

Enhanced Security System in School Bus based on RFID and GSM Technologies

G. Vidhya Krishnan and R. Vasuki

Abstract--- School bus services play an essential role in transporting students from home to school in each place. Many parents are relying on school bus services even though they are concerned about the safety of their children. Recognizing that problem, the project proposed an SMS-based solution to help most parents identify the child movement (inside / out) of the school bus. Once the children reach the destination, the SMS will be sent to the parents. The project aims to develop school bus safety systems using GSM and RFID technique. RFID is used to identify the specific person like student's and tag with the parent's contact number, while GSM is used as a platform to inform parents of the child's movement through SMS. Tests have been conducted on the overall performance of the developed prototype. From this method, it was found that the developed program was able to provide real-time messaging to parents where their children were located with the added feature of student attendance verification. In a nutshell, this developed prototype offers peace of mind for most parents who hand over their children traveling by school bus.

Keywords--- GSM Technologies, Enhanced Security System, RFID, Short Message Service (SMS).

I. INTRODUCTION

Nowadays, most parents are relying on school bus services to transport their children to schools. Indirectly, this subject may lead to an increase in kidnapping crime activity among the School's students. The statistical report

by the national crime bureau states that every eight minutes, children go missing caused by kidnapping crime activities.

Several researchers have conducted many projects related to the RFID based security system. The school bus tracking system based on RFID technology and the GSM module. The RFID tag was embedded inside the student identity card in order to provide the tracking mechanism. The notification messages will be sent to the parents throughout the SIM-300 GSM module technology. The major problem with this framework is that the system used the older version of GPRS functionalities. In other research, the Intelligence Security has utilized the used of the microcontroller as an interface to interact with RFID and GSM modem. The embedded RFID tags will be placed inside the children's uniform to provide security monitoring. The system is design based on the IOT (Internet of Thing) framework

Hence, all the information regarding the students will be stored in wireless communicating services. It has been proven that RFID technology is suitable and sufficient to be used for security purposes. RFID is very well known for its application of multilevel car parking control and door control for different access to users. RFID has also been proposed for the halal industry for checking and recording purposes. As a summary, RFID technology is proven to be able to work for real-time tracking and security monitoring. It realizes the importance of school bus security. This security system comprises the technology of Radio Frequency Identification (RFID), Global System for Mobile communication (GSM), and the Arduino microcontroller. Besides user identification, RFID technology is used to count every entry and exit of the student's movement from the school buses. Meanwhile, GSM technology is used to

G. Vidhya Krishnan, M.E., Assistant Professor, Department of Electrical and Electronics Engineering, Gnanamani College of Technology, Namakkal, Tamilnadu, India.

R. Vasuki, PG Scholar, M.E., Embedded System Technologies, Department of Electrical and Electronics Engineering, Gnanamani College of Technology, Namakkal, Tamilnadu, India.
E-mail: vasukiravii96@gmail.com

allow the communication with the receiver (parents). The notification message will be sent to the parents by using the Short Message Service (SMS) technique. Besides, the details of students departed or arrived will be included in the notification messages. The implementation of the designed project reduce could give peace of mind to the parents who are entrusting their children traveling with the school bus.

1.1 Basic Principle

School bus services play an important role in transporting students from home to school in each country. Many parents rely on school bus services even though they are concerned about the safety of their children. Realizing that problem, they proposed an SMS-based solution to help most parents identify the child movement (inside / outside) of the school bus. Once the children reach the destination, the SMS will be sent to the parents. The work aims to develop school bus safety systems using RFID and GSM technologies. RFID is used to identify the student's identity with the parent's contact number, while GSM is used as a platform to inform parents of the child's movement through SMS. Tests have been conducted on the overall performance of the developed prototype. From the results, it was found that the developed program was able to provide real-time messaging to parents where their children were located; with the added feature of student attendance verification. In a nutshell, this developed prototype provides peace of mind for most parents who hand over their children traveling by school bus

II. LITERATURE SURVEY

However, the system is based on RFID (Radio Frequency Identification) technology, which replaces the traditional manual payment method. In the current automatic communication system, only the RFID reader detects the RFID card to deduct the amount charged according to vehicle types. In our integrated system, if a particular type of vehicle or a particular vehicle is to be blocked by the authority, it can be done in the toll booth

area. To do this, a simple code text using the GSM module is sent to the computer, which prevents the vehicle from lifting the ban after deducting the fee from the vehicle owner's prepaid account.

