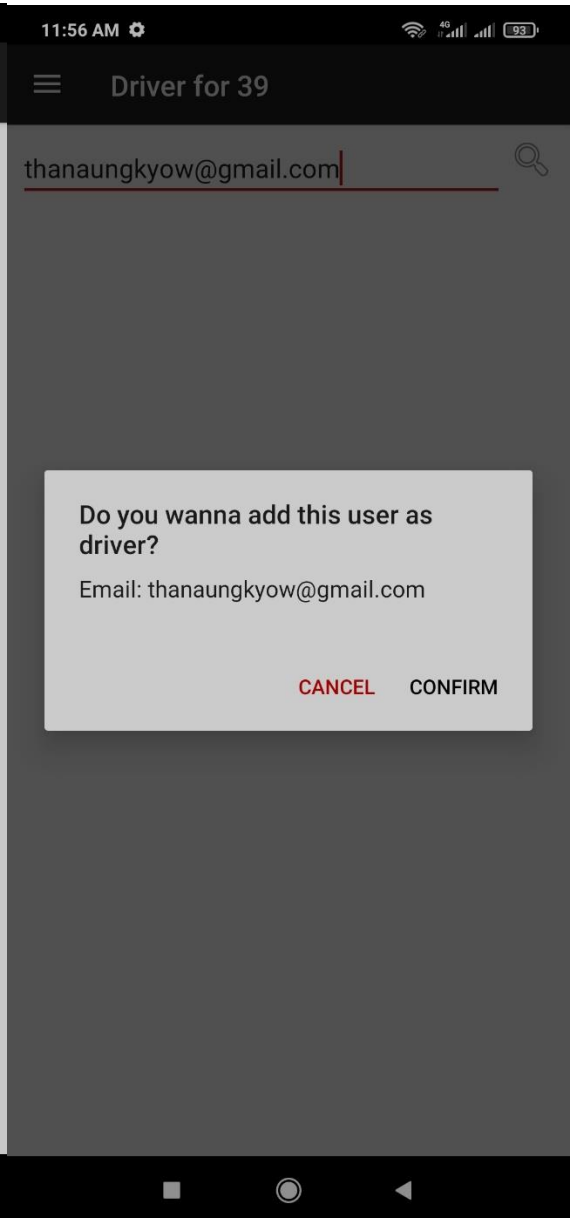
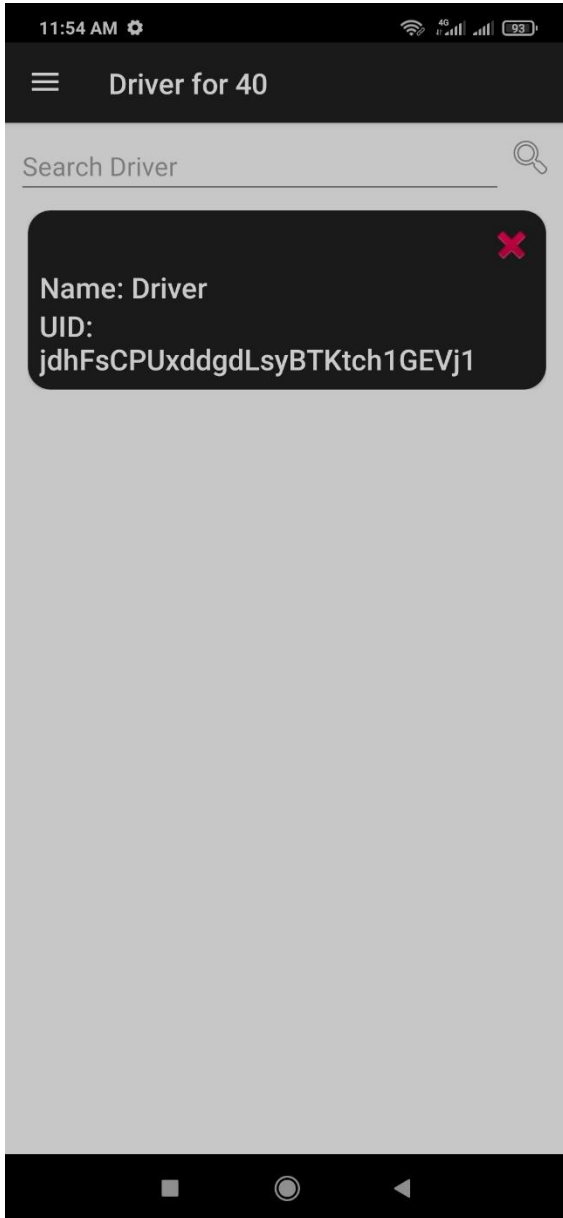
## Bus Authority Features

