

Live Tracking And Fault Tolerance In Public Transport

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Abstract—The route framework is fundamental for each individual, let it be making a trip starting with one spot then onto the next, or to discover the separation between different areas or to get data about a spot. In the present life, Time and Money are significant, nobody needs to burn through their time and cash, be it going on a long course or short one.

Other than this, strange and sudden conditions on the streets influence the smooth activity of the transport framework and the development of vehicles. Likewise, ordinary issues, for example, traffic blockage, sudden postponements, arbitrariness in traveler request, sporadic vehicle dispatching times occur, and because of which the timetable of the travelers is influenced and they definitely need to hang tight for the appearance of their separate transport.

This traveler burden can be kept away from by presenting a framework that gives ongoing data about the area and the assessed time of appearance of the transports and educates the police headquarters about the obstacles.

Keywords—Accidental Sensors, Google Maps, GPS, GSM, S.O.S, Vehicle Tracking.

I. INTRODUCTION

Mobile has become a vital communication tool which everyone prefers to possess and carry along. This technology has laid a foundation to overcome the traditional desktop-based approach of obtaining information. Location tracking is a process of determining the precise location. These tracking greatly impact to find location of a vehicle, person or other asset to which it is attached and to record the position of the asset at regular intervals. With the rapid growth of online resources, user can easily track anyone or anything. As a result, the location tracking being done progressively. The higher the volume of traffic on a road, the stronger is the case for public transport. Rail-based systems are very expensive to build & maintain. Therefore, not have extensive reach for a long time to come. No city has ever been able to—build its way out of the problem. A new, faster&cost-

efficient system is required for quality conscious groups, over & above the existing low-quality bus network.

Everyday a passenger faces the higher traffic on the roads and wait for their buses on the stops. With the help of this application the user can track the real time location of the bus and find the distance from the bus stop, also the user can see all the available buses on the particular route by which user can select one of them and start their journey. If we talk about the road accidents in India then that costs a life in every 4 minutes. Over 137,000 people were killed in road accidents in 2013 alone that is more than the number of people killed in all our wars put together. 5 lives end on Delhi's roads every day. Drunken driving is one of the leading causes of road fatalities. Drivers are held responsible for 78% of accident. So, we are proposing a system by which emergency facilities will be available as soon as possible so that we can prevent any unwanted circumstance. We implemented a device in the buses which can detect the collision/accident and it will inform to the nearest police station so that necessary action can be taken by them.

II. LITERATURE SURVEY

The last two decades have seen growing interest in the development of Android based platform and also developer tried to solve the issues related to the live tracking. During the initial phases of development. We come through various systems which are developed before in order to get an overall idea for our system. So, there are some existing systems mentioned below: -

A. M-Indicator[9,10]

M-Indicator is one of the most widely used urban transportation mobile application in Mumbai. M-Indicator covers all the major public transport details of the city of Mumbai. In addition it provides the fare of travelling different locations. It also provides the offline Mail and Express trains timings and halts. The Auto fare and Taxi fare with respect to the distance travelled is also provided by M-Indicator.

The Application also provides information the railway jumbo blocks on Sunday. It also provides Emergency Telephone Numbers for Hospitals, Ambulances, Blood Banks, Air Lines, Railways, Electricity Issue, Roadway Enquiries, Tourist Enquiries, and Important Medical Messages.

M-indicator also provides unique women safety app. It sends Automatic alert SMS to the police and also to 2 members of the family along with the location.

The application is available in all major platforms like Android, IOS, Windows, Blackberry OS as well as JAVA.

The major disadvantage of M-Indicator is that it only mentions the name of the bus stop and not its location on the map, which makes it difficult for first time travelers and persons not familiar with the city.

B. ROUTE4ME ROUTE PLANNER[11,12]

We are familiar with the Google maps routing system where one has to enter destination in sequence and the routing system will provide the route as per sequence you have provided.

In Route4Me route planner you visit the destination as per the sequence, you requested.

However, if more than 10 destinations are entered, we could travel the town in such a way that most of the nearby places which are close enough in distance but away from the given ordered sequence.

But this app has helped overcome this problem. Its re-sequences the stops on your route so that you visit them without zigzagging all over town.

Such optimization is necessary because it is very difficult for a person to visualize and sequence the order in which addresses should be visited, especially when there are multiple addresses in an unfamiliar part of town.

Thus, we are using these features in our app to get optimal sequence as well as optimal path for routing.

