

REC TRANSPORT MOBILE APPLICATION

A MINI-PROJECT REPORT

Submitted by

DANUSH NARAYANAN 221701012

PRITHIGA K 221701041

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RAJALAKSHMI NAGAR

THANDALAM

CHENNAI - 602 105

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RAJALAKSHMI ENGINEERING COLLEGE

CHENNAI – 602105

BONAFIDE CERTIFICATE

Certified that this project report “ **REC TRANSPORT MOBILE APPLICATION** ” is the bonafide work of “**PRITHIGA K (221701041),DANUSH NARAYANAN S (221701012)**” who carried out the project work for the subject CD19651 – Mini Project under my supervision.

SIGNATURE

Prof. Uma Maheshwar Rao

Head of the Department

Professor and Head

Computer Science and Design

Rajalakshmi Engineering College

Chennai - 602105

SIGNATURE

Mr. Gunasekar S M.Tech.,(Ph.D).,

Supervisor

Assistant Professor (SG)

Computer Science and Design

Rajalakshmi Engineering College

Chennai - 602105

Submitted to Project and Viva Voce Examination for the subject

CD16651 – Mini Project held on_____.

Internal Examiner

External Examine

ABSTRACT

This project aims to develop a real-time bus tracking system designed to improve the efficiency and convenience of college transportation. The system enables the live tracking of buses through a mobile application, leveraging the phone number of the bus driver for easy access and security. The application provides students, faculty, and staff with the current location of buses, estimated arrival times, and updates on delays.

The project incorporates GPS tracking, real-time data processing, and user-friendly interface design to offer an efficient way for users to plan their travel and reduce waiting times. Additionally, the system will feature notifications and alerts to inform users about route changes or delays. The development of this bus tracking system enhances communication, safety, and overall satisfaction for those relying on the college transportation services.

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PRITHIGA K(221701041)

DANUSHNARAYANAN S(221701012)

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CHAPTER 1

INTRODUCTION

In many educational institutions, students and staff rely on college-provided transport services. However, the lack of **real-time tracking**, **timely notifications**, and an **efficient complaint system** often leads to inconvenience and uncertainty. This project aims to develop a **College Transport Mobile Application** that enhances the commuting experience by integrating **live location tracking**, **instant route updates**, and a **complaint management system**.

The app will allow students to track their buses in **real-time using Google Maps**, receive **notifications about route changes or delays**, and easily **report issues to the transport administration**. By leveraging **Firebase for backend services**, **Google Maps API for tracking**, and **Flutter for cross-platform app development**, this system will provide a **user-friendly and efficient solution** to improve the reliability and accessibility of college transport services.

CHAPTER 2

LITERATURE REVIEW

Sathyabama University – Real-Time Tracking

- The transport system lacks accurate **real-time tracking**, making it difficult for students to see the exact location of the bus.
- This limitation leads to uncertainty in bus arrival times and possible delays for students.

University of Minnesota – Notification System

- The current system does not provide **instant alerts** for **bus delays or route changes**.
- Students face difficulties in planning their commute efficiently due to the lack of real-time updates.

Binghamton University – Mobile App

- The university has implemented a **mobile application** with a **user-friendly interface** and an **attractive design**.
- This enhances the overall user experience, making it easy for students to access transport information.

CHAPTER 3

SOFTWARE USED - FIGMA

Frontend: Flutter

- **Language:** Dart
- **Framework:** Flutter (Cross-platform for Android & iOS)
- **State Management:** Provider
- **UI Components & Utilities:**
 - Flutter Map (for real-time bus tracking)
 - Latlong2 (for handling map coordinates)
 - Flutter SVG (for vector graphics)
 - Shared Preferences (for local storage)
 - Logger (for debugging & logging)

Backend: Firebase

- **Firebase Core** – Integrates Firebase into Flutter
- **Firebase Authentication** – User login & authentication
- **Cloud Firestore** – NoSQL database for storing routes, schedules & complaints
- **Firebase Storage** – Storing images (bus photos, complaints, user profile pictures)

Networking & API Calls

- **HTTP Package** – API requests
- **Intl Package** – Handling date/time format

LIMITATIONS

Technical Limitations

1. Server Downtime Risks

- If the backend server **crashes** or undergoes maintenance, the app will stop updating bus locations.
- Requires **constant monitoring and backups** to prevent service interruptions.

