UET ROUTE MANAGEMENT APP Project Proposal

Section: SE

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UET Route Management App

1.1 Abstract

The UET Route Management App is designed to address key challenges faced by students using the university's bus service. Currently, the absence of real-time information regarding bus arrival times leads to uncertainty, long wait periods, and missed buses. This is especially problematic for new students unfamiliar with bus routes, making it difficult for them to know where to board or when to disembark. Furthermore, the lack of a centralized complaint system prevents students from reporting service issues, such as delays, overcrowding, and vehicle conditions, resulting in a frustrating and disorganized commuting experience.

The UET Route Management App aims to resolve these issues by providing students with real-time GPS tracking of buses, displaying detailed route information, and offering a centralized platform for filing complaints. Key features include secure login via Student ID, live GPS tracking of buses, real-time notifications for students, and a complaint management system. The app will also benefit university administration by generating data on bus usage patterns and enabling them to manage and resolve complaints efficiently.

The development process will follow an iterative approach, starting with requirements gathering from students through surveys. The app will be built using React JS for the frontend, Node.js with Express for the backend, and MongoDB to store data. Realtime GPS tracking will be integrated using Google Maps API or similar services. After testing, the app will be deployed, followed by feedback collection for further improvements.

The UET Route Management App is inspired by transport systems at universities like GCU, the University of Michigan, and MIT, but is specifically designed to address the unique commuting challenges faced by UET students.

1.2 Introduction

Imagine a typical morning, as a UET KSK student. Catching University bus is the only reliable way for reaching university. You are anxiously waiting for the bus at your stop, checking the time repeatedly relying on guesswork, or sometimes even miss the bus entirely because it arrived earlier than expected. For new students, the anxiety is even greater — they're unsure which stop is theirs, so they rely on asking around. And to make matters even worse, there is no central complaint system where students can file their complaint regarding any issue related to routes.

Now, picture a different scenario. With the **UET Route Management App**, students check their phones and instantly know where their bus is and how long it will take to arrive. They can track its real-time location, know the exact route, and receive notifications as they approach their designated stop. Complaints about late buses or overcrowding? Simple — students report it directly through the app, ensuring their concerns are heard and addressed promptly. This app transforms the uncertainty of commuting into a stress-free, organized experience, making it easier for students to focus on their studies instead of worrying about getting to class on time.

The **UET Route Management App** offers a digital solution that provides real-time updates, route information, and an easy way to file complaints, making commuting easier for students and giving the university a more organized way to manage its bus services.

1.3 Problem Statement

Students at UET face several challenges when using the university's bus service. The lack of real-time information about bus arrival times cause uncertainty, often leading to long wait periods or missed buses. This is particularly problematic for new students who are unfamiliar with the bus system and struggle to figure out where to board or when to get off. Furthermore, there is no centralized complaint system, making it difficult for students to report issues like delays, overcrowding, or vehicle conditions. This results in a frustrating and disorganized commuting experience for the student body.

Problems Faced:

- **Uncertainty in Bus Arrival Times:** Students lack real-time information about bus arrival, leading to long wait times or missed buses.
- **Challenges for New Students:** Students unfamiliar with the bus system struggle to know where to board and when to get off.
- **No Central Complaint System:** There's no easy, centralized way for students to report issues regarding the bus service.

1.4 Objectives

The **UET Route Management App** aims to:

- Provide real-time GPS tracking of buses for students.

- Display detailed information on bus routes, including estimated arrival times and bus status.
- Implement a centralized system for students to file complaints related to the bus service
- Simplify the commuting experience for both new and current students, reducing stress and wait times.

1.5 Scope

For Students (Users):

- **Authentication**: Only students or Faculty members having an authenticated university ID will have access to the app.

For the University:

- **Schedule and Updates**: Only the authorized personnel from transport office will be allowed to update the status and schedule of the routes.

- **Complaint Management**: Authorized personnel will manager and take actions against the complaints.

1.6 Features

For Students:

- **Secure Login via Student ID**: Only authorized students can access the app.
- **Route Overview:** Displays key details like bus plate numbers, estimated arrival times, and bus status.
- **GPS Tracking:** Allows students to track the real-time location of their bus after it departs from the university.
- **Complaint System**: Enables students to report bus service issues directly through the app.
- **Notifications**: Alerts users when their bus is approaching or when there are route changes.