Some of the Important Features of Route4Me is that it provides automatic Route scheduling and Easy Address Importing and Selection.

C. RIDLR[13,14]

RIDLR is a Public Transportation App which can be used by the users for transportation purpose. The RIDLR app works in many cities of India. The user can use the app to locate nearby bus stops, metro stations and railway stations. The user can previously plan his travel by entering the source and destination. RIDLR app provides the user to recharge their Mumbai Metro smart card with few steps. It also provides the Timetable, Route of Local train and Metro train. The user gets the route and schedule of the different bus services available in Mumbai i.e. BEST bus, NMT (Navi Mumbai Municipal Transport) bus and TMT bus. Along with timetable, it also provides the facility of Recharging the Best Bus Pass Online, Book NMT (Navi Mumbai Municipal Transport) Bus ticket online by selecting the NMT (Navi Mumbai Municipal Transport) bus number and the number of passengers that will be boarding the bus. RIDLR also provides the Real Time Traffic status to the users, so that the user can plan out the best route to reach the destination. It also provides the best parking information to the user, and because of this the time and money of the user can be saved. Various Features of RIDLR are: -

- Best Ticketing
- Renew Best Pass
- NMT Ticketing
- Metro Smart Card Recharge
- Real Time Traffic Status
- Packing Information
- Live updates of Traffic System

D. CTU Bus Guide[15,16]

CTU Bus Guide is a free app that aims to provide quick access to CTU bus stops, routes and timings to the citizens of Chandigarh.

The application provides information about the following

- Source and Destination (All routes, Stops and timings): Enter source and destination and get all the routes between them along with the bus timings and bus stops.
- Bus routes with all day timing: Get Route details from starting point to end point with timings. User can also get any bus time details which the bus operates on throughout the day.
- Bus Stops with all day timing: Get the next buses coming on this stop with time details.
- Send Feedback: User can send feedback by clicking on the feedback menu from the app and along with his name, phone number and e-mail user can submit his feedback regarding CTU services, buses, timings, fares etc.
- Fares: User can get fares details for AC and Non-AC Buses by clicking the Bus fares menu from the app.
- Call Helpline: From the Helpline menu user can directly call the CTU helpline by single click from the app.
- Bus Pass Info: The bus pass menu offers all the details about the CTU buss pass including Daily pass, Student pass etc.

The application has been developed by the team of SPIC-Microsoft, Centre of Excellence (Chandigarh).

E. BusRapid Transit System

Bus Transit System often referred as BRTS which is a service of public transport using buses with an objective to provide faster, more efficient mode of transport to the people. A BRTS could be developed either by altering the existing infrastructure, vehicles, etc., or by constructing completely dedicated new roads and buses. This permanent integrated system uses buses or specialized vehicles on roadways or dedicated lanes in quickly and efficiently transport passengers to their destination, while offering the flexibility to meet transit demand.

Basic Features of Bus Rapid Transit System: -

- Pre-boarding fare collection and fare verification
- Low-emission vehicle technologies

- System management through a centralized control center, utilizing Intelligent Transport System (ITS) applications such as automatic vehicle location
- Clear route maps, signage or real-time information displays that are visibly placed within stations and vehicles.
- Low-cost infrastructure elements that can increase the speed and reliability of bus services
- Buses successfully avoiding congestion without the need for long sections of dedicated bus lanes.

Major Problems Faced by Bus Rapid Transit System are: -

- Lack of support by Public Transport industry
- Developing a robust business and financial model by obtaining buy-in from existing operators and financiers
- Taxi Association against implementing Rapid Bus Transit System
- Construction of the whole system is the time factor
- Environmental impact assessment process and outcomes with concerns about increased noises and expropriation of existing houses.
- Training operators and owners in skills needed for successful Bus Rapid Transit System.
- Educating both current and potential Users.

F. Vehicle Tracking and Accident Alert System

This vehicle tracking system takes input from GPS and send it through the GSM module to desired mobile/laptop using mobile communication. Vehicle Tracking System is one of the biggest technological advancements to track the activities of the vehicle.

The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send the coordinates and the location data to the monitoring center. At monitoring center various software's are used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis.

Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles.

Vehicle tracking system main aim is to give Security to all vehicles. Accident alert system main aim is to rescuing people in accidents. This is improved security systems for vehicles. The latest like GPS are highly useful now a days, this system enables the owner to observe and track his vehicle and find out vehicle movement and its past activities of vehicle.

