

Real-time College Bus Tracking System

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Abstract - In the today's society the major issue facing by the student is to catch the college bus on time to reached the destination, the student will be unaware of the college bus whether it has already left the place of the pickup or not?, where is bus? in that case there is no proper solution which identifies the location of a bus. Henceforth in the order to help the students in finding the accurate location of bus, the proposed system implements an Android applications which could help in finding the solution to this problem. By applying latest idea regarding the solution based on GPS (global positioning system) on Internet of Things(IoT), the college students can effectively organize and schedule the bus movement on a campus and also helps to tracking and document it in real time. Thus, the user's application receives from the Google Map API the map that highlights the recent position of bus. This system also included with the emergency panic button if any accident occur in between the travelling by clicking the panic button student has sent to the notification of alert message to the admin it is equipped with exact location of bus through Gmail.

Key Words: Android, GPS, Google Map API, Gmail.

1. INTRODUCTION

Another technological innovation focused at making it possible to get accurate and timely information on the state of affairs of the college buses is the real-time college bus tracking application. This system also improves with the mobility of the current and the future students and the efficiency and security of using mobile applications, cloud database, and GPS. Real time data collection about buses makes the users well informed about the route. The Global positioning system(GPS) tracking unit integrated with each bus, the cloud database and computing server, real time applications for immediate updates, Firebase as a cloud database and the communication network that links all these parts as the real time school college tracking system. These GPS units constantly feed position information on the bus to the central server. Similarly, it provides real-time positions of the buses, estimated time and arrival schedule at the user developed mobile applications connected to the cloud. The first advantage of having a real-time bus college tracking is safety of student, or the chance to significantly enhance it, indeed. Safety of a college is achieved through accurate locating, which ensures identification of the students' location

in a time of an emergency or if they miss the bus. Further, through the technology, a student can be told the likely time that the bus they have to board to get to college will be arriving based on their preferred timetable. In addition to this, the proposed system gives the alert notification message to the admin if any accident occur in between the travelling and can be achieving by the assist of Google Map.

2. LITERATURE SURVEY

The basis of "Real-time college bus tracking system", various work is completed from different authors. Based on research conducted by Mohammad Nazmul Hasan et. al. [1], the author proposes to develop an easy real-time bus locating system which only requires cell phones and a real-time server. This, through make use of database server, occurs in real-time, while through the internet map service, the application collates and disseminates bus location. It provide almost accurate position information which is very useful for tracking bus and it's minimize the waiting time at the each bus stop. In [2], R K.Premkumar et. al. proposed an advanced real-time tracking system of bus will be bind up with GPS, IoT, Android, and Google Maps. The system captures any sort of the real-time bus position data and lets the users know in an effort to assist them stay on schedule and avoid long waits. Through the provision of information at closer range of users to the stop, and providing the accurate bus' location, it conflicts challenges such as jam and break down. In [3], B. Janarthanan et. al. described the Real-Time Bus Monitoring and the Passenger Informations system to display the whereabouts of bus in a large metropolitan city as of the moment. The technological application involves the usage of GPS data from the bus with feeds relayed through GSM to a control center and displayed on the GLCD panels at a bus stops. In [4], the authors Anjali Badkul et. al. proposed design an Internet thing based real-time of bus monitoring system to feed the statistics to the cloud for data collecting which is developed by Nodemcu. The study employs radio-frequency identification (RFID) high frequency tags affixed on buses and RFID readers installed at bus stops. Using an application on the mobile phone, the consumer can for instance see what is going on there regarding the bus or time of bus is going to arrive. The purpose of proposed system discussed by author A. Sharif et. al. in [5], has a broad aim of making it extremely trouble-free for the members of the campus community to identify where the buses are and when they are expected to arrive additionally the number of passengers it is carrying. It is developed for Android using such IoT devices as People Counters, GPS trackers, PhoneGap, and others. In [6], Rahit Minni et. al. propagates the sytem that utilizes cellphone and