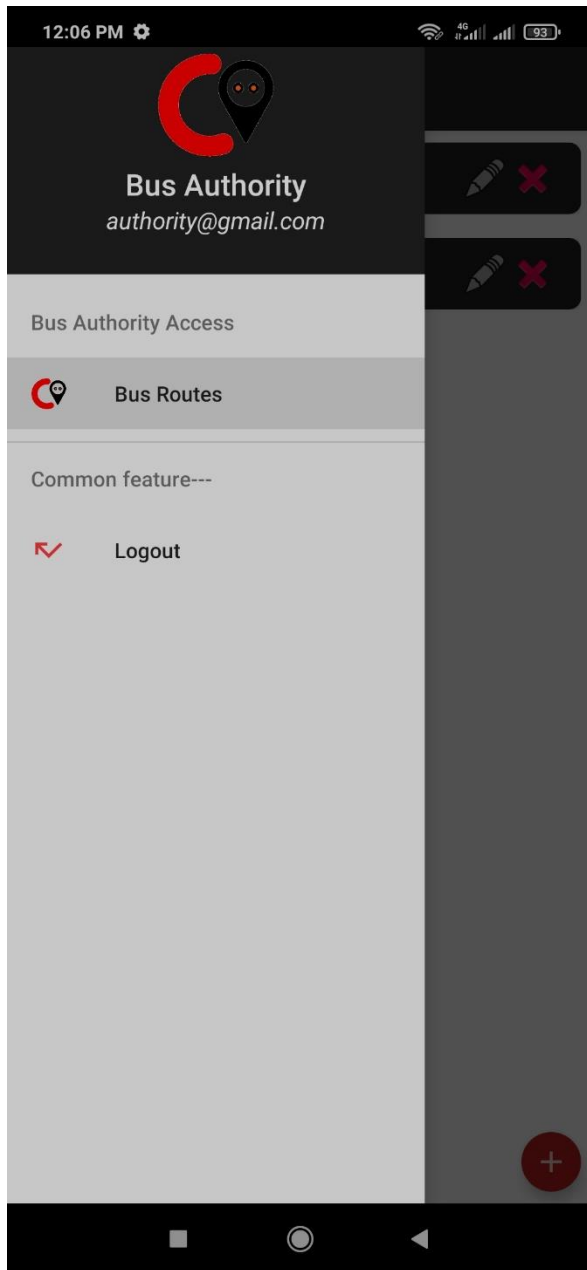














# CHAPTER 5

## DATABASE DESIGN AND DEVELOPMENT

### 5.1 Database Design

#### Entity Relationship Diagram (ERD)

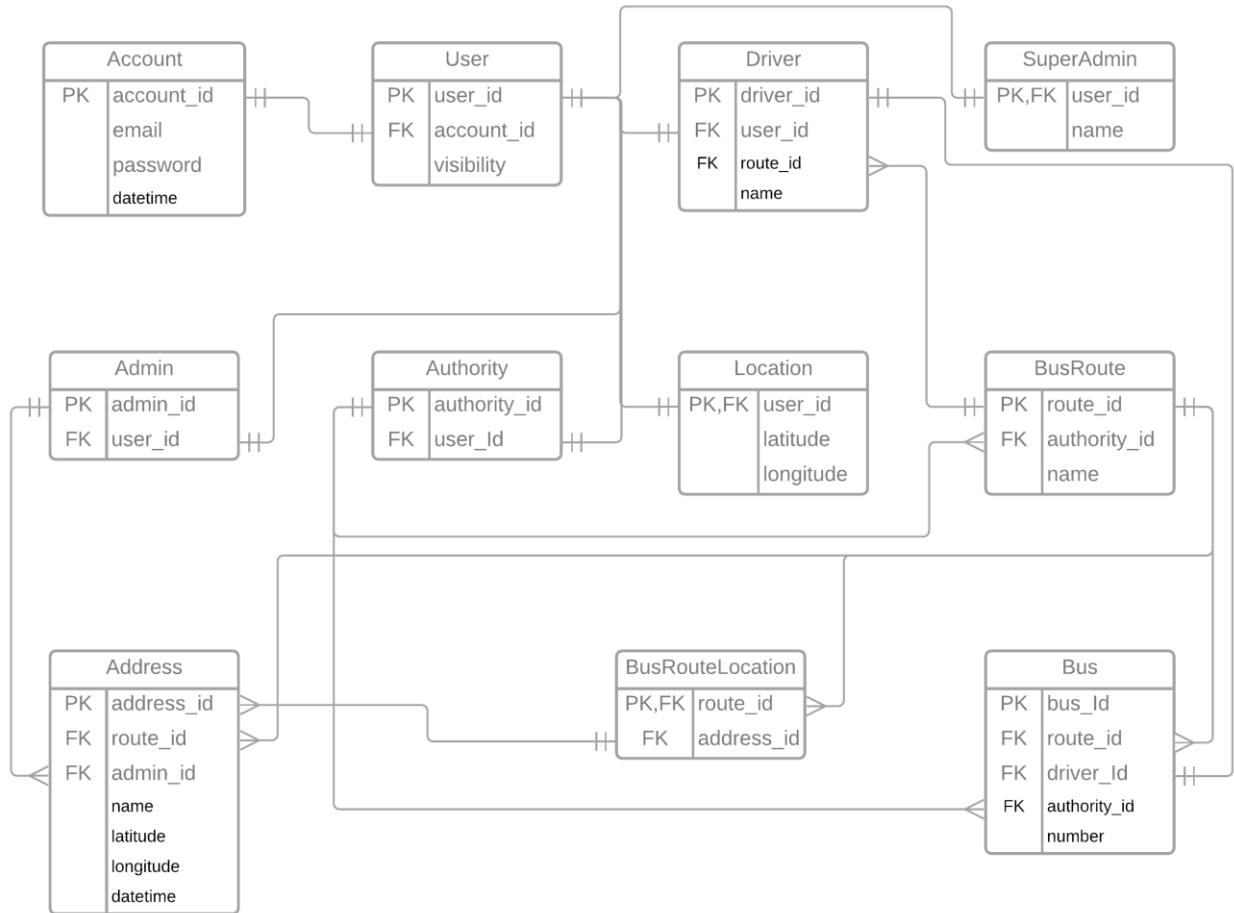


Figure 5.1: Entity relationship diagram (ERD)

