INTELLIGENCE SYSTEM FOR SCHOOL BUS TRACKING

AUTHOR'S

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ABSTRACT

The use of private vehicles intensifies the existing unbearable traffic jam and majority of the parents consider school buses to be largely unsafe for their kids. However, safe and user friendly school buses can reduce the use of private vehicles and will eventually cut back the traffic jam in cities especially in school hours. All buses can be tracked by the guardians using the proposed intelligent and secured tracking system for school buses. This proposed system includes an Android application that can be employed to send notifications during entry and exit of the students using Bar code scanner, ensuring arrival confirmation of the student by dual authentication. The focus of the research is to display the feasibility of a safe and intelligent school bus using secured tracking system based on authentication procedures. It is expected that the offshoot of this research initiative will regain the confidence and reliability of parents in school bus and reduce the use of individual transport. A smart school bus will keep the student safe, easing the tension for parents and the city will have a smooth traffic system

KEYWORDS: School Bus, Safety System, GPS, Bar Code Scanner, IoT

INTRODUCTION

In the context of daily affairs, one of the common problem is traffic jam where the personal cars carrying students during school hour directly com- pounds the negative impacts on traffic jam. This happens because parents having private transport don't want to take the risk of using public trans- port or traditional school bus for schoolgoing children. While parents who don't own a private transport and use the public ones to carry the children to school, often stay around the school for the whole of the school-hour duration. These parents often have to take number of different routes en route to school and back home. Another probable scenario is that the parents send their children to school alone but they stay tensed as they don't have any regular status updates of their loving ones. There can also be issues such as the students may not go to school or just simply passing time outside the institution, while their parents having no way to locate the whereabouts of these students. Metro cities see worsening of the traffic situation, particularly in school hours. All the sides agree that a sustainable solution providing proper safety in school buses would be beneficial to parents as well as to the students themselves [4, 5]. It will also reduce traffic jam in school-hours. The Internet of Things (IoT) is a concept in which surrounding objects are connected through wired

and wireless networks without user intervention. In the field of IoT, the objects communicate and exchange information to provide advanced intelligent services for users.

LITERATURE REVIEW

A number of school bus tracking systems have been reported in literature, and they address parts of the concern of school bus tracking and monitoring. Gadekar et al. [1] proposed an efficient and reliable school bus tracking cum safety solution in the form of an android application. Such a system allows for the parents to be aware of their child in unprecedented as well as known circumstances. The school authorities are also able to monitor the status of their buses. Generally, they have used a combination of different technologies [9, 10, 11, 12, 13]. They have used the Global Positioning System (GPS) to record the bus location and the Radio Frequency Identification (RFID) to record the student's data and then transfer this information to a server via Global System for Mobile Communication (GSM) network, to be stored in a database. The FRID detect the entering and exiting activity on the bus. The RFID reader queries the RFID tag by sending a signal to the tag and then the tag returns the previously stored data in the tag [2, 3, 18, 19]. The GPS provides the position and time information. The GPS system is based on a number of satellites regularly transmit their location in orbit as well as the time. The GPS use this information from at least three satellites and uses this information to calculate its own location (longitude, latitude, altitude) [6, 7, 20]. In this application, the GPS is used to detect the bus location, the pickup the drop-off location of students and time. The General Packet Radio Service (GPRS) shield provides away of using GSM network to receive and send data to and from a remote location [2].

PROBLEM STATEMENT

In this system, user can easily track the school bus through GPS system.

- An android application is developed to keep track of Bus which travels to and fro.
- Fingerprint Scanner is provided in every bus to ensure the child to reach school safely and back home..

OBJECTIVES

- To ensure the child reaches the school safely by School Bus.
- To track School Bus anytime anywhere.
- To ensure safety and reliability of the school buses considering the current conditions of crowded cities.

PROPOSED SYSTEM/ METHODOLOGY

1. **Step 1:** At first student's Bar Code will be checked for the first level verification.
2. **Step 2:** If the Bar Code doesn't match, then it will be considered as invalid attempt
3. **Step 3:** Verification is done
4. **Step 4:** If a positive match occurs, data will be sent to database and parents will be notified about the student's arrival
5. **Step 5:** When the student is about to be dropped off to his or her destination point, Bar Code is checked again
6. **Step 6**: Then notification will be sent to parents; so that student can't get out of bus anywhere else or can't be late to get out of the bus when they reach at school.

Attendance using QR Code

In the proposed application, QR code is an important function as it is used to take attendance of all the children present on the bus. Our application uses android's Zxing library. All the children have QR codes linked to their IDs

which makes it very easy to note their identity. When the child boards the bus, QR code scanner is run on his ID. The value is sent to the back-end and compared, which updates that the child has boarded the bus. Once the attendance of all students has been completed, the system sends a notification to the parent that their ward is on board. This way the attendance is taken without any error.