This new technology, popularly called vehicle Tracking Systems which created many wonders in the security of the vehicle. This hardware is fitted on to the vehicle in such a manner that it is not visible to anyone who is inside or outside of the vehicle. Thus, it is used as a covert unit which continuously or by any interrupt to the system, sends the location data to the monitoring unit.

When the vehicle is stolen, the location data from tracking system can be used to find the location and can be informed to police for further action. Some Vehicle tracking System can even detect unauthorized movements of the vehicle and then alert the owner. This gives an edge over other pieces of technology for the same purpose.

This accident alert system in it detects the accident and the location of the accident occurred and sends GPS coordinates to the specified mobile, computer etc.

- Vehicle Tracking Features: - It is mainly benefit for the companies which are based on transport system. Since it can show the position of all vehicles in real time, so that they can create the expected data accordingly. These tracking systems can store the whole data where the vehicle had gone, where did it stop, how much time it take at every stop and can create whole data analysis. It is also used in buses and trains, to estimate how far are they, how much time it takes for them to come to a particular stop. These systems are used to data capture, data storage, data analysis and finally data transfer.
- Accident Alert System Features: -This system is based on new technology, its main purpose is to detect an accident and alert to the control room, so the victim can find some help. It can detect accidents the intensity of the accident without any visual contact from control room. If this system is inserted in every vehicle then it is easy to understand how many vehicles are involved in a particular accident and how intense is it. So that the help from control room will be according to the control room. The present board designed has both vehicle tracking and accident alert systems, which make it more valuable and useful. This board alerts us to get alert on accident detection also.

III. PROPOSED SYSTEM

The main motive is to develop an application for live tracking of public transport and fault tolerance from a list of available Public Transports (basically Buses) on a specific route determined by the user and accident detection system using GPS and others sensors in Android Devices.

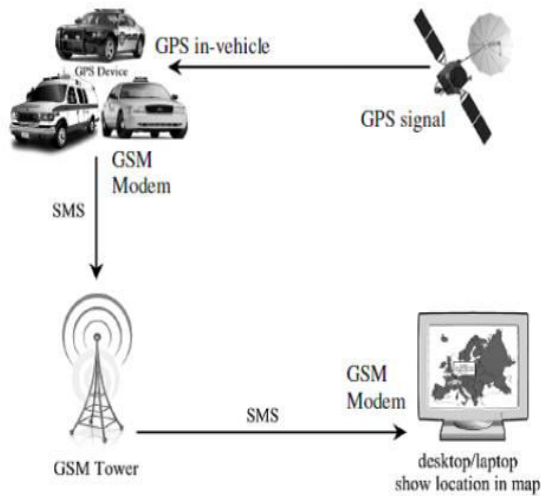


Fig. 1 [17]

Fig. 1 is the overview of the vehicle tracking system. This system takes input from GPS and send it through the GSM module to desired mobile using mobile communication.

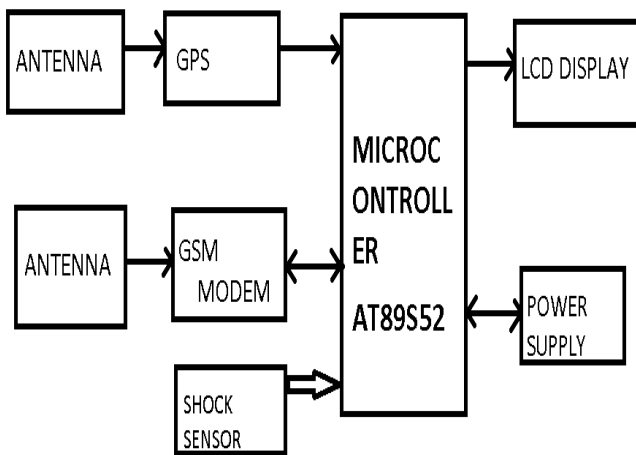


Fig. 2 Hardware architecture

A. Project Objective

The main goal of the proposed work is to improve the Bus System by adding necessary additional features into the application, like accurate bus timings, correct bus numbers and moreover adding GPS tracker into it.

This study accepts input in the form of selection of the source and destination and selection of the bus travelling the distance to display the entire details about the routes and also track the location of the respective bus and give the map of the same.