### 5.2 Database Development

I am using Firebase API as database which is the cloud storage from Google to store data as JSON(JavaScript Object Notation) format. Relevant scripts for MySQL server is as follow:

```
CREATE TABLE `Bus` (  
  `bus_Id` <int>,  
  `route_id` <int>,  
  `driver_Id` <int>,  
  `authority_id` <int>,  
  `number` <int>,  
);
```

```
PRIMARY KEY (`bus_Id`)  
);
```

```
CREATE TABLE `Account` (  
  `account_id` <int>,  
  `email` <string>,  
  `password` <string>,  
  `datetime` <string>,  
  PRIMARY KEY (`account_id`)  
);
```

```
CREATE TABLE `BusRoute` (  
  `route_id` <int>,  
  `authority_id` <int>,  
  `name` <string>,  
  PRIMARY KEY (`route_id`)  
);
```

```
CREATE TABLE `Driver` (  
  `driver_id` <int>,  
  `user_id` <int>,  
  `route_id` <int>,  
  `name` <string>,  
  PRIMARY KEY (`driver_id`)  
);
```

```
CREATE TABLE `SuperAdmin` (  
  `user_id` <int>,  
  `name` <string>,  
  PRIMARY KEY (`user_id`)  
);
```

```
CREATE TABLE `Admin` (  
  `admin_id` <int>,  
  `user_id` <int>,  
  PRIMARY KEY (`admin_id`)  
);
```

```
CREATE TABLE `User` (  
  `user_id` <int>,  
  `account_id` <int>,  
  `visibility` <boolean>,  
  PRIMARY KEY (`user_id`)  
);
```

```
CREATE TABLE `Authority` (  
  `authority_id` <int>,  
  `user_Id` <int>,  
  PRIMARY KEY (`authority_id`)  
);
```

```
CREATE TABLE `BusRouteLocation` (  
  `route_id` <int>,  
  `address_id` <int>,  
  PRIMARY KEY (`route_id`)  
);
```

```
CREATE TABLE `Address` (  
  `address_id` <int>,  
  `route_id` <int>,  
  `admin_id` <int>,  
  `name` <string>,  
);
```

```
`latitude` <double>,  
`longitude` <double>,  
`datetime` <string>,  
PRIMARY KEY (`address_id`)  
);
```

```
CREATE TABLE `Location` (  
  `user_id` <int>,  
  `latitude` <double>,  
  `longitude` <double>,  
  PRIMARY KEY (`user_id`)  
);
```

