

Teacher Transport Management System: Streamlining Daily Travel for Teachers

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**A Project Submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science and Engineering (CSE)**

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July, 2023

Declaration

This to certify that the project work entitled “Teacher Transport Management System: Streamlining Daily Travel for Teachers” has been carried out by Olin Akon Chumky, Md Imran Mir, Tanvir Hasan, Md. Golam Murtoza in the Department of Computer Science and Engineering (CSE), University of Information Technology and Sciences (UITs), Dhaka, Bangladesh. We would like to solemnly declare here that, this project has been authentically prepared by us under supervision of Mr. Al-Imtiaz Assistant Professor and Head, Department of CSE, UITs. While preparing the project report, we did not breach any copyright act internationally. We are further declaring that we did not submit this report anywhere for awarding any degree, diploma or certificate.

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Acknowledgement

First of all, we would like to thank the Almighty for allowing us to complete this work successfully. Our acknowledgement is meant to express our sincere gratitude to all those people who have been associated with this project, have helped us and by sharing their experiences and valuable opinions through which we received the required information crucial for our project. We are thankful to our parents for their relentless support. Most importantly we are grateful to our honorable teacher **Mr. Al-Imtiaz** who took time out to guide and provide us with all the necessary materials and sufficient knowledge that was the major requirement to learn the subject practically.

Abstract

In this project work, we have made a web-application which is called “Teacher Transport Management System: Streamlining Daily Travel for Teachers”. The aim of this project is to develop an online transportation management system for teachers. The system allows teachers to easily book seats for their regular commutes, providing flexibility to reserve seats for an entire month and make necessary changes when required. In the event of ride cancellations, the system notifies teachers promptly, ensuring they stay informed about any disruptions in their transportation. The project also focuses on efficient driver management, allowing the admin to assign substitute drivers if the assigned driver becomes unavailable. This ensures uninterrupted transport services for teachers. Furthermore, the admin has the capability to create new routes and manage user accounts. Effective communication is facilitated through the system, enabling teachers to contact the assigned driver for seat availability and journey details. Similarly, drivers can also communicate with teachers, ensuring smooth coordination and an enhanced user experience. By implementing this transport management system, teachers can benefit from a hassle-free booking process, real-time notifications, and improved communication channels. The project aims to simplify the daily travel experience for teachers, optimizing their commuting efficiency and providing convenience throughout their educational journeys.

Keywords: Transport management, seat booking, notifications, driver management, route, communication, user-driver interaction, seamless travel, maintenance.

Index

Declaration	ii
Approval	iii
Acknowledgements	iv
Abstract	v
Contents	vi
List of Figures	ix

Chapter 1

Introduction.....	10
1.1 Background and Motivation.....	11
1.2 Problem Statement.....	11
1.3 Introduction of “Teachers transport management system”.....	11
1.4 Objectives.....	12
1.5 Scope and Limitations.....	13
1.5.1 Scopes.....	13
1.5.2 Limitations.....	13

Chapter 2

Literature Review.....	14
2.1 Overview of Teacher Transportation Systems.....	15
2.2 Existing Transportation Management Systems.....	16
2.3 Comparative Study of Similar Systems.....	16
2.4 Summary of Related Work.....	17

Chapter 3

Requirement Analysis and System Design.....	18
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3.1	Requirement Gathering and Analysis.....	19
3.2	System Architecture Design.....	19
3.3	Database Schema.....	21
3.4	Data Flow Diagram (DFD).....	22
3.5	Module Diagram.....	23

Chapter 4

	System Implementation.....	25
4.1	Technology Stack and Tools.....	26
4.2	Database Collection.....	27
4.3	Frontend Development and Project View.....	28
4.4	Testing and Quality Assurance.....	39
4.5	Deployment and System Configuration.....	40

Chapter 5

	Conclusion and Future Work.....	41
5.1	Summary of Findings.....	42
5.2	Contributions of the Dissertation.....	42
5.3	Limitations and Challenges.....	42
5.4	Future Enhancements and Expansion.....	43
5.5	Conclusion.....	43
	References.....	44

List of Figures

3.2.1	Model View Controller Architecture (MVC).....	20
3.3.1	Database Schema.....	21
3.4.1	Level 0 Data Flow Diagram (DFD).....	22
3.4.2	Level 1 Data Flow Diagram (DFD).....	22
3.4.3	Level 2 Data Flow Diagram (DFD).....	23
3.5.1	Admin Module Diagram.....	23
3.5.2	Teacher Module Diagram.....	24
3.5.3	Driver Module Diagram.....	24
4.2.1	Teachers Database Collection-1.....	27
4.2.2	Teachers Database Collection-2.....	27
4.2.3	All Database Collection.....	28
4.3.1	User Login Page.....	29
4.3.2	User Account Role.....	29
4.3.3	Teacher Signup Page.....	30
4.3.4	Driver Signup Page.....	31
4.3.5	Admin Dashboard.....	32
4.3.6	Admin Dashboard Teacher List.....	32
4.3.7	Admin Dashboard Driver List.....	33
4.3.8	Admin Dashboard Route List.....	33
4.3.9	Admin Dashboard New Route Add.....	34
4.3.10	Teacher Dashboard.....	34
4.3.11	Teacher Info Update.....	35
4.3.12	Teacher Dashboard My Driver.....	35
4.3.13	Teacher Dashboard Driver List.....	36
4.3.14	Teacher Dashboard Reset Password.....	36
4.3.15	Teacher Dashboard Select Status.....	37
4.3.16	Driver Dashboard.....	37

4.3.17	Driver Dashboard My Teacher List.....	38
4.3.18	Driver Dashboard Password Reset.....	38
4.3.19	Driver Dashboard Select Status.....	39

Chapter 1

Introduction

1.1 Background and Motivation

The transportation needs of teachers play a significant role in ensuring their timely and efficient arrival at university. However, managing the complexities of teacher transportation can be a difficult task. Traditional methods of organizing transportation, such as manual booking systems often lead to inefficiencies, scheduling conflicts, and communication gaps. The motivation behind the "Teacher Transport Management System" project stems from the recognition of these challenges and the desire to provide a reliable and user-friendly transport management system tailored specifically for teachers. This project aims to streamline their daily commutes and alleviate the administrative burden associated with managing transportation logistics. One key motivation for this project is to offer teachers a convenient and easy seat booking system. By allowing teachers to reserve seats on a daily basis, as well as providing the option for monthly bookings, the system caters to the varying needs and preferences of teachers. Another motivation is to enhance communication and information flow between teachers and drivers. By providing a communication platform within the system, teachers can easily contact the assigned driver to inquire about seat availability or relay any specific requirements. Similarly, drivers can reach out to teachers to provide updates or address any concerns, fostering a seamless and efficient communication channel.

1.2 Problem Statement

The current transportation management system for teachers is inefficient, manual, and prone to errors and communication gaps. The lack of a dedicated system specifically designed for educators leads to various challenges in managing their daily travel needs.

These challenges are given below.

- Teachers have trouble reserving seats on institution transportation.
- There is a communication gap between the driver and the teachers.
- The absence of the driver is inaccessible to the teacher.
- It is challenging for administrative staff to replace an absent driver.
- It is challenging for the driver to determine which teachers are absent in his vehicle.
- The administrative staff has a difficult time controlling vehicles on various routes.

To address these challenges, there is a need for a comprehensive transport management system designed specifically for teachers.

1.3 Introduction of “Teachers transport management system”

“Teacher Transport Management System: Streamlining Daily Travel for Teachers” is a web-based application that is developed using Html, CSS, Javascript, React js, and MongoDB. This system aims to provide a seamless and user-friendly platform for teachers to

book their seats on a daily basis, facilitating their daily commutes to and from the educational 47 institutions. Teachers often require flexibility in their transportation arrangements, with the need to book seats for varying durations, make changes to their bookings, and receive timely notifications about ride cancellations or schedule changes. The Teacher Transit system is designed to cater to these requirements, offering teachers the convenience of reserving seats for an entire month while allowing them the flexibility to modify their bookings as needed. One of the key features of the Teacher Transit system is its ability to send ride cancellation notifications.

There are main modules in this project:

- Admin
- Teacher
- Driver

The main purpose of developing this project is for hassle-free transportation for teachers. This system will reconstruct the bridge between teachers and drivers. So now if anyone wants to communicate with each other they can do it easily from anywhere in minutes.

Our work is implemented with an easy user interface. We are planning to utilize powerful database management, data retrieval, and data manipulation. Our work is useful for saving valuable time and reducing teachers' suffering.

1.4 Objectives

- **Develop a User-Friendly Booking System:** Create an intuitive and user-friendly interface that allows teachers to easily book seats for their daily travel needs. The system should provide options for daily and monthly seat reservations, as well as the flexibility to modify bookings when necessary.
- **Enable Seamless Communication:** Implement a communication module within the system that enables smooth and efficient communication between teachers and assigned drivers. This feature should facilitate inquiries about seat availability, schedule adjustments, and other relevant information.
- **Implement Ride Cancellation Notifications:** Develop a notification system that promptly informs teachers about ride cancellations or changes in schedules. This feature ensures that teachers are promptly notified, allowing them to make alternative transportation arrangements and minimize disruptions.
- **Streamline Driver Management:** Create a simple driver management system that allows the admin to assign substitute drivers when the assigned driver becomes

unavailable. This ensures uninterrupted transportation services and minimizes delays or cancellations due to driver unavailability.

- Provide Administrative Controls for Route Management: Develop an administrative module that enables the admin to create and manage routes based on the institution's requirements. This feature provides flexibility and adaptability in addressing changing transportation needs.

1.5 Scope and Limitations

1.5.1 Scope

The scope of the "**Teacher Transport Management System**" project includes the development of a transport management system specifically designed for teachers. The system will encompass the following features and functionalities:

- Seat Booking: Teachers can book seats for their daily travel needs, with options for both daily and monthly reservations. They can also make modifications to their bookings as necessary.[1]
- Ride Cancellation Notifications: Teachers will receive timely notifications in case of ride cancellations or changes in schedules, enabling them to make alternative arrangements.
- Driver Management: The system will provide administrative controls to assign substitute drivers when the assigned driver becomes unavailable, ensuring uninterrupted transportation services.
- Route Management: The admin will have the ability to create and manage routes based on the institution's requirements, allowing for flexibility and adaptability.
- User Management: The system will include functionality for user registration, login, and account management, enabling the admin to onboard new users and maintain an updated user database.

1.5.2 Limitations

While the "**Teacher Transport Management System**" project aims to address the transportation challenges faced by teachers, it is important to acknowledge certain limitations:

- Scalability: The project focuses on providing a transport management system for a specific group of users, namely teachers. Scaling the system to accommodate a large number of users or institutions may require additional development and resources.
- Mobile Applications: While the project may include a web-based interface, the development of dedicated mobile applications for different platforms (iOS, Android) is beyond the initial scope of the project.[2]
- Security: While efforts will be made to ensure the security of user data, the project may not cover all possible security measures or address specific security requirements unique to each institution.

Chapter 2

Literature Review

2.1 Overview of Teacher Transportation Systems

Teacher transportation systems are designed to facilitate the daily travel needs of educators, ensuring their timely arrival and departure from educational institutions. These systems aim to streamline the process of seat booking, communication, scheduling, and driver management, providing a convenient and efficient transportation experience for teachers. Here is an overview of key components and functionalities commonly found in teacher transportation systems.

1. Seat Booking:

- Daily and Monthly Bookings: Teachers can reserve seats for their daily commutes or choose to book seats for an entire month in advance.
- Flexibility: Systems provide the flexibility for teachers to make changes or modifications to their seat bookings based on their needs and schedules.
- Availability and Occupancy: Teachers can view seat availability and occupancy status to make informed decisions when booking.