B. Project Overview

This project is divided into 2 parts:-

1. Hardware
2. Software

1. Hardware

Our hardware will be implemented in the bus which will be connected to our software. The parts of the hardware are as follows-

a) GSM/GPRS Module

A GSM GPRS Module is used to enable communication between a microcontroller or a microprocessor and the GSM / GPRS Network. Here, GSM stands for Global System for Mobile Communication and GPRS stands for General Packet Radio Service.

b) Gas Sensor

Gas Sensor (MQ2) detects combustible gasses and smoke. Gas Sensor (MQ2) module is useful for gas leakage detection (in home and industry). The output voltage from the Gas sensor increases when the concentration of gas.

c) Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke.

d) Microcontroller

Microcontrollers are embedded inside devices to control the actions and features of a product. Microcontrollers can take inputs from the device they controlling and retain control by sending the device signals to different parts of the device.

e) Voltage Regulator

A voltage regulator is used to regulate voltage level. When a steady, reliable voltage is needed, then voltage regulator is the preferred device. It generates a fixed output voltage that remains constant for any changes in an input voltage or load conditions. It acts as a buffer for protecting components from damages.

f) Arduino

Arduino is an open-source prototyping platform used for building electronics projects. It consists of both a physical programmable circuit board and a software, or IDE (Integrated Development Environment) that runs on your computer, where you can write and upload the computer code to the physical board.

2. Software

In software part we will cover different functionality of the application. So, the modules of the application are as follows-

a) Broadcast

To share the location with multiple people online, called broadcast.

When the driver will start his journey from starting point of the route, he will have to share/broadcast his location on the server so that user can easily track his location.

- b) Locate
To track someone's location online.
User will be able to locate the bus from anywhere.
The location of the bus/driver will be update second by second.
- c) Share
User can share his/her location with his/her parents or friends if he/she get faces any problem during the journey.
- d) SOS
If the passenger faces any issue like inappropriate behavior by the other passenger/driver, if bus got accident or other crime scene he/she will be able to send a SOS message to nearest police station.
- e) Login
A login is a set of credentials used to gain access to an area that requires proper authorization. Logins are used to gain access to and control of computers, networks, and bulletin boards, as well as other services and devices.
In our application only driver will be able to login their account. There is no any need login for the passengers.

This project focuses on the implementation of a Real-Time bus Tracking System (RTBTS), by installing GPS (Global Positioning System)-module devices or GPS through mobile devices on the buses which will transmit the current location on the GPS Receiver.

Now the GPS Receiver will be interfaced with a driver or a server and an interface driver will auto save data in a database file which will continue to do so until the GPS module is connected to a bus. From here the application will retrieve data and save it on server from where the system will display real-time information of the bus.

Apart from this Using this application, the user will be able to track the buses from his/her current location to his/her preferred destination on a preferred route. This application also enables the user to send a SOS message to one of his/her preferred contact and to one of the nearest police station.

This application can also to be used by the user in order to get details of buses on a predefined notion in order to prevent hassles while traveling to some place.

In this application is solely based on Android Platform. In the starting of the application the user has to register by using his or her email id. After registering our user is good to go and begin to use the application.

In this application the bus driver is also need to be logged in in order to broadcast the location of the bus to the server.

In the application, the user will be given four functionalities that is: -

1. Locate
2. Share Location
3. SOS Message
4. View Route

In the SOS functionality is mainly for sending an emergency message or establishing an emergency helpline of Police Station, Ambulance, Women's Helpline and Fire Station.

In the view route functionality, the user will be given rights to choose his or her desired route to a preferred destination from a pre-defined list of routes

In the locate functionality the user is given further two functionalities of setting the start point and end point of the destination. After setting this the user has been given a list of buses with user's preferred destination.

From that given list of buses the user will choose any one of the bus. After choosing the bus the interface is transferred to the map and start locating the map.

In the share module, the user will be allowed to share his or her ride details accordingly.

The real-time bus tracking system is a standalone system designed to display the real-time location(s) of the buses provided by the official authorities.

There are some screenshots are added to understand the process how the application works:-

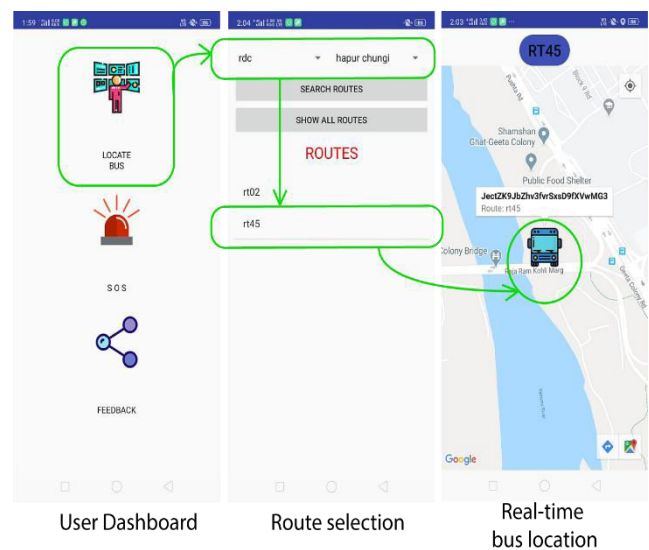


Fig. 3

In the above figure (Fig. 3) we can see that the explanation of tracking feature of the bus in 3 steps.

