

# Vehicle tracking system for Kid's safety using RFID, GPS and GSM

A. Nasneen Fathima<sup>1\*</sup>, P.S. Nivedha<sup>1</sup>, T. Sangavi<sup>1</sup> and S. Selvalakshmi<sup>1</sup>

**Abstract:** The data from National Crime Records Bureau reports that a child goes missing for every eight minutes in India. In this era, safety is the foremost concern among parents. To lessen the parent's anxiety about their children, a vehicle positioning system is formulated by merging Radio Frequency Identification (RFID) and Global Positioning System (GPS). The system consists of RFID tags and readers which is designed to scrutinize the entry and exit of a person in a vehicle. Each person is assigned with a tag which holds the precise details. When he/she enters the vehicle, the reader reads the person's tag and stores the details of entry and exit. This information is notified to the concerned authority via SMS using Global system for mobile communications (GSM). The proposed system facilitates to know about the area where the vehicle has crossed the path using RFID. The GPS technology connected with this system helps in acquiring updates on student's real time location. The detail of current location is updated in the school server. This proficient tracking structure with enriched features is designed and implemented for the purpose of protection in various streams. It is up and coming technology in the field of communication and network. The "TAGS ON ROAD" model is an evolving and justifiable technique in future world. The projected system here, is planned to be implemented in school vehicles for the safety of the students and it can also be installed in the professional security system for VIP's and politician.

**Keywords:** Vehicle tracking system, RFID, GPS, GSM, Tags, and kids safety

## 1. INTRODUCTION

### 1.1. Background

In India a child goes missing for eight minutes according to the data from national crime records bureau. Around 60,000

children go missing in a year out of which 40% of children have not been found [1]. In Coimbatore 2010, a 10-year-old girl and her 7-year-old brother were kidnapped by a taxi driver when they were waiting for the van that usually takes them to the school [2]. Child safety is a major concern among parents. This is especially true when the children are not at home. Parents want to know that all precautions are being taken care of their children. For instance, when children are coming late home, parents will naturally want to know where they are. Fortunately, you can ease parent concerns within moments by taking a look at the location of the school bus.

### 1.2. Motivation

The aim of this paper is to develop a Bus Safety System which provides the details of entry and exit of the student from buses using RFID and GSM technologies. The proposed system provides a facility to track the exact location of the bus using RFID and GPS in a cost effective way. So this could be implemented even in small scale schools. Such systems must be installed in order to reduce the number of abduction taking place.

### 1.3. Related studies

The Authors Medhat Awadalla and Dawood Al-Abri in [3] presented the system to enhance the safety of the school children to and from school. This system is used to detect when the child board or leaves the bus and gives an alert message to parents. The disadvantage of this paper is that we can't track the school bus if the school bus gets late to drop the children at the respective places. This system includes a child module and two receiver modules to track the missed children. It also conveys information about the child cry through text message to parents. It uses Voice Recognizing sensor which senses the cry of the child and when it matches the cry of the child which is stored in school, it sends the message to

Received: 20 November 2016; Revised: 25 February 2016; Accepted: 31 March 2016; Published online: 06 April 2016

\*Correspondence to: [nasneenshareef@gmail.com](mailto:nasneenshareef@gmail.com)

<sup>1</sup>Department of Electronics and Communication Engineering, Avinashilingam University, Coimbatore, Tamil Nadu, India

parents. The main drawback in [4] is the whole system is integrated in a small chip and attached to the person body. It may harm the child. Another children tracking system using android based phone for getting information about the missed child is proposed [5]. This application helps parents to monitor their child cell phone activity but also helps in tracking the children location using GPS. The fault in the system is each child and parent might not have the android phone and use of phone in school is strictly prohibited. The paper [6] focuses on children tracking system which includes panic button. When the child feels that he is in danger, he presses the panic button. It adopts Bluetooth communication among mobile terminals in every group to collect information and delivers to respective server using wireless LAN. The child module in the form of chip get fixed to the ID card. The problem is that the child might never knew that he should press the panic button when it requires. Children tracking system using android mobile device [7] in parent's hand and database is maintained in control room of the school. This system includes child module and two receiver modules. If the child goes beyond the coverage area the information is sent to control room of the school and to their respective parents as well. It uses wireless LAN and Bluetooth device to collect information and cluster head delivers the same through tags to server at school using wireless LAN. The limitation is the cluster head sends the information about the children group and not about each individual. This makes difficult for the parents to identify their child information. The system [7] is designed to track the children while entering and leaving the bus using RFID and GSM Technology. This helps the driver to know how many children had got into and left the bus. If the students get missed in the school bus the information will be sent to the school. The shortcoming of this paper is only the entry and exit of the student is identified.

## 2. EXPERIMENTAL FRAMEWORK

RFID system is now an emerging technology in various fields, which is well known for its compact size, processing speed etc. It also plays a leading role in security and process management. The RFID technology is a means for uniquely. Identifying an object with a wireless radio link, allowing data to be stored on an RFID tag and retrieved in remote application at a later point of time. The details about the student like his/her name, roll number, boarding place will be recorded in the computerized database and also on the RFID tag. Radio Frequency Identification (RFID) is a common term

used to depict a system utilizing radio waves by which the object or person is identified by means of a unique serial number. The microcontrollers are very useful to an extent in communicating with the devices such as displays, sensors, etc.