2. Communication:

- User-Driver Interaction: Systems enable direct communication between teachers and assigned drivers. Teachers can inquire about seat availability and receive updates or notifications regarding any schedule changes or cancellations.
- Notification System: Teachers receive timely notifications about ride cancellations, delays, or any other important information related to their transportation.

3. Scheduling and Routing:

- Route Management: Admins have the ability to create, manage, and optimize routes based on the institution's requirements, considering factors such as geographic coverage, student distribution, and traffic patterns.
- Pickup and Drop-off Points: Systems provide predefined or customizable pickup and drop-off points to ensure efficient and convenient transportation for teachers.

4. Driver Management:

- Assignment and Substitution: Admins can assign drivers to specific routes or vehicles, ensuring that teachers have dedicated drivers for their transportation needs. In cases of driver unavailability, systems enable admins to substitute drivers and maintain a seamless transportation service.

5. Administrative Controls:

- User Management: Admins can manage user accounts, including teacher registration, login credentials, and access control.
- Reporting and Analytics: Systems may provide reporting features to generate insights on transportation efficiency, route utilization, and user satisfaction.

2.2 Existing Transportation Management Systems

There are various existing transportation management systems that cater to the needs of educational institutions and offer features suitable for teacher transportation. Here are a few examples.

1. **TransLoc Rider:** TransLoc Rider is a widely used transportation management system that provides real-time tracking, route planning, and communication capabilities. It allows teachers to track the location of their assigned vehicles, receive notifications about arrival times, and communicate with drivers for updates or inquiries.[3]
2. **Versatrans My Stop:** Versatrans My Stop is a mobile application that provides parents and teachers with real-time information about school bus locations, estimated arrival times, and notifications for delays or schedule changes. It offers convenient and transparent communication between teachers and transportation personnel.
3. **SchoolPass:** SchoolPass is a comprehensive transportation management system that focuses on optimizing student and staff transportation logistics. It offers features like route planning, real-time tracking, communication tools, and administrative controls. Teachers can access their transportation information, communicate with drivers, and receive notifications about any changes or updates.

2.3 Comparative Study of Similar Systems

A comparative study of similar transportation management systems for teachers can help in understanding the strengths, weaknesses, and unique features of each system. Here is a comparative analysis of three popular systems: TransLoc Rider, Versatrans My Stop, and SchoolPass.

1. **TransLoc Rider:**
 - Key Features: Real-time tracking, route planning, and communication capabilities.
 - Strengths: Provides accurate real-time bus tracking, interactive maps, and notifications for arrivals and delays. Offers a user-friendly interface and robust communication tools.
 - Weaknesses: Limited administrative controls and reporting features. Integration with other institutional systems may require additional customization.
2. **Versatrans My Stop:**
 - Key Features: Real-time information on bus locations, estimated arrival times, and notifications for delays or schedule changes.
 - Strengths: Offers a mobile application for convenient access to transportation information. Provides a user-friendly interface and seamless communication between teachers and transportation personnel.
 - Weaknesses: Limited administrative controls and customization options. Integration with other systems may require additional development.
3. **SchoolPass:**
 - Key Features: Route optimization, driver management, and communication tools.

- Strengths: Provides comprehensive features for route planning, real-time tracking, and communication. Offers administrative controls for managing routes and drivers.
- Weaknesses: Limited integration capabilities with other institutional systems. Reporting and analytics features may be less robust compared to dedicated reporting tools.

2.4 Summary of Related Work

Related work in the field of teacher transportation management systems focuses on developing solutions that address the specific needs of educators. These systems aim to provide a convenient and efficient way for teachers to book seats, communicate with drivers, and receive notifications about schedule changes or cancellations. Existing systems such as TransLoc Rider, Versatrans My Stop, and Edulog Parent Portal offer features like real-time tracking, communication tools, and administrative controls. However, there are variations in their strengths and weaknesses. Evaluating these systems based on factors like usability, communication capabilities, administrative controls, and integration can help educational institutions select the most suitable solution for their transportation management needs.[3]

Chapter 3

Requirements Analysis and System Design

3.1 Requirement Gathering and Analysis

Requirement gathering and analysis is a crucial step in the development of a teacher transportation management system. It involves understanding and documenting the needs, expectations, and constraints of the educational institution and its teachers.

- **Conduct Interviews and Surveys:** Engage with users through interviews, surveys, or focus group discussions to gather their input and insights. Ask questions about their current transportation challenges, desired features, and expectations from the system.
- **Analyze Existing Processes:** Evaluate the existing transportation management processes, including seat booking, communication, scheduling, and driver management. Identify pain points, inefficiencies, and areas for improvement.
- **Prioritize Requirements:** Categorize and prioritize the gathered requirements based on their importance and impact. Distinguish between "must-have" requirements that are critical for system functionality and "nice-to-have" requirements that enhance user experience but are not essential.
- **Define Functional Requirements:** Document the specific functionalities the system should have, such as seat booking, communication tools, driver management, scheduling, and reporting capabilities. Specify details like seat availability, booking modification options, and notification.
- **Consider Non-Functional Requirements:** Identify non-functional requirements related to system performance, security, usability, scalability, and integration with other systems. Consider factors like response time, data protection, user interface intuitiveness, system capacity, and compatibility with existing IT infrastructure.

3.2 System Architecture Design

The Model-View-Controller (MVC) architecture is a software design pattern that separates an application into three main components: the model, the view, and the controller. The model represents the data and business logic of the application, encapsulating the information and providing methods for accessing and manipulating it. The view is responsible for presenting the data to the user, providing a user interface for interaction. It receives updates from the model and displays the information accordingly. The controller acts as an intermediary between the model and the view, handling user input, interpreting commands, and updating the model or view as necessary. It manages the flow of data and ensures the separation of concerns between the other components. Each architectural component is built to handle specific development aspects of an application. It isolates the business logic and presentation layer from each other. It was traditionally used for desktop graphical user interfaces (GUIs). Nowadays, MVC is one of the most frequently used industry-standard web development frameworks to create scalable and extensible projects. The main goal of this design pattern was to solve the problem of users controlling a large and complex data set by splitting a large application into specific sections that all have their own purpose.

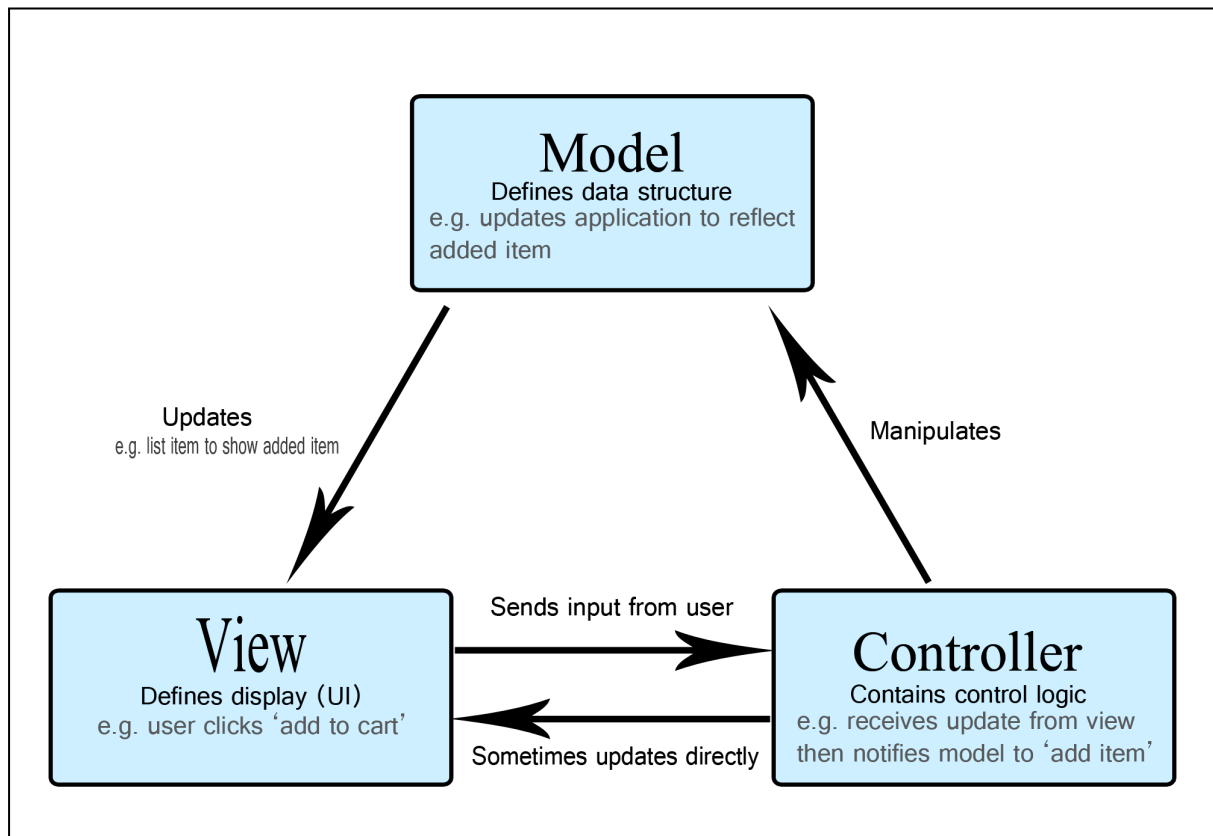


Figure 3.2.1: Model View Controller Architecture (MVC)

The three parts of the MVC software-design pattern can be described as follows:

1. **Model:** Model manages data and business logic. The Model component corresponds to all the data-related logic that the user works with. This can represent either the data that is being transferred between the View and Controller components or any other business logic-related data. It can add or retrieve data from the database.
2. **View:** It handles layout and display. The View component is used for all the UI logic of the application. It generates a user interface for the user. Views are created by the data which is collected by the model component but these data aren't taken directly but through the controller. It only interacts with the controller.
3. **Controller:** It routes commands to the model and view parts. The controller is the component that enables the interconnection between the views and the model so it acts as an intermediary. The controller doesn't have to worry about handling data logic, it just tells the model what to do. It processes all the business logic and incoming requests, manipulates data using the Model component and interacts with the View to render the final output.

