BUZZ YATRA

[1]ASHA G, [2]RONEEL V, [3]ABHISHEK N, [4]SUHAS J, [5]ADITYA PRAMOD DESHPANDE

[1]Asst. Professor , Department of Computer Science and Engineering , Rajiv Gandhi Institute of Technology, Bangalore, India
[2,3,4,5]U.G Student, Department of Computer Science and Engineering , Rajiv Gandhi Institute of Technology, Bangalore, India
E-mail: [1]ashagujjar2018@gmail.com, [2]roneelv974@gmail.com, [3]abhishek005n@gmail.com, [4]suhasg027@gmail.com, [5]adityadeshpande286@gmail.com

Abstract - Commuters on Bengaluru's BMTC buses often face two challenges: missing their stops and lacking quick access to safety tools. This paper proposes a Progressive Web Application (PWA) to address both through two key features. Customizable stop alerts notify passengers one stop before their destination via pop-ups and vibrations, reducing the need for constant route-checking. A one-tap SOS widget, accessible from the home screen, instantly shares live location with pre-set emergency contacts. Built on a plug-and-play model, the system can integrate seamlessly into platforms like Namma BMTC or Uber. Future enhancements may include route optimization, real-time tracking, and basic Kannada assistance for newcomers, combining safety, convenience, and cultural relevance. This modular framework aims to make urban mobility more adaptive and commuter-centric.

Keywords - Progressive Web App, Stop Alerts, Emergency SOS Widget, Plug-and-Play Model, Public Transport Safety, Urban Mobility, Tourist Assistance

I. INTRODUCTION

Public transport systems are the lifeblood of urban mobility, particularly in rapidly growing cities like Bengaluru. With over five million daily commuters relying on BMTC buses, efficiency and safety are not luxuries—they are necessities. Yet, for many passengers, the experience remains fragmented. Stops are easy to miss in crowded buses, announcements are inconsistent, and safety features—when they exist—are often buried behind layers of navigation. These challenges intensify for newcomers to the city, tourists unfamiliar with routes, and individuals who travel alone.

Digital solutions have attempted to bridge these gaps, but most focus narrowly on real-time tracking or payment systems, leaving commuter-centric features underdeveloped. This paper hypothesizes a Progressive Web Application (PWA) that integrates seamlessly into existing platforms while introducing two key innovations: (i) **customizable stop alerts** that notify passengers one stop before their destination via visual and haptic cues, and (ii) a **one-tap emergency SOS widget** that instantly shares live location with pre-set contacts.

By employing a plug-and-play architecture, the proposed framework avoids redundancy, enabling integration with applications such as Namma BMTC, Uber, and other mobility services. Future iterations could incorporate intelligent route optimization, contextual location-based trivia, and basic Kannada assistance—creating a platform that not only improves safety and convenience but also enriches the commuter experience. Through this modular approach, the hypothesis envisions a scalable, commuter-first layer for urban mobility systems that evolves alongside the city it serves.

II. LITERATURE SURVEY

Research on urban mobility applications has primarily focused on operational efficiency rather than commuter-centric usability. Real-time tracking systems, such as Google Transit and Moovit, provide accurate location data but rely heavily on user vigilance to avoid missing stops [1]. Similarly, intelligent transport systems (ITS) have introduced route optimization and predictive analytics, yet their emphasis skews toward fleet management rather than passenger experience.

Efforts to enhance safety in public transport often manifest as standalone solutions. For instance, SOS features integrated into ride-hailing apps like Uber or Ola allow live location sharing, but these are typically tied to proprietary ecosystems, limiting their adaptability for public buses. Moreover, research on Progressive Web Applications (PWAs) highlights their potential for lightweight, cross-platform deployment, yet few studies explore their role in integrating stop alerts and emergency features in a single, modular framework.

Several studies on commuter experience underscore the importanceof contextual information—including multilingual support and cultural cues—to improve accessibility for tourists and migrants. However, existing tools rarely combine these elements with real-time mobility functions in a cohesive architecture.

This review indicates a clear gap: a need for a plug-and-play system that merges stop alerts, safety features, and cultural assistance into an integrated, commuter-first design—an opportunity this paper aims to address.

