An Android Application For School Bus Tracking And Student Monitoring System

My Bus My App

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Abstract: The BUS TRACKING AND STUDENT MONITORING SYSTEM is a mobile application that ascertain security to the students. The main objective of this application is to build a conveyance monitoring system for school children. Nowadays, parents are perturbed about children peregrinating to school because of the incrementing number of cases of missing students. On certain occasions, students need to wait a much longer time for advent of their school bus; our proposed system provides a technical solution for the above scenario. The system consists of an Internet enabled android application which will interact with a server. Authentication, attendance monitoring, conveyance tracking are the other features provided by the system. Driver, Faculty/Edifiers, Parents, and Administrators are the cessation users of the application. The application uses wireless technologies like GPS and GPRS/GSM. With this android application parents can visually examine all the forms of kineticism of the bus and monitor their child's presence.

Index Terms -Global Positioning System (GPS); General Packet Radio Service (GPRS); Global System for Mobile Communication (GSM); Student Monitoring; Android; Bus Tracking; Firebase; Cloud Server; Google Maps API.

I. INTRODUCTION

Today, parents are apprehensive about the safety of their children. There are an abundance of issues like abducting children peregrinating home, or from home when they are slumbering or during a party. Recent studies show that India is in 4th place in the number of child missing cases after Coalesced States of America, Coalesced Kingdom and Germany having 96000 child missing cases per year [1]. Nowadays, even the bus getting delayed due to a minuscule reason makes the parents bothered about it. But today's technology can provide a much better solution to ascertain the children's safety. To track and monitor their children, the proposed system provides an Android predicated bus tracking system. All the registered users can view/accumulate and exchange data inside the android application. Inside the conveyance there would be a pedagogia/faculty who would be in charge of the conveyance and he/she would withal be in charge of taking the student's attendance. As anon as it is taken, parents would be notified if their child has boarded the bus or not. The GPS in the driver's mobile is utilized to track the conveyance. Once the conveyance commences to move the parents can view the live aliment in their application with the avail of Google Maps. These avails keep them updated about all the issues on the way and plan their work accordingly. Each and all updates are notified to the parents as anon as possible. This work fixates on the design and implementation of a school bus tracking android application. The paper is organized as: Section II explicates all the works cognate to the proposed system. In Section III, we expound the working and all the modules in this application. Section IV explicates the algorithms in this system and in Section V all the results are explicated. In Section VI, all the future enhancements that could be brought in system are mentioned.

II. LITERATURE REVIEW

The literature [1] implements a RFID method to monitor student attendance, utilizing GPS tracking mechanism to track the conveyance position and determinately presaging the advent time utilizing Kalmann filtering method. Here we are superseding the hardware components utilizing an android application.

The literature [2] proposes and implements a low-cost object tracking system utilizing GPS and GPRS. The system sanctions a utilizer to view the present and the past positions recorded of a target object on Google Map through the cyber world. Rudi mentally we are utilizing an android application to develop a bus tracking system which is cost efficacious.

The literature [3] monitor bus traffic inside spacious bus stations, and can apprise administrators whether the bus is arriving on time, early or tardy predicated on RFID technology. This information is then exhibited on the different wireless exhibits inside and outside the bus station.

Paper [4] deals with Prospect Maximization algorithm to resolve traffic anomalies and it utilizes Hadoop map minimize method.

[5]Proposes an application which uses GPS and GPRS technologies to soothsay the authentic – time location of the bus and the advent time of bus.

