

Smart School Bus Monitoring with Inappropriate Drop Notification System

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Abstract

It is important for every school to have a confident and secure transportation service to ensure the safety of the students. It helps the school management to effectively manage their bus fleet and potentially reduce mishaps. This is where school vehicle monitoring takes effect. In this project system provides real time information about various parameters of the vehicle like the location, fuel level, the attendance with route wise student details, the adherence of drivers to schedule and much more. The system further allows the parents and teachers to be notified when their ward alights or boards the bus and there is a facility that if any students get travelled in any wrong bus by sending the text messages automatically to the transport manager and driver. We make use of RFID and GPS technologies and connect them to a remote server over WiFi using an ESP8266 microcontroller. An Ublox 6M GPS module is used to find the current geographic coordinates of the vehicle's location as well as the speed it is going at. An MFRC522 RFID reader identifies each student as they board or alight the vehicle by reading the id from their RFID tags.

Keywords- RFID, MFRC522, Ublox, GPS.

I. INTRODUCTION

The travel of students from home to school and back has always been a source of concern for parents. Students often get on the wrong school bus and get off at the wrong stops. Bus drivers may not be able to identify all the students and will not know in time if a student is missing. While some schools have already implemented GPS tracking of buses using GSM and other means, they do not ensure absolute safety. Some of these devices do not give real time information whereas some are too expensive to be a ubiquitous solution. The proposed system describes a low cost comprehensive school bus monitoring device that tracks the location, the speed, the people onboard, adherence to route and schedule and other information pertinent to school buses.

II. INTERNET OF THINGS

2.1 IoT

The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, collecting and sharing data. Thanks to cheap processors and wireless networks, it's possible to

turn anything, from a pill to an aero plane, into part of the IoT. This adds a level of digital intelligence to devices that would be otherwise dumb, enabling them to communicate without a human being involved, and merging the digital

and physical worlds. Adding RFID tags to expensive pieces of equipment to help track their location was one of the first IoT applications

2.2 RFID Technology

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2.3 RFID Better Than Barcodes

The significant advantage of RFID devices over the others mentioned above is that the RFID device does not need to be positioned precisely relative to the scanner. We all are familiar with the difficulty that store checkout clerks sometimes have in making sure that a barcode can be read. And also obviously, credit cards and ATM cards must be swiped through a special reader.

In contrast, RFID devices will work within a few feet (up to 20 feet for high-frequency devices) of the scanner. For example, you could just put all of your groceries or purchases in a bag, and set the bag on the scanner. It would be able to query all of the RFID devices and total

your purchase immediately.

RFID technology has been available for more than fifty years. It has only been recently that the ability to manufacture the RFID devices has fallen to the point where they can be used as a "throwaway" inventory or control device. Alien Technologies recently sold 500 million RFID tags to Gillette at a cost of about ten cents per tag.

One reason that it has taken so long for RFID to come into common use is the lack of standards in the industry. Most companies invested in RFID technology only use the tags to track items within their control; many of the benefits of RFID come when items are tracked from company to company or from country to country.

III. SCOPE OF THE PROJECT

The students attendance is taken by the RFID cards. RFID cards are distributes among all school students. The unique ID in the RFID cards is stored in a database in the microcontroller along with personal. Every student's identification data and fee details will be sending to the management and staffs through GSM communication. There is a facility that if any students get travelled in any wrong bus the SMS will be sent to DRIVER and TRANSPORT MANAGER.

3.1 In appropriate Drop Notifications

In this paper parents and school authorities can get notified by SMS. When there are bus delays, If their child boards the wrong bus, Unscheduled stops and in case of Emergencies.

3.2 Generation of Reports

The software will generates accurate and effective reports on the information such as Distance, History, speed, Stops of the travel etc.

3.3 Fees Default Alert

The management and in charge staff of the school will get notified by the Fees default alert message. The transport manager can able to see the defaults in the server and he/she can get the details within a single click

3.4 Route wise Attendance

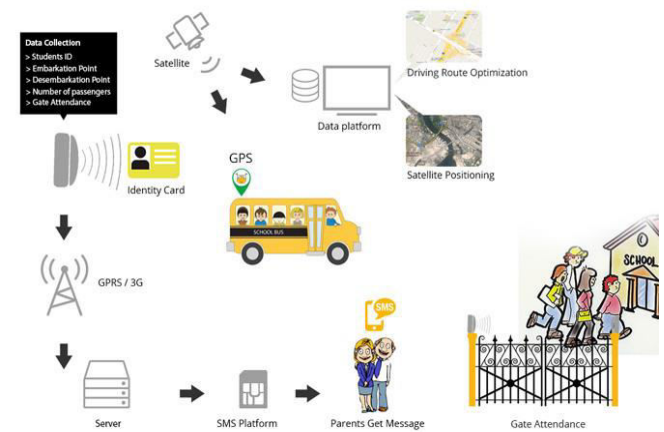
The rout wise attendance will be taken by the system by RFID card while the ward is entering in to the bus. In this the teacher will know the arrival of the students earlier.