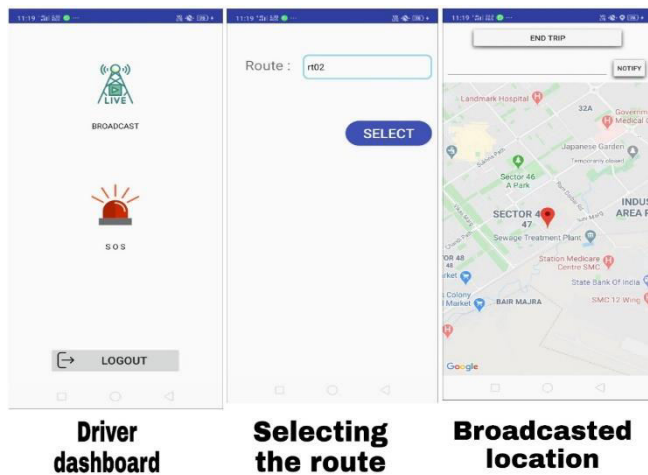


Fig. 4

Above Fig. 4 is showing the process of broadcasting the location of bus driver. When driver will start the bus from the starting point of the route he will broadcast his location.

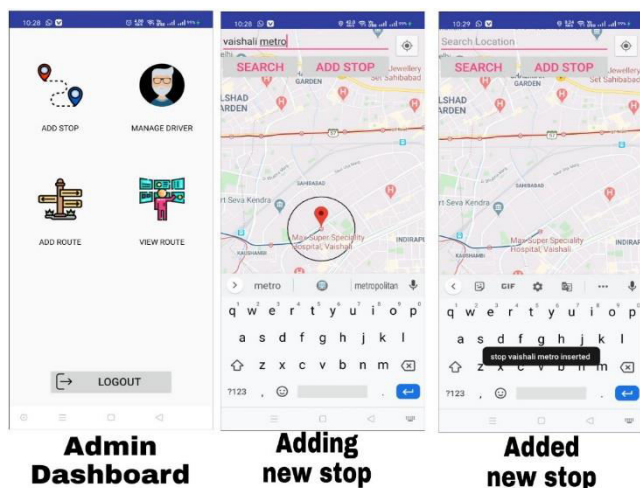


Fig. 5

Fig. 5 shows the admin functionality i.e. adding a new stop. There are total 3 functionality which is operated by the admin only.

C. Conclusion

Main motto of the project is to incorporate different types of sensors so that they help in decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights and it can also provide better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity.

D. Future Scope

The following features can be added up as future enhancements:

- We can manage auto-rickshaws and trains like these buses.
- We used only free google APIs so if we use the paid one then we can add some more features like- traffic congestion detection.
- We can add customer care service.
- We can also show the fare between the specific stops.

IV. ACKNOWLEDGMENT

We would like to thank our project guide **Mr. Naman Sharma** for his enormous co-operation and guidance. We have no words to express our gratitude for a person who whole heartedly supported the project and gave his valuable time while making this project. All the inputs given by him have found a place in the project. The technical guidance provided by him was more than useful and made the project successful. He has always been a source of inspiration for us. It was a memorable experience learning under such a highly innovative, enthusiastic and hardworking teacher. We are also thankful to our Director **Dr. B.C. Sharma**, HOD **Dr. Rekha Kashyap**, and all the staff members of the Computers department who have provided us various facilities and guided us to develop a very good project idea. Finally, we would also like to thank teachers of our college and friends who guided and helped us while working on the project.

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Mr. Naman Sharma is a professor of Computer Science Department at Inderprastha Engineering College, Ghaziabad. He has teaching experience of 4.5 years. In their achievements he attended many conferences, published his journal in a international journal and won 1st prize for Internship under Infosys Campus Connect Program. He has Master Degree in Computer Science Engineering from

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