

IOT Based Child Security System for School Bus

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Abstract : This paper presents an IoT-based approach of school bus tracking, with a focus on increasing child safety and providing real-time communication with parents. The system uses RFID tags as the primary means of verification, followed by a secondary verification process using cameras. The camera captures images of students and checks them against previously stored images, also checking compliance with mask-wearing protocols. In addition, the system monitors the students' temperature using an IR sensor. The proposed system uses ESP8266 controllers and SIM800L modules with integrated GSM modem and GPS receiver. GPS tracking enables precise determination of a vehicle's location, with data transmitted to a remote server over TCP via a GPRS service. The system also includes a web-based application for data visualization.

Significantly, the proposed system shows superior accuracy compared to previous methods. It provides real-time data on various vehicle features including location, route, speed, passenger list, driver compliance and schedule. The system uses ESP8266 to connect GPS, RFID, and Firebase servers to the cloud via WiFi, enabling seamless integration and efficient data transmission. Introducing a Smart School bus security system using IoT offers many benefits, including increased student safety, increased accountability, and reduced practices costs and better communication between parents, schools and transport agencies.

I. INTRODUCTION

In an age marked by rapid technological advancements, ensuring the safety and security of our most precious assets, our children, is a paramount concern. The daily commute to and from school is a vital part of a child's routine, and it is essential that this journey is not only efficient but also safeguarded with cutting-edge measures. The "Smart School Bus Safety System using IoT" project emerges as a groundbreaking solution that leverages the power of Internet of Things (IoT) technology to address this critical issue.

The "Smart School Bus Safety System using IoT" project represents a significant step forward in ensuring child security during school transportation. By harnessing IoT technologies, it empowers parents, guardians, and school administrators with the means to protect and monitor our children as they embark on their educational journey, reaffirming our commitment to their well-being in this rapidly evolving world.

II . LITERATURE REVIEW

The purpose of this literature review is to provide a comprehensive understanding of IoT-based school safety systems, focusing on their definition, components, technological aspects, and practical applications. By exploring existing literature on this topic, the review aims to identify common themes, challenges, and recommendations for future research and policy development. The scope of the review encompasses an examination of IoT technologies utilized in enhancing school safety, examples of IoT devices and sensors commonly used in school safety applications, and potential implications for response times, effectiveness,

and policy frameworks.

hit RFID identification the scholars are made to undergo the 2d degree of verification the usage of a digital camera. Here, the digicam captures the pupil's photograph and verifies it with the image the is formerly stored and assessments if the scholar is sporting the mask or not. This machine also monitors the temperature of the pupil the usage of IR sensor.

1.Title: IoT Based Intelligent Real-Time System for Bus Tracking and Monitoring

Authors: Mona Kumar, Ajitesh Kumar, Arbaz Khan

Abstract: Smart education is the constituent of smart cities. Smart education is the use of computers in the classroom. However, there are many other factors to improve a child's quality of education. One part is the amount of time the child spends on a bus from traveling bus to home. Although, with currently available technologies as the Internet of Things (IoT) and Android, with these advanced technologies we will be able to track or visibility in a child's life. This paper presents the design and implementation of an IOT based system that permits parents, schools and regulatory bodies to track the conditions of comfort and safety inside a bus in a real-time manner. A variety of reports for various activities for bus comfort and attendance are then generated from this realtime S.Srinivas on this study provides an IoT-primarily based technique to high school bus tracking, emphasizing the function of IoT generation in enhancing baby protection and actual-time communication with dad and mom. RFID tag is used as a first degree of verification. Only after a

2. Title – “ IoT based technique to high school bus tracking”

Authors - s shrinivas ,Mina Kumari ,R.S Krishnan R. S. Krishnan et al.

A secure bus management system was proposed for colleges, integrating IoT technology to address security concerns, especially during the COVID-19 pandemic. Parents are

periodically provided with parking information to get their child ready for school at a scheduled time before the bus arrives at the boarding area. College bus rides are maintained and updated for college officials for new facilities The proposed system provides real-time data about various features of the vehicle, including location, route, speed, passenger list, driver compliance, schedule, etc. The vehicle's current geographic information is determined using the Neo 6M GPS module. RFID card modules are used for passenger tracking to calculate passenger costs and safety and security of passengers. All the data from the modules used are transferred to a real-time database that we implemented in firebase and the data can be accessed by the passenger, fleet manager and driver using the website. A web portal is used to display all data for the passengers and the fleet manager for buses and drivers.

3.Title –“ A secure bus management system for colleges, integrating IoT technology”

Authors: A.Ahmed, Adarsh Kumar, P.Das

Abstract - IoT technology to address security concerns, especially during the COVID-19

pandemic. Parents are periodically provided with parking information to get their child ready for school at a scheduled time before the bus arrives at the boarding area. College bus rides are maintained and updated for college officials for new facilities. [3]The proposed system is equipped with ARDUINO (UNONO6M) controllers and SIM800L modules as well as an integrated GSM modem and GPS receiver. Vehicle speed tracking via GPS provides the global location of the vehicle with accurate longitude and latitude coordinates from (2.5 m) to (3.5 m) satellites and then, all data is transmitted via GPRS service to a remote server over TCP (Connection Protocol and Internet). which are partially embedded in a web-based application. Surprisingly, the proposed scheme provides more accurate results compared to previous works.

