

# INTELLIGENT TRANSPORT MONITORING SYSTEM FOR SCHOOL CHILDREN

Munaf S<sup>1</sup>, Sathish K<sup>2</sup>

<sup>1</sup>Assistant Professor (Sr.Gr), <sup>2</sup>UG Scholar  
Department of ECE,  
Sri Ramakrishna Institute of Technology,  
Pachapalayam, Coimbatore-641010, India.

**Abstract:** Recently in all over the world, the number of crimes has been increased, kidnapping a child is one of the notable crimes which is a challenging to the public and the police department day by day. Students need to commute between a residence and academy every day for various purpose. A secure commute of school kids has been a critical issue. This paper intends to find a solution to solve the problem by developing a transport monitoring system that will manage the entry and exit of students from the buses through an energy efficient method. In the proposed system, students will be monitored by using RFID. The process does not need any accessory in action. The system will monitor the student, also detects automatically when the bus met an accident. The system sends an SMS to the parents about each child and the overall database to the school management. In addition, it sends an alert message to the school administration if the bus meets an accident for the reclamation.

**Keywords:** *RFID, GSM, Accident, Detection, Safety, Reclamation.*

## I. INTRODUCTION

In the fast growing modern world establishing transportation system has been the generative power for human beings to have the highest civilization above creature in the earth. Many NGO's taking innovative efforts taken in all around the world by various programs to warn against careless driving, accidents have taken place every day. Despite of the safety measures, children don't have the skills to protect themselves, may end up with dangerous. However, many lives could have been saved if the emergency service could get the crash information and proper help provided at time. School buses are transferring millions of children's daily in various countries around the world. While there are many issues that might disturb the parents regarding the safety transportation of school going children, the paper intends to look into introducing access safety in respect of School buses through bus tracking system that will help the school Children transportation in a secure and safer way. The supervision of the regularity of students during their entry and exit from the bus is difficult for the drivers, which led to endangering child safety. It has been increasing significantly in recent years. This project is observing the entry and exit recordings, aims to create a suitable environment by following certain set of criteria of security and safety for school bus that will have a positive impact on the student and their family.

The Rest of this paper is organized as follows. Section 2 reviews the most relevant work to the theme of this paper. In Section 3, the overall system design is presented. Section 4 gives detailed description of system implementation and testing. Finally, section 5 concludes the paper.

## II. RELATED WORK

This section presents the most related work to the problem addressed by this paper. Shraddha Shah & Bharti Singh [3] proposed a solution to the parents who were worrying about their children, due to the increase of kidnapping and road accident cases. This system defines an SMS based solution which guides parents to track their children location in real time. GPS module is used to track the location of a child. A bus safety mechanism is designed to monitor the entry/exit of children from the bus. When enters into the bus RFID tag located in the children's identity card and it will be detected by the RFID reader and it displays each children information on the screen. Also, the system will send a text message to the parents comprises of location and time. This system provides a solution to the drunk and drive, speed control system. Mr.Kumar [7] suggested a RFID as a system that transmits the identity of an object using radio-frequency waves. This identity is transmitted in a form of the serial number that is different for every object. The RFID system consists of reader and tag. The tag consists of the microchip connected to an antenna and it can store a maximum of 2 KB of data, which may include data and information about the object, manufacturing date, and destination. Also observed that the ability of the reader field decreases quickly with increasing distance, which defines the area of reading to 4-5 meter distance. Ben & Abdullah [1] adopted a system that monitors children inside the bus. It uses a combination of RFID, GPS and GPRS technologies. Each student have a unique RFID card. The card is embedded in each of the student's school bags. Whenever a student enters into the bus or exits from the bus, the reader read the time, date, and location and then transfer the data to the database and this does not require any action from the drivers and students. This system facilitates parents to receive SMS alerts within 10 minutes of the designated pick up and drop off points after reaching destination point. The system will also notify the parents via SMS when the student boards from the bus or when entering and leaving the school, this will make the parents take the appropriate action because they have precise answers to boarding and times. If the child is still inside the bus for a predetermined period after running off the bus engine, and bus's doors are closed, a message will be sent to school management, and the system will display the accurate location of the bus. Sumanth Naidu & Raghava Prasad [9] proposed a prototype

development for the students who are bunking college lectures. In the many colleges of rural area are facing the common problem, the students are bunking the college lectures and meet with the accidents. It is necessary to tell their parents to know what their child whether they in/out the college. The education department is asking the records of all students which is more difficult to maintain. The Author's proposed a prototype model to giving solution this issue. This prototype development has automated attendance system to monitor the attendance of students. Seong-eun yoo & Daeyoung kim[4] presented a wireless sensor network application called school zone safety system. There are many school zones in our country. These school zones are near the schools. In the school, it has lower speed limits and an illegally parked vehicle which expose a thread to the school children and it is barring them from the view of drivers. The authors proposed a system to monitor speed limit and to prevent the illegal parking in the school zone. These school zone safety system detects the illegally parked vehicles and also reducing the traveling speed of vehicles via an LED the speed of the vehicle to be displayed. These all process was done by school and safety system and this system can detect all kind of vehicles.

