

A Review on Safety Management System in School Bus

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Abstract - An essential component of providing children with a quality education is ensuring their safety as they move between school and home. With crime and accidents occurring frequently, parents are worried about their children going to school. In this paper, a detailed review of latest works that were implemented in the arena of smart school bus management system is presented. The paper briefs about the different sensors used, use of recent technologies, its working and future work.

Key Words: RFID (Radio Frequency Identification), SMS (Short Message Service), GPS (Global Positioning System), GSM (Global System of Mobile Communication), VANET (Vehicular ad hoc Network), API (Application Programming Interface), IOT (Internet of Things), VBBS (Vehicle Black Box System).

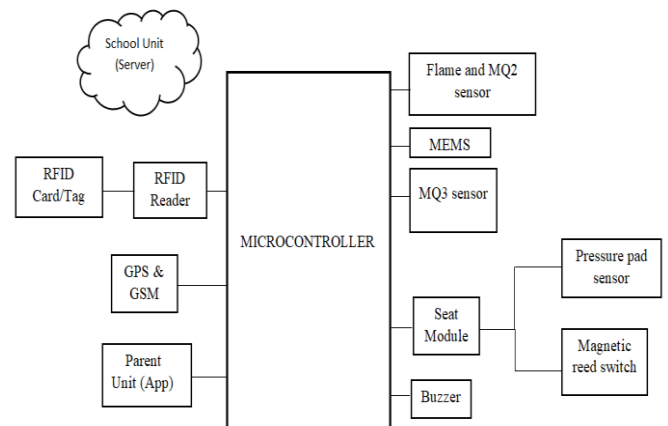
1. INTRODUCTION

In the modern world, ensuring safety and well-being is a crucial issue. For students, school transportation should be a reliable means of communication. An appropriate solution for the secured transportation of children has become a crucial concern since the implementation of the School Transport Security, the Executives Act in 2012, which focuses on the engine transport, drivers, and other issues. There have been numerous accounts of children experiencing difficulties while moving. Kids' safety is typically the top concern for parents and school staff, especially while they are apart from their children. They are constantly concerned to make sure that all necessary safety precautions are being performed. For instance, parents are frequently concerned about their child's arrival.

1.1 Safety Management System

The proposed framework shows that the RFID following innovation is a functional choice for observing and following the students during their transportation to and from school, on school transport. The framework will inform guardians by SMS at whatever point youngsters enters or leaves school transport, this will guarantee guardians that kids are securely reached to objective. GPS and Google maps are utilized for route and show benefits separately. GSM utilized for sending ready message. The framework tracks the school transport by the GPS Module and furthermore gives a

caution in the event that the transport crosses as far as possible. The GPS Module is utilized for live following of the School Transports and alarming on the off chance that fire mishap happens and send an alarm message to the guardians, school and furthermore for the fire motor and moreover we can likewise screen the ailments of the driver and caution the authorities in the event of any unfortunate behavior. Alarming the concerned people when the transport faces any mishap is additionally made conceivable.



2. Literature Review

S Malathy et.al [1] developed a design in which a Sensible bus tracking system was created. The requirements for a general sensible bus trailing system are stated. It informs the general public, students, faculty, and school service corporations about the accurate placement of the mobile school service vehicle. For the development of the application package, the planned system makes use of both internet and mobile platforms, as well as current technologies. The mobile application simplifies access for children/students and their faculty, and parents can easily track their children's buses. The utility corporations can register new students and confirm bus routes. The benefits of this system include cost efficiency, protection, and ensuring the safety of children.

Raja Godwin D et.al [2] developed a system which ensures the safety of children in school bus during the transportation. The system consists of RFID Reader which is located in the bus and it detects the tags of the child. Once the tag is detected the notification along with the data is sent to the

relevant authorities. They have created an application where the parents can log into it and obtain the details about their children and also track the location of the bus. The system also includes a feature where the admin can add one or more of stops and generate a route and also track the live location of the bus. The future work mentioned is to enhance the system by implementing Parking Management System using VANET and also to extend the system for full-time monitoring with minimum cost.

