GPS Enabled Bus Tracking System For Android Device

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Abstract- *Our project is based on a government Bus Tracking which runs through android application. This enables people to find out the exact location of the bus. Due to that people arrive at their stop in the correct timing. The main purpose of developing this android application is to provide the exact location of the people respective buses in Google Maps that providing details like bus location and distance from them. People use this android application. It is a real-time system that shows the current location of the bus is updated every moment in the form of latitude and longitude which is received by the people through the application. The application also estimates the time required to reach a particular destination on its route. This mode of communication is useful for tracking the exact location.*

Keywords- GPS, ANDROID APPLICATION, GOOGLE MAPS.

I. INTRODUCTION

Bus Tracking System (BTS) is the technology used to find the exact location of a vehicle using GPS through satellites and ground-based stations. By following the triangulation method, the tracking system enables us to find an easy and accurate location of the vehicle. Vehicle information like current location, time, distance travelled, etc. can be viewed on an android application via the Internet. And also data can be stored and downloaded to a system from the GPS unit at a base station and that data can be used for analysis. The Bus Tracking System is an important tool for tracking vehicles at any period of time and further it is becoming increasingly popular for people using their vehicles and hence as theft prevention and retrieval device.

1. The system containing modern hardware and software components that help to track their vehicle online. Any vehicle tracking system containing mainly three parts mobile vehicle unit, fixed based station and, database and software system.
2. Vehicle Unit: Vehicle Unit is the hardware component that is directly attached to the vehicle having a GPS. The unit is configured with the primary modem that functions with the tracking software by receiving signals from GPS with the help of satellites. The controller converts the data and forwarding the location data to the server.
3. Fixed Based Station: It consists of a wireless network to receive and sending the data to the data centre. Base stations are equipped with tracking software and geographic map useful for finding the vehicle location. Maps of all landmarks are available in the base station that has an in-built application.
4. Database and Software: The location information or the coordinates of every visiting area are stored in a database, that can be viewed in a display screen with the help of digital maps. However, the users have to connect themselves to the android application with the respective vehicle ID stored in the database and the user can view the location of the vehicle traveled.

II. LITERATURE SURVEY

Paper1:"Real time bus tracking android application", International Research Journal of Engineering and Technology, September 2015.

BUSES have become an important means of transport in cities. This public transport can have used by majority of the population in cities. But as we know that nothing is perfect, buses also have one drawback that is the commuters have to wait for too much time for the bus to arrive; which in turn leads to usage of separate vehicles thus leading to increase in fuel consumption. Rather than waiting for buses it would be beneficial for the passengers to know the tentative timing of the buses, so that they can plan their journey accordingly. Hence, for the convenience of citizens an android application is proposed, which will track the location of both the user and the BUS and then will calculate the approximate time required by the BUS to reach the stop including the traffic analysis. As every citizen is well known with the working of Android phones there won't be any problem in using the application, as Android is a user-friendly operating system. The approximate time will be calculated by tracking the current location of the bus and the user. As the BEST has already installed GPS in buses, the tracking method will help in locating the vehicle. The approximate time required by the bus will also be calculated so that the

commuters will be aware about the waiting time for their respective buses. It will also be favorable for those not having GPS facilities as they will also be able to know the updated bus schedule without using network.

Paper2:" **Real-time GPS/GPRS based vehicle tracking system," International Journal of Engineering and Computer Science, Aug. 2015**

Our bus tracking device will function a viable notification system which will effectively assist pedestrians in making the choice of whether to attend for the bus or walk. This device may be a standalone system designed to display the real-time location(s) of the buses in Mumbai city. The system will contain a transmitter module installed on the buses and receiver boards installed on all the bus stops, LED embedded map of the simplest bus transportation routes at the centralized controller. it'll even have passenger data system software installed at the bus stops, which can provide a user the relevant information regarding all the bus numbers going for his source to destination alongside the route details and therefore the cost. Assembly of those modules will enable the tracking device to get GPS data from the bus locations, which can then transfer it to the centralized control unit and depict it by activating LEDs within the approximate geographic positions of the buses on the route map. it'll also transmit its bus numbers and route names continuously as soon because the bus comes within the range of the receiver at the stop. Additionally, the device is going to be portable and sustainable; it'll not require an external power source, which can eliminate long-term energy costs.