3.3 Database Schema

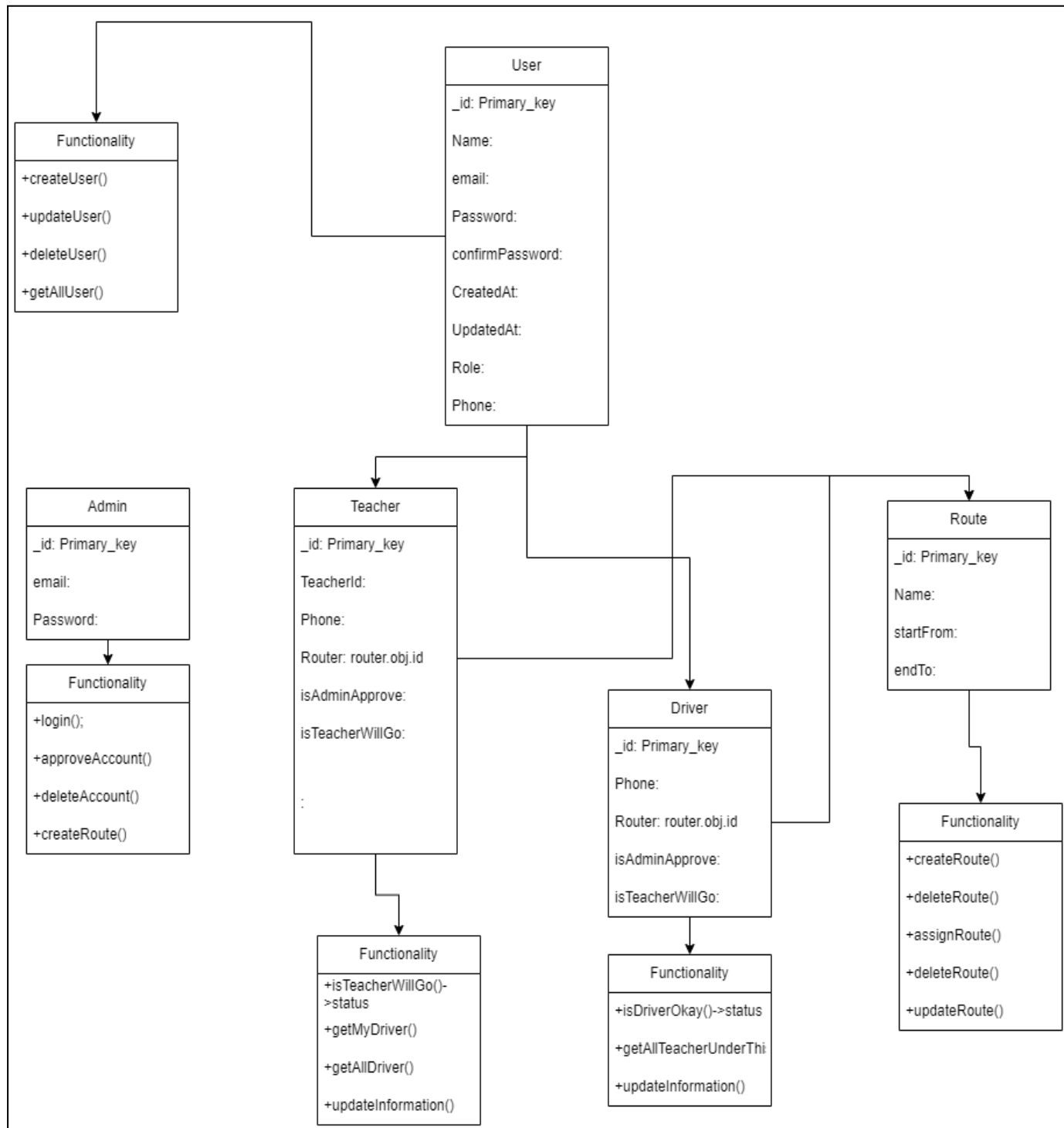


Figure 3.3.1: Database Schema

3.4 Data Flow Diagram (DFD)

This is a zero level data flow diagram of our system.

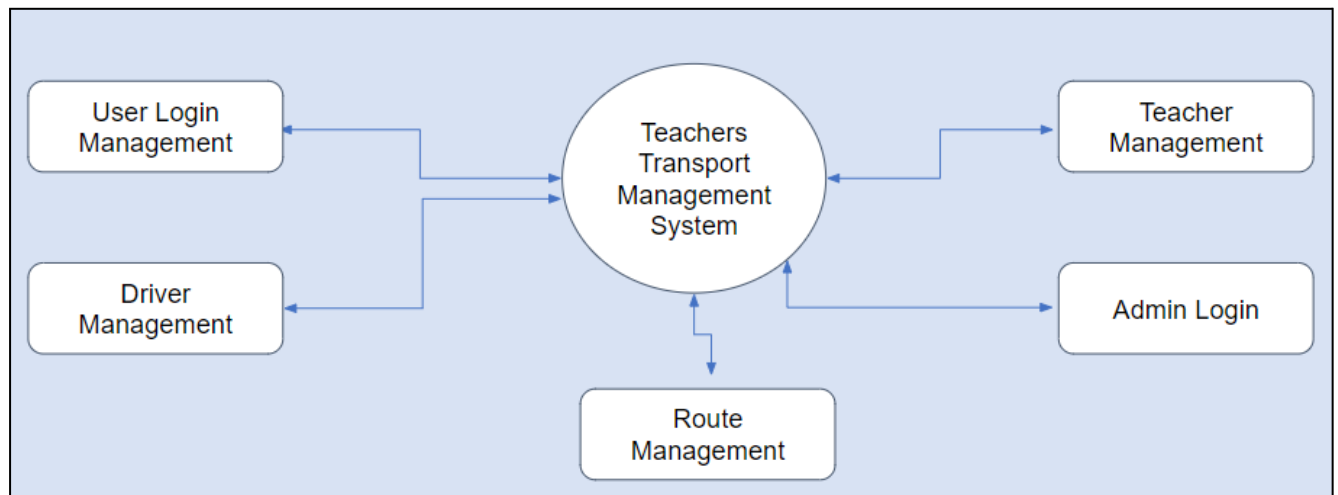


Figure 3.4.1: Level 0 Data Flow Diagram (DFD)

This is a level one data flow diagram of our system.

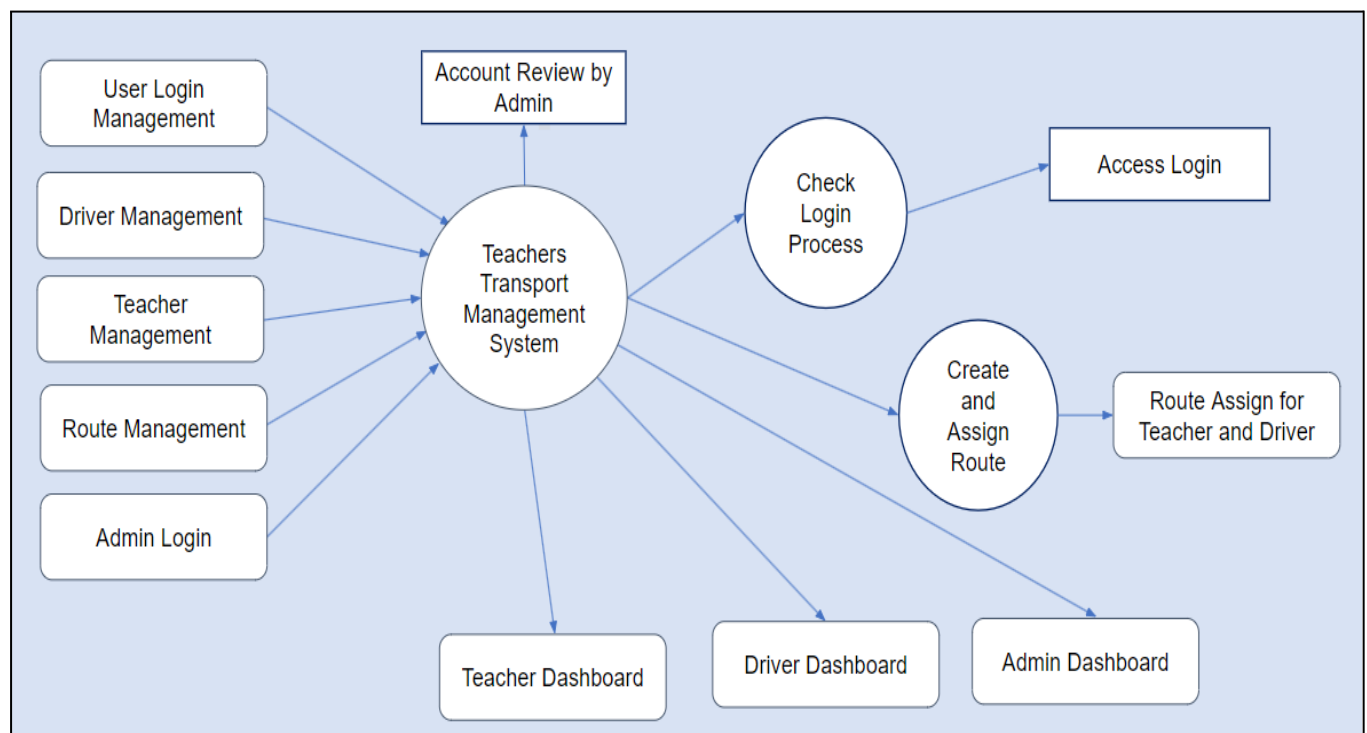


Figure 3.4.2: Level 1 Data Flow Diagram (DFD)

This is a level two data flow diagram of our system.

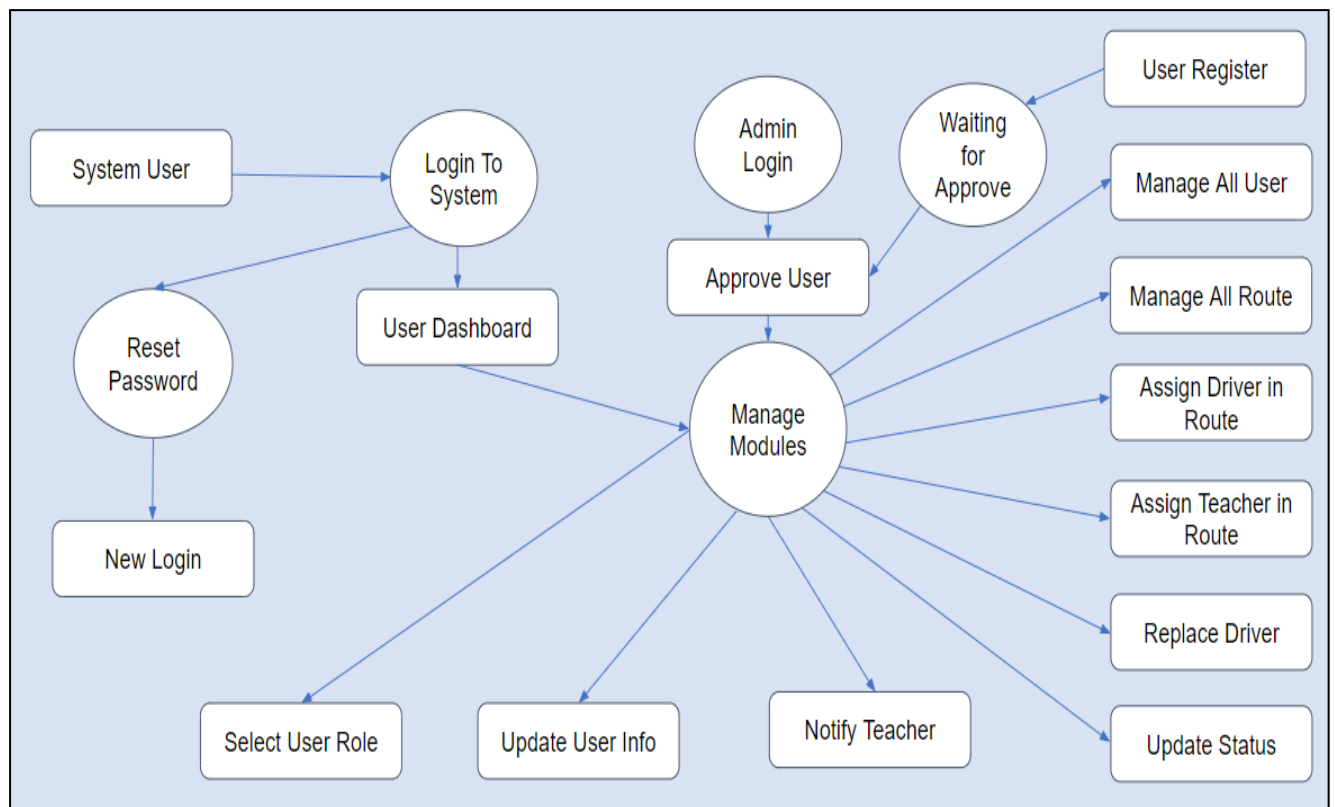


Figure 3.4.3: Level 2 Data Flow Diagram (DFD)

3.5 Module Diagram

This is our Admin module. These functionalities will be shown after Admin login.

