

# Advance School Bus Tracking and the Children Safety System

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**Abstract** - At the current point in time, due to the increasing number of kidnaps and accident cases, parents always worry about their children, even their children using a school bus for transportation. Millions of children require school buses to pick up and drop to the school on an everyday basis. A means of safe transport for these children is one of the main concerns that need to be taken care of by the school management. Hence, the need for a reliable management system of the school bus in today's world has increased to a greater extent. So we are developing a smart tracking system for school buses, which is an android based application for providing remote tracking. GPS is used to track the location of the school bus in real-time. The RFID technology is used to identify the identity of children, and GSM is used for sending the SMS mode of alert mechanism. Parents can see the location of the bus, and they will be notified when the children are getting into a bus or getting down from a bus. The proposed system will result in providing the security to children travelling via school bus, helping the attendant to keep the attendance of students.

Along with this, parents will be able to apply for leave if their child is not going to school. Alert will be there if the child is failing to board a bus.

**Keywords:** GPS, GSM, Microcontroller, RFID

## 1. INTRODUCTION

Due to the increase in the number of kidnaps, parents are worried about the children going to school. Although the students are using school transportation, then also some security issues are there, which makes the parent worry. The high-risk zone is when the student is outside the safety of school or home. For a working parent, it is difficult to take the ward directly to the school. This makes ensuring student presence on the boarded school bus a necessity to reduce the anxiety of parents. Usually, parents keep calling the driver to check the present location of the bus as well as to ensure their ward has boarded the bus. There is always an element of uncertainty involved in this process. It is always possible for the driver to mistake students for another or to give wrong information.

Moreover, the inability to keep track of the ward will increase the anxiety, which in turn will affect the quality of work by the parent. The advancement in technology right now makes it possible to live to track the location and make this information available anywhere on the planet. This becomes possible with the introduction of the Internet of Things. It allows effective communication of devices over the internet, enabling data acquisition, transmission as well as analysis.

We are going to do us tracking of the school buses using a GPS tracking system. Along with this essential feature, we are also integrating some advance functionalities in our system. Parents will get the notification when the child will board on or board off from the bus. As well as, using an RFID helper will able to keep the attendance of students inside the bus.

Parent can apply the leave, if their child is not able to come school. It will save time and fuel of school bus. If at bus stop due to any reason child cannot get into bus, then alert message will be send to parents. Transport manager will design the trips according to leaves applied by parents. Driver will able to see which route have to follow in bus route. In this way, we are trying to implement our system.

The system would help in providing security to children travelling via school bus, supporting the attendant to keep the attendance of students. Parents can easily see the location of the school bus as well as able to apply for leave if their child is not going to school for a particular day. Alert will be there if the child is failing to board a bus.

The main objective of the development of this system is to help parent/authority of school to track the school buses and provide interaction in more efficient and effective way resulting in greater reliability and security.

## 2. LITERATURE SURVEY

**Paper 1: "Real Time Vehicle Monitoring and Tracking System for School Bus via BeagleBone" May 2016**

BeagleBone based vehicle tracking for school buses are designed to track the school bus in real-time and to provide security to the students while travelling. This system consists of Beagle Bone Black, GPS, GSM, Alcohol Detector, Door

Sensor, and Eye-blink sensor. The proposed system is placed inside the vehicle to track the school bus in real-time with date, time, and location. The sensors are used in the proposed system to monitor the driver and vehicle. The sensor gives information during critical situations. In order to monitor properly, the deployment of the web server is necessary to display the vehicle data that will store the data and display it to clients about the vehicle. If the driver is drowsy, it sends a message to the owner, indicating that the “driver is in drowsiness,” and it sends the message to the owner regarding “alcohol detection.” By using the IP address, parents can log in to the website with the user name and login password and can easily track the school bus.

**Paper 2: "ENHANCE SAFETY SECURITY AND TRACKING SYSTEM FOR SCHOOL BUS AND CHILDREN" May 2016**

A system monitors the daily transportation service for school going children to enhance the security and safety of the children. The system consists of three main units, bus unit, parent unit and school unit. The bus unit consist of hardware parts. The bus unit is used to detect when a child enters/exits from the bus using RFID Card. This information is communicated to the parent unit and school unit that identifies the children did/did not enter/exit the bus. The notification like the students whose next stop is, sent to the parent who stays on the next stop using Geofence. The system enhances the security of the children like the bus hijacked, extracting the location and instantly sending notification to the admin as well as the nearest police station using SOS and Spherical Cosine Rule. The system develops an android application for the parent for getting notifications and live tracking of the bus and web based application for the admin that facilitate the management and provides useful information about the children and some specific details like routing, allocating stops, scheduling, optimized route and reports. The system tracks the school bus by the GPS Module and also gets an alert if the bus crosses the speed limit.

