"Synopsis"

On

"BUS TRACKING SYSTEM USING GPS"

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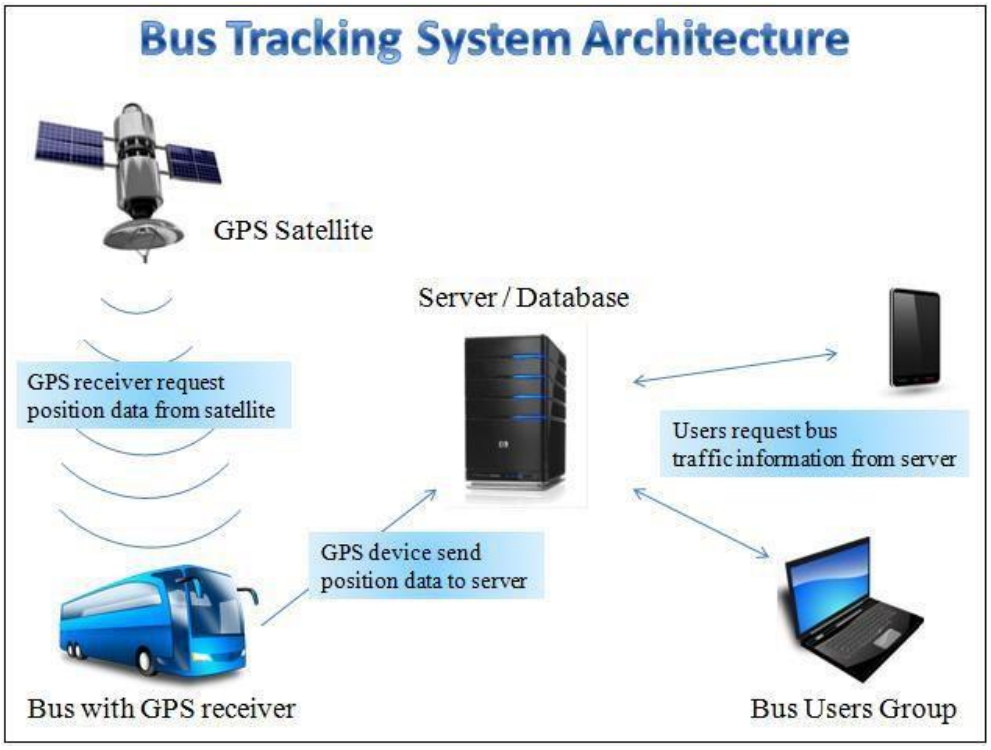
1. Introduction

College bus Tracking System (VTS) is the technology used to determine the location of a vehicle using different methods like GPS and other radio navigation systemsoperating through satellites and ground based stations. By following triangulation or trilateration methods the tracking system enables to calculate easy and accurate location ofthe vehicle. Vehicle information like location details, speed, distance traveled etc. can be viewed on a digital mapping with the help of a software via Internet. Even data can be stored and downloaded to a computer from the GPS unit at a base station and that can laterbe used for analysis. This system is an important tool for tracking each vehicle at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device.

The system consists of modern hardware and software components enabling oneto track their vehicle online or offline. Any vehicle tracking system consists of mainly three parts mobile vehicle unit, fixed based station and, database and software system.

Vehicle Unit: It is the hardware component attached to the vehicle having either a GPS/GSM modem. The unit is configured around a primary modem that functions with the tracking software by receiving signals from GPS satellites or radio station points withthe help of antenna. The controller modem converts the data and sends the vehicle location data to the server.Fixed Based Station: Consists of a wireless network to receive and forward thedata to the data center. Base stations are equipped with tracking software and geographic map useful for determining the vehicle location. Maps of every city and landmarks are available in the based station that has an in-built Web Server.

Database and Software: The position information or the coordinates of each visitingpoints are stored in a database, which later can be viewed in a display screenusing digital maps. However, the users have to connect themselves to the web server with the respective vehicle ID stored in the database and only then she/he can view the location of vehicle traveled.



2. Literature Survey

recently, all over the world, crime against children is increasing at higher rates and it is high time to offer safety support system for the children going to schools. This paper focuses on implementing children tracking system for every child attending school. However the existing systems are not powerful enough to prevent the crime against children since these systems give information about the children group and not about each child resulting in low assurance about their child safety to parents and also does not concentrate on sensing the cry of the child and intimating the same to its parents. The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (lpc 2378), Global positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent's hand and the other as monitoring database in control room of the school. Finally, implementation results for the proposed system are provided in this paper.

Hiroshima City Children Tracking System is a safety support system for children based on ad hoc network technologies. Field experiments have been conducted in cooperation with an elementary school in Hiroshima. In this paper, we propose a new generation children tracking system which is based on experiences and findings of the field experiments for Hiroshima City Children Tracking System. Our proposed system consists of Android terminals which has Wireless LAN device and Bluetooth device with the ad hoc communication function. Our system manages groups of Android terminals using Autonomous Clustering technique. In this paper, we show the system requirements for our children tracking system and describe the implementation features to satisfy the system requirements. Finally, we provide some preliminary implemented results for our proposed system.