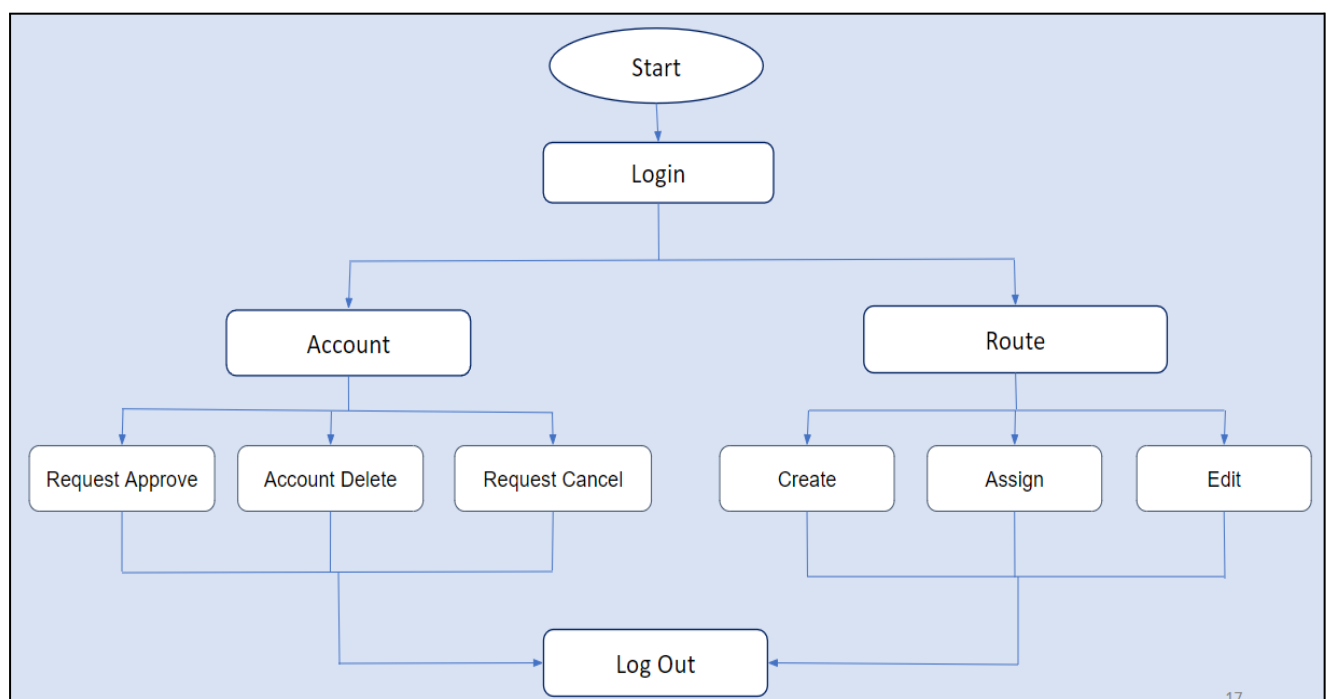


Figure 3.5.1: Admin Module Diagram

This is our Teacher module. These functionalities will be shown after Teacher login.

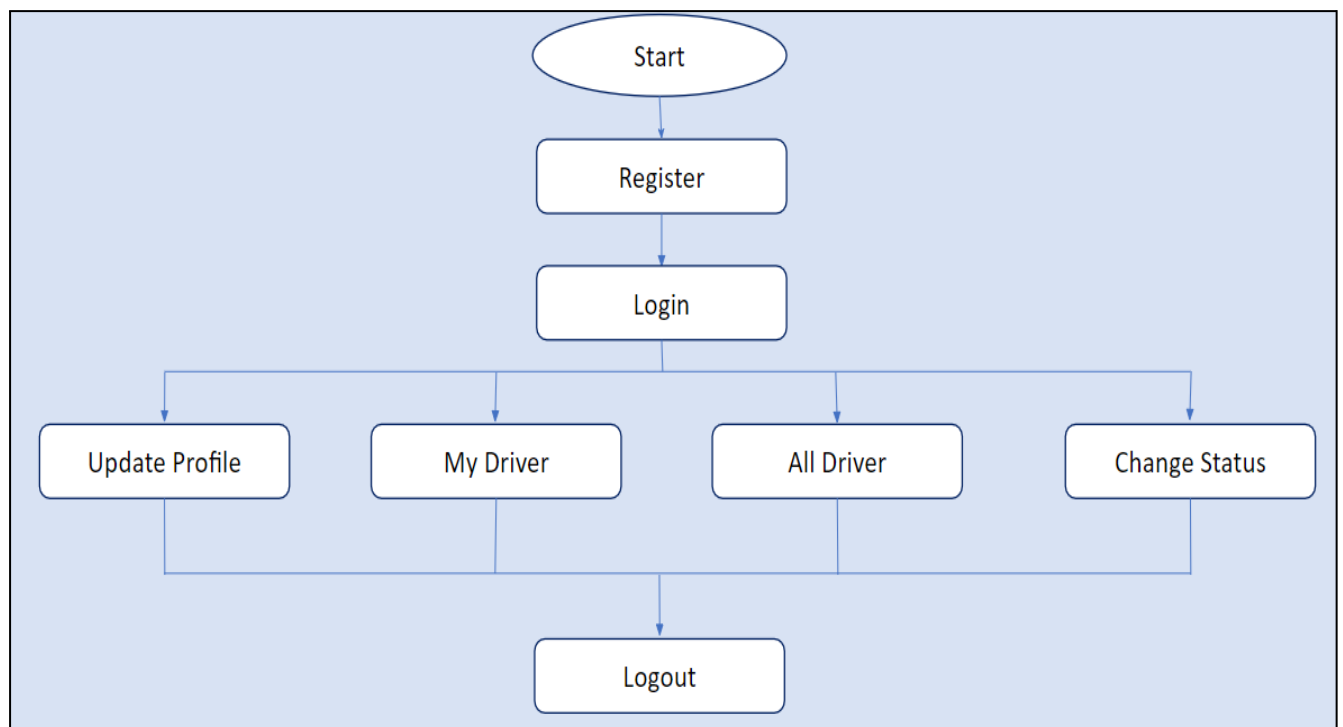


Figure 3.5.2: Teacher Module Diagram

This is our Driver module. These functionalities will be shown after Driver login.

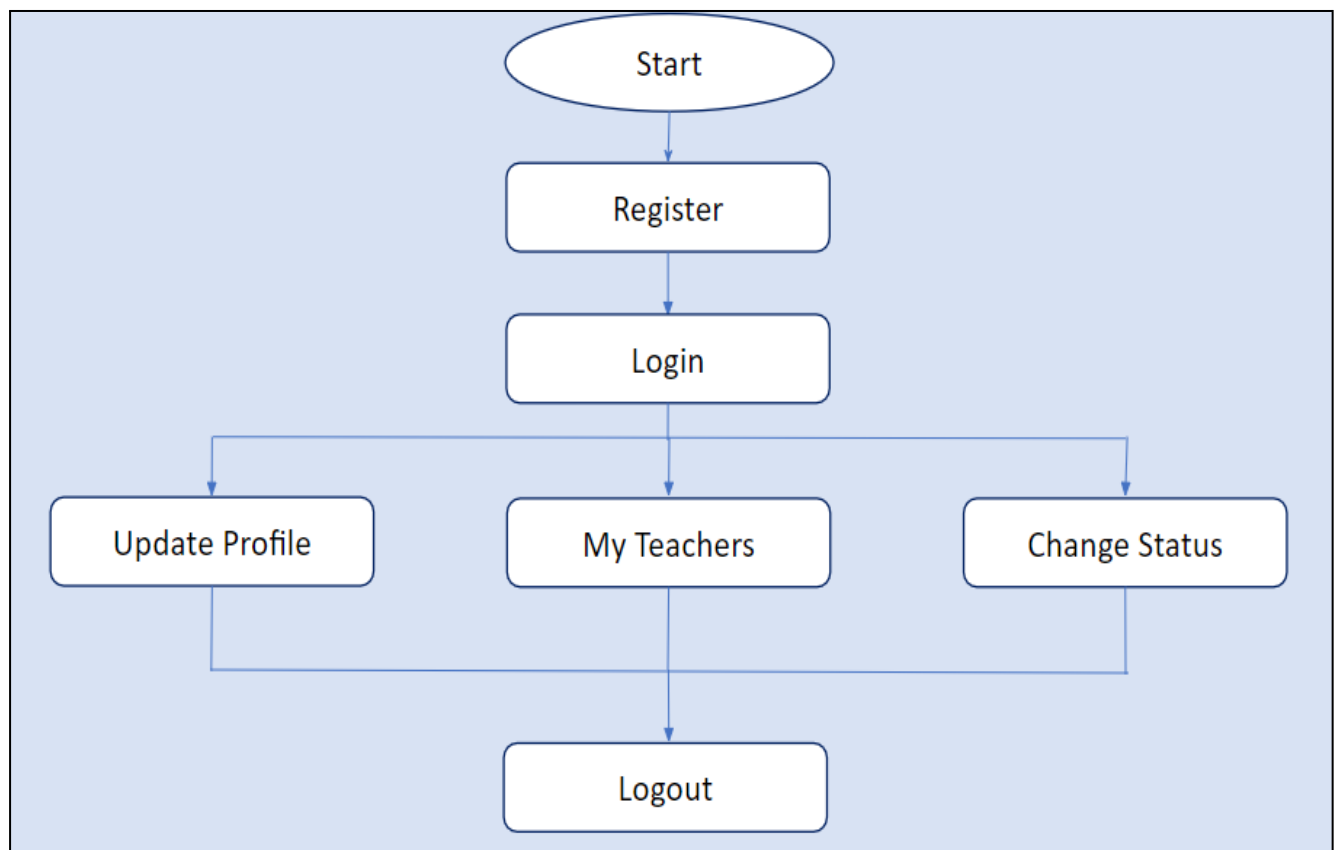


Figure 3.5.3: Driver Module Diagram

Chapter 4

System Implementation

4.1 Technology Stack and Tools

The selection of a technology stack and tools for the teacher transportation management system depends on various factors, including project requirements, scalability needs, and development team expertise. Here are some technologies and tools that were used in our project.[5]

1. Front-end Development

- Programming Languages: HTML, CSS, JavaScript
- Frameworks: React, Context, Next Js, User Interface (UI)
- Libraries: Bootstrap, Material-UI, Semantic UI

2. Back-end Development

- Programming Languages: JavaScript, TypeScript
- Frameworks: Express.js (Node.js), Next.js
- Database Management: MongoDB

3. Server-side Technologies

- Server-side Scripting: HTML, JavaScript, TypeScript
- API Development: RESTful APIs

4. Development Tools and Collaboration

- Version Control: Git
- Project Management: Jira, Trello
- Collaboration and Communication: Google meet

5. Security and Authentication

- Encryption: node.bcrypt.js
- Authentication: OAuth, JWT (JSON Web Tokens)

4.2 Database Collection

This is the Teacher database collection. This collection stores Teachers information.