Ilker Korkmaz and Alp Camci [3] used a variety of open, cutting-edge technologies to design and construct an architecture that encompasses both web and mobile platforms. Kids and students can use the smartphone application to make use of school services wiser, and parents can quickly track their children's transportation. Additionally, bus service providers can quickly register new kids and choose the school buses' itineraries on a dynamic basis. Scalability, flexibility, affordability, security, and dependability are all features of the system. The use case scenarios are created for various system actors. On the basis of the design criteria, a prototype system is put into practice. When developing system software, open software frameworks are preferred. Integrated third-party open API services are employed in the routing process for the dynamic establishment of the routes. With several test scenarios, the entire system is tested. For the tested prototype, some runtime output screenshots of the graphical user interfaces of the mobile application are displayed. These sample user interfaces show how user-friendly the program is given that the system works automatically in the background. According to the test findings, the application met all the criteria needed to be a successful smart bus tracking system. The focus can be on potential improvements to the creation of routes using various API services as the next stage to be taken into account for the upcoming development.

The approach, which was proposed by Khaled Mohfouz and S. Mohammad Rameshi [4] intends to improve school community safety by lowering and eliminating instances of leaving pupils behind on school buses by keeping track of their attendance in the vehicles. The produced route guarantees that bus drivers will arrive at the home address of a student who is present, and in the event of severe errors or manipulation, this might signal a situation of a student going missing, allowing authorities to take urgent action to protect the student's safety. The suggested method assumes the usage of an Android app that makes handling processes connected to attendance simple. The proposed system was successfully deployed, and it was further able to track student attendance using face or fingerprint recognition technology and build routes based on the attended classes.

Mona Kumari, Ajitesh Kumar and Arbaz Khan [5] designed a Real Time Tracking system which constantly tracks the bus location in real time. The GPS module is installed in the bus to read the location of the bus. Once the

data is read it is passed to microprocessor and is stored in the server. The stored real time data can be fetched by the user. RFID technology is been implemented in order to obtain the information regarding the number of students in the bus and it also provides information about the vacant seats. Since the user can track the live location of the bus it helps him to decide whether he have to wait for the bus or not. This reduces the waiting time of the passenger or traveler. Along with current location the estimated arrival time is also provided and the calculated arrival time is provided through an application built.

Jafrul Islam Sojol et.al [6] designed and implemented the Smart school bus consisting of various sub-modules to ensure the safety of the children. The seat occupation sensing module used to indicate the presence of child on the seat is done using the pressure pad. The passenger safety state sensing module detects if the seat belt is plugged or not. The received data from both the modules is displayed in Real-time seating data display module and in the Parent Alert sub-module the alert message is sent whenever the student fastens the best. In the future the intend to add live video streaming so the parents and the school authorities can watch the live video which shows the condition inside the bus. They also planned to improve the sensitivity and quality of pressure pad devices. Along with these improvements the intend to develop web-based interface so that the parents can log into the system from any part of the world.

Tarneem M. Hamadto et.al [7] proposed a system which also describes method to track school buses and provide interaction in more efficient and effective way. It can result in greater reliability to provide real-time updated of school bus location, reduce man-made errors in check-in and check-out operations, and can notify parents about the status of the student on-board the school bus.

To track, monitor, and operate the vehicle engine, Saurabh S. Chakole et al. [8] presented a system using TMCS. To accomplish this, a relay is connected to the vehicle's ignition wire. It utilises a microcontroller, LCD, GPS, and GSM. It is built and developed to have locking mode, track monitoring mode, and control mode. It works comfortably and produces results that are accurate and of high quality. On GMAP, location may be quickly found. Position locking mode delivers alert messages and offers significant safety if the vehicle or system changes. It functions as an anti-theft tool and can function without internet. Future improvements to the system are possible. The system has advanced by being able to function with both online and offline application.

Tun Mohamad Aqil Mohamad Fadzir et.al [9] proposed and executed a school transport security framework in light of RFID and GSM innovations. The execution of the RFID innovation could identify the understudy's development entering or leaving the school transports. The warning message is sent straightforwardly to the parent cell's phone

when their youngsters were effectively left or shown up to the objective and give piece of brain to the guardians. Participation checker, as an extra element will give early warning to the guardians in the event that the youngsters isn't ready (missing). What's more, the proposed venture can be additionally made do by executing the Worldwide Situating Framework (GPS) as the area tracker. Concerning size and helpful, wristband with a loop on chip innovation could give more benefit than utilizing the understudy personality card. Be that as it may, for the long run execution the viability of the proposed framework model can be assessed in light of the avoidance estimation of the hijacking wrongdoing exercises among the young kids.

