



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 5)

Available online at: www.ijariit.com

GPS based real time vehicle tracking system for kid's safety using RFID and GSM

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ABSTRACT

When it comes to student transportation, every school has two major problems – student school bus safety and efficient fleet management. The reports from international crime bureau that a child goes missing for every three minutes in the world. This is a big issue which has to roll in parents mind. They always worried about the child when they send their children to a place behind their eyes the places like school or private classes. To lessen the parent's anxiety about their children, a vehicle positioning system is prepared by merging radio frequency identification, global positioning system, web server, web tracking, and android technology. The system consists of RFID tags and reader which is designed to scrutinize the entry and exit of a person in the particular vehicle where child boarded each person is assigned the tag which holds the precise identification details when children enters the vehicle, the readers read the person tag and stores the details of entry, exit, and vehicle identification code. This information is notified to the concerned authority like school admin and parents via the android app and website as entering, exit, pickup, drop, vehicle emergency and wrong route of the vehicle. 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 location updates in the school server database. This proficient tracking structure with the enriched feature is designed and implemented for the purpose of protection in various stream. It is up and coming technology in the field of communication and network. The tag on the road model is an evolving and just able technique in the future world. The projected system here is planned to be implemented in schools for the safety of the students and it can also be installed in the professional security system.

Keywords— GPS tracking, Child safety, School transport safety, Real time vehicle tracking, GSM data sender, GSM operation, RFID identify scan, Kid's tracker

1. INTRODUCTION

In the world, the child goes missing for three minutes according to international crime record bureau. Around 1, 52,000 children go missing in a year out which 85% have not been found. In India in 2010, a 10-year-old girl and her 7-year-old brother were kidnapped from school by a taxi driver when they were waiting

for the van that usually takes them to the school. In India, child security is measure concern, many of child goes kidnapped while they have been dropped by the school bus and parents unaware about bus timing or delay or early arrival of the bus so they did not reach to pick their children and that lead to crime.

In 2015, A 7 year girl was sexually harassed by a bus driver while her ride to home, he took her to alone place and sexually exploit daily but the parent hadn't known about her situation and lately came home they never knew why she comes late than expected no one doubt bus driver for such crime. The girl was sick after some days and doctor confirmed that she has been sexually exploited and such cruelty exposed and main culprit bus driver gets by police but this incident spoil all life of that girl and her family.

In 2014, the 10-year girl has been kidnapped immediately after dropped by the bus in front of her apartment as her mother didn't get any notification that she reached her to stop she was completely unaware about her location and the girl has been kidnapped and killed by kidnapper that gives lot pain to our society.

Child safety is the major concern among parents this is especially true when the children are coming late home, parents will naturally want to know where they are fortunately you can ease parents' concerns within moments by taking a look at the location of the school bus.

2. MOTIVATION

Motivation Comes after seen a lot of crime about children so we need to develop such system to give children location while they are in school vehicle with board in Notification at android app, Vehicle location to both the authorities, drop Notification, wrong route, and bus emergency notification that helps to minimizes the risk of crime toward children who travel alone or another consenting person. The aim of this paper is to develop a school vehicle safety System which provides the details of tracking information of the student from the vehicle 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.

3. RELATED STUDIES

[1]The Authors Alex Atkin and Dallas Alabama in 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 parents. The main drawback in [1] is the whole system is integrated into a small chip and attached to the person body. It May harm the child. Another child tracking system using android based phone for getting information about the missed child is proposed.

[2]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 the phone in school is strictly prohibited.

[3]The paper focuses on children tracking system which includes a 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 the respective server using wireless LAN. The child module in the form of chip gets fixed to the ID card. The problem is that the child might never know that he should press the panic button when it requires.

[4] Children tracking system using the Android mobile device in parent's hand and the database is maintained in the control room of the school. This system includes a child module and two receiver modules. If the child goes beyond the coverage area the information is sent to the 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 the 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.

[5]The system 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 on 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.

4. EXPERIMENTAL WORK

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 the remote application at a later point in 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 of 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.

5. EXPERIMENTAL RESULTS

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 on 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.