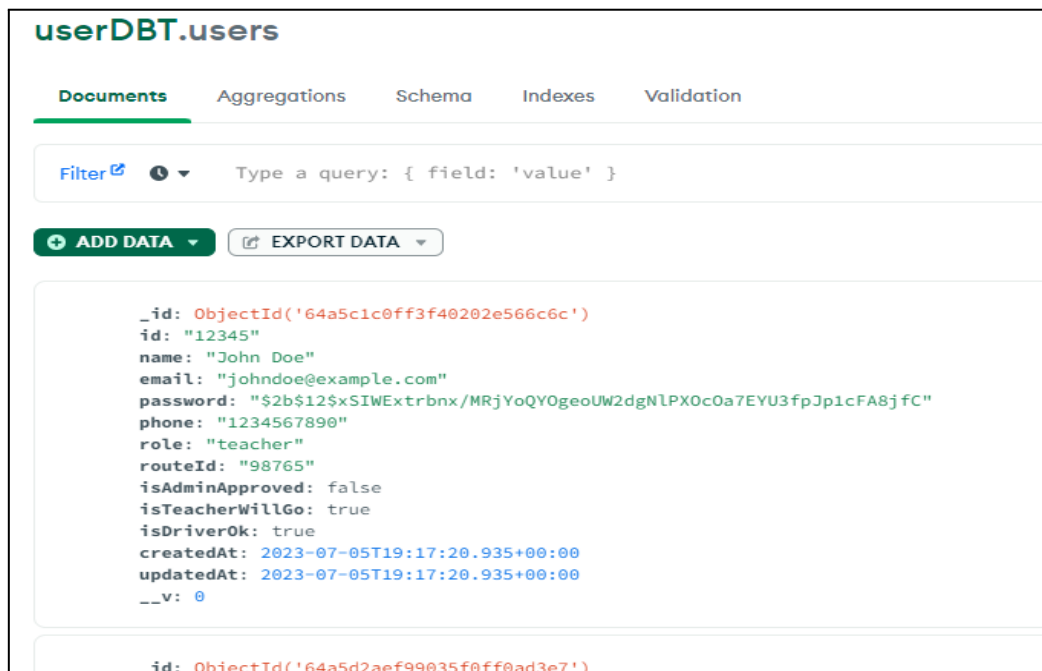


Figure 4.2.1: Teachers Database Collection-1

This is the Driver database collection. This collection stores Driver information.

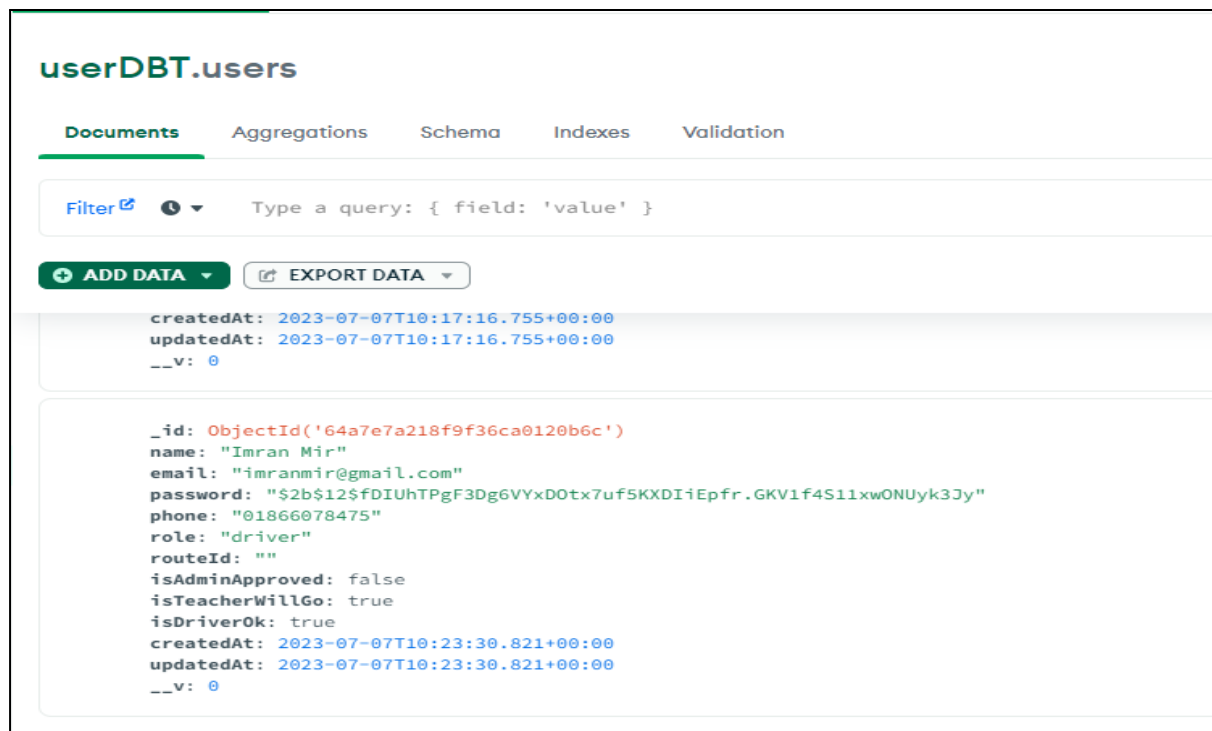


Figure 4.2.2: Teachers Database Collection-2

All collection of database

This is the whole database collection. This collection stores the whole information of our system.

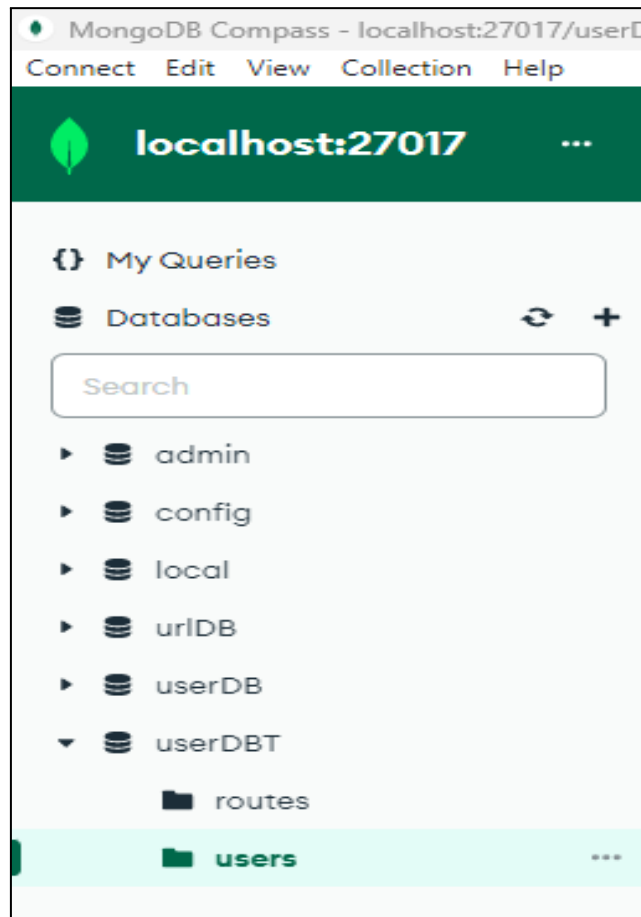


Figure 4.2.3: All Database Collection

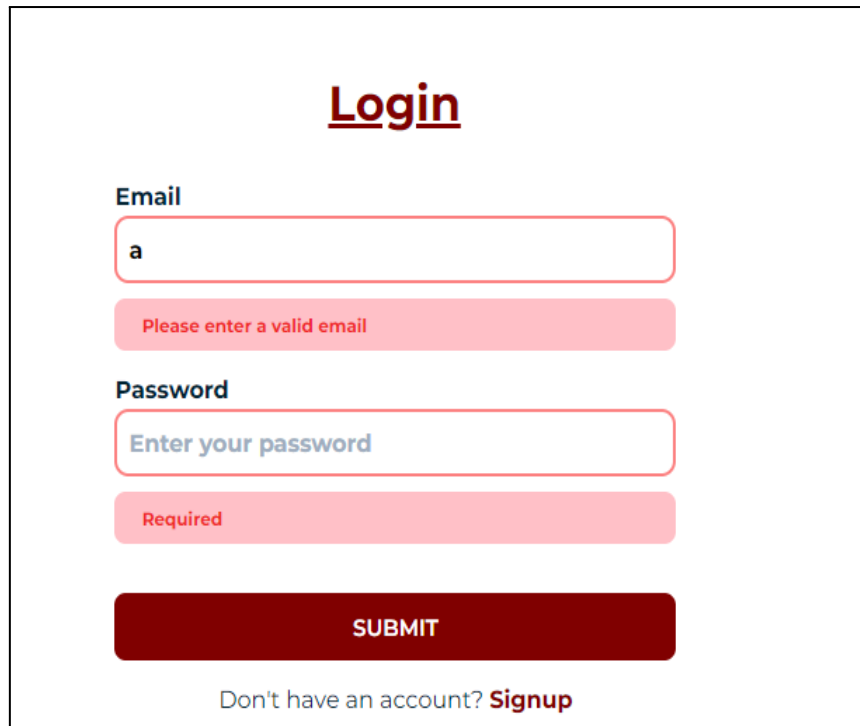
4.3 Frontend Development and Project View

Frontend development focuses on creating the user interface (UI) and user experience (UX) of the teacher transportation management system. It involves designing and implementing the visual elements, interactive components, and functionality that users interact with.

Our project view is given below.

4.3.1 Login

Here all users will login to the Teachers Transport Management System.

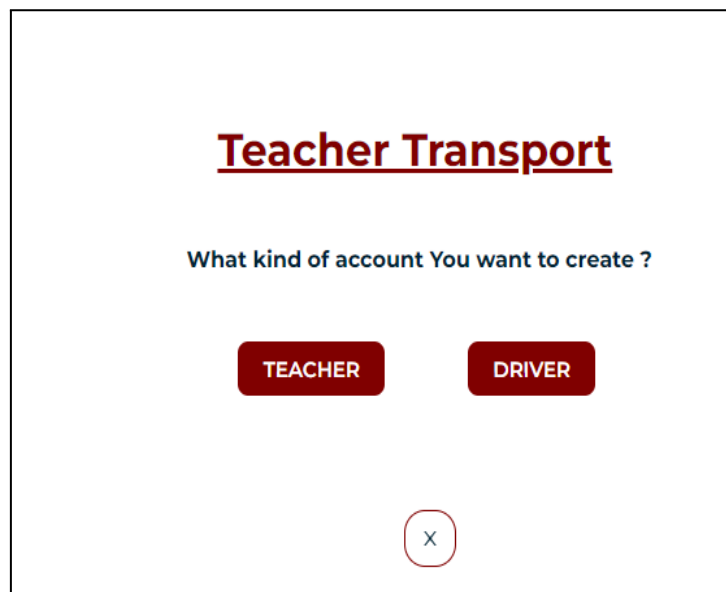


The login page features a central heading **Login** in dark red. Below it, there are two input sections. The first is labeled **Email** and contains a text box with the letter 'a'; below this box is a red error message: **Please enter a valid email**. The second section is labeled **Password** and contains a text box with the placeholder **Enter your password**; below this box is a red error message: **Required**. At the bottom of the form is a large dark red button with the text **SUBMIT** in white. Below the button, there is a link: **Don't have an account? [Signup](#)**.

Figure 4.3.1: User Login Page

4.3.2 Account Selection

In this page users will select their role (Teacher or Driver).



The account selection page has a heading **Teacher Transport** in dark red. Below the heading is the question **What kind of account You want to create ?**. There are two dark red buttons: **TEACHER** and **DRIVER**. At the bottom center, there is a circular close button with an 'x' inside.

Figure 4.3.2: User Account Role

4.3.3 Teacher Signup

On this page teachers will sign up in the system.

