

A PBL REPORT ON

SCHOOL BUS ROUTE DEVIATION TRACKING SYSTEM

SUBMITTED BY

Atul Patil	14
Vedant Patil	16
Sumesh Shetty	41
Rushikesh Pawar	19
Gokul Pisharody	21



MENTORS

PROF. GAYATRI HEGDE

DEPARTMENT OF IT ENGINEERING

PILLAI COLLEGE OF ENGINEERING

NEW PANVEL – 410 206

UNIVERSITY OF MUMBAI

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Problem Statement

Management of buses of school transportation system is the main problem now a day. Based onto the current system there is no such system which provides information about the bus, its expected arrival time, the expected waiting time and what is the current location of the bus. The exact route where the bus is moving, and to receive notifications for the deviation of the bus to ensure the safety of the students in the bus.

Students often get on the wrong buses and get off at the wrong stops. Drivers maybe unable to identify all students and will not know in time if a student is missing. Parents have no way of knowing if their ward is safe until the evening when the bus returns. There is no provision to monitor driving within speed limit or unscheduled deviations. School students aren't allowed phones. Working parents have no way of knowing if and when their kids get home. There is no reliable method for tackling delays or accidents, which further aggravate parents. The messaging system which is being implemented ensures the safety of the students, the route is being fixed into the database and the safety message is sent to the parents or the admin ensuring the route deviation has taken place.

Relevance of Subjects

- **AIT:** AIT has been widely used in the project like the basic html functions and the use of latest html version i.e. HTML5 and CSS3 are used along with PHP to make a responsive web design.
- **SWS:** For security purposes, we have implemented the user authentication like of the user login and generated security API key. Project encrypt the password of Admin and parents using MD5SHA.
- **SE:** For implementation and development of website, we use Evolutionary Model, we developed android application with spiral model and update it time-to-time with new features.
- **DS:** For DS, the database which we have in firebase has user client interaction.

Introduction

There are buses made available for passengers travelling distances and also the school buses, but not many passengers have complete information about these school buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass, time taken for the bus to reach, maps that would guide the passenger with his/her route and most importantly, track the current location of the bus and give the correct time for the bus to reach its bus stop. The proposed system deals with overcoming the problems stated above. The system is an Android application that gives necessary information about all the buses travelling in Panvel. This information overcomes the problems faced in the previously built application “Panvel Bus Guide”. The platform chosen for this kind of system is android, reason being Android Operating System has come up on a very large scale and is owned by almost every second person. Also, Android is a user friendly platform, thereby enabling ease of access for all the users. A number of applications made for the Android Operating System is increasing on a large scale ever since its advent. Android is an open source mobile software environment. Brought up by Google, the operating system has been made Linux based and uses Java programming language. It has a virtual machine that is used to optimize memory usage as well as resources. This application has been developed using IDE (Android Studio 1.6) with ADT (Android Development Tools) and Android SDK (Software Development Kit). There are a number of constraints that need to be satisfied.

School Bus Tracker is a simple application created to help you ensure your children's safety. It combines GPS and RFID technologies to provide you with real time location and event information to your smart device. School Bus Tracking Solution School Bus Management Systems is mainly used for Schools & Parents to ensure the safety and security of children by getting the real time information of their child's school vehicle Our customizable solution can help schools to simplify and optimize route management, reduce maintenance expenditures, and monitor student drop-off and pick-up times.

Scope

School & Parents can save time by avoid waiting at the bus stop. School can monitor the Driver & School bus activities remotely. School can optimize the school bus utilization. Increase transparency in school pick up and drop. Emergency situations can easily handle. Get real time alerts of bus location. Increases safety and driver responsibility . Get access to exact school bus location and arrival/departure. Regular monitoring to prevent delays in bus arrival. Tracking the halt, speed and idle state of bus. Instant notifications to parents/guardians. Use your smartphone to find out present location of the bus.