III. EXISITING SYSTEM

Public transport navigation in Bangalore is currently supported by a combination of digital platforms and official services. These include general-purpose navigation tools such as Google Maps, the official BMTC applications, and various third-party transit apps. While these systems provide essential route-finding capabilities, they remain insufficient for bus commuters due to limited contextual awareness and lack of safety features.

A. General Navigation Tools

Applications like Google Maps offer bus route suggestions, estimated travel durations, and walking directions to and from bus stops. Despite their widespread use, these platforms are primarily optimized for private and multi-modal transportation rather than bus-specific commuting. Key limitations includeLack of stop-specific alerts, resulting in passengers missing their stops.Dependence on continuous internet connectivity, which is inconsistent across several regions in Bangalore.No cultural or linguistic support for tourists or new residents

B. BMTC Official Applications

The BMTC mobile applications provide bus schedules and route information directly sourced from the transport authority. However, these apps face persistent reliability issuesOutdated or inaccurate data due to static schedules and poor synchronization with traffic variations.Absence of real-time stop notifications and personalized route recommendations.No integrated safety mechanisms such as emergency location sharing.

C. Third-Party Transit Applications

Several independent applications aggregate bus route data through crowdsourcing or user contributions. While these apps attempt to improve on official solutions, they suffer fromData fragmentation, leading to inconsistent or unreliable route information.Interfaces focused on navigation rather than commuter safety or cultural adaptation.No provisions for proactive alerts or localized information about the commuter's surroundings.

III. PROPOSED METHOD

The proposed framework introduces a Progressive Web Application (PWA) that enhances commuter experience through two core modules: Customizable Stop Alerts and a One-Tap Emergency SOS Widget. The system adopts a plug-and-play architecture, allowing seamless integration with existing transport platforms such as Namma BMTC, Uber, and other mobility applications without requiring major infrastructural changes.

A. System Architecture

The architecture consists of four key layers:
User Interface Layer: A lightweight PWA accessible via browser or app wrapper, supporting offline caching for low-connectivity areas.

Service Layer: APIs that interface with live transit data (e.g., GPS-based bus location feeds) and user-defined preferences.

Notification Engine: A rule-based system that triggers alerts one stop prior to the destination using on-screen prompts and haptic feedback.

Emergency Module: A background service enabling instant live-location sharing with pre-set contacts through a home-screen widget.

B. Stop Alert Feature

Users select their destination stop upon boarding. The system cross-references real-time GPS data and bus route information to predict arrival at the preceding stop. Once triggered, alerts appear as both visual notifications and device vibrations, ensuring accessibility even for distracted or hearing-impaired users.

C. Emergency SOS Widget:

The widget, installable directly on the home screen, bypasses the need to open the full application. With a single tap, it shares the user's live location with pre-set emergency contacts via SMS or internet-based protocols, depending on network availability.

D. Plug-and-Play Integration

The modular design leverages RESTful APIs and standardized data formats, allowing it to be embedded within existing transport ecosystems without affecting their native functionalities. This architecture enables rapid adoption by transit authorities and private mobility providers alike.

E. Future Extensions

Planned enhancements include:Intelligent Route Optimization using machine learning models to recommend safer or faster routes.Real-Time Bus Tracking with congestion prediction.Cultural Assistance features such as basic Kannada translations and contextual trivia about locations, enhancing usability for tourists and new residents

IV. WORKING PRINCIPLE

The proposed system operates by integrating real-time transit data, user-defined inputs, and modular

APIs to deliver stop alerts and emergency assistance through a Progressive Web Application (PWA).

A. Stop Alert Mechanism

Input Selection: Upon boarding, the user selects their destination stop from a list of route-specific stops.

Data Synchronization: The application continuously fetches GPS-based bus location data via the service layer APIs.

Prediction Engine: The notification engine calculates the remaining distance to the selected destination and identifies the preceding stop using geofencing techniques.

Trigger Event: When the bus approaches the preceding stop, the system sends a visual pop-up and haptic vibration to alert the commuter, reducing the likelihood of missing the stop.

B. Emergency SOS Function

Widget Access: The SOS widget is installed on the user's home screen for immediate accessibility.

Activation: A single tap activates the emergency protocol without opening the full application.

Location Transmission: The user's live location is captured via device GPS and sent to pre-set emergency contacts through SMS or internet-based channels, depending on network availability.