Create an account as a Teacher

Name

name must be at least 4 characters

Email

Please enter a valid email

Teacher Id

Teacher Id is a required field

Mobile number

Enter a valid phone number

Route

UITS-Khilgoan ▼

Password

Password with minimum 5 characters, 1 upper case letter, 1 lower case letter, 1 numeric digit.

Confirm Password

Passwords must match

SUBMIT

Already have an account? [Login](#)

Figure 4.3.3: Teacher Signup Page

4.3.4 Driver Signup

On this page the driver will sign up in the system.

Create an account as a Driver

Name

Enter your name

Name is a required field

Email

Enter your email

Required

Mobile number

Enter your Mobile number

Required

Password

Enter your password

Confirm Password

Confirm Password

Required

SUBMIT

Already have an account? [Login](#)

Figure 4.3.4: Driver Signup Page

4.3.5 Admin Dashboard Page

In this System Admin will see this page as dashboard

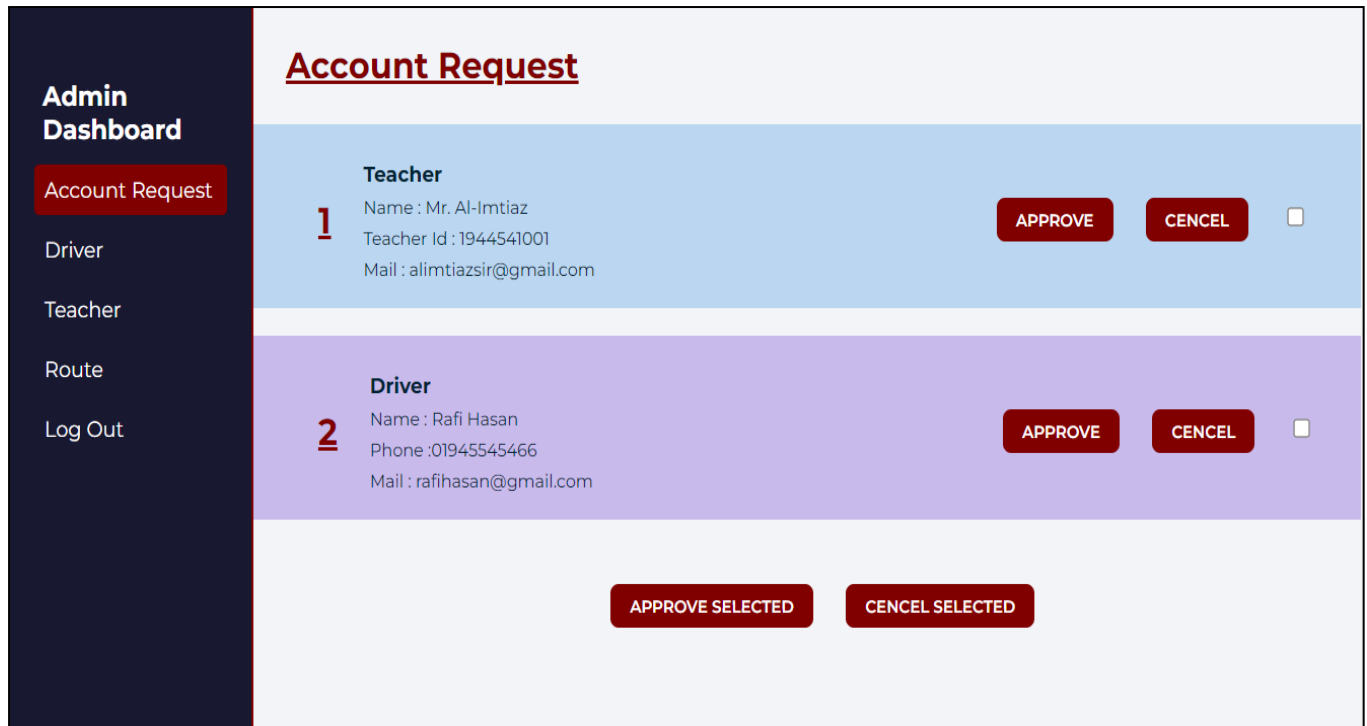


Figure 4.3.5: Admin Dashboard

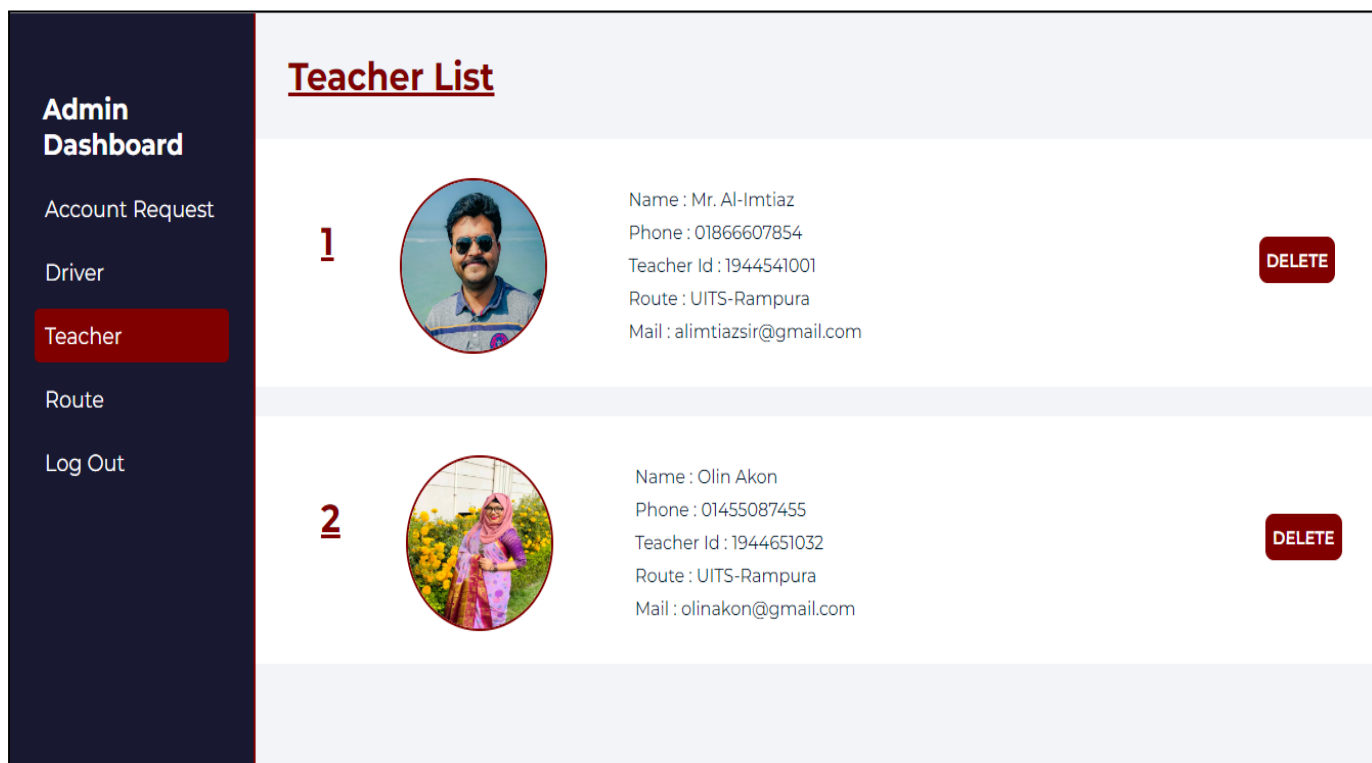


Figure 4.3.6: Admin Dashboard Teacher List

Admin Dashboard

Account Request


Driver

Teacher

Route

Log Out

Driver List



Name : Md. Imran Mir


Phone Number : 01911111111

Driver Id : 1944651035

Route : Campus-Rampura

Mail : imran@gmail.com

ACTIVE



Name : Rafi Hasan

Phone Number : 01911111111

Driver Id : 1944651011

Route : Campus-Mohakhali

Mail : rafi@gmail.com

ABSENCE

Figure 4.3.7: Admin Dashboard Driver List

Admin Dashboard

Account Request

Driver

Teacher

Route

Log Out

Route List

Driver : Rafi

Route

Mohakhali - Campus

Campus - Mohakhali

Driver : Rafi

EDIT

Route

Mohakhali - Campus

Campus - Mohakhali

Driver : Rafi

EDIT

ADD ROUTE

Figure 4.3.8: Admin Dashboard Route List

Admin Dashboard

Account Request

Driver

Teacher

Route

Log Out

Route List

From

UITS

To

Link Road

Driver Name

Likhon

ADD ROUTE

X

Figure 4.3.9: Admin Dashboard New Route Add

Teacher Dashboard Page

In this System Teacher will see this page as dashboard

Teacher Dashboard

Profile


My Driver

Driver List

Status

Reset Password

Log Out



Name : Mr. Al-Imtiaz

ACTIVE

Phone Number : 01866607854

Teacher Id : 1944541001

Route : UITS-Rampura

Email : alimtiazsir@gmail.com

UPDATE

Your Driver is ABSENT!

X

Figure 4.3.10: Teacher Dashboard

Name

Mr. Al-Imtiaz

Email

alimtiazsir@gmail.com

Teacher Id

19446510001

Mobile number

01911111111

Password

Enter your password

UPDATE INFO

Figure 4.3.11: Teacher Info Update

Teacher Dashboard

Profile


My Driver

Driver List

Status

Reset Password

Log Out



Name : Tanvir Hasan

ACTIVE

Phone Number : 01911111111

Driver Id : 19446510001

Route : Campus-Rampura

Email : tanvirhasan@gmail.com

Figure 4.3.12: Teacher Dashboard My Driver

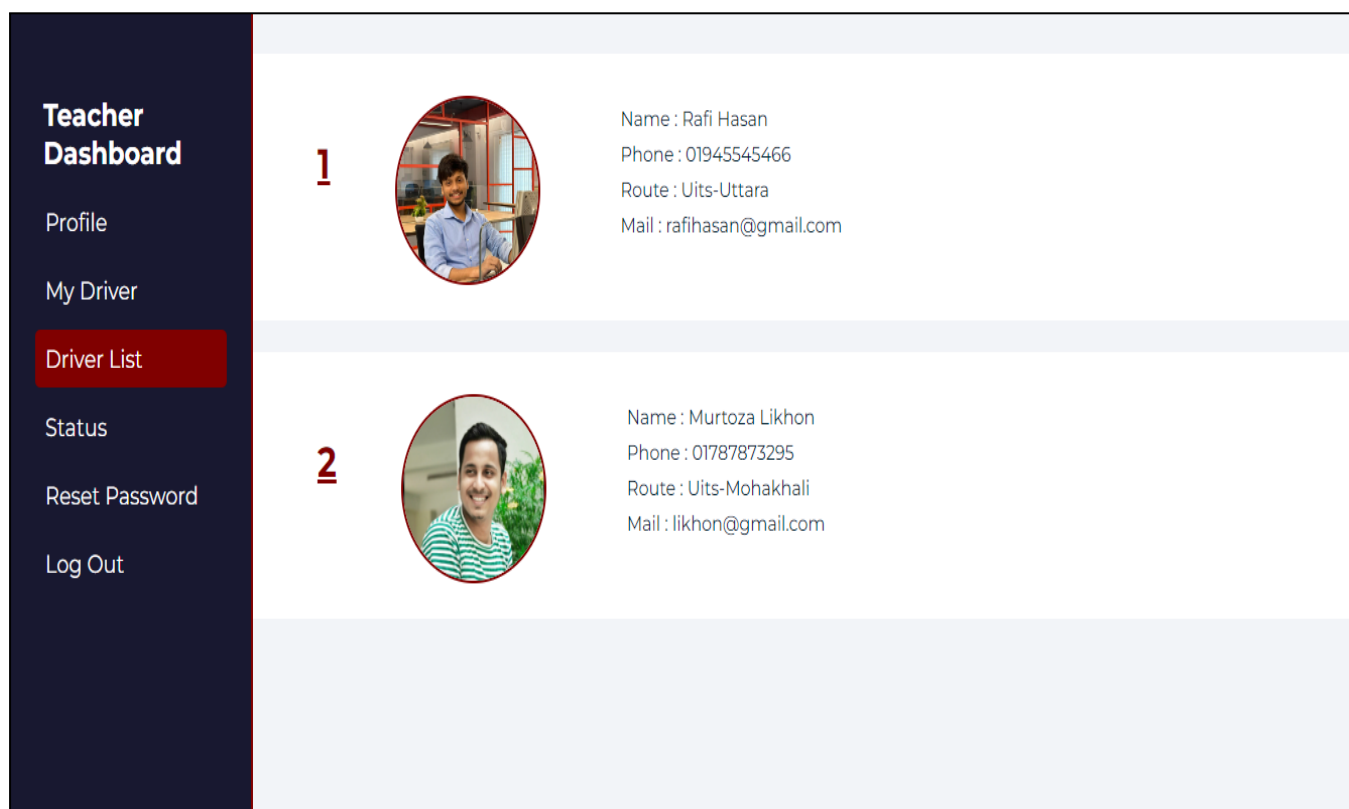


Figure 4.3.13: Teacher Dashboard Driver List

Teacher Dashboard

- Profile
- My Driver
- Driver List
- Status
- Reset Password**
- Log Out

Reset Password :