2. High Data Usage

- Continuous GPS updates consume **mobile data**, which could be a concern for users with limited data plans.
- Optimization techniques like **location update intervals** can reduce data consumption.

3. Device Compatibility Issues

- Some older devices may not support **real-time tracking features** efficiently.
- The app may have **performance issues** on low-end smartphones.

User Experience Limitations

1. Notification Delays

- **Push notifications** may be delayed due to background restrictions on some devices.
- Users may miss critical updates about bus delays or route changes.

2. User Adaptability

- Some students and faculty members may find the app **complicated** to use.
- Training or user guides may be needed for **first-time users**.

3. Limited Offline Functionality

- The app might not work when **offline**, preventing users from accessing saved schedules or routes.

Operational Limitations

1. Dependency on Driver Cooperation

- If drivers **forget to start tracking** or turn off their devices, users won't get real-time updates.
- Requires **strict adherence** to operational guidelines.

2. Traffic and Unexpected Delays

- The app can't **predict real-time traffic jams, roadblocks, or accidents**, leading to inaccurate ETAs.
- Integration with traffic APIs (like Google Maps) could help improve accuracy.

3. Scalability Challenges

- As the college grows and adds **more buses/routes**, the system may require **more storage and processing power**.
- Without proper infrastructure, the app may experience **lag or downtime**.

CHAPTER 5

PROPOSED METHODOLOGY

1. Goal

Develop a **real-time college bus tracking system** to assist students and drivers in efficiently managing their transportation.

2. Key Features

- **Live Location Tracking** – Uses GPS to provide real-time bus locations.
- **Arrival Notifications** – Alerts users about bus arrivals, delays, and route changes.
- **User-Friendly Mobile App** – An intuitive application for Android/iOS to enhance accessibility.
- **Admin Dashboard** – A control panel for monitoring and managing bus data.

3. Implementation Approach

A. System Components

- **Mobile App (Students & Faculty)** – Displays bus locations and estimated arrival times.
- **GPS on Buses** – Enables real-time tracking of bus movement.
- **Backend Server** – Processes and manages tracking data.
- **Admin Dashboard** – Provides insights and monitoring capabilities.

B. Technology Stack

- **Mobile App** – Developed for **Android/iOS** with maps integration.
- **Backend Development** – Using **Node.js or Python** to process real-time data.
- **GPS Integration** – Utilizes GPS to update and track live bus locations.
- **Database** – Stores user and bus route data securely.
- **Notification System** – Sends alerts to users about bus status.

C. Development Process

1. **GPS Integration:** Equip buses with GPS tracking devices.
2. **Backend Development:** Create APIs to process location data.
3. **Mobile App Development:** Build the frontend for students and faculty.
4. **Admin Dashboard Creation:** Provide a control panel for monitoring buses.
5. **Testing & Deployment:** Ensure the system runs smoothly before launch.

4. Expected Outcome

- **Accurate Live Tracking** of college buses.
- **Enhanced Communication** between students, faculty, and drivers.
- **Reduced Waiting Times** with real-time updates and notifications

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5.2 ADVANTAGES:

1. Real-Time Tracking

- Students and faculty can **track buses live** and know **exact arrival times**, reducing **uncertainty and long waiting times**.

- Helps **plan travel** efficiently, avoiding missed buses.

2. Improved Safety & Security

- Real-time bus tracking ensures **student safety**, especially during late hours.
- Emergency alerts can be integrated for **quick response to incidents**.

3. Instant Notifications & Updates

- Users receive **real-time alerts** on **bus delays, route changes, or cancellations**.
- No need to call or rely on word-of-mouth for transport updates.

4. User-Friendly & Convenient

- A **simple mobile app** with an intuitive interface makes it easy for students, faculty, and staff to use.
- No need to physically check for bus arrival times—everything is available on the phone.

