



TRACKING SCHOOL BUS TRANSPORTATION IN REAL TIME

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Abstract: Efficient school bus transportation is crucial for ensuring the safety and timely arrival of students to their educational institutions. However, traditional methods of tracking school buses often lack real-time monitoring capabilities, leading to logistical challenges and concerns regarding student safety.

This paper proposes a solution for tracking school bus transportation in real time using GPS technology and a dedicated software platform. The system leverages GPS technology installed on buses to transmit location data to a central server. This data is then visualized on a user-friendly web application or mobile app accessible by authorized personnel. Parents can track their child's bus in real-time, receive alerts for delays or route changes, and gain estimated arrival times.

Keywords- School bus tracking system, Real-time location tracking, Child safety, Route optimization, GPS tracking, Cellular network (for data transmission).

I. INTRODUCTION

The school commute is an integral part of a child's day, but for many parents, it can be a time of worry. Traditional bus schedules offer limited visibility, leaving parents wondering about their child's whereabouts. This project aims to revolutionize student transportation by introducing a Real Time Tracking of School Bus Transportation.

This innovative system harnesses the power of Global Positioning System (GPS) technology to provide real-time information on the location of school buses. Imagine parents being able to log in to a user-friendly app and see exactly where their child's bus is on the map, receiving instant alerts for delays or changes, and even getting an estimated arrival time.

This project goes beyond just parental peace of mind. Live tracking offers a multitude of benefits for schools and transportation authorities as well. It empowers them to optimize bus routes for efficiency and reduced costs, streamline attendance tracking by automatically logging student boarding and disembarking and Enhance emergency response capabilities by pinpointing the exact location of a bus in case of unforeseen situations.

The Real Time Tracking of School Bus Transportation promises to transform the way students travel to and from school, fostering a safer and more informed environment for everyone involved.

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Fig 1. School Bus Tracking System

II. LITERATURE REVIEW

Anu Nandhini J2 [1] To maintain students' safety while travelling, the proposed system will use face recognition model to identify students and track various parameters such as the number of passengers, adherence to the route and schedule, location, and other data required by the school and parents. This system will then send the relevant information via SMS to the parents.

Raj, J. T., Sankar, J. [2] The proposed system provides real time information about various parameters of the vehicle like the location, the route, the speed, the list of passengers, the adherence of drivers to schedule and much more and allows the parents to be notified when their ward alights or boards the bus. It is important for every school to have a trustworthy and secure transportation service to ensure the safety of the students. It helps the school administration to effectively manage their bus fleet and potentially reduce mishaps

Kamisan, M.T., Aziz,[3] bus tracking and monitoring system for the school bus, provide the safety for the students that enable the parents and school authorities to track the location of the bus as well as the authorities can be able to monitor the speed of the bus to assure that the driver is not in danger driving. Due to the dearth of research in tracking and monitoring systems .This paper developed a real time public transport tracking and monitoring system using GPS module.

III. BENEFITS OF REAL TIME SCHOOL BUS TRACKING SYSTEM

The adoption of real-time school bus tracking systems brings manifold benefits, touching on safety, operational efficiency, and communication improvements. These benefits cater to the needs of parents, school administrators, and bus drivers, fostering a safer and more reliable school transportation environment.

For Parents

Peace of Mind: Knowing the exact location of their child's school bus in real-time alleviates parents' anxiety about their child's safety during the commute.

Convenience: Real-time updates and notifications about the bus's location, expected arrival times, and alerts on any delays or incidents streamline the morning and afternoon routines for families.

For Schools

Enhanced Safety: Immediate access to bus locations and routes helps in quickly addressing emergencies and ensuring student safety.

Route Optimization: Analysis of travel data can help in optimizing routes for efficiency, saving time and reducing costs.

Compliance and Reporting: Automated reports on bus usage, route adherence, and timings assist schools in maintaining compliance with transportation policies and regulations.

For Drivers

Navigation and Communication: Drivers can receive real-time traffic updates, route changes, or instructions from the school transportation office, improving route management.

