

# Vehicle Tracking System for Children Safety Using RFID, GPS and GSM

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**Abstract-** A data from the 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 are 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 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 politicians.

**Index Terms--** GPS, GSM, RFID readers, RFID tags.

## 1. INTRODUCTION

### 1.1 Background

According to the statistics from national crime records bureau, in India a child keeps disappearing for every eight minutes. Around 60,000 children go missing in a year from which 40% of children have not been found [1]. In Coimbatore 2010, a 10-year-old girl and her 7-year-old brother were abducted by a taxi driver while waiting for the van that usually takes them to the school [2]. Children safety is a major anxiety among parents. They want to know whether all the safety measures are available for their children. Parents will want to know about the whereabouts of their children when they are late home. By tracking the location of the bus we can reduce the parent's fretfulness. This leads to the development of vehicle tracking system in school buses.

### 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.

## 2. LITERATURE SURVEY

The Authors MedhatAwadalla, Dawood Al-Abrie, et al 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. A system [4] that includes a child module and two receiver modules to track the children who is missing. It also sends information about the child cry through text message to parents. It uses Voice Recognizing sensor to sense the cry of the child. When it matches the cry of the child which is stored in school, it sends the message to parents. The main drawback 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 in tracking the current location of the children using GPS. The fault in the system is each child and parent might not have the android phone and use of phone in school may be strictly prohibited. The paper [6] focuses on children tracking system which includes panic button. In any dangerous situation, the

child is supposed to press the panic button. It uses Bluetooth technology to communicate among mobile terminals which collects information and delivers to server using wireless LAN. A module which is enclosed in the children's ID card is in the form of chip. The problem is that the child might never know that he should press the panic button when it requires. Children tracking system using android mobile device [7] includes child module and two receiver modules. The database is maintained in the control room of the school. If the child goes beyond the coverage area the information is sent to control room of the school and also to the parents. It uses wireless LAN and Bluetooth device to collect information. The limitation is the cluster head sends the information about the children group and not about each individual. This makes difficulty for the parents to identify their child information. The system [8] is designed to track the children while entering and leaving the bus using RFID and GSM Technology. 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.

**3. OBJECTIVE OF STUDY**

RFID system is an evolving technology in various fields, which is renowned for its condensed design of size, processing speed etc. It plays a preminent role in Anti-Theft and tracking process. The RFID technology has a feature of exclusively identifying an object or a person with a wireless radio link, allowing particulars to be stored on an RFID tag and reacquires it in distant application.

The details about the student like his/her name, roll number, boarding place will be logged in the electronic automated database and also on the RFID tag. Radio Frequency Identification (RFID) utilizes radio waves to detect an object or a person by a unique serial number. The microcontrollers are used as a communicating bridge between devices.

The RFID & GSM based system helps in tracking the vehicles. The communication between the vehicle unit and the main server is achieved using Zigbee. This security system is simple and cost effective. RFID technology is an emerging technology in the field of construction of roads which has extensively grown in intelligent transportation systems (ITS) [9-16]. Because of its evolution in various fields, transportation and tracking industries are researching and implementing RFID technology to improve the precision of data acquiring process.

**4. PRINCIPLE OF OPERATION**

**4.1 Existing System**

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 fig.1.

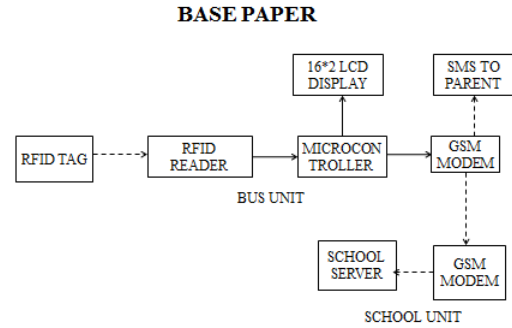


Fig 1. Block diagram of existing work

**4.2 Proposed System**

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

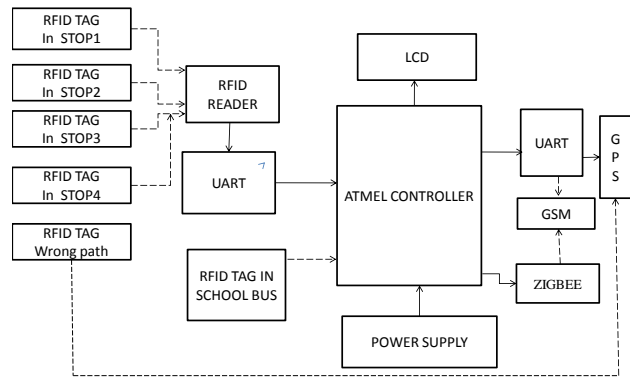


Fig 2. Architecture of proposed system

**4.3 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.

## 5. DESIGN AND IMPLEMENTATION

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

### 5.1 HARDWARE DESCRIPTION

#### 5.1.1 Microcontroller

The Atmel microcontroller is used to maintain the school bus tracking system. The microcontroller is compatible with the industry standard 80C51. It is applied for its low power, high performance and non-volatile memory technology. The program can be modified any number of times and dumped into microcontroller because of the on-chip flash memory. The GPS is used for tracking the school bus. A software program to control them is written in the Embedded C language which is compiled and then saved into the microcontroller's flash memory.