Current Password

New Password

Confirm Password

RESET PASSWORD




Figure 4.3.14: Teacher Dashboard Reset Password

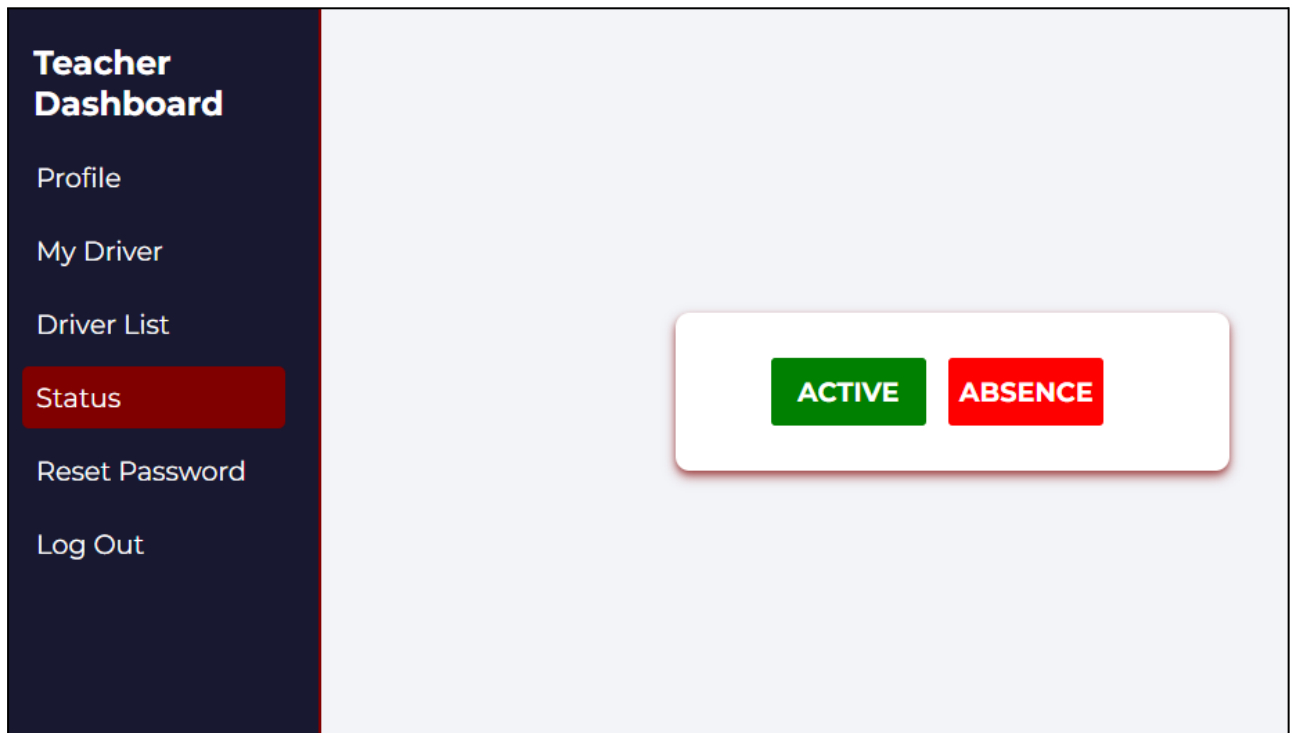


Figure 4.3.15: Teacher Dashboard Select Status

Driver Dashboard Page

In this System Driver will see this page as dashboard

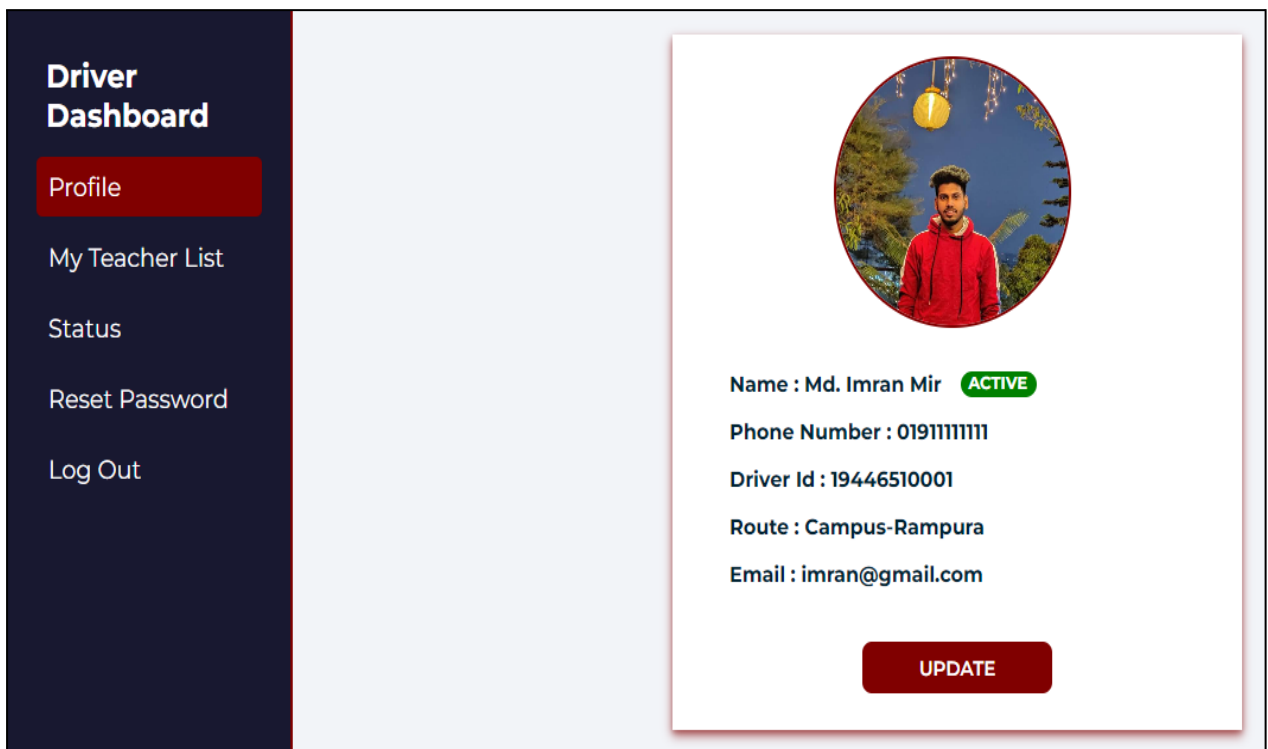


Figure 4.3.16: Driver Dashboard

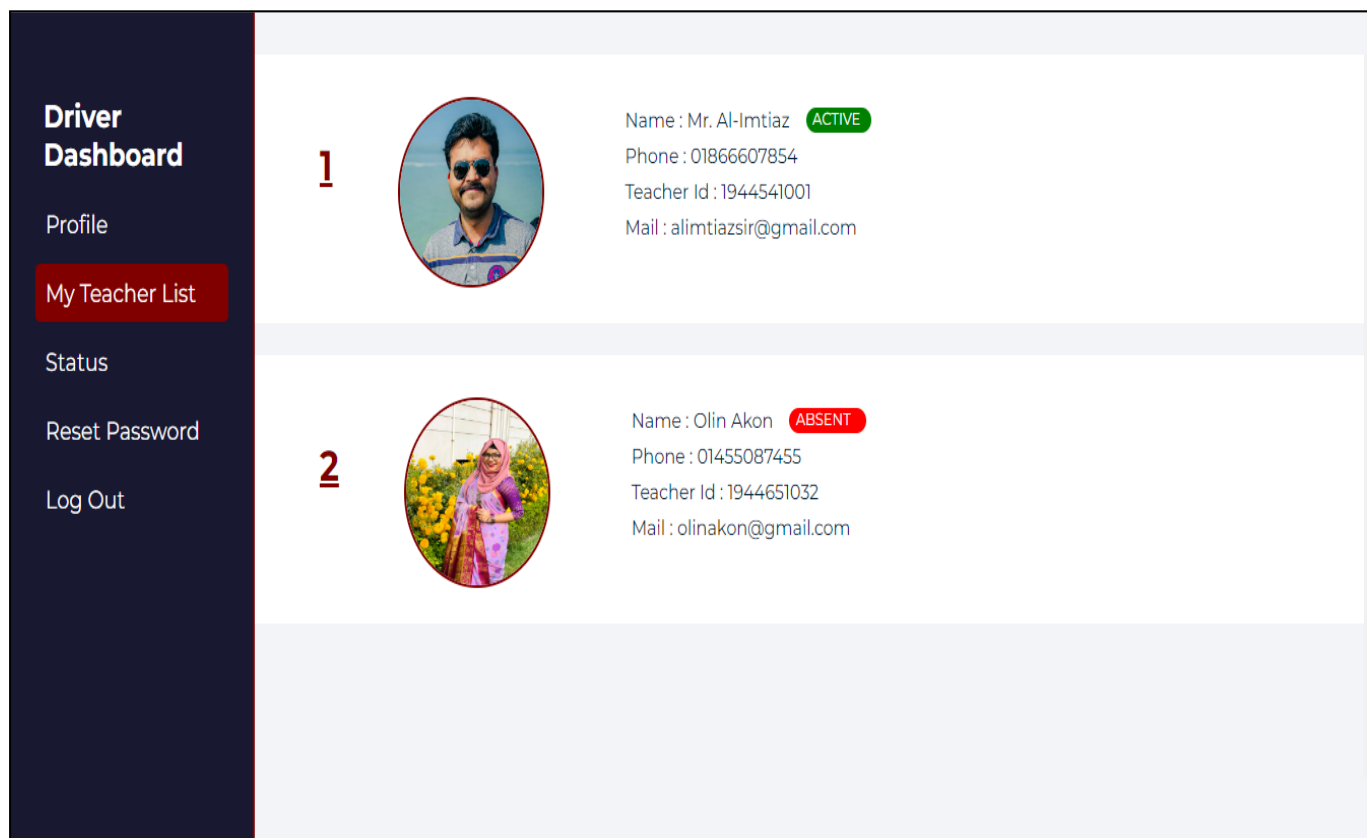


Figure 4.3.17: Driver Dashboard My Teacher List

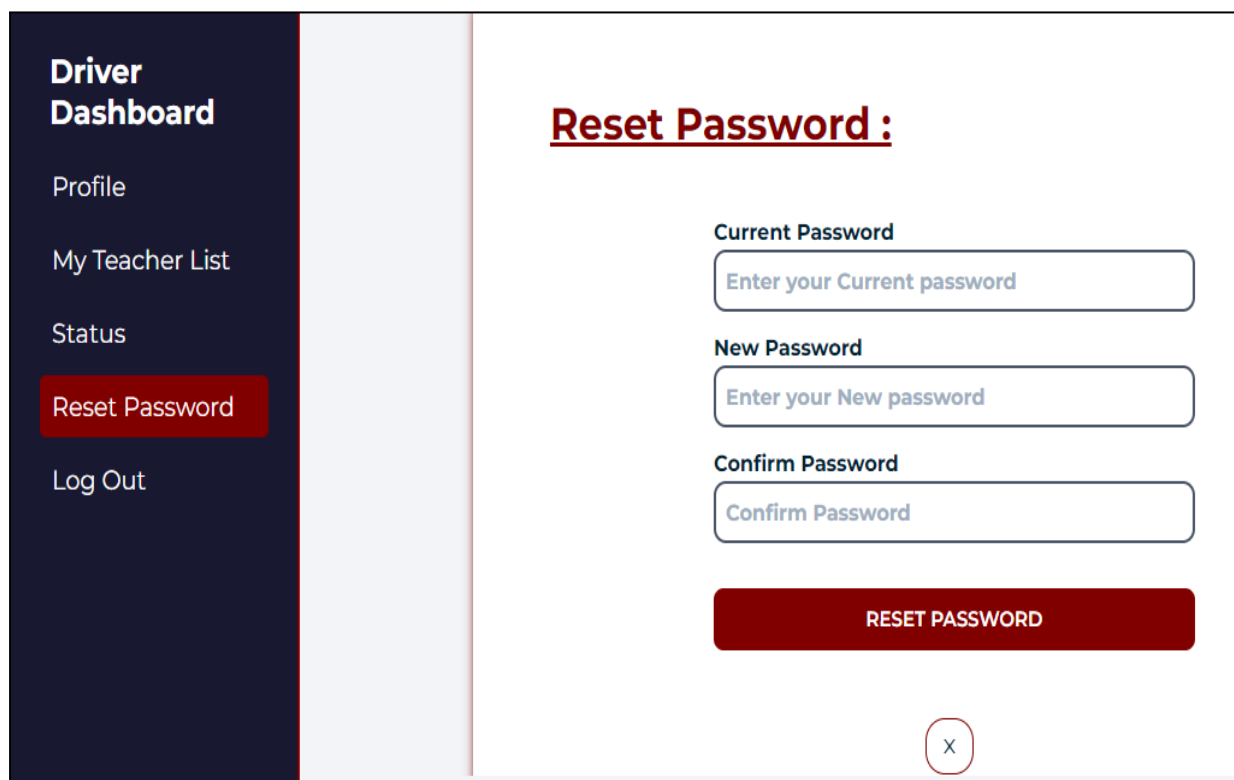


Figure 4.3.18: Driver Dashboard Password Reset

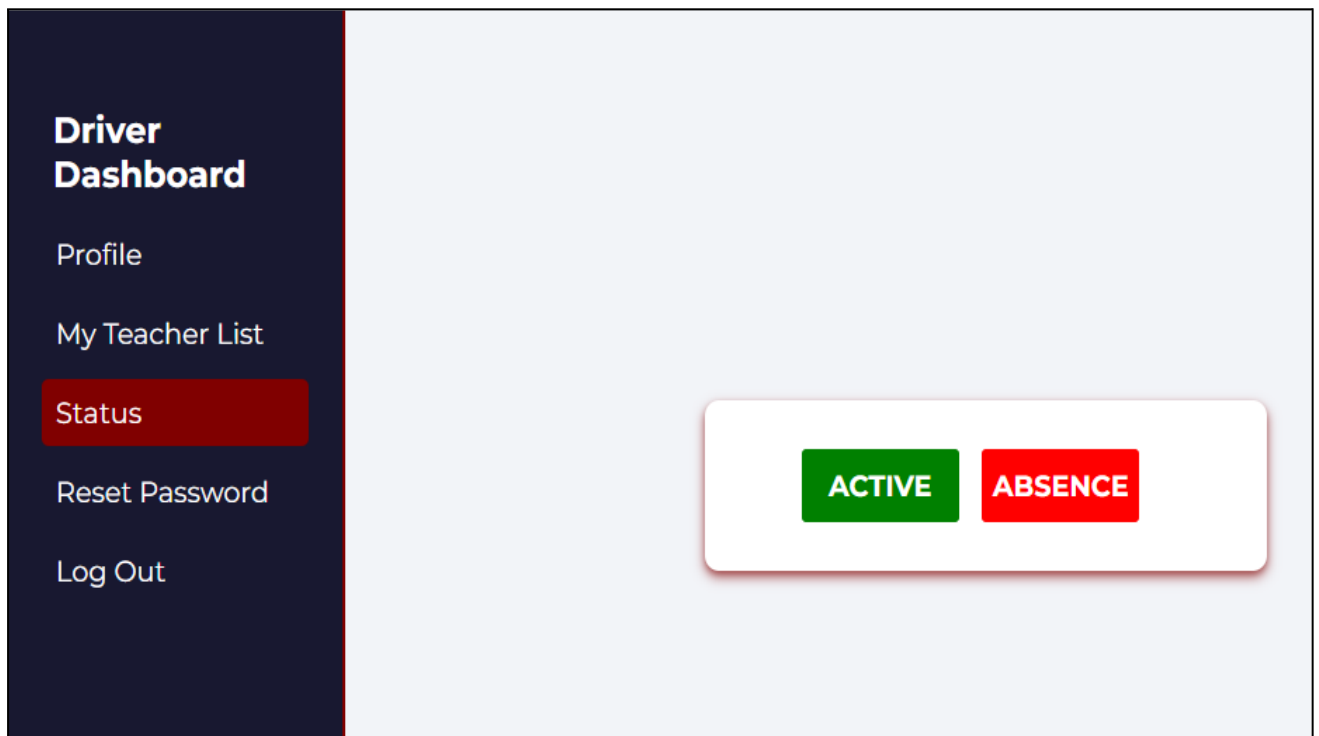


Figure 4.3.19: Driver Dashboard Select Status

4.4 Testing and Quality Assurance

Testing and Quality Assurance (QA) involve a set of processes and activities aimed at ensuring the reliability, functionality, and overall quality of a software system. This includes the creation and execution of test cases, identifying and fixing defects, evaluating system performance, and validating that the system meets the specified requirements and user expectations.[6]

1. **Functional Testing:** Functional testing is the process of verifying that individual components or functionalities of a software system perform as expected, ensuring that it meets the specified requirements and functions correctly.
2. **Usability Testing:** Usability testing involves evaluating the user interface and user experience of a software system to ensure that it is intuitive, user-friendly, and meets the needs of the intended users.
3. **Performance Testing:** Performance testing is the process of assessing the responsiveness, scalability, and resource usage of a software system under various load conditions to ensure it meets performance requirements and can handle expected user traffic.
4. **Security Testing:** Security testing is the process of evaluating a software system's vulnerabilities, identifying potential threats, and assessing the effectiveness of security measures to ensure the protection of sensitive data and mitigate security risks.

- 5. Bug Tracking and Fixing:** Bug tracking and fixing involves the systematic identification, reporting, tracking, and resolution of software defects to ensure the stability and functionality of the system.

4.5 Deployment and System Configuration

Deployment and system configuration involve the activities related to preparing the software system for production and configuring it to operate in the intended environment. This includes tasks such as selecting hosting infrastructure, installing and configuring the necessary software components, setting up databases, and ensuring proper system connectivity and security. [7]

1. Environment Setup
2. Software Installation and Configuration
3. Database Setup
4. System Integration
5. Monitoring and Logging Setup
6. Testing in the Production Environment

Chapter 5

Conclusion and Future Work

5.1 Summary of Findings

The project on teacher transportation management systems and their related features gives several significant findings. The summary of the key findings is given below.

- **Teacher Transportation Challenges:** The study revealed that teachers face various challenges in managing their daily travel needs. These challenges include difficulties in seat booking, communication gaps with drivers, lack of timely notifications for schedule changes or cancellations, and issues with driver management.
- **Importance of Seat Booking Flexibility:** Teachers require the ability to reserve seats on a daily or monthly basis and make modifications when necessary.
- **Timely Notifications:** It provides teachers with timely notifications about ride cancellations, schedule changes, or any other important information. Sending notifications timely helps teachers to make alternative arrangements and minimize hassle to their transportation.