the open-source of Google Map API which is freely available. To reduce interval between two buses and, therefore, increase the overall effectiveness of a system, it is important to have up to date information on movement of buses. Through the GPS and the GSM signal the Alert system may used to identifies location of devices with the high level of precision. In [7], Ms. A. Deebika Shree et. al. described their work according to alerting, tracking and monitoring in the paper, the author proposes an automated public bus transport tracking implemented in IoT environment. While the RFID readers are mounted on the bus stops and the buses are equipped with the RFID tags, the Arduino board is exploited in the system as a central board. In [8], Mr. Darshan Ingle et. al. present a low cost to track of vehicle for instant bus information services to customers through the Short Messaging Service (SMS) without using GPS or internet. In [9], Süleyman Eken et. al. the authors proposed system like waiting in bus stops the passengers have the authority to scan with their mobile phones QR codes that show the map of the current position of bus, the current time of bus was due and bus lines. It also erases waiting on C4 besides providing alerts by using SMS or email. In [10], Sharmin Akter et. al. proposed an IoT cloud based on tracking for the bus which will enhance the operation of public transport. The service also enables a passenger to buy a ticket and decide where to sit and this saves time for passenger for the authorities, the application is useful because it will show the position and times of the buses, thus reducing time spent by passengers waiting or standing. In [11], SeokJu Lee et. al. proposed a mobile vehicle tracking method using the alow-cost microcontroller and the car location is using real geographic co-ordinates in form of GPS while the GSM/GPRS is being used for sending this location to the database. In [12], Shubham Jain et. al. develop a GPS assisted school bus locator system for real time tracking of school bus. However, since the objective of the system is to ensure the students no need to pay out more time waiting for bus, then that information is put in a website and an Android application, showing the real time position of them and a possible time they are likely to arrive. To improve GPS accuracy it filters the data obtained from the Google API using a Kalman filter on the acquired Google Maps. In [13], J. C. Ogbonna et. al. proposed development of GPS-based real-time mobile tracking system for public vehicles. This follows moving cars and relays coordinates to a web server shown on GIS maps using GPS equipped cellular master. In [14], the work including number of GPS-based car monitoring methods by Kismat Pradhan et. al. examines the effectiveness of these methods and indicates the they are fit for real-time tracking and safety. It reflects the frequency of using GPS-GSM system usage; this means the cars can be tracked using internet maps or other related software at low cost if found. Hoping that the information provided will be useful for further improvement of the vehicles' safety, the importance of car monitoring is described in the paper for both private and commercial utilization. In [15], Mark Darren Savuriar et. al. proposed the system about RM416 is compared to RM6500 charged by conventional systems and it is ideal in the 15 km radius area. This equipment acts like a car's black box that logs and tracks information like co-ordinates and speed, time down to the last detail through the Google API and software. Hence users have the capacity to view the stored data.

3. METHODOLOGY

The present work is using hardware components ESP8266, GPS tracker and buzzer. The proposed work used firebase as a cloud database to stored data. Using Google Map APIs, an Android application might be used to view the current location of the college bus.

3.1 SYSTEM DESIGN

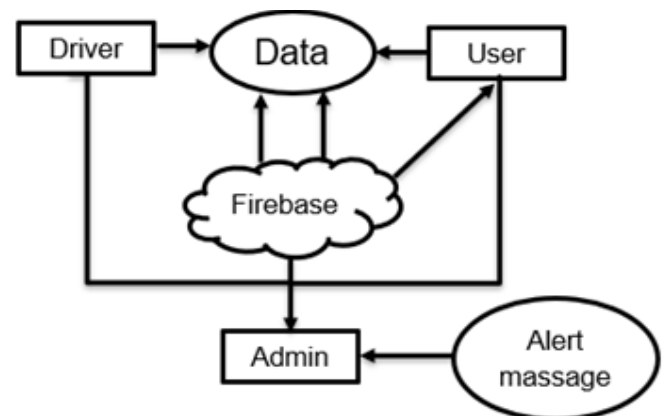


Figure 3.1.1 System Architecture

The representation of the current proposed system real-time college tracking system for college bus includes two types of implementation such Internet of things as a hardware components and android application. The hardware componenets it is tracker and ESP8266 are used to tracking the live location with the WiFi supports to store the data in cloud platform as firebase and it could associated with Google Map API. The system contains basic functions togetherwith safety functions Besides These basic functions, the system includes elements of safety features. This is because they incorporate a separate panic button to enable people to alert the authorities in the case of an emergency that is happening in the bus. Once the panic button is pressed, the system will capable of notifying the admin and other concerned authorities using the Firebase platform; it also provide the present details of the bus. This helps for instance in emergent circumstances that will require prompt aggravation.