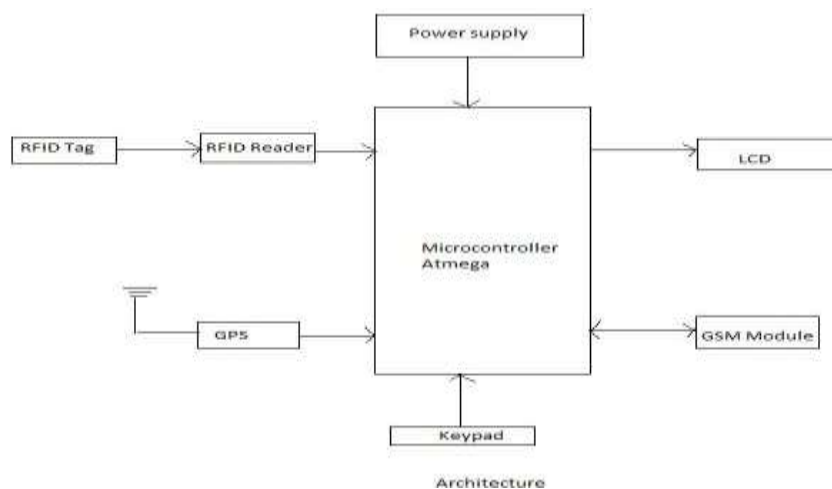
**Paper 3: "SCHOOL BUS TRACKING AND SECURITY SYSTEM" 2018**

The proposed system recommends a SMS based application which consists parents to track their children location in real time. Initially the details of the students are collected and stored in the database. The details are converted into QR code and embedded with children's identity card. When the children enters the bus, the QR code is scanned by the mobile application and the timing, stop details will be sent to the parents as notification. Later on, when the bus gets started, the GPS in the mobile phone is turned on and send the location updates to the parents to easily track the bus location. Thus our proposed system is capable of notifying parents through SMS once the child enters/leaves the school, enabling parents to trace the bus, helping smooth and safer rides to the school.

**Paper 4: "IoT based School Bus Tracking System" Jan 2019**

This System recommends an android based solution which assists parents to track their children’s location in real time. To track the location Active RFID module is used and to identify the identity of the child a biometric identification is used which is in built in the system. Whenever a child boards a bus, the biometric identification is done in the bus, and the system will identify the child and update log on a server will send notification to the parents which consist of current location and time. Parents can see the location of bus, they will be notified when the children is getting into a bus or getting down from the bus.

**3. PROPOSED SYSTEM**



**Fig.1: Architecture Diagram of Proposed System**

Hardware components used in the system at bus unit are as follows:

1. **GPS:** It will be used for fetching the real-time location of the bus. GPS is connected to the microcontroller.
2. **GSM:** GSM module is used for sending messages to the mobile application. It is also connected to the microcontroller.
3. **Microcontroller:** It is connected to all hardware components in the bus unit. It acts as a central part of sending messages to the server.
4. **RFID:** It consists of an RFID reader and a tag. RFID reader fetches information from an RFID tag. Algorithms used in the system :

1. **Dijkstra's algorithm**

2. **Google's encoded polyline algorithm**

**Dijkstra's algorithm:**

This algorithm is used to find the shortest route to reach the nearest stop. The inputs to the algorithm are nothing but the two co-ordinates. One is for the user's current location. Another one is for the nearest stop location. The user's co-ordinate act as a source and bus stop is to act as a destination node.

**Google polyline algorithm:**

Is used for highlighting the particular path between two points on Google map.

#### 4. IMPLEMENTATION

In our proposed System, we are providing a android application at user interface.

At user interface there will be four modules:

1. Parent
2. Helper
3. Administration
4. Driver

**Parent:**

- Real Time Bus Tracking: In this, real time location of bus can be seen by parents on Google maps.
- Notification: In this, when child will board on or off the bus then parents will get the notification due to RFID.
- Leave: In this, parents can apply leave on mobile application if their child is not going to school so that bus will not come to his/her stop.
- Bus Route Tracking: In this, parents are able to see the route of bus for going to school.

**Helper:**

- Attendance: In this, helper will able to manage attendance of students inside a bus automatically using RFID.
- Bus Route Tracking: In this, helper is able to see the route of the bus for going to school.

**Driver:**

- Message: In this, driver can message to administration in case of emergency.
- Bus Route Tracking: In this, driver is able to see the route of the bus for going to school.

#### Administrator:

- Trip Design: According to applied leave`s by parents administration will design the trip for school buses.
- Real Time Bus Tracking: In this, real time location of buses can be seen by administration on Google maps.
- Message: Administration is able to send messages to parent, helper and driver.

#### CONCLUSION

The proposed system is designed to track the school bus in real-time with the help of GPS, GSM and RFID. The system also helps to maintain a systematic record of students, apply leave and emergency notifications during times like tire puncture, engine problem and even accidents. The system provides security to students effectively and also is more comfortable for parents and institutes.

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