

# Smart Student Transit Bus System

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**Abstract**— Now-a-days, many children commute between home and school. It is the need of time to develop a system for safer transportation as crime rate with children are increasing at alarming rate. And to make it easier for parents to keep an eye on their child, we proposed a monitoring system in this paper, through which the parents will get updated about child's transit activity. The system monitors embarking and disembarking of the child into the bus using RFID, GPS, GSM and GPRS technologies. The system will do all the process whenever child enters or leaves the bus, the RFID tag on their I-card will get detected. And using this information a database on website will get created with details like number plate of bus, driver name, conductor name, location, time and child's details which can be accessed by parents through their login ID and password. This information can also be accessed on cell phone via SMS by a request message sent by parent's phone number to help line number.

**Index Terms**—bus safety system, child tracking, GPS module, GSM modem, student transit system, student security

## I. INTRODUCTION

According to recent crime statistics, an estimated 60% of children were exposed to violence, crime, or abuse within past few years. Such unfortunate incident may take place in homes, schools, on street, in the bus etc. In day-to-day scenario, almost every parent is office goer. Thus, it becomes difficult to take proper care of their child. A child's schedule mainly includes travelling to some institution like school, class, sports club or to friend's home. At institution and other places, authorities are responsible to take care of children. But the neglected part of the child's day-to-day schedule is travelling which needs more attention. Thus, we proposed a monitoring system which allows parents to be at mental peace by notifying them that the child has reached the destination safely. The system includes two parts i.e. bus module and server module. The bus module is placed on the entrance door of the bus. It will take RFID readings and GPS co-ordinates, process it and pass it to the GPRS module.

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Using AT commands, GPRS module gets internet connectivity and data is sent to the server where whole log is created using database management system. The database will be available on the designed website. The parent or any responsible authority can login via their login ID and password and can keep track of child's activity. The database have detailed entries like bus number, driver name, conductor name, ideal and actual route taken, ideal and actual boarding and getting off the bus stop, time, location and details of child's class and details of parents and their respective contact number. The services can also be accessed on parent's cell phone without internet. A request message will be sent by parents to server using provided help line number, the server module will answer to the upcoming request using GSM's SMS service and will sent details of the child's commutation.

## II. LITERATURE SURVEY

G.Bharathi and L.Ramurthy in "Implementation of Children Tracking System Using Arm7 Microcontroller" [3] proposed a framework in which child will carry a module that includes ARM7, GPS module, GSM modem and LCD display. When any authorized person or parent sends a request message to GSM modem interfaced with the ARM controller. The GSM modem will send the location details i.e. longitude and latitude co-ordinates via SMS to the parent's mobile phone. Thus child's present location can be easily traced.

In A.Al-Mazloun, E.Omer, M. F. A. Abdullah's work [4], the problem was solved by proposing an android application which will be installed in child's mobile phone. The parent can see the location of the child on a real time map. The parent has to send an SMS request to the child's device to get the location of child.

In "Bus safety system for school children using RFID and SIM900 GSM modem" paper [1], written by Maryam Said Al-Ismaili, Ali Al-Mahruqi, Dr. Jayavrinda Vrindavanam has presented an idea of system which will monitor entry and exit of the children travelling in a school bus using RFID and GSM modem. On the successful journey of the child, an SMS will be sent to parents or authorized person that child has safely travelled.

### III. PROPOSED SYSTEM FRAMEWORK

The system block diagram of the proposed system is shown in the following figures (Figure 1 and 2).

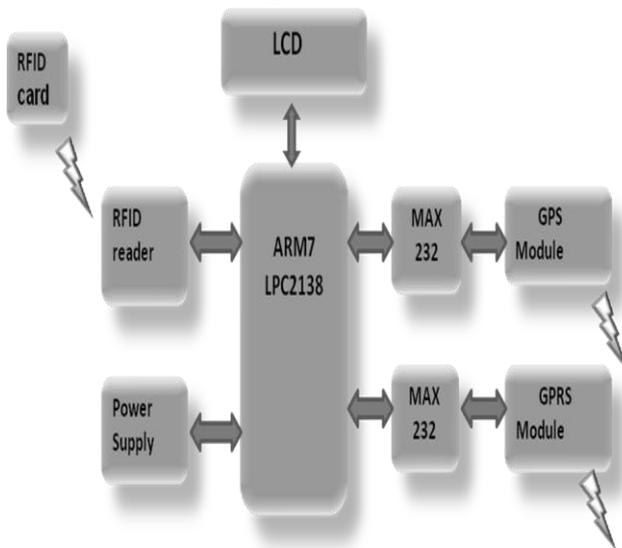


Figure 1

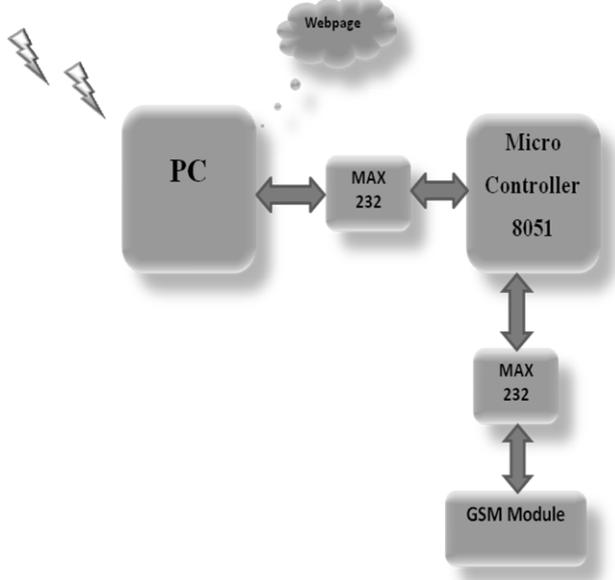


Figure 2

The major steps involved in the development of the system are explained hereunder.