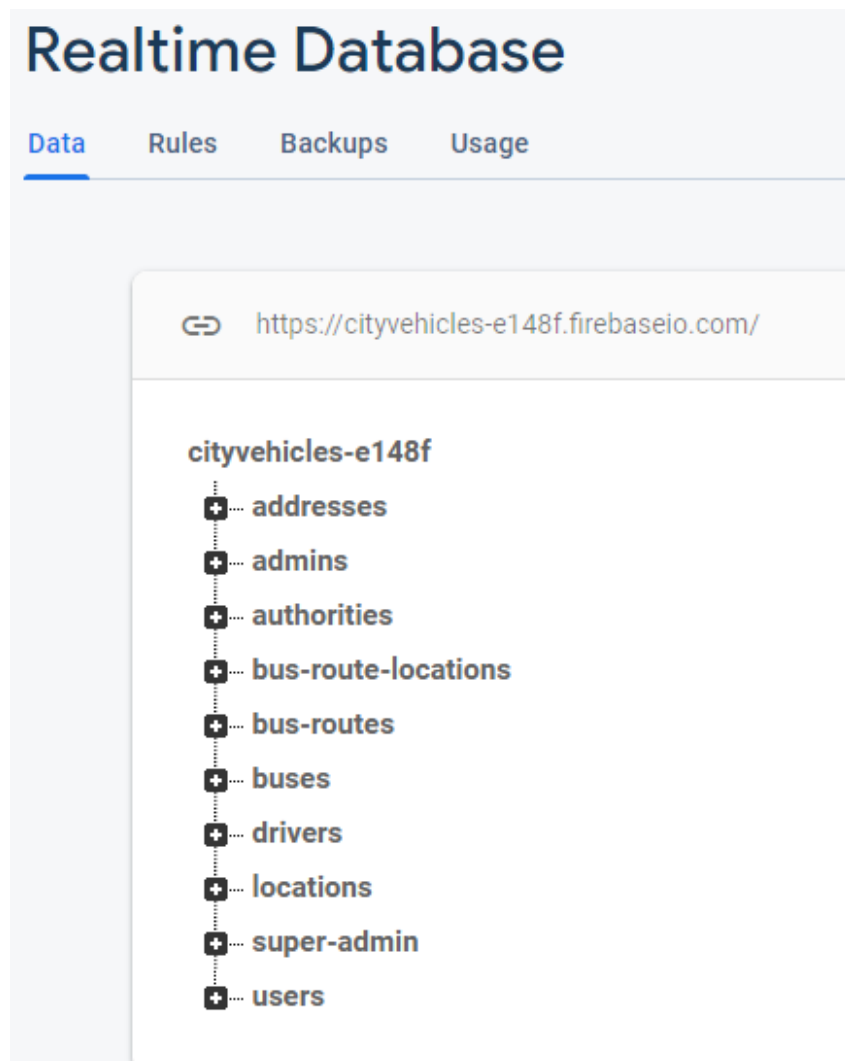


Figure 5.2: Table structure on Firebase real-time database

# CHAPTER 6

## PROJECT MANAGEMENT

### 6.1 Work Breakdown Structure

Work breakdown structure is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. It provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. It's arranged in a tree structure manner to show all sub-sections required to be accomplished in each phase throughout the project.