In present time due to increase in number of kidnapping and road accident cases, Parents always worry about their children. This paper proposes a SMS based solution to aid parents to track their children location in real time. The proposed system takes the advantage of the location services provided by module kit which carry by the Childs in their school bag. It allows the parent to get their child's location on a real time map by the geographical coordinates which send by the module kit. Information such as GPS coordinates and time are gathered and sent to the parent's phone that's preregistered on the module kit. The communication between the parent and the child module kit is done using Short Message Service (SMS). SMS offers the system unique features. It will allow the system to work without the need of internet connection. The system sends the location of child's smart phone to parent's smart phone when the parent wishes to check on the child.

Millions of children need to be moved from home to school and vice versa every day. For parents, obtaining a safe transport for their children is a critical issue. Many children find themselves locked in a school bus in the bus parking lot after falling asleep on their way to school, miss the bus, step into the wrong bus, or leave at the wrong station with no method to track them. This research tested the applicability of radio frequency identification (RFID) technology in tracking and monitoring children during their trip to and from school on school busses. The child safety system developed in this research utilized the passive RFID tracking technology due to its efficient tracking capabilities, low cost, and easy maintenance. To explore the technical feasibility of the proposed system, a set of tests were performed in the lab and with the public. These experiments showed that the RFID tags were effective and stable enough to be used for successfully tracking and monitoring children using the bus. When asked to give their feedback of the solution through a questionnaire, more than 95% of the parents see that such a solution will take their anxiety and worry away and will provide them a tool to track their kids during commuting to and from their schools.

This paper presents the recent technical research on the problems of privacy and security for radio frequency identification (RFID). RFID technology is already used widely and is increasingly becoming a part of daily life. However, issues regarding security and privacy with respect to RFID technology have not been resolved satisfactorily. There are huge number of challenges, which must be overcome to resolve RFID security and privacy issues. It is because of the many constraints attached to the provision of security and privacy in RFID systems. These challenges are chiefly technical and economic in nature but also include ethical and social issues. Along with meeting the security and privacy needs of RFID technology, solutions must be inexpensive, practical, reliable, scalable, flexible, inter-organizational, and long lasting. This paper reviews the approaches which had

been proposed by scientists for privacy protection and integrity assurance in RFID systems, and treats the social and technical context of their work. This paper can be useful as a reference for non specialist, as well as for specialist readers.

3. Methodology

The proposed system is operated by the Android platform smartphone, with the built-in GPS receiver. The bus location is tracked using GPS, which is based on the trilateration mathematical principle. The location of the GPS can be determined as it is capable of receiving data from at least three satellites. To receive the signal from the satellite, the conductor should turn on the GPS in his Android smartphone. The device receives the GPS data and sends the latitude and longitude values of the location of the bus to the server at regular intervals.

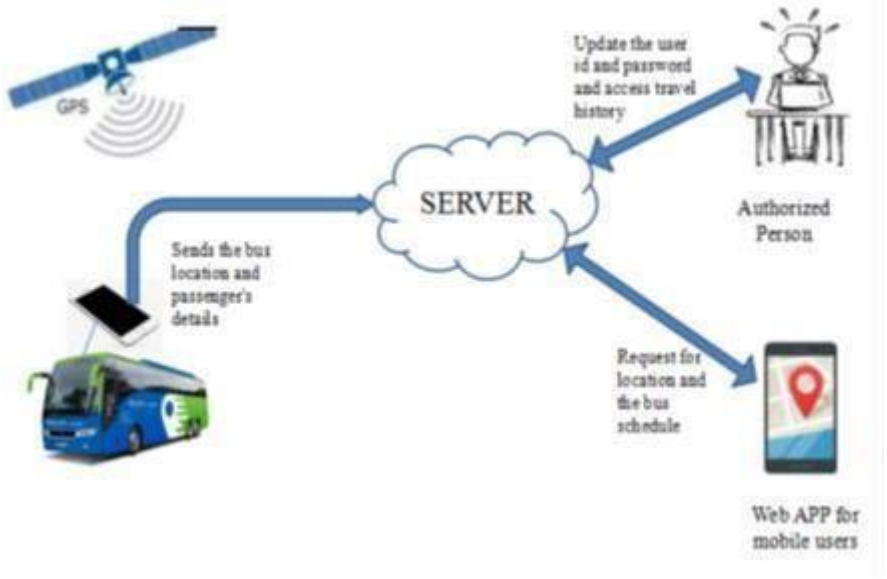


Fig: Architecture of proposed system

In this system, the server is the most important module and acts as the central repository of the system. It acts as the intermediate between the bus module and the user module. Here, the whole information is stored and maintained in the MySQL database. A web application is used to facilitate the submission and request of information to the database server. In MySQL, tables are created to store various types of data. Each table comprises the username and password of the conductor or the authorized person, live coordinates of GPS, route ID, bus number of all the buses, bus schedule, passenger details, longitude, the latitude of all the buses and distance between them and also the order of bus stops for various routes.