Many cities have found that GPS tracking system not only improve the efficiency of city bus operation, but also encourage commuters to take the advantage of bus system. Many bus system have discovered that GPS tracking system which allows to monitor the location and arrival time of their bus actually increase the number of people using school buses for commuting. The application is a user friendly one that anyone can access for free of cost. The basic idea for this project was to guide the bus travelers with the routes, all the possible stops that come on their way to the destination and moreover, display maps and track their locations and show the estimate remaining time required to reach. The aim is to overcome all the drawbacks faced in all the previous applications and generate fast and accurate results. The proposed system has been divided into two modules as follows. Module 1 gives information about all the routes from the source to the destination and give maps for the same. Module 2 give information about all the buses along with the bus numbers that go through the selected stops, track the location of the selected bus and send this information to the passenger giving him/her the estimate time required for the bus to reach. This is done using the Client-Server technology.

Methodology

This system is a combination of web as well as android application where the driver will be using the android application where as admin and parent will be using web application.

System allows admin to add a new driver where driver id and password is generated and stored into the system.

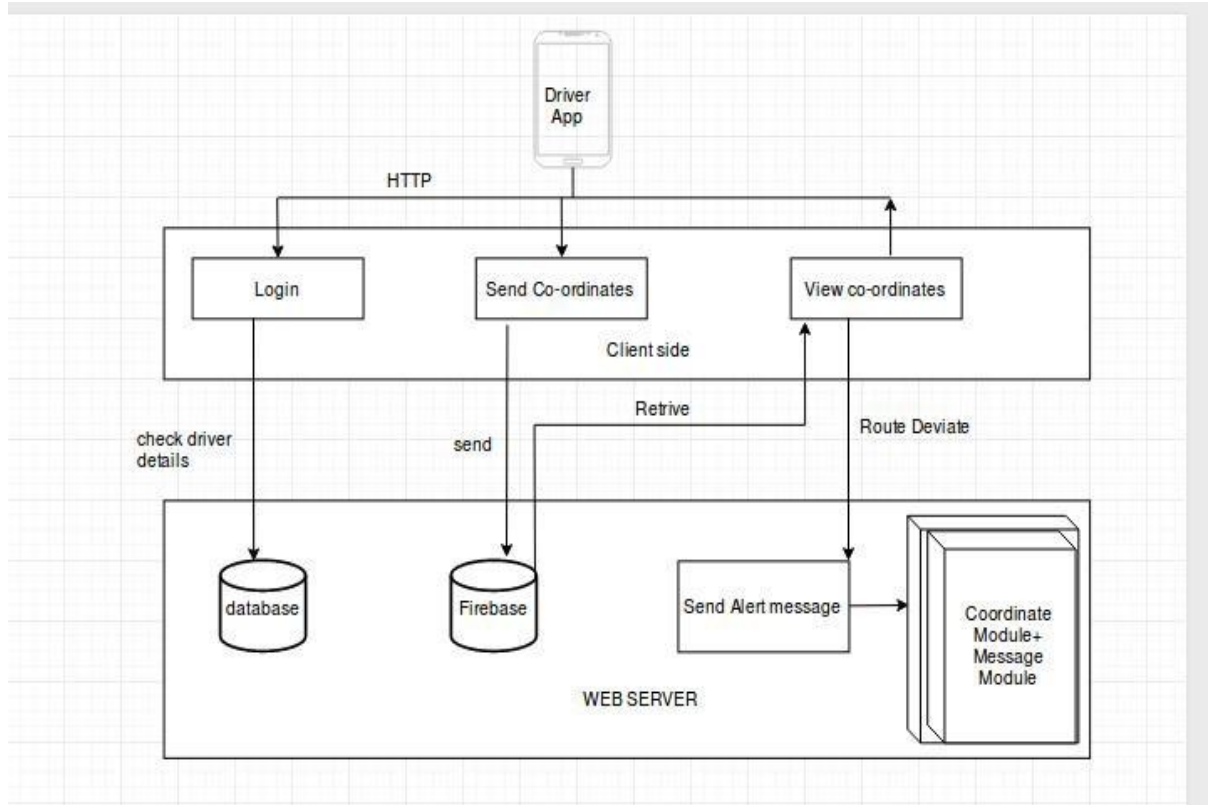
The driver will have the android application installed in his android phone, when the driver will login to the application, his GPS location will be sent and stored into firebase.

As soon as driver log-in, GPS location of the driver will be tracked automatically by the application and stores the GPS co-ordinates into database after every 5 millisecond.

When driver logs out from the application, again GPS location will be stored. In order to keep track the attendance of the driver, this system plays a major role.