### 5.2 SOFTWARE DESCRIPTION

#### 5.2.1 KEIL $\mu$ Vision 4:

The program to be stored in the microcontroller is developed by the keil  $\mu$ vision software. It is used to compile and debug the 8051 program which is written in C. The keil software is used to combine project management and run time environment. It is used to build facilities, source code editing and program debugging. It is user friendly and working operation is simple. The keil simulator screenshot is shown in fig.3&4.

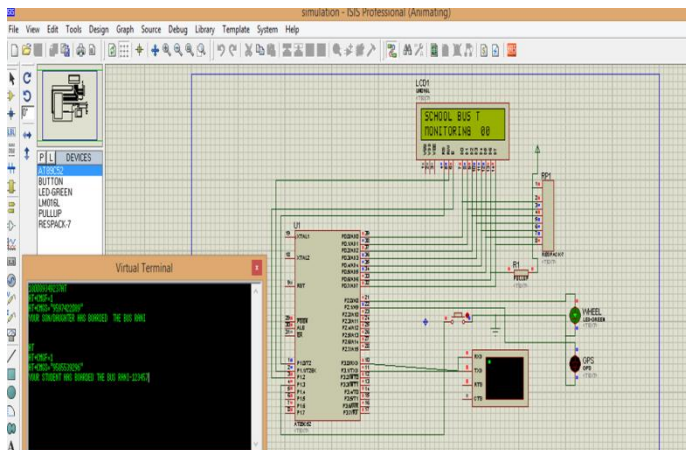


Fig.3 software simulation

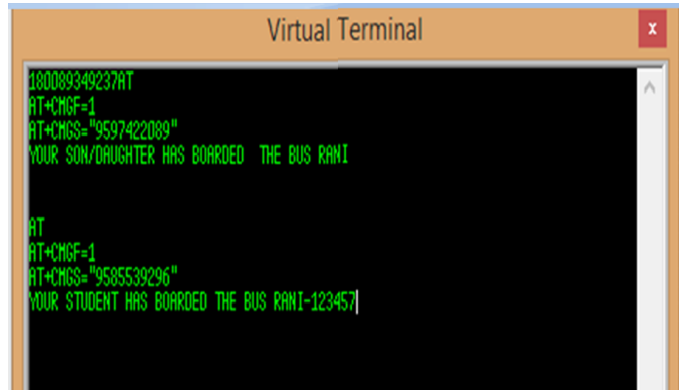


Fig 4.simulation result

## 6. STRUCTURE RECORD

The school bus tracking system which contains RFID reader module, GPS receiver, 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 fig 5.

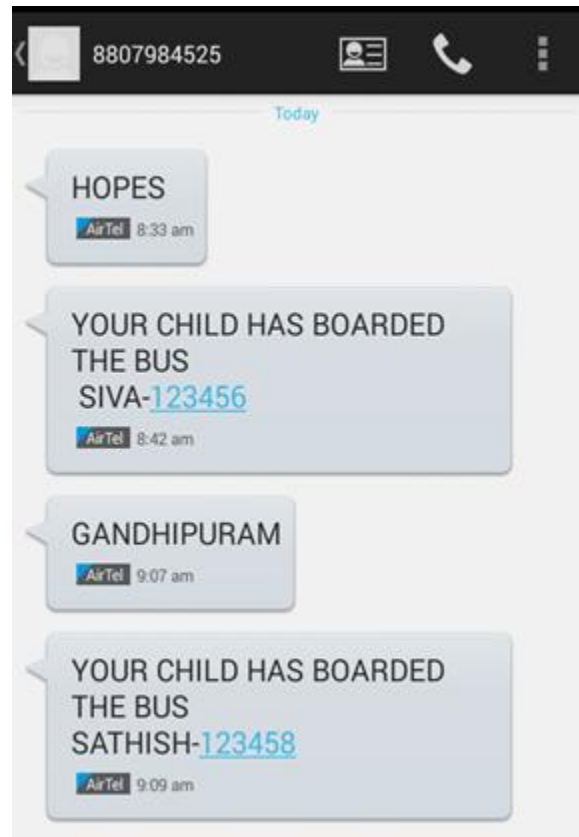


Fig 5.Entry and Exit message to school unit

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 fig 6. This database is updated in the school server. The database 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.

