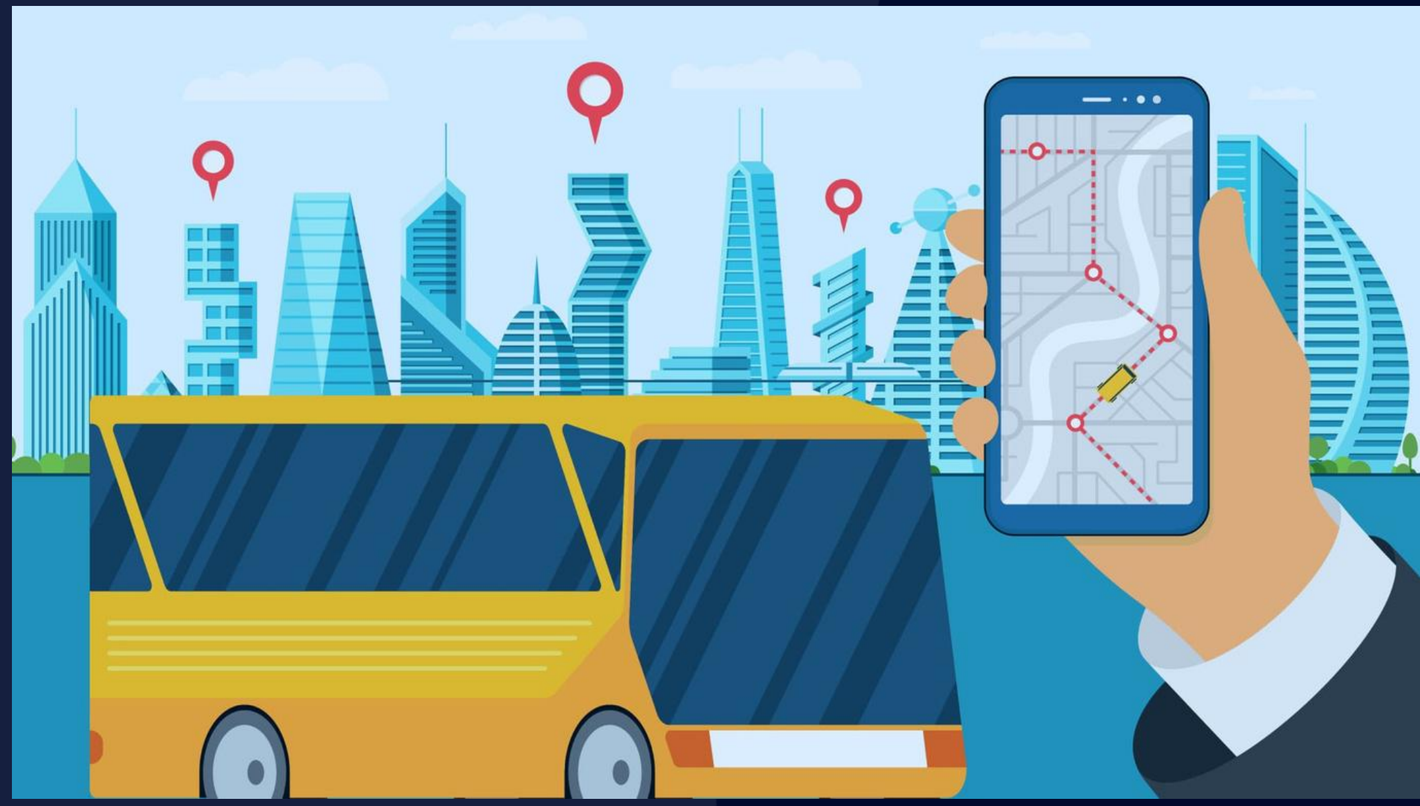
SMART PUBLIC BUS MANAGEMENT & TRACKING SYSTEM



INTRODUCTION

Smart Public Bus Management & Tracking System is intended to modernize public transport in Sri Lanka by allowing real-time tracking, staff coordination, online booking, and automated alerts, ultimately enhancing the reliability and efficiency of bus services.

LIFECYCLE MODEL

The system will follow the Agile Software Development Life Cycle (SDLC)

- Planning & Requirement Analysis
- Design & Prototyping
- Development
- Testing
- Deployment
- Maintenance & Iterative Updates

USER ROLES AND FEATURES

Admin

- Add/Edit/Delete bus routes and schedules
- Assign staff
- Real-time monitoring of all buses
- View analytics: trip count, delays, feedback reports
- Push alerts

Drivers & Conductor

- View schedules
- Start/stop GPS sharing
- Mark attendance or absence
- Notify unavailability
- Emergency SOS button to alert

Passengers

- Register/login and update profiles
- Browse buses by location, route, and time
- Track live location of buses
- Set custom alerts
- Book tickets and view trip history
- Submit complaints and feedback

KEY SYSTEM FEATURES

01 Route Management (Admin)

02 Staff Management (Admin)

03 Real time tracking (Admin & Passengers)

04 Location Sharing (Drivers)

05 Online Ticket Booking (Passengers)

06 Notification & Alerts (All users)

07 SOS emergency Button (Drivers)

08 Analytics Dashboard (Admin)

09 Feedback & Reporting (Passengers)

SYSTEM WORK FLOW

01 Driver opens mobile browser → clicks "Start Sharing Location."

02 Browser captures location every 5 seconds → sends to backend or Firebase

03 passenger screen fetches live bus coordinates

04 React shows live map using Leaflet → calculates distance from passenger

05 Alarm rings when distance ≤ 1 KM (configurable)

OVERALL SYSTEM DESCRIPTION

Operating Environment:

- Web browsers (desktop & mobile).
- Backend: Node.js / Java / Spring Boot.
- Frontend: React.js
- Database: MySQL or PostgreSQL.
- Real time updates: Firebase realtime database
- Third-party: Google Maps API, SMS gateway.

Product Perspective:

- Modular & scalable web-based system.
- Integrates with GPS APIs, payment gateways.

NON FUNCTIONAL REQUIREMENTS

- Performance: System must support 100+ concurrent users without latency
- Security: User authentication, encrypted data transfer (HTTPS), secure APIs
- Scalability: Modular architecture for expansion to new regions or features
- Usability: Mobile-friendly UI, simple dashboard layouts
- Availability: 99.5% uptime with regular backups

FUTURE IMPLEMENTS

- Mobile apps for Android/iOS
- QR-based ticket validation
- AI-driven traffic-based rerouting suggestions
- Integration with National Transport APIs

CONCLUSION

- The Smart Public Bus Management & Tracking System aims to improve public transportation reliability and passenger convenience in Sri Lanka.
- By combining real-time tracking, online booking, and staff coordination, the system will modernize bus operations.
- Future upgrades like mobile apps and AI-based rerouting will make it even more efficient and user-friendly.