The same concept can be implemented in a car parking system or some other safety concern. The real-life model construction cost of the system is very low and stable. Using the most powerful RFID system can improve the response time of the entire system. Overall, fee collection combined with security is a very beneficial and effective system. The technical design of the system includes a GSM module, which enables the vehicle owner to send a confirmation speech on cost reduction.

Security is an integral part of our life, be it personal or providing it for our belongings. Constant technological advancements have been made in the field of developing security systems over the past few years. 'Radiofrequency identification' (RFID) and 'Global system for mobile communication' (GSM) are a few fields in which security systems have propelled to new heights. RFID has been used widely for database management in places like malls and office areas. GSM is also used as a medium of interaction between the customer and back end devices in various fields.

The conventional object tracking system based on different wireless protocol standards is vulnerable to various security threats. Information about a tracked object which is supposed to be sent to the authorized person must be secured. As the medium of communication is air, security threats like reply attacks, DOS attacks, etc. may occur. For this purpose, a particular provision of applying security protocol needs to be implemented. This project gives a glance at possible security concepts that would be applicable on a hardware platform without affecting the operational speed of an object tracking system. This project suggests a solution with the application of XOR and PRNG Protocol along with Binary ECC protocol at two different stages of the object tracking system.

The proposed settlement would be useful in the secured use of an object tracking system based on RFID, GPS, and GSM modules.

The goal of this project is to perceive and detect gas leakage, gas cylinder drop level, and food count and library book history of the student by using the gas sensor, weight sensor, and RFID (Radio Frequency Identification) approach and to provide complete information and usefulness needed. This proposed system defines the design of controller based on a security system for use in industries or hostel. Enterprises have been a critical part of the swelling of the nation's economy. The swelling in industries has also lead to the swelling of tragedies in the past decades, out of which majority caused by omission or human errors. The initiate method is discussed as a menace board system to detect dangerous gas leaks, Gas cylinder drop level, hostel food count, and library book count from the set value using a controller, gas sensor, weight sensor, and RFID reader. The controller system takes a congruous measure, turns on, and makes a message send to the security van through the GSM modem. The alert notification sends to the cell phone, concerning the situation to minimize the menace.

A user identification system is developed using RFID technology for registering, monitoring, and control of an access pass for security purposes. The system is designed for use in Sudan Atomic Energy Commission premises, which helps the managers in monitoring and registers the information to retrieve it in need. The proposed system consists of a control circuit that controls a gate entrance, and software which monitors, displays and record user information and system status. The software is capable of reading and displaying the user card number, user name, arrival time, and the number of times the card used and save all these data in a text file in a GUI designed and configured using software. The system makes a special pass for users to access the system at any time. The control circuit is attached with a GSM modem module that can send an SMS message to a master control mobile phone in case of intruders or

unauthorized access.

Security for women has become a significant issue in most of the countries. It has become mandatory to come up with a solution to protect the women from being a victim and to reduce the attacks. Design and implement a highly reliable system for protecting women from being harassed. In this project, we have developed an intelligent women safety system using Radio Frequency Identification (RFID) and Global positioning system (GPS). The main idea here is using an active RFID tag with a passive RFID reader to scan the information, and this information is transferred to the microcontroller wherein the contacts of around several people are stored in the database. Once the controller receives the data, it sends the message to the communications through the GSM module, and the location is tracked through the GPS.

III. EXISTING SYSTEM

Smart School Bus Tracking System with fully automated features that effectively alert the bus driver despite the limitations of existing systems. Two ultrasonic sensors placed on the bus door are used to sense the entrance and exit of the students through the bus door and are sent to the controller. Three times the alarm is set to make it stronger. When the vehicle is turned off, the controller compares the number of students entering and exiting. If a mismatch is detected, the controller sends commands to process all alarms on the system, alerting the driver and people around the bus area. The system also works with the school administration and parents to send SMS if the driver does not take immediate action. In this techniques that checks the operation of the alarms to improve the reliability of the system. This system is implemented to alert the bus driver to ensure that no children or students are left on the bus after the vehicle is turned off. The system is tested under different conditions, and the results show that the smart bus monitoring system works efficiently with reliability ratio