Rohan Bandal and Atul Oak [10] proposed a directing information from a hub which is fitted on the transport which sends GPS information and the RFID label peruser shows the understudies present on the transport. MQTT convention makes it simple to add numerous hubs to the framework as it is light in weight. A portable application is convenient to use as every one of the information is accessible on the application about the transport area status and the quantity of understudies as well as the specific understudy present on the transport. A shut circle representative will a superior extra to this task as the ongoing undertaking utilizes a merchant which is public in nature.

Santhanalakshmi and Sethuraman [11] The goal of this project is to develop a universally installable Internet of Things (IoT) replica of the Vehicle Black Box System (VBBS). In order to monitor activity inside the automobile, a camera and sensors will be put there. Data and images will then be transferred to email and short message services, while web pages will be recorded in real-time. Medical help is dispatched to the scene of the collision and its approximate location. This essay primarily focuses on enhancing accident victim care and making fraud easier to spot. In the future, photographs will be continuously processed in the cloud, where the image will be recognized by the claimant or robbery, given to the police system, and located in the police database.

Nitesh Mandal et al. [12] discuss the identification of drunk driving and the wearer's seat belt status. Based on how it works, a system is proposed and categorized into three groups: GPS, seatbelts, and alcohol. After the alcohol part, it is checked to see if the driver was intoxicated while operating the vehicle by looking at the seat belt portion, which determines if the seat belt is worn or not. The ignition state, or the ON and OFF state, of the vehicle is controlled by both of these components. Using the GPS, get the e Topics discussed by Nitesh Mandal et al. include the identification of drunk driving and seat belt usage. GSM can be utilised to establish this system by sending a message to the nearby police station, hospital, and ambulance whenever an accident occurs. This system can be implemented utilising a technique where, in the event of an accident, GSM sends a message to the local

ambulance, hospital, and police station in order to save the injured. In addition to recording events so that we can identify causes in addition to accidents, we can also incorporate a camera that could function as a "black box" (much like the one in an aeroplane). Using cutting-edge machine learning algorithms, we can analyse driving abilities. This system can be achieved using a method in which GSM transmits a message whenever an accident occurs to the adjacent police station, the hospital, and also the ambulance that is positioned nearby.

Rambabu Vatti [13] created and deployed a low-cost bus tracking system that enables commuters to view seat occupancy levels, specific bus locations, and estimated arrival times on their smartphones. This eliminates several issues, including thefts, accidents, and crowding at bus stops. It also cuts down on waiting times. This prototype technology, which is now being used to track buses on a single route, can be used on all lines. This system comes with a low-coverage frequency RFID reader, however a high-coverage frequency RFID reader can also be used to implement it.

An RFID and GSM system was proposed by Hasmah Mansor et al. [14]. The Klang Valley region was the focus since it has stable and available GSM technology, and the majority of working parents rely on school bus services for their kids. If the kids aren't on board, the RFID technology's added feature has alerted the parents in advance (absent). The adoption of this gadget and system on all Malaysian school buses, particularly those in the Klang Valley, could lower the number of cases of kidnapping, missing, and truancy among schoolchildren. Instead of using a frame method, the Global Positioning System (GPS) can be suggested as an enhancement for a future project's location tracker. Another choice is to utilise a bracelet using coil-on-chip technology in place of an RFID card.

3. CONCLUSIONS

Despite the fact that there have been many good safety management systems, the research field is still difficult since the proposed system is meant to increase the safety of children during daily transportation. This survey of recent research provides an overview of efforts made by researchers to develop intelligent, energy-efficient monitoring systems that will enable continuous monitoring and prompt alerts and notifications. A better monitoring system for kid safety management will undoubtedly be created with the help of IoT, wireless communication standards, and the latest sensors for detecting various quality criteria.

Successfully implemented to detect the student's movement while they were entering or exiting the school buses. Using GSM technology, notification message has been successfully sent to parent mobile's phone as soon as

their children were successfully departed or arrived at the destination. Attendance checke

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