



BUSMATE

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Abstract: Busmate is an innovative mobile application designed to revolutionize public bus travel by prioritizing safety, connectivity, and convenience. Developed using React Native, this app ensures a seamless experience for travelers and their trusted contacts by providing real-time journey tracking and updates. The app enables users to share their trip details, including location, destination place, and fare price, with up to five trusted individuals, fostering improved communication and peace of mind, through integration with a robust to track the traveler's location in real time.

With its user-friendly interface, BusMate ensure accessibility for users of all ages. The application bridges the gap between technology and public transit by empowering users with essential tools for safe and efficient travel. By enabling informed, real-time updates and fostering a sense of connection, BusMate sets a new benchmark for smart public transportation solutions.

IndexTerms – Real-time tracking, notification system, public transport, mobile application, safety, connectivity, React Native, live location, robust.

I. INTRODUCTION

In today's fast-paced world, public transportation serves as a crucial lifeline, connecting people to their destinations. However, the absence of real-time information and limited communication options often makes bus travel uncertain and stressful. To address these challenges, BusMate has been developed as an innovative mobile application aimed at transforming the public bus service experience. BusMate provides a user-friendly interface, real-time tracking and smart notification systems, ensuring bus travel becomes more convenient, reliable and secure. By utilizing GPS-based tracking and travel information, minimizing uncertainties and delays.

II. RELATED WORK

From the literature review, it is evident that modern technologies such as location tracking, cross-platform mobile development frameworks, notifications techniques have significantly improved the development and functionality of real-time public transport applications. A wide range of studies has explored these tools and techniques, offering valuable insights for the implementation of reliable, responsive, and user-friendly mobile solutions.

Nadar Dabit [1] examined the complexities of native mobile application development and demonstrated how react native simplifies the process by allowing developers to build native views and access platform-specific components using JavaScript. His work highlights the potential of react native to streamline app development without compromising performance or functionality.

Alexander Benedikt [2] explored expert-level practices for building high-quality, production-ready react native applications. The study focused on advanced techniques such as styling, managing local storage and implementing seamless navigation all of which are crucial for delivering user experience in cross-platform.

Shpetim Kadrija and Agon [3] explored mobile app development using the react native hybrid framework. Their study introduced tools like Styled components for dynamic UI design and Axios for handling HTTP requests.

III. METHODOLOGY

The BusMate app involves sending notifications of the journey details like bus name, starting point, destination point and the fare price of the bus to the trusted friends or family members of the user. Once the user enters into the app, he will see two options one is start tracking and another is friend's information. If the user chooses start tracking, he will see another two options one is current location and another is saved location that means already tracked location. The user can share his journey details by filling the details and he has to click save and track button. once the user clicks the track button the app sends notification to his trusted people about his journey details. The notification contains the user entered details and location tracking option so that they can track the user's location. On the other case if the user selects friend's information option, he can manage his friends list by adding and deleting their details. This ensures a safety travel and connection with the friends and families.

IV. SYSTEM DESIGN

Architecture of the BusMate

1. Frontend Layer

Technology: Built using React Native with Expo, ensuring a seamless cross-platform experience for both Android and iOS users.
Features: Intuitive user interface for starting and ending journeys, Integration of map views for real-time location tracking, options for users to select and manage friends for notifications, Notifications displayed to users for key travel updates.
User Experience: Delivers responsive design and smooth animations for a modern mobile app interface.

2. Backend Layer

Technology: Backend APIs are developed using Node.js and Firebase supporting lightweight and scalable server-side logic.
Features: Journey State Management: Tracks when users start and end journeys, Location Tracking: Processes real-time location updates received from the frontend via GPS services, Notification Trigger System: Evaluates journey events (start/end), sends notifications via push notification services (e.g., Firebase Cloud Messaging (FCM) or Twilio), Friend Management: Maintains relationships between users and their selected friends for notification delivery.

3. Data Management Layer:

Technology: Database: Utilizes Firebase Realtime Database for storing user details, journey history, and friend lists, Location Services: Leverages the Google Maps API or similar services for accurate geolocation tracking.
Features: Stores user profile and friend relationships, Tracks journey details including start and end timestamps and location data. Logs notification delivery status for reference and debugging, Data Processing: Efficiently manages real-time location data with periodic updates to ensure low latency and high accuracy.

4. System Integrations

Geolocation Services: Enables precise user location tracking during journeys.
Push Notification Services: Sends triggered notifications to friends when a journey starts or ends.
Expo SDK: Handles notifications, permissions, and GPS location in the mobile app seamlessly

V. DATA FLOW DIAGRAM

1. User interaction

User interacts with app to select tracking to enter journey details and managing trusted people preferences via front-end interface. Trusted people interact with the app to view notifications and track the user's location.

2. Frontend to backend communication

The front-end sends user data to the backend server using secure HTTP protocols. The server processes data and communicates with a database for storage and retrieval.

3. Notification and Alerts

The backend triggers notifications to trusted people when the user starts a journey. Notifications may include the start time, starting location, price of the bus and destination of a user.