Alert

Once the attendance of each child has been taken, the application sends a notification to the respective parent/guardian about the departure of the bus. The application uses Way2SMS API to send notifications to parents when their child has boarded the bus. In addition to this, a notification is sent via the android app as well, as shown in Figure. 3 When a child is dropped off at a point his QR code is scanned again and thus the system logs that the said ward has been dropped off. The message is sent to their parent/ guardian and the map displays that the said drop off point has been visited. En-route, the location of the bus can be viewed by the parent. An alert is also sent to both the parent/ guardian and the school body in the following situations:

1. The bus goes off route

2. There is unexpected traffic causing a delay an emergency (SOS) situation.

HARDWARE AND SOFTWARE REQUIREMENT

- **Hardware**

1. PC Specification: Memory: 2 GB RAM and above
2. Processor: Intel(R) Core (TM) i3-2350M CPU@ 2.40 GHZ

- **Platform:**

1. Operating System: Windows 7 and above
2. Programming Language: Java & XML
3. IDE: Android Studio 8.2 Python (Python 3.9 and Onward)

SYSTEM DESIGN

The core of this research is to implement an intelligent system for tracking school buses. It should ease the work of the school authorities by making the system automated. A mobile application is used for giving parents/guardians a real-time update on the status of their children. This application is implemented in Android. The application facilitates the tracking the live location of the bus, taking the attendance of the children entering and leaving the bus, sending alerts to authorities and parents in case of emergencies and giving an estimated time of arrival. Real-time location is tracked using Google Maps API on smartphones. For the bus conductor and/or staff, the application is used to take the attendance of the children present on the bus with the help of QR code. This information is dispatched to the school server. Similarly, the drop status is also recorded using the code scan. The bus conductors have an emergency button on the application, which can be used during extreme emergencies to alert the authorities via the web portal and the parents via the mobile application. A web application is maintained for the school authorities to view the status of the bus and maintain the database of the students, parents and bus drivers information. MySQL database is maintained to store this information. The updates are sent from the conductor's phone to the Django server via REST APIs and stored in the database. By the web portal, school bus authorities can simply keep a check on the status of the bus and be alert in case of emergencies. The forecast for bus delays due to traffic is viewed on the website by the authorities to schedule the departure of buses to avoid tardiness. The mobile application can be accessed as a parent or a bus conductor. The credentials are exclusively provided to them by the school. A parent can log in as a parent to check his child/children's status when boarding or departing the bus. A profile will be maintained for the user to edit any information of the children which will be reflected in the database. The live location is available is visible to parents at all times and estimated time is shown on the application based

on traffic congestion, etc. These details are also fetched via REST APIs from the Django server after they have been transmitted to the server from the conductor's phone. The technical requirements that should be considered while using the system are:

1. Smartphone must allow access to GPS sensors and Camera

2. Data collection from QR Code should happen in real-time 3. Alerts to conductors, school authorities and guardians require internet connectivity.

System Testing:

The following table represents four test cases that were conducted while doing this project for drowsiness and yawn detection of the driver.

Test ID	Test Condition	System Behavior	Test Result
TC1	Register User	Registration successful	Pass
TC2	Register User	Registration Unsuccessful	Fail
TC3	Login	Login successful	Pass
TC4	Login	Login Unsnccessful	Fail

Table: - System testing

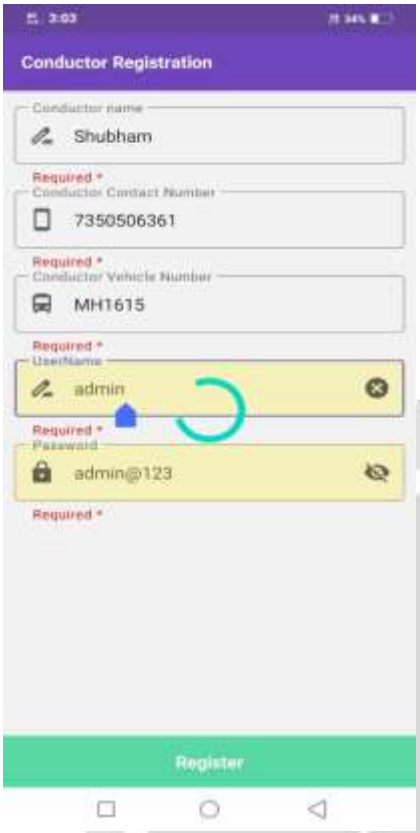
EXPERIMENTAL RESULTS:

1) Login Activity

In this Login Form user can login with their registered accounts. After successful login user can be forwarded to the Bus Tracking Activity

2) Student Registration & List Activity

In this Activity, student is registered by filling application form. Each student is identified by its own QR code.


Conductor Registration
Conductor name
Shubham
Required *
Conductor Contact Number
7350506361
Required *
Conductor Vehicle Number
MH1615
Required *
UserName
admin
Required *
Password
admin@123
Required *
Register


Conductor Track App
Contact Number : 7350506361
Vehicle Number : MH1615
Conductor Name : abl
Contact Number : 8554883365
Vehicle Number : mh23gv5647
Conductor Name : Amey Agnihotri
Contact Number : 7887555257
Vehicle Number : MH15 AC2311
Conductor Name : bhushan
Contact Number : 5968230147
Vehicle Number : mh15341
Conductor Name : Ganesh
Contact Number : 9284114502
Vehicle Number : MH15FN2067
Conductor Name : Pankaj Borase
Contact Number : 8554883610
Vehicle Number : MH15PB2316
Conductor Name : Prabhu Lokhande
Contact Number : 2456789318
Vehicle Number : MH-15 BN-8235
Conductor Name : Anil Gaikar
Contact Number : 7387109772
Vehicle Number : MH 15 BJ 43


Admin Dashboard
2022-05-29
OUT
OUT
OUT
IN
OUT
OUT
OUT
OUT
OUT
OUT

CONCLUSION

In this project, a secure school bus system has been proposed for city. This system will ensure safety; ease tension and anxiety of parents, and will without doubt, improve road conditions. It will also provide an easy pick1up system by providing notifications. Guardians will get notifications through an Android application; this app can be used to see the current status of the bus in a map, thus it will be easy for the parents to track the movement of the bus and get notified at the appropriate times. Hence, they will have a highly reliable, secure and intelligent system to depend upon.

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