### III. SYSTEM DESIGN

#### A. System Engineering Requirements

Our system is proposed with the following engineering requirements:

- Our system should recognize each child and detect when every child boards or exit from the bus.
- Our system should have a database to store student's information.
- Our system should be easy to re-configure.
- The communication should be reliable.

#### B. Design Constraints

The constraints are the restrictions on the design. They are imposed by the environment and the customer. The constraints considered in our system are:

- The system should not be harmful for human beings or the environment.
- The device should hurt the child in any way.
- The system should provide an option to choose between different Languages.
- Children's information should be available for authorized personal.

#### C. Top Level Description of the proposed system

The system is located inside the school bus. It is responsible for detecting the child when he boards or leaves the bus and then this information is sent to the management. The system checks if there are missing children, and it sends a text message notification to their parents and management.

#### Our proposed system provides the following advantages:

- The system uses RFID tags for children detection which is not harmful since it uses frequency ranges that are safe and legally approved.
- The deployment cost is reasonable.
- The system is automatic and user friendly.

The bus safety system is that each student carries a card that contains a unique number with his/her name, when students enter the bus, the RFID reader will capture their details and display them into a screen placed in front of the driver and also driver easily know whether the child is in/out the bus. Then after the bus stopped and students got off from the bus, the driver will scan his card and also press a button to send detail to management, also system indicate who is outside and inside the bus. If they are inside the bus, the system will display their names into the screen and also it will send SMS to the school management to take the right decision.

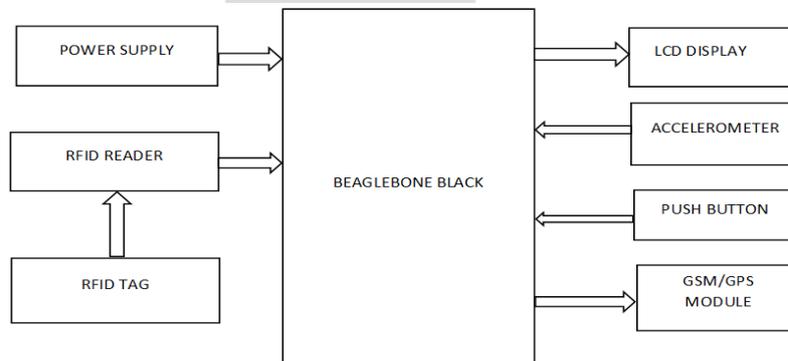


Fig.1: The proposed System Architecture

The system will also send the message to the management and parents to inform them the safe departure and arrival of the bus to the destination. System also provides alert message when it gets accident and gives overall database to management.

### The Bus Unit Description:

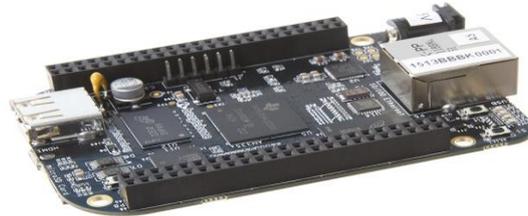
This system will detect the children when they board/leave the bus. It will use RFID technology to achieve this purpose. This technology consists of a reader and tags. There are three types of RFID readers based on their frequency ranges, low frequency, high frequency and ultra-high frequency. We chose to use UHF RFID reader, because it has a faster data transfer than the others. The RFID reader will be located inside the school bus by the entrance. It will be positioned where it will only detect the children when they are inside the bus. But if the child was outside near the bus, the reader will not detect him. Each child will wear a card with RFID tag attached to it. The system is responsible for sending relevant tag information to the school unit where it will be stored and processed. Based on the received information, other related child's information can be retrieved from the database for further processing.

## IV. IMPLEMENTATION AND TESTING

A prototype of the system is implemented and tested. Testing is very crucial part to validate the functionality of the proposed system. It should be designed to increase the likelihood of finding an error and checking the functionality of the proposed system. The units were implemented individually at first and they were tested to check if they were working properly. Then, they were integrated and configured as required for the system. The unit test was held for all the units in our system.

### A. Beagle bone black:

Beagle Bone Black is an economical, open source development kit for ARM® Cortex A8 developers. Boot Linux in under 10-seconds and get started on Sitara™ AM335x ARM Cortex-A8 processor development in less than 5 minutes with just a single USB cable. It is the master of the system that controls all the components and get/give data to them at respected speed. And also check every component whether it done its job properly.



### B. The RFID Reader:

RFID transponder tags are given to each student. The tag would include unique ID. When the tag is brought near to the RFID reader, the data is received by the receiver, and gives out a serial output and has a range of about 8-12 cm. When a 125 KHz RFID passive tag is brought to the field module will get sustain from the field.

### C. Accelerometer:

Accelerometers are the devices that can measure acceleration, which is the rate of change of the velocity of an object. These ranges can vary from  $\pm 1g$  up to  $\pm 250g$ . Typically, the smaller the range, the more sensitive the readings will be from the accelerometer. Readings of the accelerometer at the particular time compared with the reference value and found that whether the object met an accident or not.