The Literature [6,7, 8, 9] verbalizes about conveyance tracking and sundry advent time prognostication methods. The proposed system can withal be elongated to get this information in a cost efficacious manner.
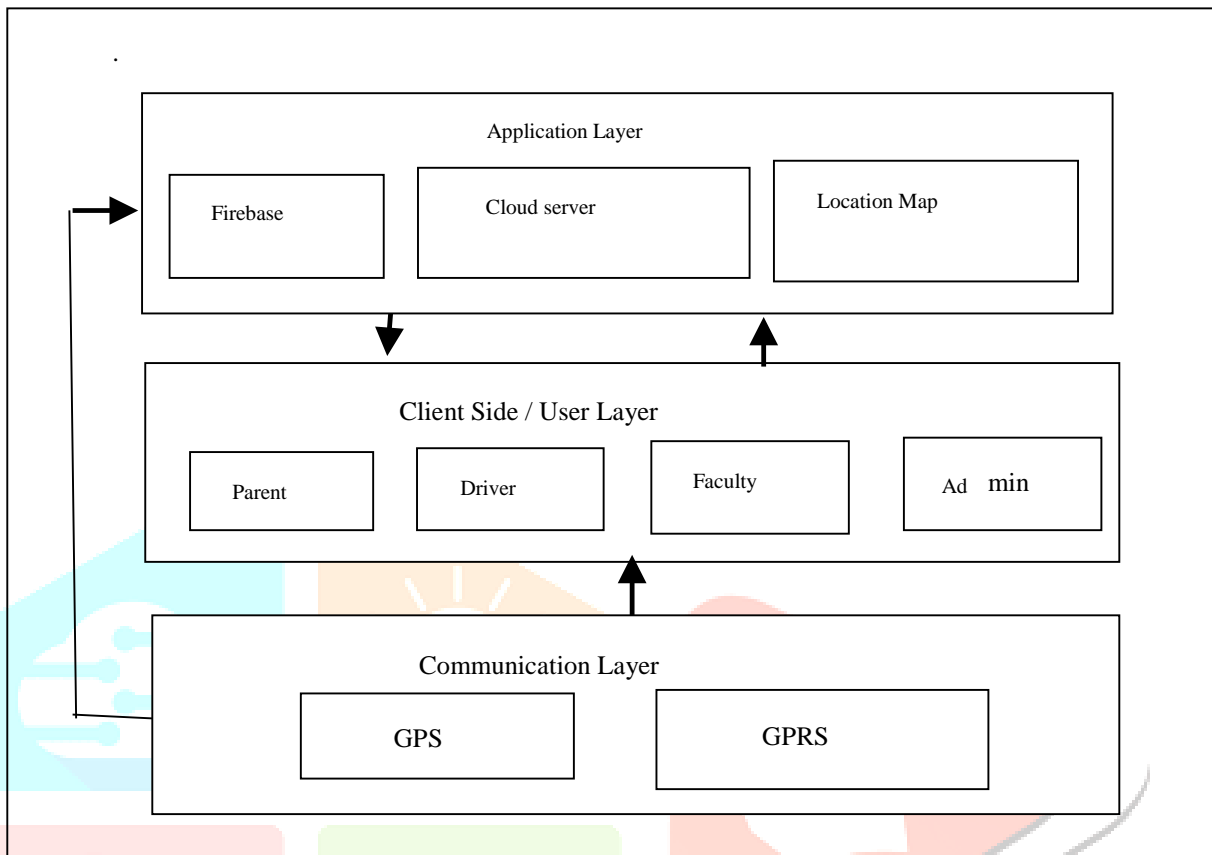
III. SYSTEM ARCHITECTURE

Fig 3.1. system architecture

A. Communication Layer

This Layer is utilized to establish a connection between the Utilizer layer and the Application layer. Sundry technologies like GPS and GPRS is utilized in this layer.

GPS: Ecumenical Situating System is utilized to locate the contrivance. Tracking is possible even without the GPS, we could utilize the distance of the contrivance from most proximate tower and some other features. But it won't be precise, the obstacles in the way makes it hard. If we are utilizing GPS, then we would be able to pinpoint the contrivance even through some obstacles, but if there are a plethora of obstructions or if the contrivance is indoor, it might be tough to get the location.

GPRS: General Packet Radio Accommodation is a wireless communication accommodation predicated on packets and enables perpetual connection to Internet to the mobile contrivance. It is utilizing this connection; we are sending data from contrivance to cloud server and Firebase and taking data from them. A stable GPRS connection is needed for the live tracking of the bus.

B. Client / User Layer

This layer mainly consists of all the users of this application. They interact with the system to amass and give information. The sundry functions of all the users are as verbally expressed below.

Faculty: He/she is the one who is in charge of the whole children in the conveyance and their safety. They are given the ascendancy to mark the attendance of the children in the to and from journey and ascertain that the children board the bus in time safely. Once the attendance is taken, it is sent to the cloud server and will be stored there. As anon as the attendance is updated, parents would be notified and they could just check it.

Driver: He would notify the conveyance is commencing to peregrinate from the school. Once he notifies, the location commences transmitting from his contrivance. It is sent to Firebase and stored there for later use. For every update in location, the parent can view each and every kineticism of the bus.

Parent: He/she can perpetually watch over his child on his/her way to school and back home. They can optically canvass all the diminutive moves that the bus makes and can check if their child has boarded the bus or has gone missing or did he/she bunked the bus. Parents would be notified if there is a holiday, at least a night prior to it and even special events or some issue on the way.