IV. RELATED WORK

The existing system provides real time information's of the vehicle like the location, The route, speed, list of passengers and the adherence of drivers to schedule and much more.

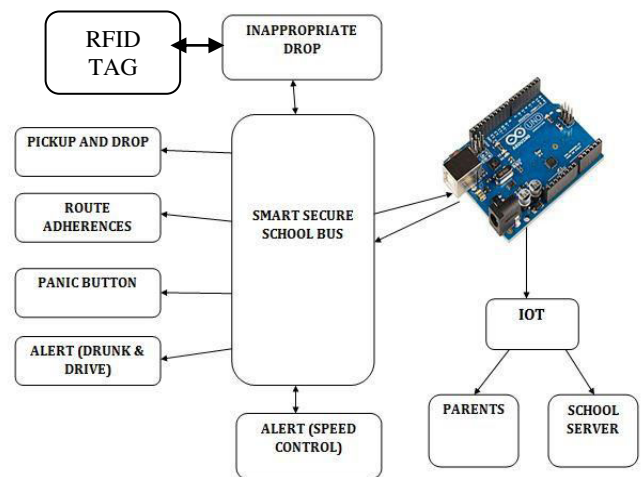
In the existing paper there is no immediate student departure or arrival based notification system initiated. To know more students based information like rout wise student list there is no detailed database is maintained. In the paper we can't able to notify the student fees pending details alert.

V. OVERALL ARCHITECTURE



The above diagram includes the overall architecture of the concept. It includes notifications, arrival and departure time of the students, inappropriate notification, GPS tracking and student attendance by RFID tag.

VI. SYSTEM ARCHITECTURE



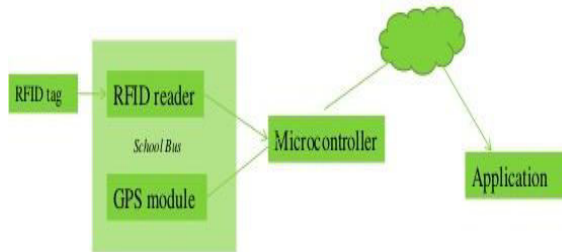
VII. MODULES

4.1. Functional Modules

Location Tracker - GPS module attached to the microcontroller reads real time location of vehicle continuously. The microcontroller uploads the geo-coordinates thus received to the back -end database via Wi-Fi. The front application continuously checks for changes in the database, on loading. When the application finds a change in the database, it reads the newly updated coordinates and plots them on 3 maps in its UL using the phone's internet.



Students Identification- The ID cards of each student is embedded with an RFID tag. An RFID reader connected to the microcontroller identifies each student as they enter. The processor searches for the student in the database finds the respective parent's id and notifies them with the location input from the GPS module. In this module we can also identify stop wise student list. It helps to get the stop wise student count and record.



Inappropriate Drop - In this module we can able to identify the students who are travelling in wrong routes. The transport manager and the bus driver will get notified by the sms to know that the students get travelled in the wrong route. In administration side they can able to identify immediately about the inappropriate drop of the student and the can able to take action for that.

Pick-Up and Drop - In this application, information about child that is when child is picked up and when dropped will automatically send to the parents. Parents can see this information in the android application via smart phone.

Parent Interface Module - This is an app which is used as a user interface. User can interface with the system using the application. All the values send through the wireless module can be seen through the application.

Speed Control - In this application, if driver cross the speed limit of the bus then sensor will detect the over speed of the bus and then voice message in that case will sent to the school management. To detect the over speed of the bus RPM sensor will be used.

Logistic Management - The logistics management will be provided for the data storing purpose. Data about child that is pick-up drop with date and time, Bus attendance of child etc. Such data is will be stored in the logistics management. User of this system can see this data online anytime.

Emergency Alert Button - This application is going to use in emergency cases. We will provide there two panic buttons one for the driver and one for the children's. If there is any emergency such as road accident, heart attack to the driver and any in case of driver then there is a panic button near to the driver so that he/she can press that button. After pressing panic button the voice message will get sent to the school management.

4.2. User Modules

Admin - The administrator can able to add drivers, stops, routes and student in the database. They can able to view location, Speed and list of students on the board. The administrator will access all information in the database. He / She can update the database. They can able to

monitor inappropriate pick up and drop of the student. They will contact parents, Drivers and in charge staffs. They will monitor the fees details of the students.

Driver – The driver can View rout and scheduled stops. Contact admin or emergency services. Get notification SMS about inappropriate drop of the students.

Parents - The parents can view current location, route, designated route and current speed. Parents gets notified when their child alight and gets on. View bus schedule. Contact admin or bus driver.

VIII. CONCLUSION

This paper show that RFID based smart secure school bus technology is a feasible for supervising and tracing the child's during their drive to and from school. Also the speed control, drunk and drive, missing children's, accident emergencies, inappropriate drop, panic button and logistics management plays a major role to improve child security.

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