### D. GSM/GPS Modem:

SIM808 module has two functions (GSM and GPS). It features ultra-low power consumption in sleep mode. It also supports GPS for indoor localization. The module is controlled by AT command through UART. The GPS is used to receive location when bus met an accident. The information of student send to parents, management and GPS location send to management.

### E. LCD Display:

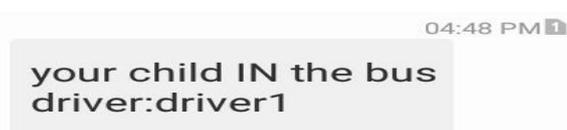
Thus when the tag will be scanned the tag number will be displayed on the LCD and after a predetermined delay (programmable) the message will be sent to the parents using the GSM module.

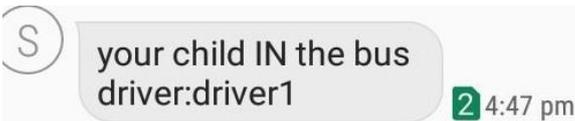
### F. LED & Push Button:

Indicate when push button press to send database to management. Also for sending alert message. Push button is used to give the control signal to the Beagle Bone black for sending whole list of students to the management. And also used to send alert message to management when need backup.

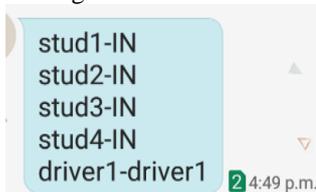
## V. RESULT & DISCUSSION

When driver enter into the bus scan his card and each child show the card in front of reader and enter into the bus after card was read the message was send to the respected parents as shown below:





After reaching the school the driver need to press a switch to send the whole database to the management. The system send the message as shown below:



Also the system detect the accident automatically, if accident occurred then it send the message to the management as shown below:

**We need help@ LAT:1056.78564  
LON:77890.8753**

As per the message given by the system to the parents and the management, if any problem occurred, then the necessary action can be taken in time for the fast recovery. It makes easier to parents and management about the transportation of children every day.

## VI. CONCLUSION

Combination of RFID, GSM and GPS is one of the advanced methods for safety and security purpose. Presently, there is an increase in road mishaps, moreover, kids landing at the wrong place is a major concern. Intelligent Transport Monitoring System is a feasible system for supervising and tracking of children commuting to school. Additionally, accelerometer for accident detection plays a major role to help the children commute safely. The system is capable of notifying the parents and the school management through text message once the child enters/leaves the bus, helping smooth and safer migration to the destination. Future work, including the camera with the system to enhance observation level of the children.

## REFERENCES

- [1] Abdullah.k & Ben.H, "Smart Tracking System for School Buses Using Passive Rfid Technology to Enhance Child Safety". Traffic and Logistics Engineering-Vol.1.No.2, pp.191-196, 2013.
- [2] Bannaravuri & Parthiba Jonnala, "Vehicle Positioning System with Accident Sensor and Android Technology" 978-1-5090-4437-5/17/\$31.00 IEEE, 2017.
- [3] Bharti Singh & Shraddha Shah, "RFID Based School Bus Tracking and Security System" 978-1-5090-0396-9/16/\$31.00 IEEE, 2016.
- [4] Daeyoung Kim & Seoung-eun Yoo, "School Zone Safety System Based on Wireless Sensor Network" Sensors 2009, 9, 5968-5988; doi: 10.3390/s90805968.
- [5] Devesh Kumar & Narendra Kumar, "SMS Based Kids Tracking and Safety System by Using RFID and GSM" International Journal of Innovative Science, Engineering & Technology (IJJISSET), Vol. 2, Issue 5, 2015.
- [6] Maryam Said Al-Ismaili, "Bus Safety System for School Children using RFID and SIM900 GSM Modem" International Journal of Latest Trends in Engineering And Technology(IJLTET),Vol. 5,Issue 1, 2015.
- [7] Kumar Chaturvedula.U.P, "RFID Based Embedded System for vehicle Tracking and Prevention of Road Accidents" International Journal of Engineering Research and Technology (IJERT), Vol.1, Issue 6, 2012.
- [8]Mohammed Rafi & Navya, " Android Based Children Tracking System using Voice Recognition" International Journal of Computer Science and Mobile Computing (IJCSMC),Vol.4,Issue 1, 2015.
- [9] Raghava Prasad & Sumanth Naidu, "RFID based Student Monitoring and Attendance Tracking System" International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2013.
- [10] Reshma Rathod & S.T.Khot, "Smart Assistance for Public Transport System" International Conference on Inventive Computation Technologies (ICICT), DOI:10.1109/Inventive.2016.7830206.

## Acknowledgment

The authors would like to thank the authorities of Sri Ramakrishna Institute of Technology – Coimbatore for providing research support and environments for carry out the research works.



Mr.S.Munaf received his M.E degree in VLSI Design from Anna University of Technology Coimbatore and his B.E degree in Electronics and Communication Engineering from Anna University Chennai. He received his Diploma in Electronics and Communication Engineering from State Board of Technical Education Chennai. Pursuing Ph.D under Anna University in the area of High Performance VLSI design. He is having 14 years of Teaching Experience.