3.1 Existing Block Diagram

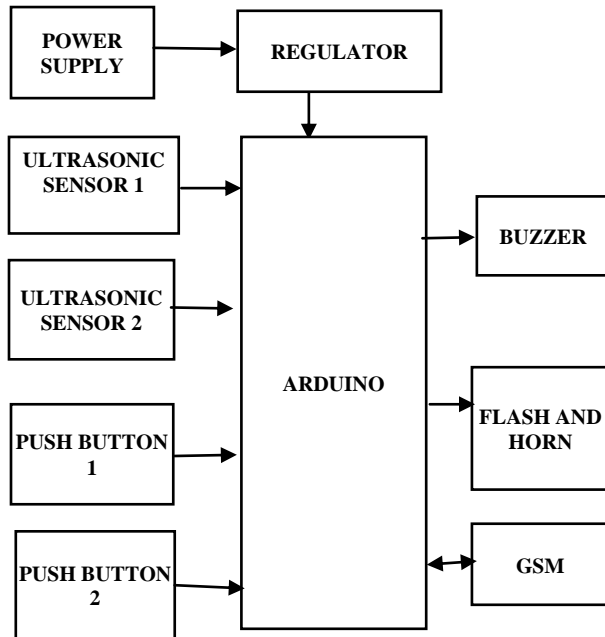


Figure 1: Existing Block Diagram

When the system is built, Arduino boots, ultrasonic sensors, LCD, and GSM modules, after the initialization process is complete, two ultrasonic sensors start sending signals to the microcontroller. If the width of the bus door is some distance, if the ultrasonic sensor is less than some distance, it will assume that a student has crossed the bus door. If the first ultrasonic is read less than Some distance and the second ultrasonic reads less than Some distance, then the threshold counter is increased to one, meaning that a student has got into the bus. However, if the second ultrasonic reads are less than some distance and the first ultrasonic reads less than some distance, then the exit counter is increased by one, meaning that a student exits the bus. Both the entry and exit counter are displayed on the LCD when the driver is on duty, and the students are taken. When the engine is off, the microcontroller compares the number of students entering and exiting. If both are equal, no alarm is generated, and the microcontroller sends the command to show the LCD "no passengers on the bus." If it does not match, the buzzer will activate, and the "Student = XX remaining on the bus" will be displayed on the LCD. These are used to warn the surrounding people if the driver neglects to reset the buzzer alarm. If the person on the bus

and no one reset the alarm, the SMS will be sent to the school administration and parents. SMS is sent 2 minutes after the buzzer alarm is activated.

3.2 Draw Back

- Failure occurred in ultrasonic sensors due to the reason that can't detect very fast movement of objects.
- Reliability which can still be improved using high quality sensors with more sensitivity and by adding additional ultrasonic sensors to avoid to the failures.
- The cost of the system increase due to high quality sensors.
- No GPS system to track the bus location in case if the alarm is activated.
- The accuracy of the system is low which require more ultrasonic sensors.

IV. PROPOSED SYSTEM

When the system is on the pic microcontroller energized, and it receives input from RFID and GPS. The design procedure for the developed system begins with the installation of the RFID reader in every school bus entrance or exit doors. Students are provided with the passive tags that have been registered with a unique serial identification number. The RFID reader will match the unique identification number of the respective students and display it on the LCD screen module. Meanwhile, GSM technology provides a response to the given data and sends the notification message towards the registered parent's mobile phone number. Two different timeframes have been set (morning and afternoon) to indicate the student is on board from home/school or otherwise. This method is useful to alert the parents about their children to attend. GPS used to track the current position of the bus and to locate the current location of the child. The buzzer is on when the children are not identified or not present. The LCD displays the identity of the children and the area of the bus.