III . PROPOSED SYSTEM AND ARCHITECTURE

Now days, buses are the most conveniently used mode of transportation in our country. It is an android based IOT application which facilitates people to track real time location of bus using raspberry pi controller. The people are provided with an Android app where they can register their details like username, email-id, password and mobile number. After the process of registration, users can login into their profile. After login, it will notify the number of buses on that particular route along with number of vacant seats available. A RFID system is connected with the raspberry pi, GSM and GPS module to notify the location and updated count of passengers in the bus. An updated count of passengers refers to the traffic in that area that facilitates the administrator to increase or decrease the bus services in that area. The proposed system can also be implemented in school buses which helps the parents to check the real time location of their child in the bus. The parents will also be notified using a message that the bus will be arriving in 5 minutes at the bus stop .RFID along with GPS and GSM module helps in sending the message that when their child enters a bus and whenever he/she As bus is widely used mode of transport, so that large number of people travels through it. Because of this a huge data is being generated that is stored is database. This can be seen

and analyzed by authorities for making the transport system more efficient. The authorized and authenticated persons can only view this data.

IV . EXPERIMENTAL STATUS

The product B-Tracker has implemented the main goal to track the location of a bus and also add the necessary features into application like accurate bus timings, student arrived date and time, and more on forming a device having GPS and GSM both in it. In this we are implementing functionality of IOT by using raspberry pie and android to formulate the app on mobile phone. We are also adding RFID that could scan the student detail using barcode to detect whether he belong to this bus or not. The B-Tracker will send the detail to the bus administrator and mobile devices of the people. People can open the Google map to track the real time location of the bus or can get the SMS notification of the real time coordinates of the bus .RFID system is useful for the identification of passengers. Sensors are fixed on both the doors. Front door is for the entry and back door for the exit. The entry door increases the count of passengers and exit door decreases the count of passengers.

The functionality for different modules is listed below:
 x Identification of the people is done by the RFID. Each has their own RFID tag. With the help of this basically students can be monitored by their parents and also by the bus administrator. x When passengers enters or exits from the bus, the data is updated in the database of the bus.

V . REAL – TIME APPLICATION

IoT Based Smart School Bus Monitoring and Notification System has several practical real- time applications that enhance the safety, efficiency, and reliability of school transportation. The following are key real-time applications of the system:

Real-Time Bus Tracking

The system provides parents and school authorities with the ability to track the location of school buses in real-time using GPS

technology. This application ensures that parents can monitor the bus's progress and know exactly when their children will arrive at designated stops.

Automated Notifications

The integration of a GSM module enables the system to send automated SMS notifications to parents and school staff. These notifications can include:

Alerts when the bus is nearing a stop. Notifications for delays or changes in the bus schedule.

Emergency alerts in case of unexpected incidents, such as accidents or breakdowns.

Student Attendance Management

Using RFID technology, the system automates attendance tracking by identifying students as they board and disembark the bus. This application allows for real-time attendance records, ensuring that all students are accounted for and enhancing safety during transit.

Obstacle Detection and Safety Alerts

The incorporation of ultrasonic sensors allows the system to detect nearby obstacles while the bus is in motion or when stopping. This real-time application helps prevent accidents during pick-up and drop-off, ensuring a safer environment for students.

VI PROTOTYPE AND RESULT

The locations of buses are tested on different applications. They are tested on their reliability to perform in real time and provide the live results to the users. The accuracy of the hardware is also tested with the software. Hardware and the software has been tested together for their stability on communication with one another. The features are also tested on the face book and YouTube live with the features of live comments or complaints.

In figure 4 the route is visible in Google Earth from University to UTHM main campus. GPS device gives out signals in 'GPGGA', 'GPRMC' and GPGSV format. Positions on a map are then displayed when the received signals from the GPS device is translated. Gps Gate provides the option of using Google Earth. Google Earth could be used as a platform to display the latitudes and longitudes. Signals from the Gps Gate are translated and an icon named "Bus UTHM" is displayed for real-time navigation on Google Earth.

VIII . METHODOLOGY AND DESIGN

The innovation of this work is to solve the problems of public transport framework in India. India is a developing country with massive population. Here, we face many difficulties in our daily life, for example water, power, house, transport etc. In transportation, for bus every bus is controlled by a conductor. The conductor collects money from each passenger in order to issue ticket. This process is usually slow and takes more human efforts. In this way, to control this issue related to public transport as a civilian of our nation we have chosen to furnish safe and automatic Public Transport System for urban cities.[3] As we suffer a lot with our public transportation, we limit the issues related to it. We are able to provide some changes in the previous transportation in the proposed system we would providing passengers RFID tag and the conductor used to have an RFID Reader, read the RFID tag. In this system destination should be entered manually by the passenger so that amount would be automatically debited from the tag. At the same time we are providing additional information bus arrival and leaving time and real time position of bus on Google map. [4] The transport has special feature for handicap to make the use of the bus effortlessly. With the "B-Tracker", users can track the real time bus location which helps them in their daily life for their convenience. Leonardo D 'Errico [9] says that a system is proposed for the safety of children. Its applicability lies in every day path from home to school and vice versa, and using buses for it. Different techniques like GPS, RFID, and GSM are used for the safety of children and clarification to their parents as well. In this paper RFID technology is tested by tracking and monitoring activities of children from home to school and vica versa. In conclusion a phase of analysis is verified.