The RFID & GSM based system helps in tracking the vehicles. Zigbee is used for communication between the vehicle unit and the main server. This security system is simple and cost effective. RFID technology is a relatively new technology in road construction field that has widely spread in intelligent transportation systems (ITS) [8-15]. Because of its benefits, construction and transportation industries are researching and implementing RFID technology to improve data acquiring and storage applications.

### 2.1. Principle of operation

#### 2.1.1. Existing model

Each student is given with the RFID tags which contain the details of the student, contact person and their phone number etc. The RFID reader, kept in the bus, will read the serial number of the tag that contains the details of the students. The information read is stored in the microcontroller and sent to school server via GSM modem. Once the tag is read by the reader simultaneously a message is sent to parents. The block diagram is shown in figure 1.

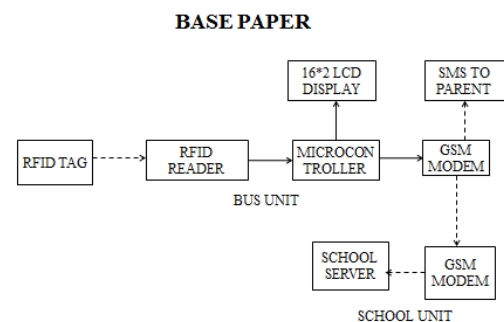


Figure 1. Block diagram of existing work

#### 2.1.2. Proposed model

A RFID tag contains the details of the area, is placed in the bus stop. Once the reader reads the tag the information is sent to school server via GSM modem and a message about the current location of bus is sent to the parents. Usually the bus tracking system consists of GPS system but it provides only the LAT and LAN value. But usage of RFID provides the

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exact location of the bus as the tags are pre-programmed. The architecture of proposed system is shown in figure 2.

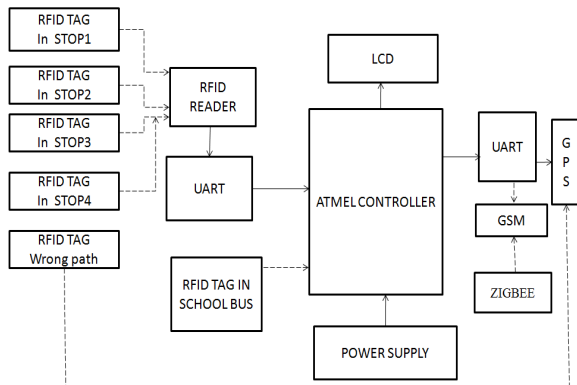


Figure 2. Architecture of proposed system

### 2.2. Database server

The school server maintains a database that contains the details of the students such as name, contact person, mobile number of the concerned authority and the location of the bus. This server can be accessed by the parents anytime to know the entry and exit of their children and the current location of the bus.

## 3. DESIGN AND IMPLEMENTATION

The vehicle tracking system is formed by a microcontroller, hardware and software design techniques.

### 3.1. Microcontroller

The Atmel microcontroller is used to maintain the school bus tracking system. Low-power, high-performance CMOS 8-bit microcontroller with 8KB of ISP flash memory. The device uses Atmel high-density, non-volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. On-chip flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. The GPS is used for tracking the school bus. A software program to control them is written in the Embedded C language, compiled and then saved into the microcontroller's flash memory.

### 3.2. KEIL $\mu$ Vision 4

The  $\mu$ Vision IDE combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. KEIL  $\mu$ Vision IDE development tool is used to compile and debug the 8051

program written in C. Its working process is simple and easy to use. It helps to develop the embedded programs rapidly. Once the target code is generated it is dumped using flash magic software. The keil simulator screenshot is shown in figure 3 and 4.