To distinguish each bus among the various buses, it is thus, provided with a particular ID that is unique and is stored in the database. Additionally, along the routes in which the bus travels, points are set up at the closest bus stops. These points are stored in the database and are necessary to calculate the distance between the passenger and the bus. This increases precision in obtaining the data. To depict the route in which the bus is traveling, each route is provided with a route ID and the order of bus stops on that route are stored. The order of bus stops, and the route id helps to depict the direction of bus, and also to provide the longitude and latitude values of bus to calculate the distance. Google Maps are used to plot the location of the bus. To increase the accuracy in locating the real-time location of the bus on the map, real-time coordinates of the current bus are uploaded to the server where it is compared with the coordinates of the closest bus stop and the distance between them is calculated.

Bing Maps Distance Matrix API is used as it provides the distance and travel time for a set of origin and destination. To calculate the distance and arrival time, we consider longitude and latitude values of bus location as origin and location values of the bus stop as the destination. It calculates the arrival time based on predictive traffic information, mode of transportation, start and end time, and more. Moreover, it has the advantage of calculating the speed automatically. The

map retrieves information from the database using PHP and JavaScript. PHP is used to export the bus location and other details from the database and to display it on the web application.

4. Hardware Requirements and Software Requirements.

4.1 Hardware Requirements

ϒ Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106

• Operating Voltage: 3.3V

• Input Voltage: 7-12V

• Digital I/O Pins (DIO): 16

• Analog Input Pins (ADC): 1

• UARTs: 1

• SPIs: 1

• I2Cs: 1

• Flash Memory: 4 MB

• SRAM: 64 KB

• Clock Speed: 80 MHz

• USB-TTL based on CP2102 is included onboard, Enabling Plug n Play

• PCB Antenna

• Small Sized module to fit smartly inside your IoT projects

4.2 Software Requirements

4.2.1 Requirements

- OS X El Capitan (10.11+)
- Windows 7, 8.0, 8.1 and 10 (32-bit and 64-bit**)**

4.2.2 Software Requirements

- Arduino
- C++

Fig: Arduino

5. Future Scopes

➢ We can use the EEPROM to store the previous Navigating positions up to 256
➢ locations and we can navigate up to N number of locations by increasing its
➢ memory.
➢ We can reduce the size of the kit by using GPS+GSM on the same module.
➢ We can increase the accuracy up to 3m by increasing the cost of the GPS receivers.
➢ We can use our kit for detection of bomb by connecting to the bomb detector.
➢ With the help of high sensitivity vibration sensors we can detect the accident.
➢ Whenever vehicle unexpectedly had an accident on the road with help of vibration
➢ sensor we can detect the accident and we can send the location to the owner,
➢ hospital and police.
➢ We can use our kit to assist the traffic. By keeping the kits in the entire vehicles and by knowing the locations of all the vehicles.

If anybody steals our car we can easily find our car around the globe.

➢ Enhanced Real-Time Tracking: Future systems can offer more accurate and reliable real-time tracking of buses. This could involve the use of advanced GPS technologies, such as high-precision positioning systems or integration with other location-based technologies like GLONASS or Galileo, to provide more precise bus location information.
➢ Predictive Analytics: Bus tracking systems can incorporate predictive analytics algorithms to estimate and display accurate arrival times for buses at various stops. By analyzing historical data, traffic patterns, and other factors, the system can provide passengers with more accurate arrival time predictions, reducing waiting times and improving

overall efficiency.

➢ Integration with Mobile Apps: Mobile apps can play a crucial role in the future of bus tracking systems. Passengers can use dedicated mobile apps to view real-time bus locations, estimated arrival times, and other relevant information. Additionally, app integration can enable features like personalized notifications, alerts for route changes or delays, and the ability to provide feedback on bus services.

➢ Integration with Smart City Infrastructure: Bus tracking systems can integrate with other smart city infrastructure components. For example, they can be connected to traffic management systems to optimize bus routes based on real-time traffic conditions. Integration with smart traffic signals can also prioritize buses at intersections, improving the overall flow of public transportation.

➢ IoT Integration: The Internet of Things (IoT) can enhance bus tracking systems by connecting various sensors and devices on buses. This integration can enable monitoring of important parameters such as vehicle health, fuel consumption, passenger load, and environmental conditions. The data collected can be used for predictive maintenance, optimizing operations, and improving the overall efficiency of the bus fleet.

➢ Advanced Data Analytics: Future bus tracking systems can leverage advanced data analytics techniques to derive meaningful insights from the collected data. By analyzing the data on bus routes, passenger patterns, and demand, transportation authorities can make informed decisions regarding service improvements, route optimization, fleet management, and resource allocation.

➢ Integration with Multi-Modal Transportation: Bus tracking systems can be integrated with other modes of transportation, such as trains, trams, or subways. This integration can provide passengers with a seamless experience when transferring between different modes of transportation, with real-time updates and synchronized schedules across the entire transportation network.

➢ Sustainability and Eco-Friendly Features: Future bus tracking systems can incorporate sustainability and eco-friendly features. For example, they can provide information on bus emissions, encourage the use of electric or hybrid buses, and promote greener transportation alternatives. Such features can contribute to reducing carbon footprints and promoting environmentally friendly practices.