Administrator: He/she is the responsible for the management of all users, conveyances and routes in the system. Admin is

adscititious given the ascendancy to apprise parents about all events even if it is a minuscule one.

C. Application Layer

This layer contains all the consequential technologies that are working mainly in the back end. It consists of the following components and its functions are expounded along with it.

Firebase: It is platform for the development of web and mobile applications provided by google which is free for a diminutive number of users utilizing the same access point. In firebase, GPS location is preserved in genuine time database which will be yare for updating in the other end. It only takes a few milliseconds to preserve and make the same changes where it is being called upon.

Cloud server: A server is utilized to store the details of the users and all the information about the buses, routes and attendance of the children. Historical data are supplementally preserved in the server. It is where all the users interact and accumulate all the information that they require.

Location map: it is shown in parent's contrivance utilizing google maps API. Once a vicissitude in location data is found in the firebase, the same will be updated in the map.

For this study secondary data has been amassed. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are amassed for the period of five years. The time series monthly data is amassed on stock prices for sample firms and relative macroeconomic variables for the period of 5 years. The data accumulation period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index are taken from yahoo finance.

IV. ALGORITHM

This section contains the sundry algorithms in different user's contrivance/ server. Here we are identifying conveyances position utilizing Google Map API. The code will capture conveyances position and send it to Firebase cloud database. The driver is responsible to enable this module utilizing his authenticate credentials. The screenshot of the module has given in Fig 2.

A. Starting Journey in the Admin Module

Input: Authenticate Credentials of the Admin.

Output: Integrate, Manipulate and Abstract Driver, Student and Parent module.

1. Login to Admin Portal
2. Add, Update, View & Efface Student, Driver and Parent to database.
3. View bus location.
4. Generate Student and Bus report.
5. Logout from Admin portal.

Upon authenticating the admin's credentials, the system grants access to functions sanctioning additament, manipulation, and abstraction of data within modules dedicated to drivers, students, and parents.
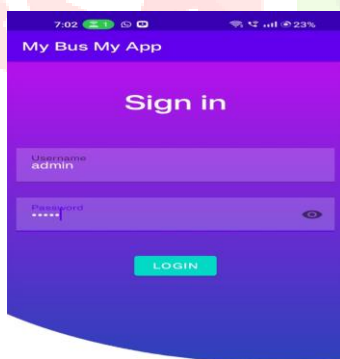
Fig A.1: Admin Sign-in

Fig A.2: Admin features

B. Starting Journey in the Driver Module

Input: Authenticate Credentials of the Driver.

Output: Live GPS location of the conveyance

1.   Login to Driver Portal
2.   Click on "Start Journey" once it is time to leave the school.
3.   Read Latitude and Latitude of the contrivance from GPS.
4.   Google Map loads exhibiting the vehicle's location.
5.   Start sending the location data to Firebase until the destination is reached.

The attendance module will capture the attendance of the students in the bus with time and send to the cloud server for further processing. Faculty present in the bus is responsible for this. An android interface is utilized to do the attendance ingression.
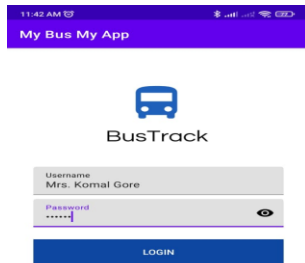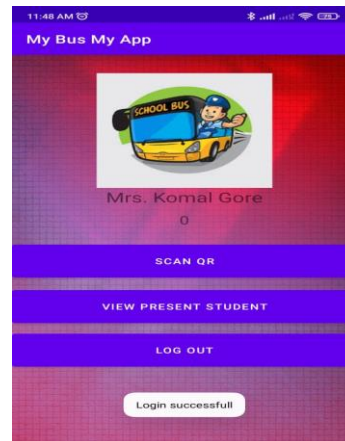

Fig B.1: Driver Login

Fig B.2: Driver features

C. Taking Attendance in the Driver Module

Input: Authenticate Credentials of the Driver.

Output: Attendance list of the children in the conveyance.

1.   Login to Driver Portal.
2.   Click on "Take Attendance" and scan their QR code once the conveyance leaves the school.
3.   Mark the set of students that are present in the bus.
4.   The final data is sent to the cloud server.

Whenever a route change or delay in reaching the intermediate cases has been recorded and stored in the firebase cloud server and plot the data in Google Map.
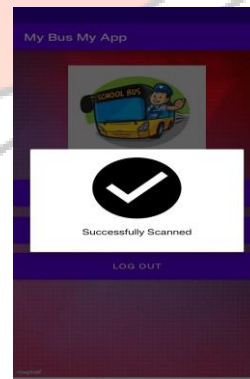

Fig C.1: Scan QR Code of student

Fig C.2: Scanning Successful

D. Tracking Bus in the Parent Module

Input: Authenticate Credentials of the Parent.