3.2 PROPOSED SYSTEM

Our proposing system uses android platform that allows to parents to identify exact location of vehicle at anytime and anywhere. The live location of bus can shown to the respective log in mobile application using Google Map. The Android application includes user modules:

- i. Driver Module
- ii. Parent Module
- iii. Admin Module

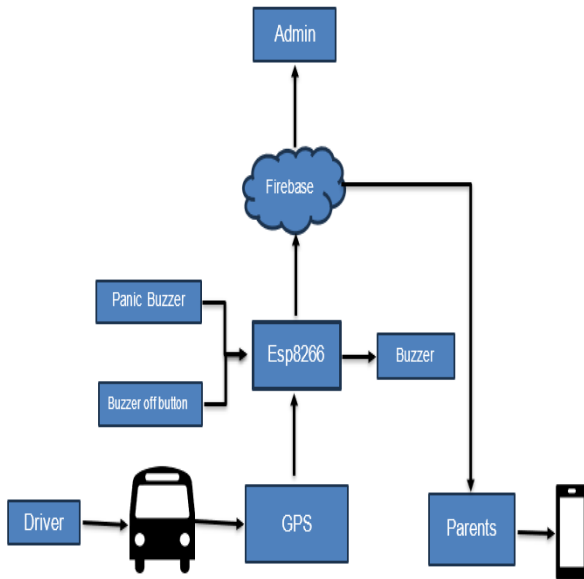


Figure 3.2.1 Schematic view of propose model

This section is outline the module descriptions of the propose system. The Figure 3.2.1 shows the schematic representation of a proposed model.

3.2.1 Driver Module

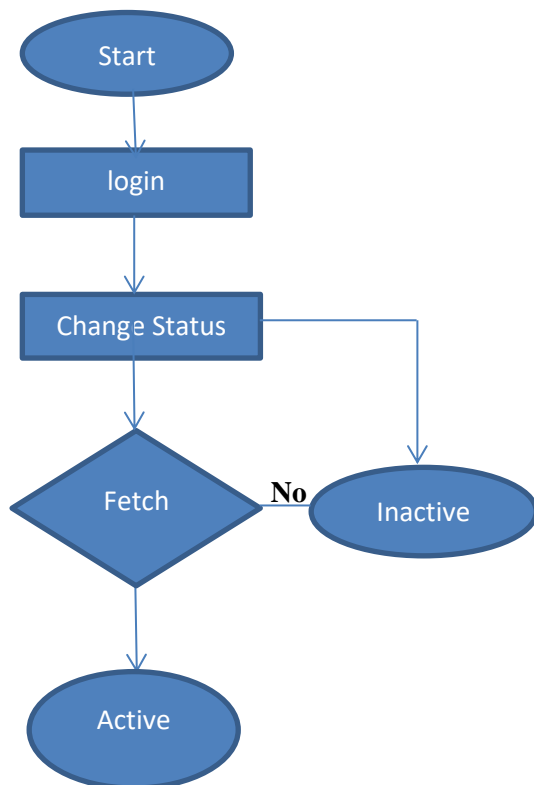


Figure 3.2.1 Driver Module

In Figure 3.2.1 the driver module allows the bus driver to set the bus status as 'active' or 'inactive'. When active, the GPS location is automatically transmitted to Firebase.