C. Plug-and-Play Model

The system's architecture uses standardized RESTful APIs, enabling seamless integration with third-party transport platforms such as Namma BMTC or Uber. This eliminates the need for standalone deployment while preserving the autonomy of host applications.

V. IMPLEMENTATION AND TECHNOLOGY

The proposed system is implemented as a Progressive Web Application (PWA), leveraging web-based technologies for cross-platform compatibility while maintaining near-native performance.

A. Technology Stack

Frontend:HTML5, CSS3, JavaScript for core PWA functionality.React.js or Vue.js for dynamic UI rendering and component-based architecture. Service Workers for offline caching and background updates.

Backend:Node.js with Express.js to handle data processing and routing.

Real-time Database: Firebase or MongoDB for storing user preferences and stop data.

Data Sources: Primary Approach (API-Based): RESTful APIs for bus GPS feeds and stop details.

Alternative Approaches: Crowdsourced GPS data, Bluetooth beacons, or offline route databases if APIs are unavailable.

Notification Services:Web Push API for browser alerts.Vibration API for haptic feedback on supported devices.

Emergency SOS:Geolocation API to fetch live location.SMS Gateway (e.g., Twilio) or WebRTC for location sharing via cellular or internet channels.

B. Implementation Workflow

User Onboarding: User selects destination stop and grants permissions for notifications and location access.

Stop Alerts: System fetches bus location either via APIs or alternative data sources (crowdsourced or beacon-based). Notification engine calculates distance to the target stop and triggers alerts one stop prior.

Emergency SOS: Widget directly accesses device GPS.Location and timestamp transmitted to pre-set contacts via SMS or internet protocol.

Plug-and-Play Integration:Host apps embed the PWA through an iframe, WebView, or SDK, allowing independent feature deployment without disrupting core app functionality.

Figure 1 shows the operational flow of the proposed Progressive Web App. The process begins with the user selecting their destination. The system then tracks the user's location continuously. When the bus is one stop away, a ring and vibration alert is sent to notify the user to prepare for deboarding. At any point during the journey, the user can tap the SOS widget to instantly share their live location with emergency contacts, ensuring enhanced safety

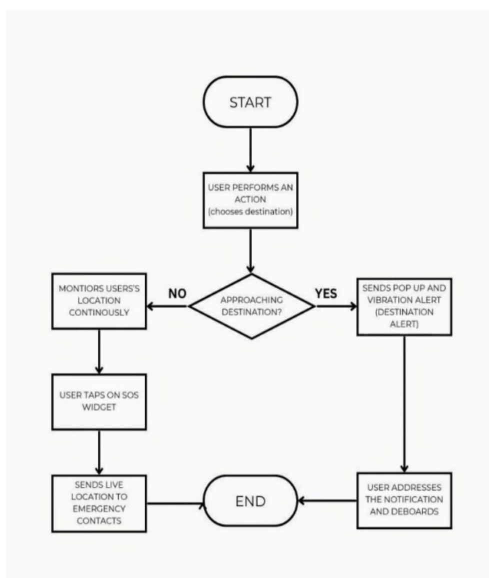

Fig. 1. System flow of stop alert and SOS widget.

REFERENCES

[1] College Bus Tracking and Notification System K. Premkumar; Pavithra K. Presiela J. Priyadarshini D. Priyanga P.

[2] Real-Time College Bus Tracking and Notification System for Student Convenience B. Sandhiya V. V. K. Ravichandra; V. Siddhartha M. Vanathi J. Karthika D. Saral Jeeva

[3] Enhancing Bus Arrival Alert and Crowd Optimised FrequencyS Anitha Jebamani; N. Aishwarya; Thenmozhi A M; Semmozhiselvan A; Gokul S

[4] Real-Time College Bus Tracking and Notification System for Student Convenience B. Sandhiya, V. V. K. Ravichandra, V. Siddhartha, M. Vanathi, J. Karthika, D. Saral Jeeva Jothi

[5] Campus Commute: An Innovative Approach to College Bus Tracking and Management MARY POSONIA A, ALBERT MAYAN J, BHUVANESH D,BHARATH P , ABRAHAM V S ASHOK KUMAR K

[6] Bus Tracking System using Mobile GPS Technology Jayaraam. S P, Jayakumar. D , B.Sandhiya , M.Vanathi , J.Karthika

★★★