Output: Live location of the conveyance.

1.   Login to Parent Portal.
2.   Click on "Track bus" to optically discern the current location of the bus.
3.   Fetch data from Firebase for every vicissitude that occurs.
4.   Plot the data in Google Map.

The screenshot for the conveyance tracking module has been captured in the following figure (Fig: D.1). Sometimes bus route may change because of traffic, religious celebrations or protests etc. and thereby delay comes in travelling. Predicated on the delay in the travelling, the parents can ken the position of the conveyance is the one of the consequential magnetizations of this module.

We can enhance the features just by soothsaying the advent time of the conveyance in each intermediate cases [2].
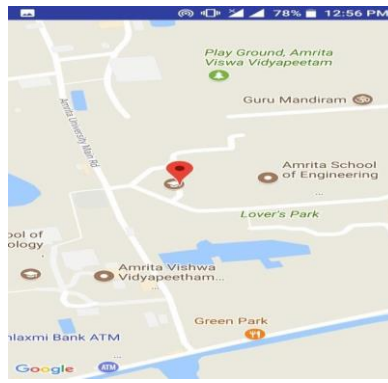

Fig: D.1. Location of Bus on Map

E. Viewing Attendance in the Parent Module

Input: Authenticate Credentials of the Parent.

Output: Status of their child.

1. Authenticate to Parent Portal.
2. Click on "View Attendance" to optically discern if the child has boarded the bus.
3. Fetch data from server.
4. View/Show the attendance status

The above pseudo code w

ill sanction the parents to view the attendance of their ward and hence they can ascertain the security. The data will be retrieved from the firebase cloud server and populate the data to the android application.

F. Tracking Bus in the Student Module

Input: Authenticate Credentials of the Student.

Output: Live location of the Bus.

1. Login to Student Portal.
2. Click on "Track bus" to optically discern the current location of the bus.
3. Fetch data from Firebase for every transmutation that occurs.
4. Plot the data in Google Map.

The functionality enables students to track the live location of their school bus through the Student Portal. Upon authenticating their credentials, students can access the "Track bus" feature to view the current location of the bus on a Google Map interface. Genuine-time data from Firebase is perpetually fetched to update the bus's location, providing students with precise and au courant information. This feature enhances student safety and sanctions for better orchestrating of commute times.

Fig: F.1: Student Login

Fig: F.2: Student Features

V. RESULTS:

The system was developed utilizing android studio, the webserver is XAMMP. The database used is phpMyAdmin and firebase. The application is regimentally installed in android tabs and phones. The different GUI s in the application and their utilization has shown below. It contains different modules for administrator, faculty, parents and drivers. Screenshot of parent's view has been shown in fig D.1. Application contains attendance monitoring and conveyance tracking and monitoring features (Fig: D.1)

Fig V.1: Screenshot of parents'view

Fig V.2: Attendance report

Attendance Monitoring Module: The preceptor is responsible for the safety of children in that conveyance. Faculty takes attendance in the morning and evening and update the information for the parents. An android application interface is utilizing to record the attendance by the faculty in charge. The recorded attendance has been pulled up to android application from firebase server and which can be viewed by the parents, screenshot of same is placed here (Fig V.1).

Conveyance Tracking and Monitoring: The driver notifies the commencement of the conveyance and from that moment, the vehicle's location could be visually perceived by the parents. Retrieving the position of the conveyance utilizing Google map API. Parents could keep of their children utilizing this application. As anon as the conveyance commences moving, parent would be notified about that and they could just watch each and every kineticism of the conveyance. Just as the conveyance is leaving the school, the child's presence would supplementally be notified.

VI. CONCLUSION:

We developed an Android application for school bus tracking and to monitor children. It was with the utilization of wireless technologies like GPS and GPRS and some good platforms like Firebase. With the avail of this application parents need not worry about their child. Its implementation is done in a very cost efficacious way as it only needs mobile's GPS and Internet connection. This might not be 100% efficient as it depends on the haste of the mobile and the connectivity of the GPS. This would be a great assuagement for the parents who are genuinely worried about their child's safety. Some of the future enhancements that could be brought in this system are Dactylogram Scanner, RFID Tags [2], ETA (Estimated time of Advent) [2], Chat box for parents to interact with faculties etc,

VII. REFERENCES

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