5.1 Proposed model

The System provides parents, school authorities, and other users with real-time notifications. Users will be notified whenever a child misses or boards the wrong bus. And, the notifications can be obtained via apps and web server interface. When a child arrives at the assigned location, the first notification will be received. As a child swipes the RFID card in the card reader installed in a school bus, the second notification will be sent to parents and school. Apart from this, users also receive notifications whenever the driver crosses the speed limit or deviate from the scheduled route. An RFID tag contains the details of the student and area, it will be used for identification of particular individual child that has been tracked by his parents with this RFID student Id among all cluster of the children. Driver console app helps to formulate the status of all children boards in the bus if some child dints board so it will notify the bus driver. Once the reader reads the tag the information is sent to school server database via GSM modem and a data about the current location of bus and board time are sent to the parents on their phone as a notification in the app as app connected to the real-time database to the school. Usually, the bus tracking system consists of the system but it provides the latitude, longitude, GPS time, location fixing details, bus Id, bus No, bus speed, engine on/off status, bus route id, board children student ID read by RFID reader the tags are pre-programmed. This is one way you can ensure the safety of children on the school bus, students can use RFID tags stick to their school ID cards to swipe in the card reader installed in the bus. This marks their attendance and the notification will be sent to the parent's app and school server. This helps you in indicate whether a bus stop has been missed also you can know from where a student boarded the bus and where they can catch.

The architecture of the proposed system is shown in figure 2.

- Device
 - RFID reader module
 - GSM/GPRS/GPS module
 - Arduino nano Controller Module
 - Power distributor
 - Supply auto switcher live to battery
 - Backup battery
 - Firmware with C++ coding
- MYSQL Database
- Web server coded with PHP and HTML
- Web console for school admin

- Map using Google Map
- Android app for parents
- Android Console app for Driver

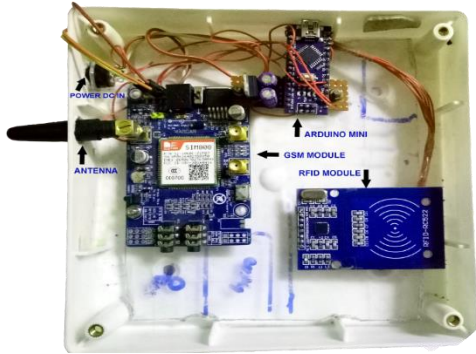


Fig. 1: The architecture of the proposed system

5.2 Database server

The school has its own data server which contains student information, RFID code, student id, pick and drop location, bus detail, driver and conductor information, bus location, users, parent information, etc.

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.

5.3 Implemented System

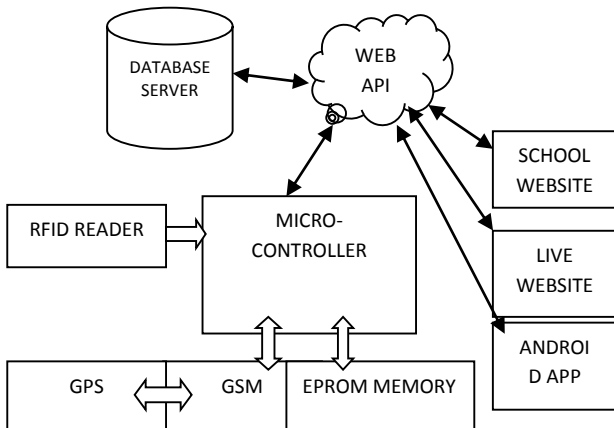


Fig. 2: Internal architecture of the system

5.4 School admin portal

The school has its own login portal that helps to track all buses location, running and stop status of the buses. The bus has sent all required information to school server that admin can view all relevant information by fetching the database it helps to track all activity related to child safety. If bus acquires the wrong route or stops somewhere more that assigns time that will blow the notification to admin to find out the problem and take necessary precaution before any incident happen.