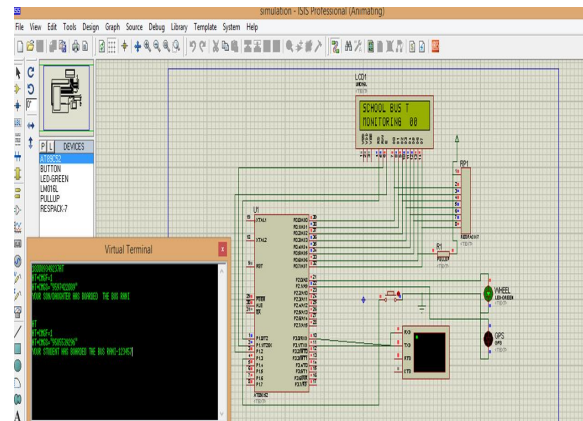


Figure 3. Software simulation

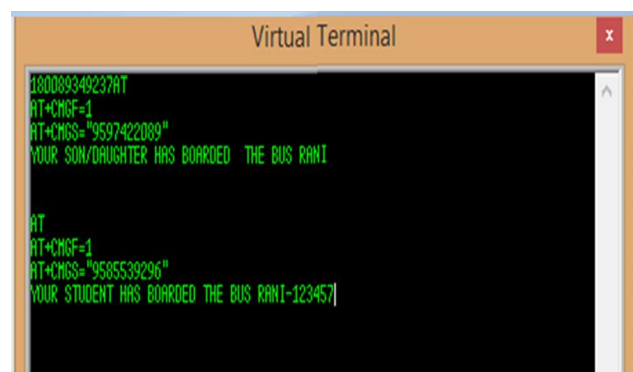


Figure 4. Simulation results

## 4. DESIGN AND IMPLEMENTATION

The school bus tracking system having RFID reader module, GPS receiver and GSM modem. Each student is given with RFID tag which holds the information of the student such as name, parent's mobile etc. When the student enters or leaves the bus the reader reads the tag information, stores it in the microcontroller (AT89S52) and message is sent to parents and school unit figure 5. The tags on road contains the specific location information is also read by the reader and stored in the microcontroller and send SMS via GSM. If the bus travels other than the usual path, it can be tracked using GPS in figure 6. This database is updated in the school server. The database

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will be created in the school where details of every student are stored. The parents can go through the database at any time for further details.

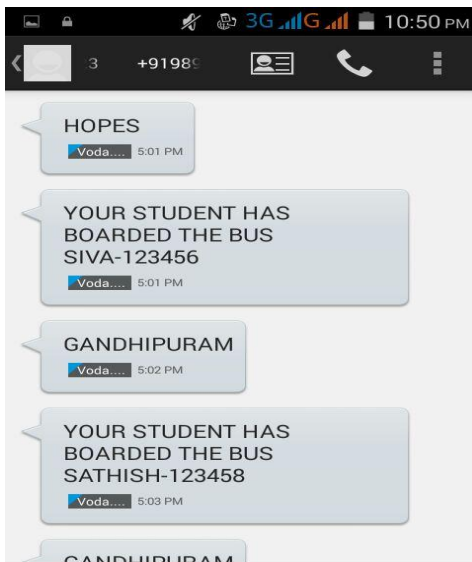


Figure 5. Entry and Exit message to school unit

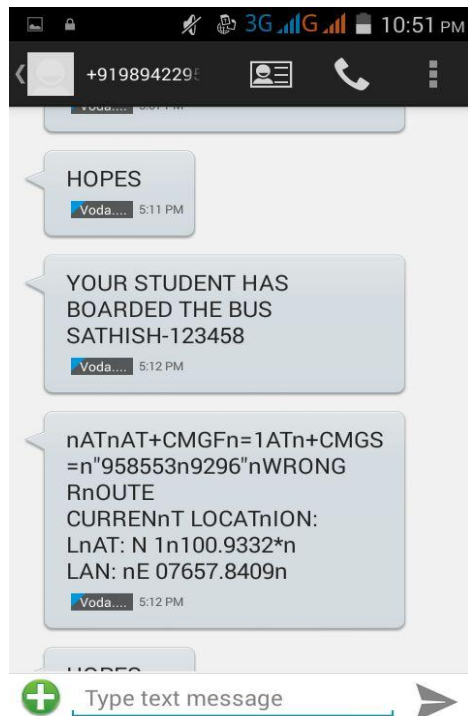


Figure 6. Path detection using RFID and GPS

## 5. SYSTEM VALIDATION

The testing is done to analyse the functionality of the proposed system. The proposed system is tested using keil vision software and the simulated results are shown in figure 4. The tested system is designed, developed and implemented as a prototype model. The hardware structure of the module is shown in figure 8.

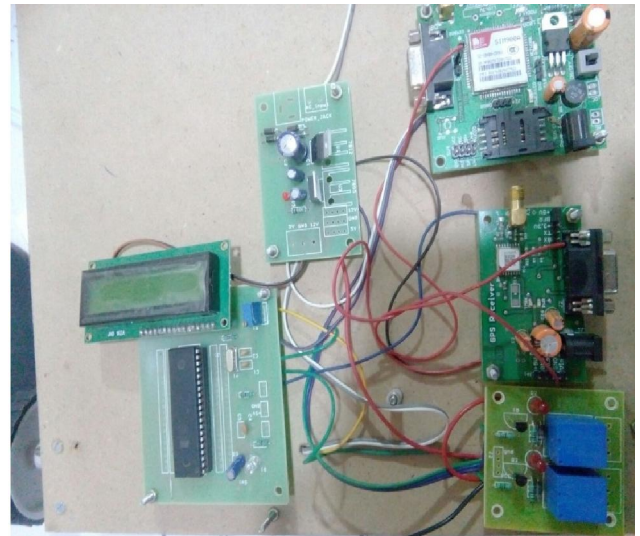


Figure 5. Hardware architecture of proposed method

## 6. CONCLUSION

This security system endeavours the safety transportation for the school children during daily outing. The system uses RFID for detecting the child whether boards or leaves the bus along with the stopping (boarding place) of the children. The message will be sent simultaneously to the parents and the school. The details of the boarding and leaving the school bus will also be updated in the school database. The GPS used is to track the position of the bus if it goes other than the usual path.

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