IV . FUTURE SCOPE

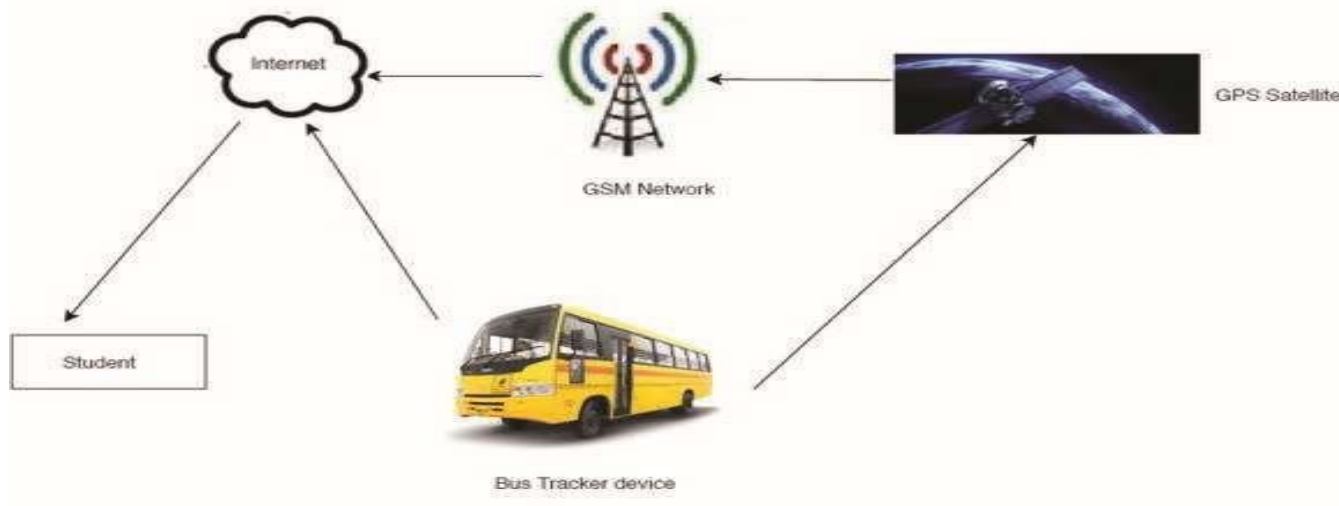
GPS devices are affordable nowadays and are not limited to big enterprises or government agencies. Demand for such trackers is high and as a result the prices are low. These devices could be produced for small companies and even individuals.

Businesses could use vehicle tracking for assessment of driver's performance and give the travelers best experience. In the near future vehicles could use tracking devices which would prove efficient in saving time as it reduces the waiting time for the travelers.

Tracking systems could be used by individuals. Family members could monitor the teen drivers in the family. Trackers could also be helpful for ensuring the safety of elderly and could be monitored anytime they are away on road.

Improved Security Features

Biometric Verification: Adding fingerprint or iris scanners to confirm a child’s identity during boarding
Panic Button System: Equipping buses with panic buttons that children or drivers can press in case of emergencies, sending instant alerts to authorities.



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X I . CONCLUSION

In summary, this research paper provided a comprehensive survey of IoT-based school security systems and highlighted their potential to improve security measures in educational environments. The literature assessment clarified the technological components of IoT gadgets, their integration with existing safety infrastructure, and their impact on response time and efficiency. In addition, the evaluate identified demanding situations to be confronted in implementation and provided perception into hints for destiny research and coverage improvement.

However, it's miles important to be aware the restrictions of this look at. One obstacle is the reliance on current literature, which may not include all latest trends and case studies in IoTprimarily based faculty security structures. Additionally, the scope of the overview may additionally were confined by the provision of relevant studies articles and publications that doubtlessly left out certain components of the topic.

Despite these boundaries, the findings of this studies have numerous implications for future scope, coverage, and intervention. In terms of destiny scope, there is a need for persisted studies and innovation within the

development of IoT-based totally school protection systems, in particular in addressing new threats and developing technological abilities. Policy implications include the improvement of guidelines and regulations to ensure the ethical and accountable deployment of IoT solutions in instructional environments that address privateness, facts protection, and interoperability concerns. In addition, interventions to promote consciousness and adoption of IoT-primarily based school safety systems among educational institutions and stakeholders are vital to realizing the potential blessings of these technology in improving student protection and nicely-being. By addressing these implications, stakeholders can paintings to create safer and more steady gaining knowledge of environments for college kids around the arena.

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