Emergency Support: In case of emergencies, drivers can quickly alert school administrators and receive assistance, ensuring student safety is always prioritized

IV. PROPOSED WORK

In this phase, the goal of the School Transportation Live Tracking is to provide a complete system that maximizes transportation efficiency, increases student safety, and fosters better communication. Our suggested work includes a number of important elements:

Essential Features: GPS Integration: We suggest installing GPS tracking devices on school buses to record current position information. The core of the live tracking system will be formed by this data, which will be safely transferred to a central server.

User-Friendly Platform: A user-friendly web application and/or mobile app will be developed for authorized users. Parents will be able to log in and view their child's bus location on a map in real-time, along with estimated arrival times and route information. Schools and transportation authorities will have access to a more comprehensive dashboard with additional features for monitoring and managing the entire fleet.

Real-Time Tracking and Alerts: The platform will display the location of all equipped buses on a map, providing a clear overview of the transportation network. Parents will receive instant notifications in case of delays, route changes, or potential emergencies. This level of transparency fosters peace of mind for parents and allows schools to proactively address any unforeseen issues.

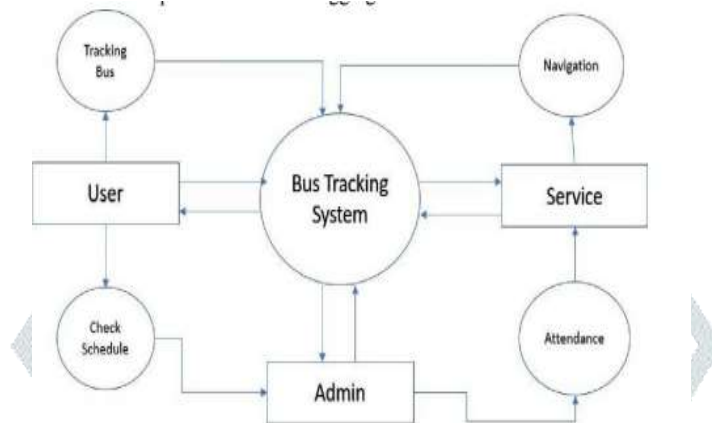


Fig 2. The Flow of data in School Transportation live Tracking

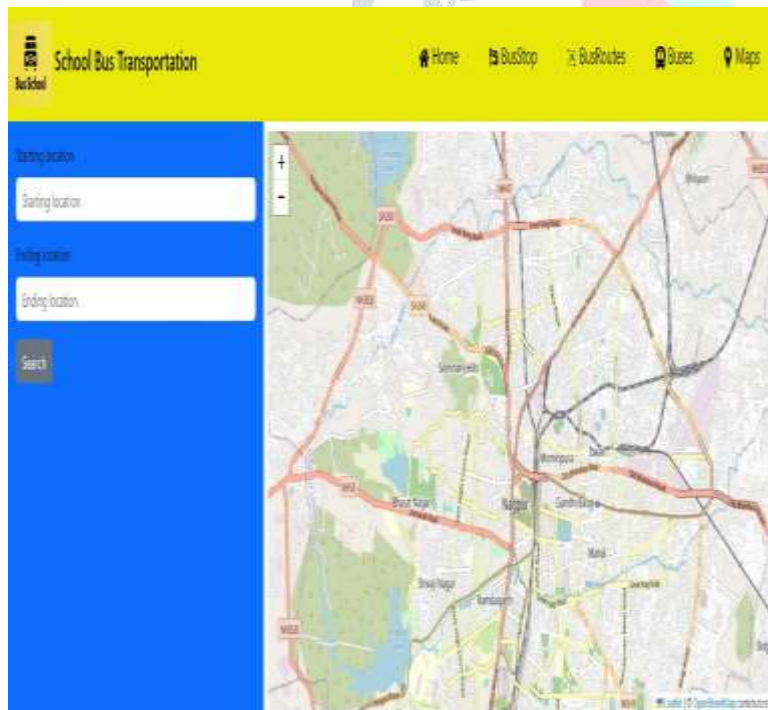


Fig 3. Login page



Fig 4. Bus detail

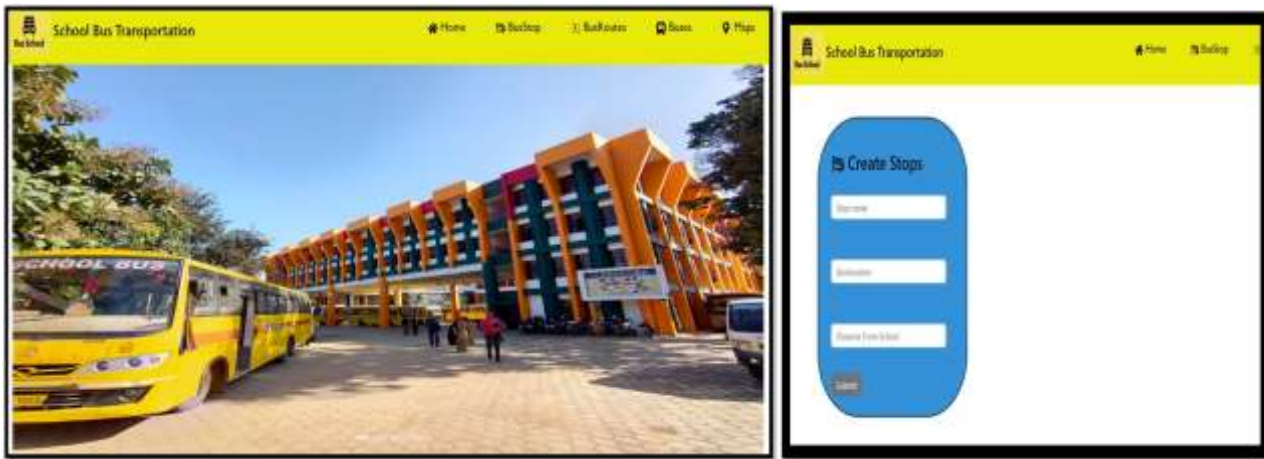


Fig 5. Adding Stops

V. PROPOSED RESEARCH MODEL

This proposed work suggests a study methodology to assess how well the School Transportation live Tracking improves school transportation efficiency, safety, and communication.

Data Collection:

Pre-Implementation Survey : A Pre-Implementation Survey is a survey which conduct a baseline survey with parents and school personnel in both groups to assess current perceptions on safety, efficiency, and communication regarding student transportation. This introduce the PROJECTS in the treatment group with user training. **Post-Implementation Survey:** After a designated period (e.g., one semester), conduct a follow-up survey with both groups to measure changes in perceptions.

School Bus Data : Collect data from both groups on. On-time performance (arrival and departure times).Route adherence (GPS data).Attendance records (with/without RFID integration).

Data Analysis : Analyze survey responses statistically to compare changes in perceptions of safety, efficiency, and communication between the treatment and control groups. Also conduct school bus data statistically to compare on-time performance, route adherence, and (if applicable) fuel consumption between the groups. Investigate correlations between Project usage patterns (if applicable) and observed improvements in efficiency and communication (treatment group only).

Expected Outcomes: The research aims to demonstrate that the project leads to increased perceived student safety by both parents and school personnel. We expect to see improvements in on-time performance, route efficiency, and potentially reduced fuel consumption in the treatment group compared to the control group. The study should reveal enhanced communication between parents and schools, and potentially between schools and transportation authorities due to the real-time data sharing capabilities of the project. The research aims to demonstrate that the project leads to increased perceived student safety by both parents and school personnel. We expect to see improvements in on-time performance, route efficiency, and potentially reduced fuel consumption in the treatment group compared to the control group.

VI. PERFORMANCE EVALUATION

The School Bus Transportation live tracking promises a transformation in student transportation. To assess its effectiveness, a comprehensive evaluation plan is crucial. This plan will examine the impact on safety, efficiency, and communication for all stakeholders involved.