III. EXISTING SYSTEM

In the existing system, the people not known about the exact location of the bus and whenever people need to know about the location, they ask someone nearby. Sometimes, the bus may be delayed due to some circumstances such as traffic congestion, technical issues, etc... At that moment the user will not be able to decide whether the bus has arrived or not. Due to this inconvenience, the people may not arrive at their destination within the reporting time.

The ability to track the vehicle through the internet is done by using Global Positioning Satellites. Data such as Speed, Velocity and Time (PVT) are transmitted over the network. The information transmitted from the tracking device is disseminated and stored on a private account or sent through the wireless network. The data is cross-referenced on a map for viewing. The exact location information provided is a cross-reference to the closest geographic address and shown in the residential /commercial address format.

The main demerits of the existing system are that the system provides only a wide layout of the geographical address, and does not provide a local address. The speed of the vehicle and engine cannot be controlled by the existing systems, thus exposing the vulnerability of an existing system that provides only tracking.

IV. PROPOSED SYSTEM

4.1 Description of Hardware unit

Global Positioning System (GPS)

Technology has rapidly advanced within the past few years and it's become very easy for all the people to tracking things.GPS stands for Global positioning system has been used for many applications today popularly within the sector of navigation, tracking, etc. A GPS is a space-based navigation system that provides exact location, current time and a couple of other information given altogether weather, anywhere on or near the planet where there's an unobstructed line of sight to four or more GPS satellites.

Arduino Microcontroller

Arduino is an open-source prototyping platform supported easy-to-interface hardware and software. Arduino boards are able to read inputs and switch it into an output. we will tell the board what to try to by sending a group of instructions to the microcontroller placed on the board. To do so, we here use the Arduino programing language and Arduino software (IDE)**.** we will say that the transmitting unit will transmit the info to the server with the assistance of GPS. This transmitting unit are going to be placed within the bus and this unit helps to transmit the situation to the domain server.

4.2 Description of Monitoring Unit

The monitoring application is to provide users an easy, comfortable tracking in which the people will be able to locate the bus in any place. This monitoring application will come under the android based application. For finding the location of the bus, the user will need an android mobile with internet access. As the user opens this application, it will show the values of longitude and latitude from the server with a static IP address via a GPS network and shows the current real-time location of the bus. This application will

automatically fetch the coordinates and shows the location in the form of Google maps integrated into it.

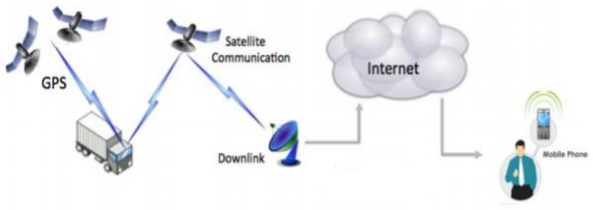

Fig1.Transmitting Unit

V. EXPERIMENTAL SETUP

System Specifications

The Hardware Interfaces for this application are system with Internet Connection, and Server with Static Internet Protocol (IP), mobile hotspot connected with Wi-Fi to activated GPS. The Software Interfaces for this application are developed through Android Studio and Google Maps API.

Hardware Unit:

The hardware unit consists of a GPS module, Wi-Fi module, and an Arduino microcontroller. The GPS module is linked with the Arduino microcontroller and connected to the power supply. The microcontroller by using the codes that containing the working algorithm dumped into it, it takes the latitude and longitude values of the current position from the GPS module and passes it on to the server through the internet. Thus the values get stored into the database in the server.

Fig2.Hardware Setup

Software Unit:

This application will show the location through Google maps. As soon as the user opens this app, search their destination and the user can locate the bus by using the Google map. The Google map shows the accurate location of the bus. The location is fetched from the database of the server where the coordinates are stored. The fetched location is transferred as a Google map and is shown to the user. The coordinates of the position of the bus are stored in the server database.