#### A. RFID card and reader

RFID (Radio frequency identification) Card contains electronically stored information. When the EM-18 reader is turned on, it transmits radio frequency. When the card is placed near the reader, the card will receive radio frequency. The RFID reader converts these frequencies into electrical power to transmit the data.

#### B. GSM/GPRS module

GSM/GPRS module support all of phone call service, SMS service and internet data transmission. Data packets are transmitted on GSM where the cell phone channels are shared. It requires Subscriber Identity Module (SIM) for

communication with network.

#### C. GPS module

A GPS, also known as Global Positioning System, is a technology by which one can navigate on land, in the air or on waters. A GPS device takes radio signals from satellites which are orbiting the earth. GPS have high tracking sensitivity of -159dB.

#### D. Microcontroller

The famous families of microcontrollers are 8051, AVR, PIC and ARMs. Among this AT89S52 and LPC2138 are selected for this experiment. LPC2138 offers two UARTs, thus it is best suited for our project. Low power, high performance, high computational performance and flash program memory are some features of the LPC2138. AT89S52 is 8 bit CMOS microcontroller with specifications like 8K bytes of flash memory, 256 bytes of RAM, a full duplex serial port, two power down modes and many more. These specifications are required in our server part.

#### E. Keil software

The ARM DS-5 development studio is the tool suite for ARM application processors and system-on-chip devices. It supports debugging, performance analyzer, and Linux application profiling. Also keil is the industry standard software which is compatible with all 8051 devices.

#### F. Apache tomcat software

It is an open source web server, usually called as Tomcat. Tomcat implements several Java specifications including servlet, web socket and java server pages (JSP), and provides HTTP server environment in which Java code can run.

#### G. MYSQL software

It is an open source relational database management system. The entire database created during the bus journey will be created in MYSQL and this database is then used in the website.

### IV. SYSTEM WORKING PRINCIPLE

Every child will have RFID tag in their school I-cards. The tag is associated with name, class, division, roll no, address and parent's contact number. When child will board the bus, he will swipe a RFID tag. The ARM controller will process this information and through GPRS modem, the information along with GPS co-ordinates is sent. Thus, at server, a database will be created on a website about the place of boarding with time, date and location.

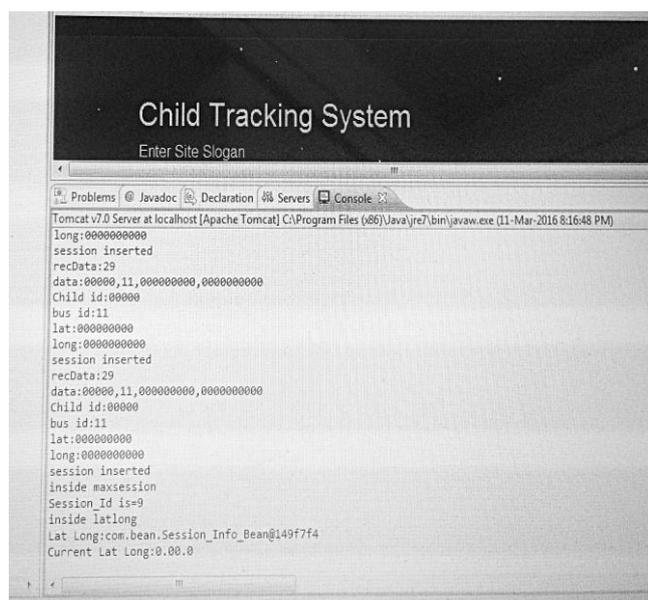
When the child gets-off the bus, again RFID tag will get swiped indicating that the child has left the bus. Again the database will be created using same technologies about this activity with time, date and location.

The parent can access the information about child whether they reach their destination safely or not by accessing the webpage. Every parent will be provided with username and password for security purpose. In any case parent wants to access information without internet connection; they can send a request to our server by sending a message using his mobile phone. The SMS will be processed by the microcontroller at the server side; a text message will be send to the parent with all the details.

If, by any chance, a child boards a wrong bus, immediately a message will be send on parent's mobile phone following with the boarding on and getting off the bus locations .

## V. RESULTS

When parents want to know the child's location they can access the information using our webpage or he can simply send a request message to GSM modem on the server side. If the parent's contact number matches with the registered mobile number, GSM modem will send the child's location to the parent.



```

Tomcat v7.0 Server at localhost [Apache Tomcat] C:\Program Files (x86)\Java\jre7\bin\javaw.exe (11-Mar-2016 8:16:48 PM)
long:0000000000
session inserted
recData:29
data:0000,11,00000000,0000000000
Child id:0000
bus id:11
lat:0000000000
long:0000000000
session inserted
recData:29
data:0000,11,00000000,0000000000
Child id:0000
bus id:11
lat:0000000000
long:0000000000
session inserted
inside maxsession
Session_id is=9
inside latlong
Lat Long:com.bean.Session_Info_Bean@149f7f4
Current Lat Long:0.00.0

```

Figure 3

When the log activity is send by the bus module using GPRS modem, the server receives the information as shown in the figure 3.

## VI. CONCLUSION

In this project, we focused on the integration of the RFID, GPS and GSM technology for safety and security purpose. It is very important nowadays due to increase in crime against students. Using this system, it becomes easier to look after the child and parents can easily know the location of the

child. The experiments indicate that the notification is send to the parents when something goes wrong otherwise all the detail of students, bus driver and the path they followed are fed on server. The proposed system can be improved further by changing the working range of RFID. The battery issue of the bus module can be solved by adding solar battery. The complexity of the code can be minimized further.

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