3.2.2 Parent Module

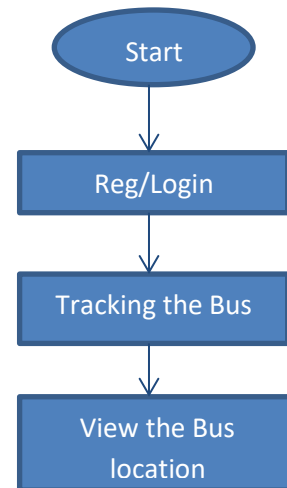


Figure 3.2.2 Parent Module

In Figure 3.2.2, the parents' module provides an interface for parents to view the real-time position of bus by fetching the latest coordinates from firebase.

3.2.3 Admin Module

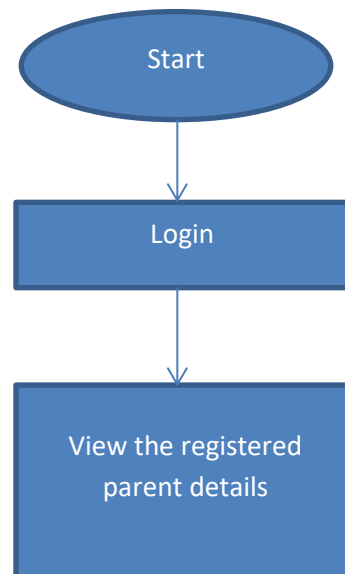


Figure 3.2.3 Admin Module

In Figure 3.2.3, the admin module enables administrative users to manage and view the all details of registered users, ensuring proper system oversight and user management

3.3 HARDWARE SPECIFICATION

3.3.1 GPS Technology

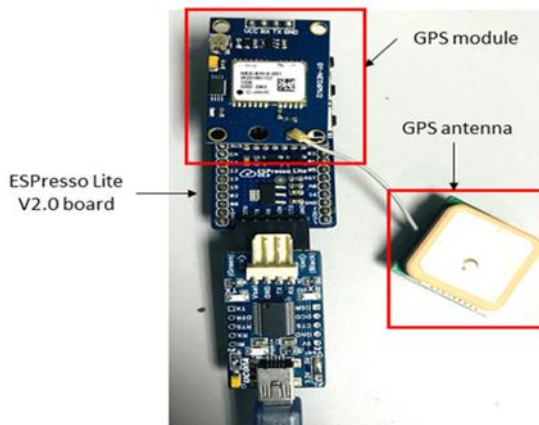


Figure 3.3.1 GPS Technology

In Figure 3.3.1 through the assistance of Wi-Fi features a GPS locator is utilized to follow the moving bus route during actual time. It also updates the embedded system ESP8266 to giving recent data.

3.3.2 ESP8266

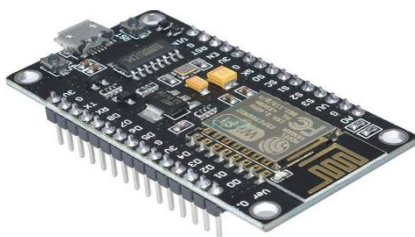


Figure 3.3.2 ESP8266

In Figure 3.3.2 ESP8266 module, utilizing a Wi-Fi module, was utilized to figure out the bus's exact spot. This functions as a GPS receiver, consistently relaying geographical coordinates to the ESP8266 and relaying the data in real-time to the Firebase platform.

3.3.3 Buzzer



Figure 3.3.3 Buzzer

In Figure 3.3.3, the buzzer is used give the alert notification to the authorized admin if any threat or any emergency is happened and there is equally a button to deactivate a buzzer if the emergency is solved.

3.3.4 Firebase

Firebase is a cloud service platform, in real-time college bus locator platform the current point of a bus perhaps in active/inactive state and real-time location coordinates are stored in firebase which serves as the cloud database. It makes it possible for an android program and physical elements to communicates easily and data is constantly updated and visible.