The role of the admin is to register a new student by entering his personal details with parent details where parent receives a mail which consist login id and password, so that parent can access the web interface to track their children. Suppose if the bus deviates from its actual route which to be followed by the bus driver then the alarm message will be sent to parents and principle stating that the bus has been deviated from its actual route.

Architecture



Hardware Specification

- WINDOWS -XP,7,8,10.
- ANDROID
- LINUX
- Mobile processor: 1GHZ or higher
- Motherboard: Genuine Intel.
- Ram: 1GB or higher
- Memory: 200MB or more.

Software Specification

- Backend: Firebase, PHP
- Operating system used: Windows 10
- Technology used: Android 4.1 or higher
- IDE: Android Studio.
- Emulators: Micro emulator 555
- Plug IN: ADT plug-in.
- Front-end: Android SDK.
- XAMPP.
- NET BEANS.
- ANDROID STUDIO.

Project Input



GUI of website

PARENT LOGIN

Login into your account!

User ID:

Password:

LOGIN

BACK

ADMIN LOGIN

Login into your account!

User ID:

Password:

LOGIN

BACK

WELCOME

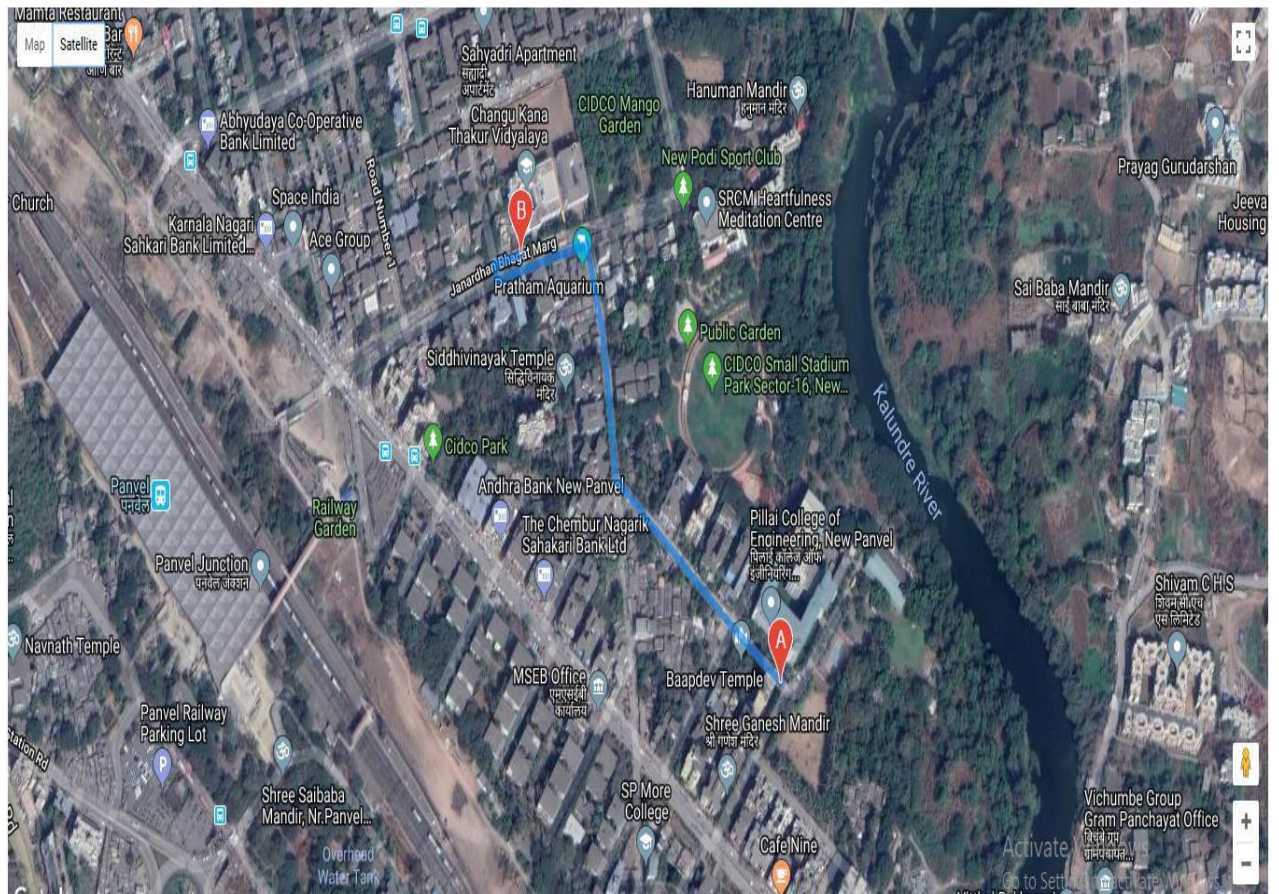
LOCATE BUS

VIEW STUDENT DETAILS

REGISTER NEW DRIVER

LOGOUT

Project Output



Application

1. Addresses Safety Concerns

The primary concern for every parent is their child's safety. With a vehicle tracking system school authorities, as well as parents, get real-time information on each student's location. “Didn't he get on the bus?” “Did he get on the wrong bus?” All such doubts become irrelevant. Notifications are sent for unscheduled stops, and the real-time location can be checked from the system's mobile application; thus quickly finding solutions during emergency situations.

2. Makes Managing Simple

The RFID school bus tracking system is convenient for school authorities. The software takes care of routing and scheduling automatically. School authorities only need to review it and make changes for exceptional cases. It saves the time and energy needed for re-routing and rescheduling whenever something goes wrong.

3. Improves Efficiency & Savings

Employing manual routing and scheduling can cause errors which might incur significant monetary losses. For instance, you might need to run an extra bus just because of a miscalculation. Such discrepancies can be avoided if you have an RFID vehicle management system in place. Employing such a system allows you to be aware of the distance covered and fuel burned by each vehicle. Therefore, it will be easier to streamline payrolls for drivers and vehicle service providers.

Also, the school authorities get to know how efficiently the buses are being run, if there is unnecessary idling and if the speed limits are being observed. These help in significant savings for the school over a period of time.

4. Acts as a Solid Record

By having a GPS vehicle tracking system, a school will be able to monitor and store the activity of each vehicle. Combined with the RFID

tags, it can be really useful in tracking children if they go missing. The database can also act as evidence when and if accidents happen.

5. Provides peace of mind