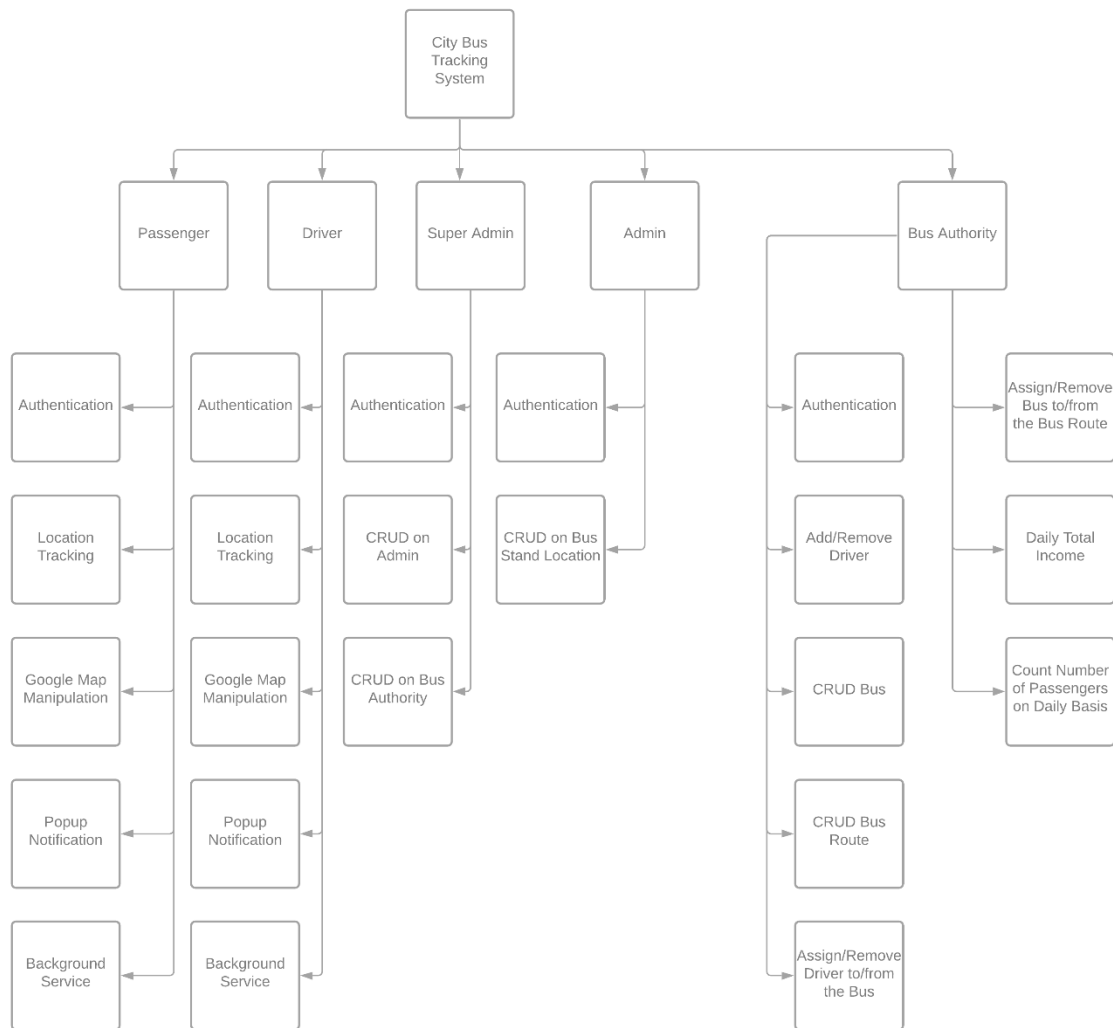


Figure 6.1: Work breakdown structure for CBTS

### 6.2 Risk Management

Every project has uncertainties and they may affect the project success. These uncertainties are known as risk. There is a need to determine the risks involved in the project to reduce the chance of its occurrence as well as develop a plan to either mitigate or avoid the risks that have been identified.

After identifying and determining the risks, they are recorded in a table called the risk

assessment matrix. This matrix lists the severity which is also known as the impact level in terms of High, Medium and Low. In addition to those details, the action plan that can be taken for each of the risks is clearly stated too.

<b>Risk Event</b>	<b>Consequence</b>	<b>Probability</b>	<b>Impact</b>	<b>Risk Response Plan</b>
Incompatible software application with the operating system	Delay in system implementation	Medium	Medium	<ul style="list-style-type: none"> <li>a) To source for other software applications that is compatible with the operating system</li> <li>b) To find another workstation</li> </ul>
User requirements keep changing	More time is required as modification is to be done throughout the whole project period thus unable to meet expected deadline of each phase	Medium	High	<ul style="list-style-type: none"> <li>a) To check with user on the requirements frequently</li> <li>b) To allocate more time for the development/implementation and testing stage</li> </ul>
Difficulties with the coding	Delay in system implementation	Medium	Medium	<ul style="list-style-type: none"> <li>a) To research more on Java language and android application development via sources such as books and tutorial websites</li> </ul>
User do not accept the system	Unable to satisfy objectives and complete the project	Low	High	<ul style="list-style-type: none"> <li>a) Make a check with the user after implementation to ensure the system functioned as per request</li> </ul>

Table 6.2: Risk Assessment Matrix

### 6.3 Fault tolerance

Bus authority ensure smart mobile and backup charger. If unfortunately the mobile is switched off (reason of battery low/freeze), automatic notify specific bus authority and bus current location will be turned off. If the mobile is stolen, driver must stop the bus and collect mobile phone (may be self/bus staff/passengers one of them) and inform bus authority hotline number(For this, bus driver will use specific their metaphor language). Then, the bus authority turned off specific bus current location.

# CHAPTER 7

## CONCLUSION AND FUTURE WORKS

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### 7.1 Conclusion

City bus tracking system outcomes with satisfactory voice among passengers, drivers and bus authority. If government makes it mandatory then gathering besides the road could be reduce within short period of time.

### 7.2 Future Works

- Monthly and yearly profit tracking for bus authority.
- Counts passengers depending of the riding and destination bus stands separately for bus authority.
- Passenger can notify emergency ride to the driver.
- Drive can notify passengers not allow on his/her bus.
- Security problem will be strong (NID/Birth Id).
- Payment gateway added.

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