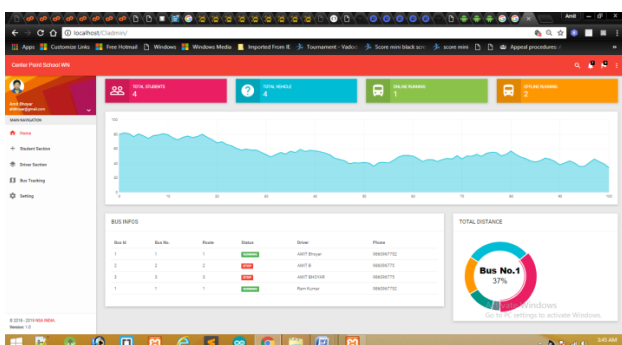


Fig. 3: Web tracking of children

5.5 Student Detail Insert

The school admin can add student information like student contact information, pickup point, drop point, RFID code, bus route, bus No etc. this information will help school admin to track student and buses for particular student boarding information.

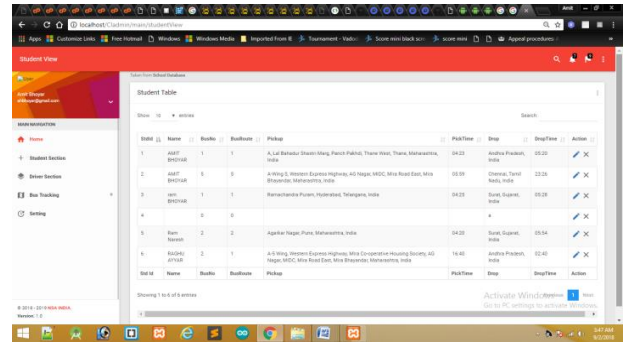


Fig. 4: Detail of student

5.6 Driver detail insert

The school admin can add driver and conductor information which requires security protocol and complete license and bus registration that will be formulated for tracking purpose, school admin should have all information related to child safety.

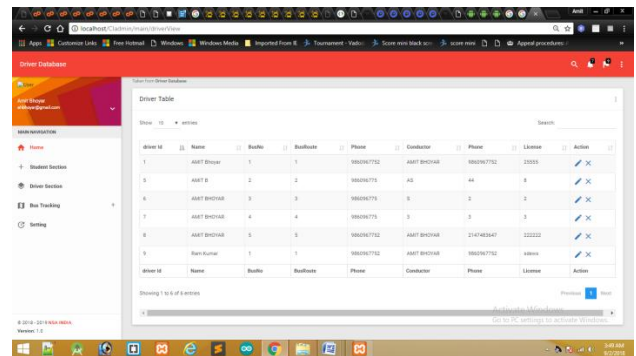


Fig. 5: Detail of driver

5.7 All buses tracking

The School admin have tracking page for location of the all the buses running or halted it also show distance traveled by the buses with assign speed detection it will help get location of the bus and maintains tracking, Google map will show all information in the form of marker which will be updated in the real time by web socket.

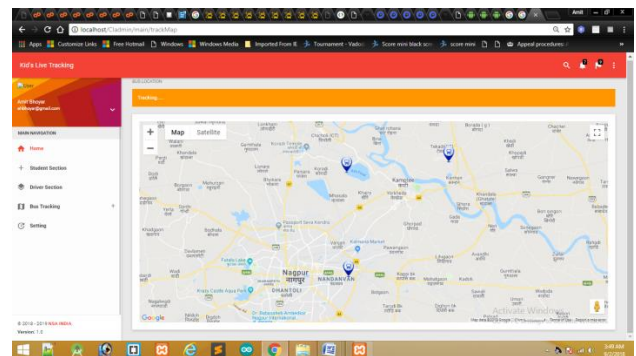


Fig. 6: Buses location tracking

5.8 Parent Console App

Parents have an android console app to track the real-time location of the bus where their child. This app will require authorization that will indicate an authorized person only can see the child location for more safety this app shows an only relevant child.