- **Driver Management and Substitution:** The project solves the need for efficient driver management and the ability to assign substitute drivers when necessary. This ensures uninterrupted transportation services and minimizes delays or cancellations caused by driver unavailability.
- **Administrative Controls:** The findings emphasized the significance of administrative controls for route management, user management, and notifications. Admins should have the capability to create and manage routes based on institutional requirements, onboard new users, and send notifications to teachers when needed.

5.2 Contributions

The key contributions of the dissertation are given below.[8]

1. In-depth Understanding of Teacher Transportation Needs
2. Development of a Customized Transport Management System
3. Evaluation and Analysis of System Effectiveness
4. Practical Recommendations for Educational Institutions

5.3 Limitations and Challenges

Limitations and challenges are inherent in any research or project. In the case of the Teacher Transport Management System project, there are several limitations and challenges that need to be acknowledged.

1. **Scalability:** The project may face scalability challenges when implemented in larger educational institutions or when the number of users and transportation routes increases significantly.
2. **User Adoption and Training:** Introducing a new transportation management system requires user adoption and training. Teachers, administrators, and drivers may need to learn new processes, adapt to the system's functionalities, and embrace the change.

3. **Maintenance and Support:** After the initial implementation, ongoing system maintenance, updates, and user support are essential for the system's smooth operation. Addressing technical issues, responding to user queries, and providing timely updates and enhancements require dedicated resources and support.
4. **Budget and Resources:** Developing and implementing a comprehensive transportation management system may require significant financial resources and a skilled development team. Acquiring the necessary budget can be challenging, for smaller educational institutions.
5. **User Experience and Usability:** Ensuring a positive user experience and user-friendly interface are critical for the success of the system. Designing an intuitive and accessible interface that accommodates different user needs and preferences can be a challenge.

5.4 Future Enhancements and Expansion

As future work, some additional tasks could be implemented in the code making it much more reliable and flexible. Some future modifications we want to make on this project is given below:

- Developing Mobile Applications
- Using advanced routing algorithms
- Data analytics and reporting
- Will develop this system for student transportation
- Smart vehicle tracking and IoT integration
- Automated schedule adjustments
- Live vehicle tracking through map

5.5 Conclusion

With the theoretical inclination we have taught earlier, it becomes very essential to take the utmost advantage of any opportunity of gaining practical experience that comes along. The development of this project "**Teacher Transport Management System: Streamlining Daily Travel for Teachers**" was one of these opportunities. It gave us the requisite practical knowledge to supplement the already taught theoretical concepts, thus making us more competent. The project is developed to design a system that allows the teachers to travel to their desired destination hassle-free and smoothly. The project contributes to the overall goal of creating a conducive and supportive environment for educators, allowing them to focus on their core responsibilities and contribute to the academic development of students.

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