



Ensure a secure ride for every student every mile of the way

## About the Client

*ISV offering real-time remote monitoring geo-enabled school bus management system.*

The client is a technology company, providing state of the art, safe, and secure transportation solutions related to student safety, compliance, and fleet management. Their solutions ensure unparalleled safety and convenience for schoolchildren, peace of mind for parents, and operational control for school administrators through real-time location monitoring and tracking of school buses.

The comprehensively designed remotely operated and administered system ensures the safety and security of more than 2 million schoolchildren. The software enables the management of several school buses at hundreds of different school districts across the United States. Their web and mobile applications manage and oversee over 14,000 school buses to ensure a safe commute for school children.

## Business Need

*Capture a significant share in the \$14 billion public school bus services industry by introducing innovative solutions.*

School administrators face a major responsibility of ensuring convenient and secure commutes for students. They are accountable to parents who expect the school bus system to work glitch-free. While parents and administrators supervise the school and home environments, it is not the same when students are on their way to school. It is this need that prompted the client to think of a comprehensive solution that was cost-effective and convenient to use for school administrators and provided the much-needed assurance parents were expecting.

“Trigent's quality deliverables nearly eliminated crashes, helping boost customer retention to an all-time high. Their managers adhere to strict guidelines to ensure top-notch deliverables and ease logistical concerns. They're adaptable, seamlessly integrating new developers or features as requested.”

## Client Benefits

- Over 40% business growth each year for the last 3 years
- Secure 2 million students across 3,500 schools
- Expansion from 2 to 62 school districts
- Eliminated unnecessary wait time at bus stops for 45,000 happy parents

The client realized the gap in the market due to the lack of a sound school bus management system providing adequate child safety and security features. The client envisaged a remotely managed, geo-enabled real-time monitoring system for school buses to capitalize on the unmet potential market demand.

The new software would provide a dependable and affordable school bus tracking system for all school districts. The new digital system would enable the monitoring of buses to make the school bus-riding experience a safer, and convenient process for students and parents.

The key features of the new advanced web and mobile apps based school bus management system solution are;

- Monitor and govern school bus movement.
- Get real-time update of student's bus location.
- Screen students as they board and deboard to prevent them from getting onto the wrong bus or getting off at the wrong stop.
- Providing real-time updates to parents, administrators, and drivers.

The system is intelligent enough to predict the expected time of arrival of the bus at their stops and present real-time location of the bus and its progress. The system alerts parents about breakdowns and alternate buses when used.

## Trigent Solution

*Enabled the client to quickly launch an innovative product to capture a majority share in a growing market*

Trigent's technology team collaborated with the client's product team to build a great product by carefully studying the requirement and evaluating it against the competition and future needs. Based on its assessment, the tech team then suggested technology interventions to introduce and upgrade features that would significantly improve safety and convenience for students using the school bus system.

Trigent followed the agile development methodology to ensure a faster time to market of the product. The two-week sprint cycle ensured that the development and updates of new features were carried out at pace to complement the web and mobile app solution to comprehensively monitor and regulate the school bus movement through the different pick-up points, the various schools, and the depot.

### The solution has 3 components

- A purpose built app on a custom android tablet for the bus driver
- A web and mobile app for school administrators to monitor and regulate school bus movement
- A mobile app on both Android and iOS for the parents to keep track of students riding the buses

### Features available in the Android app configured on the custom-built device on school buses:

- Voice prompts for navigation, route, and pickup and drops
- Displays students 'riders' names and photos at each stop
- RFID and/or barcode scanning of ID cards to register the entry and exit of students
- Notifies the driver about students that require assistance to board or exit the bus
- Works offline (without an Internet connection)
- Pre-configured and tamper-proof

## Technology Stack

- **Android Mobile App** - Native framework using Java
- **iOS Mobile App** - Native framework using Swift
- **Backend Servers** - Open Source CentOS
- **APIs** - Tomcat, Java, ActiveMQ
- **Database** - MySQL, Postgres
- **Environment** - AWS: EC2, S3, ALB, R53, SES, SNS
- **CI/CD** - Code Commit, Code Build, Code Pipeline.

- A completely automated system for maintenance and monitoring that includes app upgrades, latest data sync up, connection to network bluetooth & GPS, power on and off etc.
- The devices automatically shut down, a short while after the engine is turned off
- High bandwidth or data-intensive operations are done at a predefined schedule via wi-fi, when the buses are at the depot



### Feature benefits for parents using the Android or iOS mobile app

- Real time location of the bus on the app.
- Exact time of arrival of the bus at a given location reducing wait time.
- Instant notifications and banners to notify about bus breakdowns, alternate bus assigned, route change or any other exigency.

- Ready reference to verify swipe in and out time of their child
- Online support for complaints and suggestions

**Features on the mobile and web app for school administrators**

- Real time location tracking of all school buses

- Real time monitor in case of route deviations
- Monitoring driver check-in and check-out
- Ability to allocate alternate school bus in case of an exigency
- Alerting admins on overspeeding by bus drivers