5. Reduces Waiting Time

- By checking **live locations and estimated arrival times**, users can **avoid unnecessary waiting** at bus stops.
- Saves time and makes commuting more efficient.

6. Helps in Efficient Route Planning

- Admins can **monitor bus routes** and optimize them based on **real-time data**.
- Reduces unnecessary detours, improving efficiency and fuel consumption.

7. Enhances Communication Between Drivers & Users

- Instead of relying on manual phone calls, drivers can update users automatically through the system.
- Ensures **seamless communication** and reduces confusion.

8. Scalable for Future Expansion

- The system can be **expanded** to include **more buses, routes, and users** as the college grows.
- Can be integrated with **other transport services** like shuttle buses or ride-sharing.

9. Environmentally Friendly

- Reducing unnecessary waiting and optimizing routes can lead to **lower fuel consumption**.
- Helps in reducing the **carbon footprint** of the transport system.

10. Reduces Dependency on Manual Updates

- No need for printed schedules or manual tracking—everything is automated.
- Helps transport administrators **manage buses more effectively** with less effort.

CHAPTER 6

OUTPUT

PROJECT LINK:

<https://www.figma.com/file/IIRVt4uJFk9dOnCxvITXgN/Untitled?type=design&node-id=0%3A1&mode=design&t=zkc7btD70dIWsxDh-1>