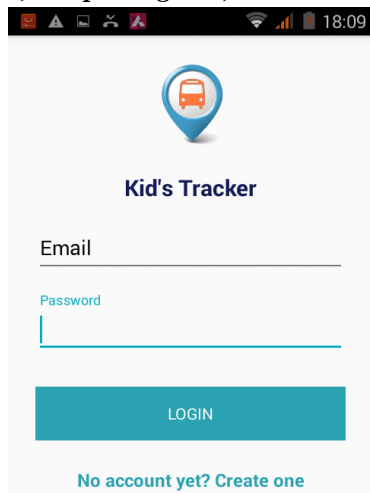


Fig. 7: Parent Kids tracking app

5.9 Driver profile screen

App has a driver profile screen if any delay or an emergency occurs in the bus it will help to call driver or conductor directly from this app by one tap. Profiles also have detail driver information with his license and residential information.

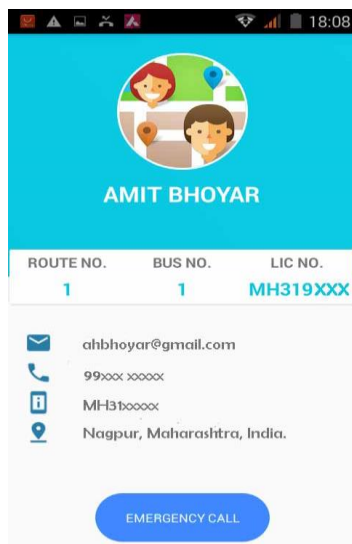


Fig. 8: Driver profile

5.10 Time estimator with the direction

Time estimator will help to show parent exact time to reach the bus at pick or drop point that helps to reach the parent to receive the child at assign location and it will get more safety.

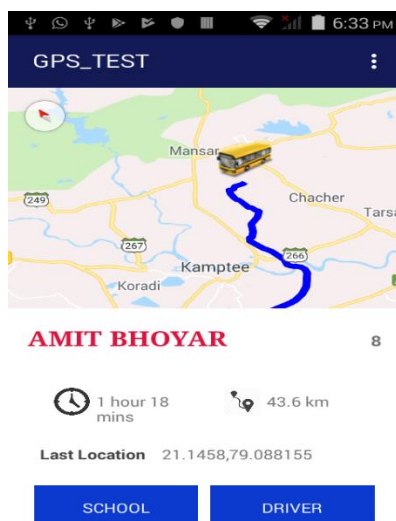


Fig. 9: Buses location tracking

5.11 Pickup and emergency notification

Once children arrived at given drop point app broadcast the notification that children has reach at an assigned point so please pick your child it will help to parent to get an exact time to reach the pickup point that reduces unwanted wasting of time if parents are busy in their work or they can send a servant to receive the child.

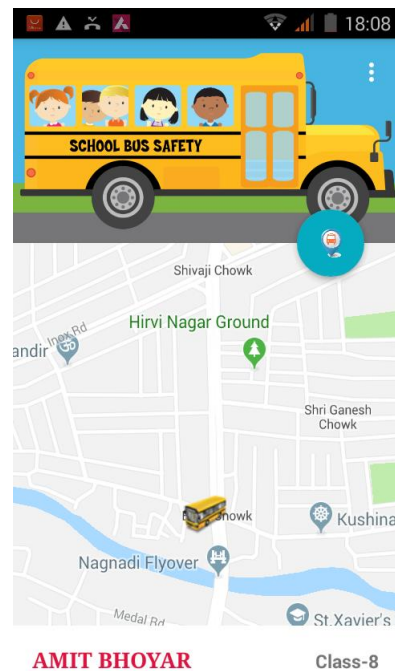


Fig. 10: Buses location tracking

6. CONCLUSION

This system gives overall safety for school children during transportation to school. The system identifies children and entry, exit time with RFID that notifies parents and school in the form of notification simultaneously GPS gets all coordinates from satellite and send it your database server by using GSM/GPRS service module with highly precise and encryption format. The device has a feature to detect unusual route taken by school bus driver or bus has stopped somewhere due to any reason this system start broadcasting alert notification to both authorities for consideration of the situation, it has live identity adder with the master card, adding, deleting and erasing function also taken place in this advanced system. The system gives a high level of security for school children as well as an educational institute.

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