

School Transportation Management System - Features Document

This document outlines the key features of a Full Stack School Transportation Management System designed to improve safety, efficiency, and communication between schools, parents, and drivers.

1. Core Features (Must-Have)

- Student Management: Add, update, and remove students with assigned routes.
- Driver Management: Maintain driver details, license info, and assigned bus.
- Bus & Route Management: Assign buses to specific routes with multiple stops.
- Attendance System: Track student boarding and drop-off.
- Live Tracking: Bus location updates via GPS integration.
- Pick-up & Drop-off Notifications: SMS/Email/App alerts to parents when the bus arrives.
- Schedule Management: Daily and weekly schedules for buses and drivers.

2. Advanced Features (Impressive for Schools)

- Parent Dashboard/App: Live bus tracking, ETA, and alerts.
- Driver App/Dashboard: Mobile-friendly panel for attendance and trip status updates.
- AI/ML Features: Delay prediction using traffic data.
- Payment Integration: Online fee payment for transport services.
- Emergency Alerts: Panic button for drivers in case of breakdown/accident.
- Analytics Dashboard: Monthly reports on fuel, punctuality, and attendance.
- Role-Based Access: Admin, Driver, Parent, and Student roles with permissions.

3. Suggested Tech Stack

- Frontend: React.js (Web Dashboard), React Native/Flutter (Mobile Apps).
- Backend: Node.js with Express.js or Django (Python).
- Database: MongoDB or PostgreSQL.
- Realtime Tracking: Socket.IO / Firebase.
- Hosting: AWS / Heroku / Vercel.

4. System Modules

- Admin Panel: Complete control over routes, buses, drivers, and students.
- Parent Portal/App: Tracking, notifications, payments, and attendance.
- Driver App: Route details, attendance marking, and emergency reporting.
- Reports & Analytics: Insights for school management.

5. Benefits for Schools

- Enhanced safety and security of students.
- Improved communication with parents.
- Streamlined bus scheduling and management.
- Real-time insights into operations.
- Cost optimization with data-driven decisions.

6. Future Scope

- Integration with biometric attendance systems.
- AI-based route optimization for fuel efficiency.
- Support for electric vehicle fleet management.
- Voice-enabled apps for drivers and parents.