For the University:

- **Track Record:** The app will generate valuable data on bus usage patterns, common complaints, and route efficiency, enabling the transport department to make informed decisions on improving the service.
- **Complaint Management:** A unified complaint management system enables the transport department to track and prioritize issues, improving response times and overall service quality.

1.7 Tools and Technologies

The app will be developed using the following tools and technologies:

- **Frontend**: React JS for building the mobile app interface.
- **Backend:** Node.js with Express for handling API requests and complaint system.
- **Database:** MongoDB for storing route information, student data, and complaints.
- **Real-time Tracking**: GPS integration using Google Maps API or a similar service.
- **Authentication**: OAuth2 for secure login via Student ID.

1.8 Proposed Methodology/ System

The development of the **UET Route Management App** follows an iterative approach:

- **Requirements Gathering**: Surveying students to understand the key issues they face.
- **System Design**: Designing the app's architecture, including user interfaces, API endpoints, and database models.
- **Development**: Building the frontend in React Native and setting up the backend using Node.js, Express, and MongoDB.
- **Testing**: Conducting unit and integration testing to ensure all features work as intended.
- **Deployment**: Deploying the app to the university's system and app stores.
- **Feedback Loop**: Collecting user feedback and refining the app accordingly.

1.9 Related Work

Several universities around the world have implemented transport management systems, such as:

- **GCU Routes System:** Government College University (GCU) implemented a basic route management system to assist students in navigating the university's bus routes equipped with real-time GPS tracking, the system provides route schedules, stop locations, and bus timings.
- **The University of Michigan:** Offers a GPS tracking app for their campus buses, providing real-time updates on arrival times and routes.
- **MIT Shuttle Tracker:** Allows students to track campus shuttle locations and view estimated arrival times.

The **UET Route Management App** is similar in its goal to improve the commuting experience, but it focuses on solving the specific challenges faced by UET students.

1.10 Team Members Individual Tasks

Both team members will work collaboratively, ensuring that their combined skills lead to the successful development of the **UET Route Management App**, with shared ownership and seamless project coordination.

Muhammad Abdullah Feroz – (Frontend & UI/UX Design)

- **Frontend Development:**

- Design and develop the user interface using React JS, ensuring an intuitive user experience for students.
- Implement key features like secure login, route overviews, GPS tracking, notifications, and the complaint system.
- Focus on delivering a user-friendly design, optimizing for ease of use and performance.

- **UI/UX Design:**

- Create and refine the user interface based on design principles and user feedback, ensuring accessibility and clarity for all users. **Mehboob Alam – (Backend & Database)**

- **Backend Development:**

- Design and develop the backend system using Node.js and Express to handle API requests, user authentication, and complaint management.
- Implement and manage the MongoDB database for storing bus routes, student data, and complaints.
- Ensure secure communication between the backend and frontend, managing data flow and real-time GPS tracking.

Joint Responsibilities

- **GPS Tracking Integration:**

- Oversee the integration of Google Maps API (or equivalent service) for accurate and real-time bus tracking.

- **Testing & Debugging:**

- Collaborate in conducting unit tests, integration tests, and user acceptance tests (UAT) to ensure functionality, performance, and security.
- **Deployment & Maintenance:**

- Work together on the deployment process, ensuring smooth integration into the university's system and app stores.
- Monitor the app's performance post-launch and make necessary updates based on student and administration feedback.

1.11 Timeline/Gantt Chart

Task	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Panning	X	X							

UI/UX Design		X	X						
Backend		X	X	X					
Frontend			X	X					
GPS Integration					X	X			
Complaint System					X	X			
Testing & Debugging							X	X	
Final Review & Documentation									X

1.12 Data Gathering Approach

To develop the **UET Route Management App**, data will be collected through several key methods:

- **Student Surveys:** Distributed to gather insights on bus service challenges, such as arrival times and route confusion.
- **Interviews with Transport Staff:** To understand current route management practices and identify potential improvements.
- **GPS Data:** Real-time location data from buses will be used for tracking and route efficiency analysis.
- **Pilot Testing Feedback:** A test version will be released to gather user feedback on functionality and design.
- **Complaint Logs and Interaction Data:** Post-launch data from the complaint system and user activity will be analyzed to enhance the service.

These methods will help refine the app to meet student needs and improve the university's bus service.