4. EXPERIMENTAL RESULTS

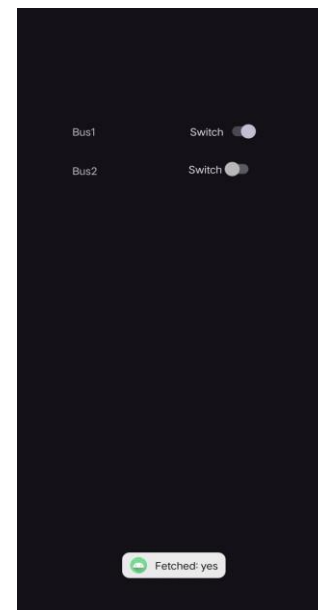


Figure 4.1 Driver Selection

Whenever the driver enter to the driver module, the driver has to login with his login credentials. In a next step the driver will change the status of bus it may be 'active' or 'inactive' if the active or inactive state fetch the location it shows switch on, it shows in the Figure 4.1

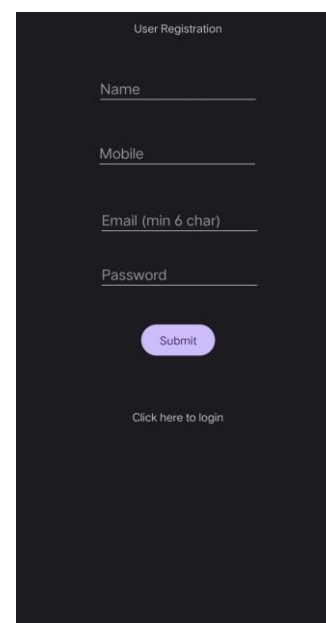


Figure 4.2 Parent Registration

To be aware of the exact live location of bus the parent have to enter to the respective module or login. Then, Choosing a bus number the parent can find the instantaneous position of bus through mobile application in the company of Google Maps this can shown in Figure 4.2 and Figure 4.3.

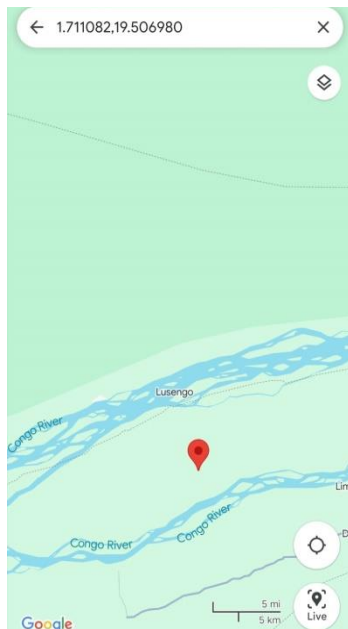


Figure 4.3 Viewing the location

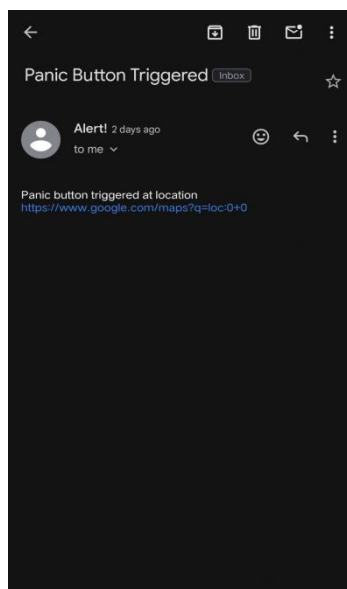


Figure 4.4 Alert Notification

The system also includes the special feature, once the bus leave the starting point of the student location in the middle of the travelling, students has the ability to send the alert message to the authorised admin with the precise location of bus this can shown in Figure 4.4

5. CONCLUSION

In this work, we incorporate the GPS tracking technology and make and upgrade the tracking process for real-time college buses which only requires real time server and a smart phone. Our application which based on two main ideas: firstly, it uses GPS to obtain the live bus location and, secondly, it updates the bus position to the database server. The expected features is available in the server-side, client-side, and bus-side in the design. This application also limits the cost of tracking the whereabouts of bus a IoT, as it doesn't need any extra hardware than a smartphone which is easily available to anyone anywhere in the world. It delivers almost accurate information at that real-time to facilitate the user track the buses. In the addition to this the presented system has one panic button it sends the alert note to the admin.

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