4.1 Proposed System Block Diagram

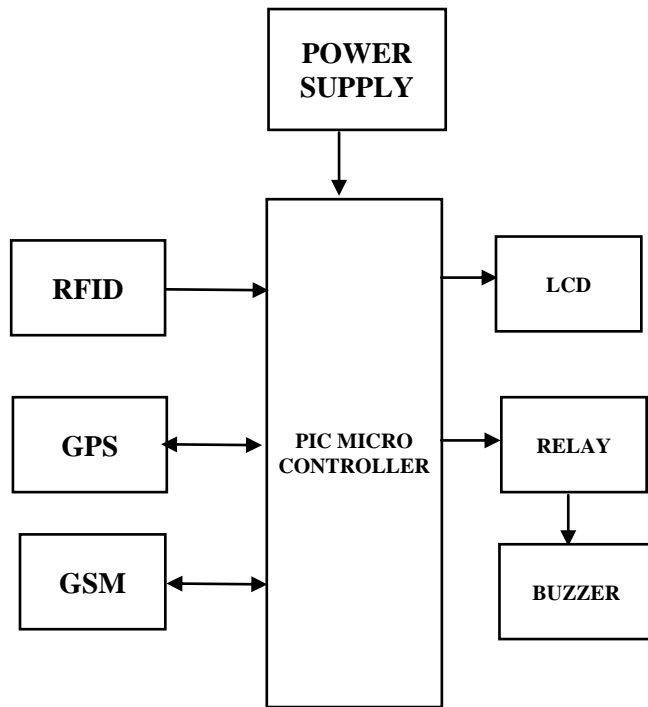


Figure 2: Proposed Block Diagram

4.2 Block Diagram Explanation

A system for monitoring the picking up / dropping off school children to improve safety. During and after the children's daily traffic. The system consists of two main units, a bus unit, and a school Unit. The bus unit is used to determine when a child is leaving boards or buses. This information is reported the school unit that identifies which children are not being made. Get on the bus or exit and issue a warning message accordingly. The system has a developed web-based database application that simplifies and delivers its administration Useful information about children to authorized individuals. Is a complete prototype of the proposed system Activated and tested to verify system performance. The results show that the system is promising daily Traffic Safety.

4.3 Advantages

- The security of the student is provided with full accuracy.
- This method is very cost-effective and requires less component (no sensor).

- By the use of GPS, we get an accurate location.
- The buzzer alerts the people around the surrounding.
- It is very safe to prevent any crime from happening.

V. RESULT AND DISCUSSION

5.1 Circuit Diagram of Development of School Bus Security System based on RFID and GSM Technologies

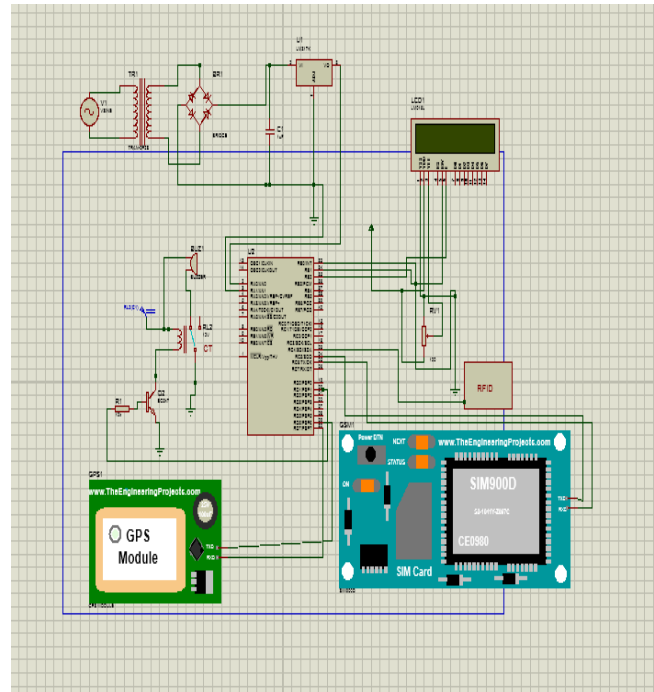


Figure 3: Circuit Diagram of Proposed System

An organization Monitor picking / dropping school children improving daily child safety and transportation to school. Structure it consists of two main units, a bus unit and a School unit. The bus unit system is used Find out when a child leaves the board or bus. This information is reported the school unit to identify which children did not board the bus or leave accordingly a warning message is issued. Identify children using the RFID tag number RFID reader with associated buses Number and driver phone number and then Check out those who don't, and if there are none Send SMS to parents of the child on the bus Number and drive number.

VI. CONCLUSION

The implemented a school bus security system based on RFID and GSM technologies. The implementation of the RFID technology could detect the student's movement entering or leaving the school buses. The notification message is sent directly to the parent mobile's phone as soon as their children were successfully departed or arrived at the destination and give peace of mind to the parents. Attendance checker, as an additional feature, will provide early notification to the parents if the children are not on board (missing). Besides, the proposed work can be further improvised by implementing the Global Positioning System (GPS) as the location tracker. In terms of size and convenient, a wristband with a coil-on chip technology could give more advantage than using the student identity card. However, for the long-run implementation, the effectiveness of the proposed system model can be evaluated based on the prevention measures of the kidnapping crime activities among the school-age children.

FUTURE SCOPE

The work believe that not only the security about a school child is concern which leads to the Gap between parent, Child and Teacher. Another important factor affecting the relationship between these entities are studies. To solve that issues we incorporate the RFID based security system with the help of GSM and GPS technology which helps the parents to better understanding of child education too. This project also able to track the student anywhere at any time. The feature is planned to enhance with sending pictures and Video clips of the location where the child found. Which gives detailed information about the location and situation to the parents and teachers and also finding the location of person at all the time.

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