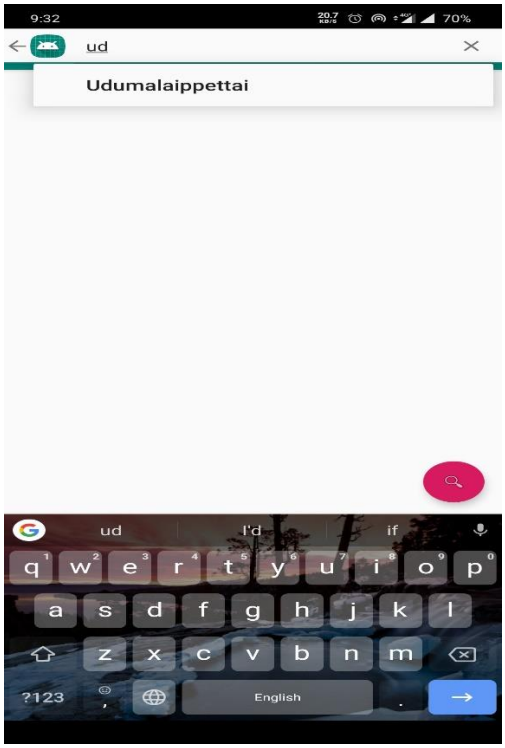

Fig3. Search page

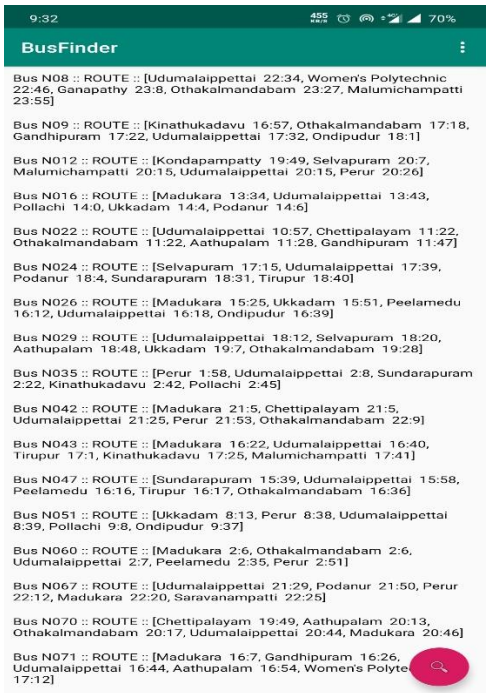

Fig4. Searched area

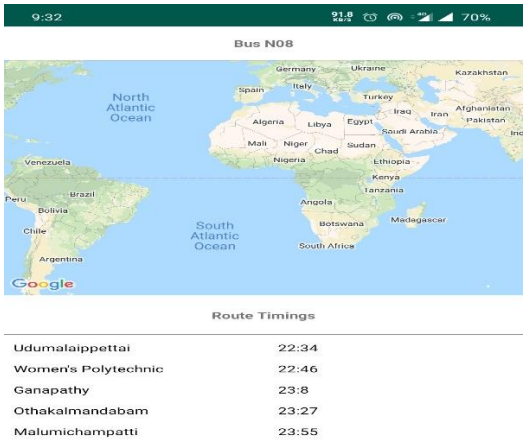

Fig7. Location Finding

The figure 3 and 4 shows the search page. This page is displayed whenever the user opens the application. The figure 5 shows the location of the details about bus by using the Google Maps. The bus location can also be viewed on the maps as shown in the figure 6.

VI. CONCLUSION AND FUTURE ENHANCEMENTS

This android application uses the help of GPS, Wi-Fi and the Google maps in order to track and locate the bus. This application successfully shows the location of the bus through the Google maps. This system can be further extended for multiple applications as follows:

Anti-theft system for bikes, cars etc.
Managing of public transports likes buses and trains.
As a vehicle management software for transport companies.
And many more similar applications and thus, this system can prove to be very helpful in future.

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