4. Database Management

Stores user data, journey details and friend's information securely. Ensures data retrieval is efficient for real-time notifications and tracking.

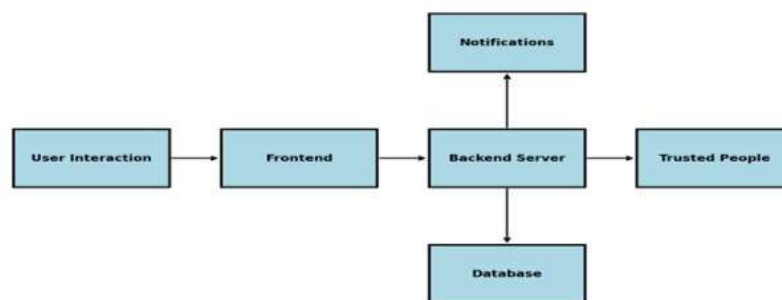


Fig 1: Data flow diagram for BusMate app

5. User Interface Design

The user interface (UI) design of the app focuses on creating an intuitive and visually engaging experience for users. It incorporates the use of React Native Expo framework, JavaScript for structural layout and dynamic interactions and CSS for styling. The design prioritizes ease of use, ensuring that users can seamlessly navigate through the interface. The layout is structured to present essential information clearly, with attention to color schemes and typography to enhance readability and overall appeal. Interactive elements, such as buttons and tool kits, are designed to be responsive and user-friendly, providing immediate feedback and improving user engagement. This holistic approach to UI design aims to deliver a cohesive and pleasant user experience.

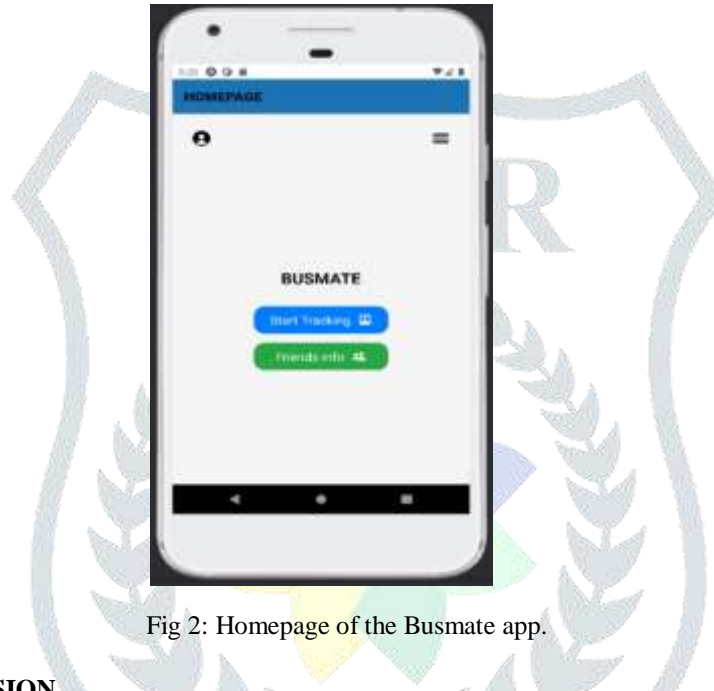


Fig 2: Homepage of the Busmate app.

VI. RESULTS AND DISCUSSION

BusMate app was evaluated based on its ability to accurately sending notification and tracking location and displaying related data. Testing demonstrated that the app effectively sends notification and tracks the location. When a person is a new user of the BusMate app he will see a login screen that has two input fields for Username and Password, a prominent login button and links for forgot password and sign up. The design is simple and minimalistic with a white background and blue accents for interactive elements. The title BusMate Login is centered and styled in a bold font.

As the person logged in, he will enter to the Homepage of the BusMate app. The center of the homepage screen features two buttons a blue Start Tracking button and a green color friends-Info button. The design is clean with a white background and cleaner Navigation elements.

If the person selects the start tracking then he will get another two options called saved location and current location. Saved location is the location which the already tracked if he is a new user then saved locations will empty. Current location is the location which the person searches. Once the person selects any one of them now, he has to enter the name of the bus, destination of the journey and price given to bus to travel. Then the person has to click track button . Once he clicks track button the notification will be sent to the person's friends list so that they can check the location of the person.

If the person selects friend formation than start tracking he will see his friends information that he enters. User can manage his friends list by adding or removing the friends.

Fig 3: Tracking information of the BusMate app

VII. CONCLUSION

The BusMate app is an innovative and reliable solution designed to enhance safety and connectivity during travel. By integrating real-time location tracking and automated notifications the app ensures that users can travel with peace of mind while keeping their loved ones informed. The primary functionality revolves around tracking the user's journey in real time and notifying pre-selected friends when the journey starts and ends.

Built using modern frameworks like React Native Expo, BusMate offers a seamless cross-platform experience with an intuitive and visually appealing interface. The app utilizes device GPS to provide accurate location updates, ensuring robust performance even during long-distance travel. Notifications are delivered promptly using the Expo Notifications API, keeping friends updated at critical moments without requiring manual intervention.

VIII. REFERENCES

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