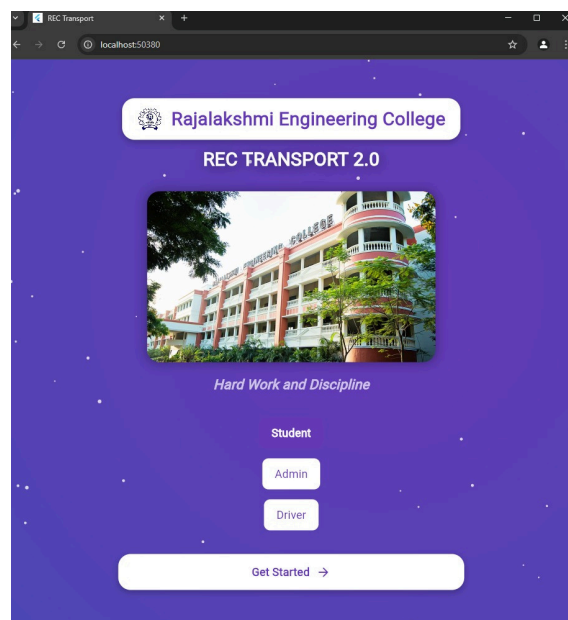


Fig 2: The Front Page

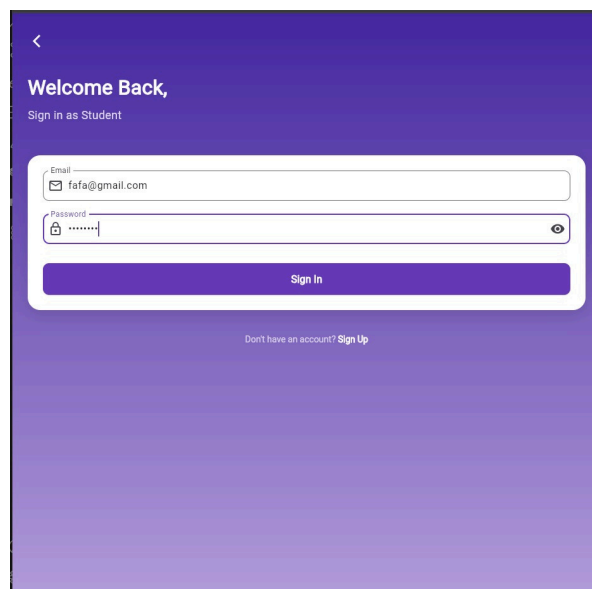


Fig 3: Login Page

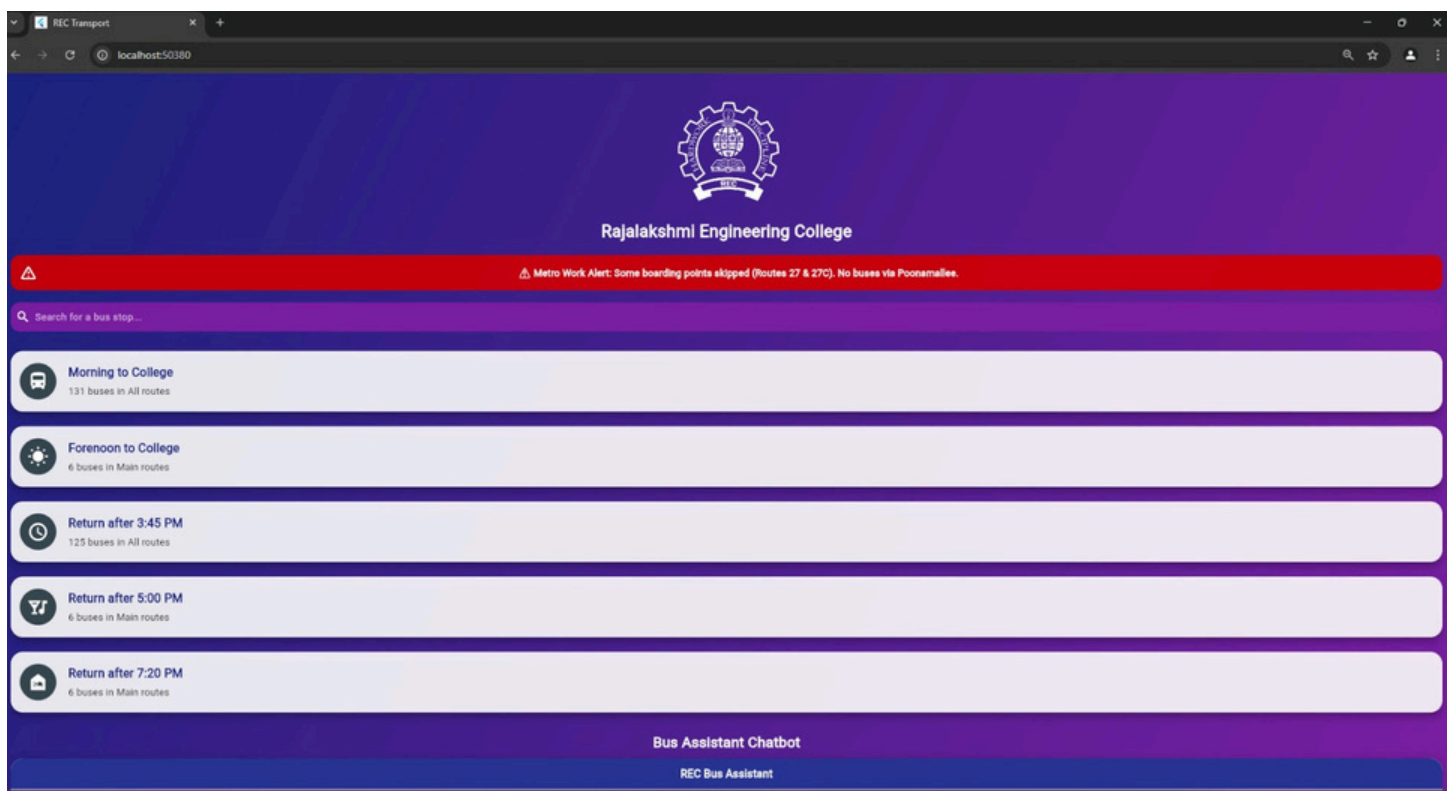


Fig 4: Main page

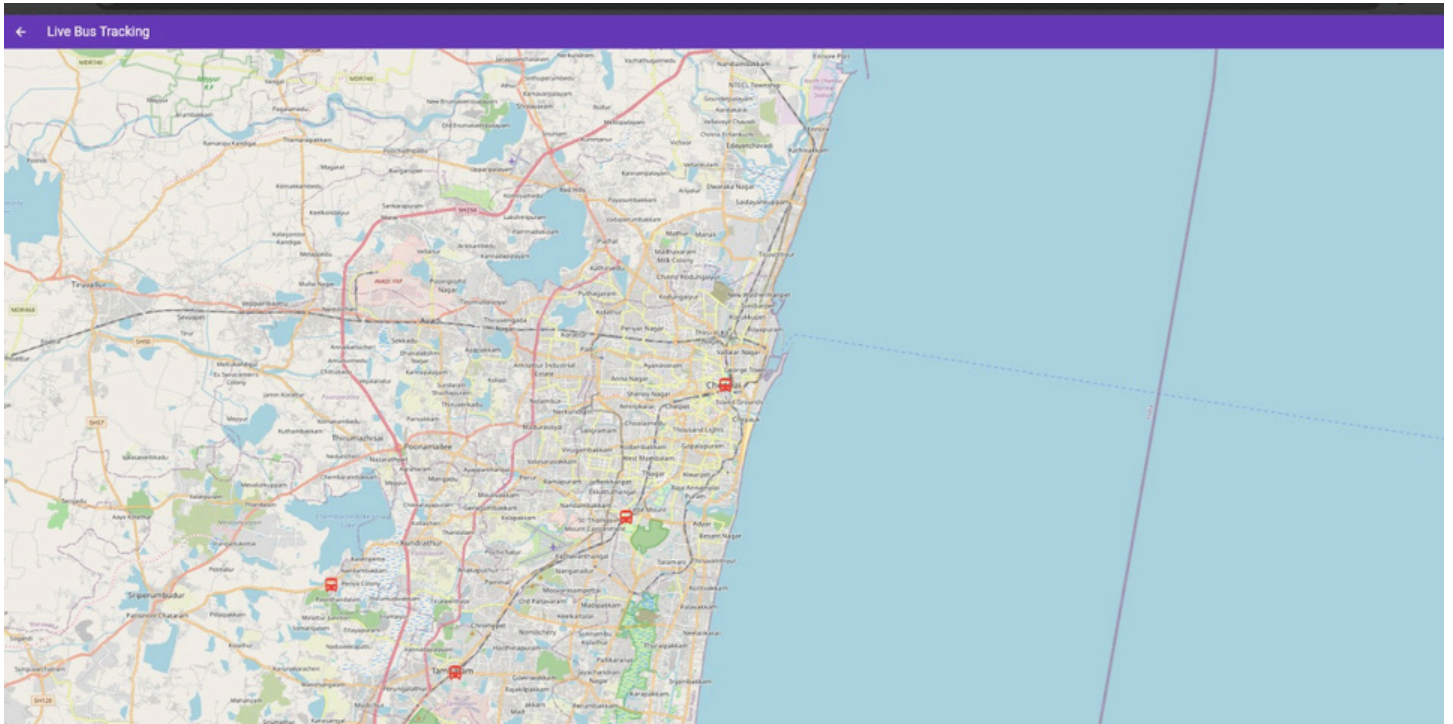


Fig 5: Live Location

CHAPTER 7

CONCLUSION:

The **REC Transport 2.0 - Bus Tracking App** is designed to enhance the efficiency and convenience of college transportation by providing a seamless, real-time tracking experience. By integrating **Flutter** for the frontend and **Firebase** for the backend, the app ensures a robust, scalable, and high-performance solution that caters to the needs of students and faculty.

With live GPS tracking, users can monitor bus locations in real time, reducing uncertainty and wait times. The app's ability to provide instant notifications about bus schedules, delays, and route changes ensures that students remain informed at all times. Additionally, features like a complaint and feedback system allow users to report issues and suggest improvements, contributing to a better transport experience.

The combination of an intuitive user interface and a powerful backend infrastructure makes **REC Transport 2.0** not just a tracking tool, but a comprehensive transport management solution. The use of **Google Maps API**, **Firebase Authentication**, and **Cloud Firestore** ensures that the app delivers accurate and secure data while maintaining a smooth user experience.

Looking ahead, the app has the potential to evolve with features such as AI-powered chat support, predictive arrival times, and QR-based bus check-ins. These advancements will further optimize the efficiency of college transport and enhance user satisfaction. With its solid foundation and future-oriented approach, **REC Transport 2.0** is set to redefine how students interact with their campus transportation system, making travel more reliable, accessible, and stress-free.

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