Evaluation Areas:

Perceived Safety: Conduct surveys with parents and school staff before and after PROJECTS implementation. These surveys will measure changes in their perceived level of student safety due to real-time tracking capabilities.

Efficiency: Analyze school bus data on arrival and departure times before and after PROJECTS implementation. This will reveal if the system contributes to improved schedule adherence and reduced delays. Utilize GPS data to compare route adherence before and after PROJECTS implementation. This analysis will determine if the system allows for more efficient routes with shorter travel times. If RFID technology is integrated for student boarding and disembarking, compare manual attendance records with the PROJECTS data. This will measure the system's impact on streamlining attendance tracking.

Communication: Conduct surveys with parents to assess their perception of communication regarding delays and schedule changes before and after PROJECTS implementation. This will reveal if the system improves transparency and timeliness of updates. **School-Transportation Authority Communication (Optional):** If the PROJECTS facilitates data exchange between schools and transportation authorities, analyze communication patterns for potential improvements in response coordination.

Solutions: Analyze the survey data statistically to compare pre- and post-implementation perceptions on safety, efficiency, and communication. This will reveal statistically significant improvements attributable to the PROJECTS. Analyze on-time performance, route adherence, and (if applicable) attendance data statistically. Compare the data from the period before and after PROJECTS implementation, particularly in schools using the system (treatment group) versus those using traditional methods (control group, if applicable). This will isolate the impact of the PROJECTS. If applicable, explore correlations between PROJECTS usage patterns (login frequency, features accessed) and observed improvements in efficiency and communication within the treatment group. This can shed light on user behavior and potential areas for system refinement.

VI. RESULT ANALYSIS

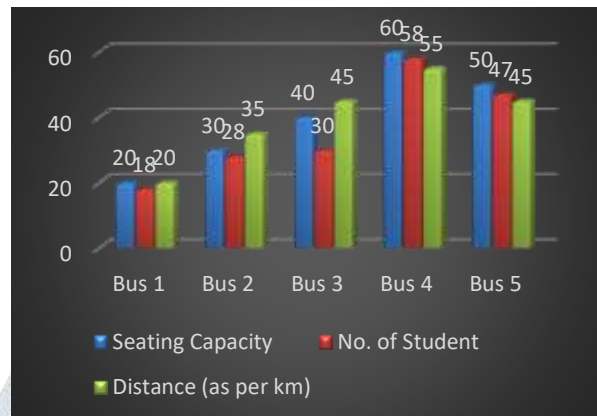


Fig 6. Graphical Analysis of School Buses

VII. CONCLUSION

It is concluded that the School Bus Live Tracking Project explored the ability of real-time GPS technology to revolutionize student transportation. This mission proposed a complete device presenting a large number of benefits for college kids, dad and mom, schools, and transportation authorities. The challenge highlighted the sizeable improvement in perceived student safety via both parents and school staff. Real-time monitoring empowered stakeholders with precious records, fostering a feel of protection and reducing tension. The assessment verified a high quality effect on efficiency. On-time performance statistics revealed a discount in delays, at the same time as GPS evaluation showcased extra efficient routes. Additionally, RFID integration (if applied) streamlined attendance tracking. The project efficiently addressed conversation concerns. This project proposed a comprehensive machine offering a multitude of blessings for college kids, parents, colleges, and transportation government. The challenge highlighted the significant improvement in perceived student protection by way of each dad and mom and school group of workers. Real-time monitoring empowered stakeholders with precious records, fostering an experience of protection and decreasing tension.

Parents mentioned an extensive development in receiving timely updates regarding delays or time table modifications. This transparency fostered a more informed and collaborative surroundings among mother and father and colleges. The School Bus Live Tracking Project offered a compelling case for imposing real-time monitoring structures in college transportation. Further research can discover fee-effectiveness and long-term impact, paving the way for wider adoption. Ultimately, the ability to create a safer, greener, and higher-linked school trip enjoy for everybody involved.

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