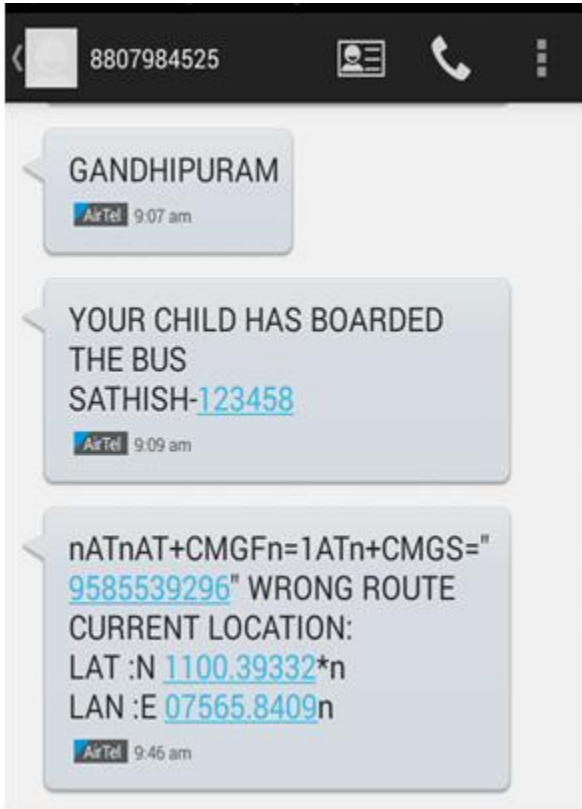


Fig 6.Path detection using RFID and GPS

## 7. TESTING AND IMPLEMENTATION

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 fig.7.

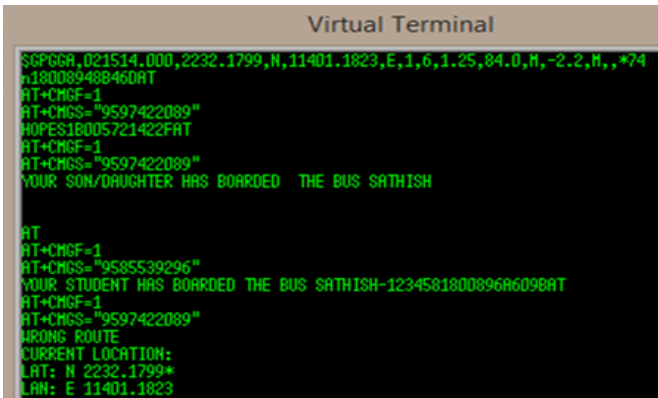


Fig 7 .simulation result

The tested system is designed, developed and implemented as a prototype model. The hardware structure of the module is shown in fig.8

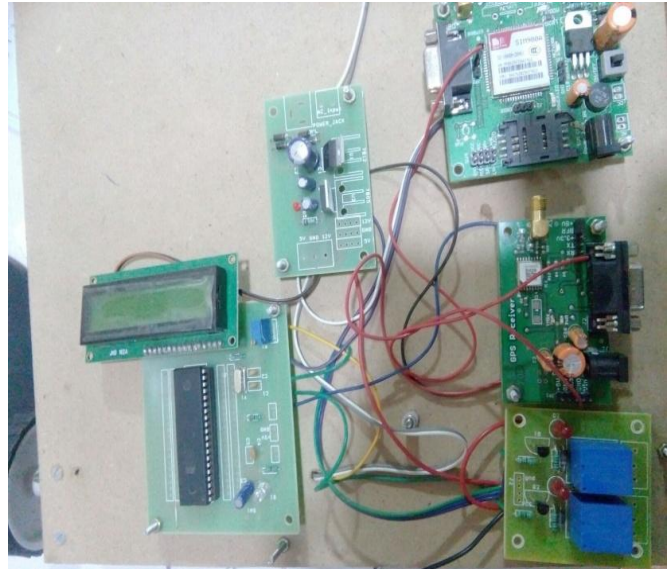


Fig8. Hardware structure

## 8. 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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**INTERNATIONAL JOURNAL FOR TRENDS IN ENGINEERING & TECHNOLOGY**  
**VOLUME 13 ISSUE 1 – MAY 2016 - ISSN: 2349 – 9303**

*Terminals* International Journal of Scientific Engineering and Technology Research ISSN 2319-8885, Vol.03, Issue.21, September-2014

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