Obviously, installing a GPS school bus tracking system provides peace of mind to parents as well as school authorities. With real-time notifications via a tracking system, you will be able to know the reason behind the delayed school transportation. Sometimes it can be traffic jam, unfavorable weather condition, break down, etc. whatever may be the reason, parents and school authorities will know about it instantly.

6. Maintains school bus attendance accurately

It is a difficult job to maintain attendance of each student separately. Also, taking attendance manually is prone to errors. With the help of a tracking system, you will be able to record school bus attendance quickly and easily. The attendance details obtained from the tracking system can be accurate and reliable one.

7. Enhances driver safety

You cannot always accompany school bus drivers and ensure that they are following essential road safety rules. By using a GPS tracking system, you get access to details such as speed, acceleration, braking, and turning of the bus. With these data, you will be able to know whether the driver is driving safely and whether he/she is following road safety rules or not.

8. Awaits avoided

By using a GPS school bus tracking system, parents are able to get real-time notification on arrival and departure timing of a school bus. Hence, long time waits and physical stress can be avoided by children as well as parents.

9. Creates a greener environment

A school bus tracking system will provide you the best route for school transportation and the idling time of each school bus. This will reduce the

fuel consumption, which indeed results in creating a greener environment for everyone.

Future Scope

- Wireless Security camera can be added to project.
- By using a security camera, parents or users can monitor their children inside the bus.
- A provision to disable the vehicle in case of theft can be added.
- This project will be put up on the cloud platform, so that it will be accessible by every Android user.
- The application will prove beneficial for every bus traveller not only school, even tourists.
- Not just buses, but this application will be useful for every person travelling by any means of transport.
- The Location Tracker will give the exact location of the bus which will make it easy for the passengers to travel.

Project learning outcome

Thus, after implementing the project we explored many new things which positively affected our knowledge and thus helped to reach newer heights in terms of making Android Application, handling of the firebase database, etc. We explored many subjects which played a very important part in the development or improvement in the available knowledge of the subject. We learned various new languages like PHP, html javascript and also shaped our understanding in the development of Software application. The firebase was also an interesting part which we got to know about as database for storing the coordinates of the location storing information.

The behavioural pattern of the GPS technology was also a means of increasing information. The messaging technique was also learned for

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