

Smart Transportation tracking system enhanced with android application

Gopinath.L and Revanth.MC.MuruganM.Tech

Department of Electronics and communication engineering

Veltech engineering college,Chennai,TamilnaduVeltech engineering college,Chennai,Tamilnadu

600062

Department of Electronics and communication engineering

600062

Abstract—Significant increase is noticed in the utilization of mobile applications for different purposes in the past decade. These applications can improve any individual's way of life in many aspects such as communication, collaborative work, learning, location services, data collection, exploring, testing and analysis. One of the most interesting mobile applications is using it for tracking by having personal locators. These locators can track children, people on work, the elderly for personal protection etc. The intention behind developing this mobile application is to provide a smart transportation system to it users and to track their movements.

Some of the essential features of this application are

- Getting familiar with the shortest path from source to destination in advance.
- Aware of approximate time of arrival to destination.
- Knowing the capacity of vehicle used for transportation.
- Short Message Service.

Keywords—communication; global positioning system; smart application; tracking; transportation

1. INTRODUCTION

Managing transportation is a collaborative activity that is based upon sharing and exchanging information. Transportation system needs an easy and effective way to manage their staff and the registered users who are using the transportation services. Staff needs an effective way to know the shortest path to get to the locations, handle the requests of the users etc. Registered users also need to keep up with the staff movements without waiting too early or causing too much delay. The registered users can inform the staff about their absence using short message service. Providing the above mentioned services collectively and managing them from any location is a challenging problem. Mobile technology can be a solution for the above problem using location based applications which serves managing transportation by navigating maps. In recent years, mobile technology revolution and its applications reached to its climax. This revolution resulted in an aggressive competition between the application developers as the developed mobile applications are similar in concepts and are identical in design but are set apart by unique features, offered services to complement the main idea.

Mobile phones are becoming smaller with modern Graphical User Interfaces (GUIs), and are very powerful. In addition, they are now can be used everywhere and at any time (ubiquitous). The advancements and enhancements the

hardware went through have made mobiles smaller in size and more effective and efficient. Furthermore, it allows us to include many types of peripherals that are not limited with a specific number [1]. Nowadays, there are three different methodologies to allow smart mobile phones to be capable of utilizing the location and positioning services: 1) The utilization of Satellite Positioning, 2) The utilization of Wi-Fi Positioning and 3) The utilization of Cellular Positioning. When looking at these positioning methodologies in a general way, it is noticeable that they have different characteristics which can be measured by Accuracy, Precision, Power consumption, Latency and Availability as proposed by the researcher Hightower et. al [2].

Tracking service providers^{1 2} [3] save the information related to locations in their own database and users are capable of accessing this information. It can be accessed and efficiently utilized upon paying over international telecommunication infrastructure. Furthermore, taking advantage of the SMS availability in mobile networks facilitates users to communicate, transfer information from one place to another. In these types of systems, the users will be more limited since this service has limited flexibility with higher cost.

In [4] the work entitled-The main purpose of this application is to provide exact location of the student's respective buses in Google Maps. It is a real time system, as the current location of the bus is updated every moment to the college server in the form of latitude and longitude which is received by the students through their application on Google map. The application uses client-server technology also it is a user-friendly and flexible to use as it is a time saving application to the user. Additionally the tracking system find out whether the student paid the transportation fees or not by using RFID reader. If he/she not paid the fees, the information will be transferred to the college server via GPRS system. Simultaneously the alarm and LED will be ON to alert the bus driver.

In [5] the researchers had the aim to achieve the following two objectives:

- Developing an automatic vehicle location system. In addition, GPS, IOT technologies will be necessary for the purpose of information transmission.
- Sending some of information that is related to the locations of vehicles (the focus was on buses) to student's parents through the utilization of SMS.

Global Navigation Satellite System (GNSS) is the primary system in their project that they are building; it utilizes a satellite that is used for positioning and tracking. GNSS is primarily utilized for monitoring numerous kinds of vehicles, for instance, airplanes, cars (including buses) and other kinds of vehicles. In this paper, they considered buses are the most important and common ways for transportation that allow us to move from one place to another. As a result of that, this is the vehicle that this proposed application will deal with mostly. When passengers coming from different places move or travel from one location to another, there is a chance that they may face different types of problems, for instance, knowing the arriving time of a bus so they can use their time wisely as well as knowing the time when to reach the desired bus stop etc. As described by the researchers who proposed this mobile application, the primary goal of this application is to minimize the time that the parents should wait when they are at the bus stop. This can be achieved through sending some information related to the different locations that the buses pass by during their movements to those parents through the utilization of SMS. The idea of this application is providing a mobile application that will benefit students and teachers to get to a bus stop without wasting any time. In practice the buses are often late due to several reasons, for instance, intense traffic. Due to this, the user may face many problems such as late arrival to the college. It would be a very useful idea to be able to build a web application for observing buses movements in real time. The process of observing buses is performed through utilizing manual methods to get the position of a bus, for instance, signals are manually operated by staff that perform the instructions using telephone from the closest bus stop. So, information related to buses movements that is propagated to the public is dependent on manual process. The proposed system only gives the position of a bus but cannot give the exact position of the bus or where it is in a particular moment. To solve this problem, a GNSS based web application is utilized which provides with the exact location of a bus that will be shown on Google Maps as well as the bus speed. Combining GNSS with a web tools such as Google Maps and web browser offers a cheap and useful bus monitoring system that solves several problems.

Other mobile application that is used to find a bus arrival time is called Ride Systems GPS³. This system provides passengers with the next bus time, in other words, the time when their next bus will arrive. The most important feature that this mobile application provides is finding stops. Furthermore, it provides the arrival times for a particular route. This application can be used by Android and iPhone operating systems.

2. EXISTING SYSTEM:

The student or the faculty does not know the exact location of the college bus and whenever he needs to know about the location, he has to call and ask someone. Sometimes, the bus may also get delayed by few circumstances such as traffic congestion. Then the user will not be able to decide whether the bus has arrived or not. Due to this, the user may face many problems such as late arrival to the college.

3. PROPOSED SYSTEM:

Real time bus tracking system incorporates a hardware device installed in the vehicle and a remote Tracking server and android application. The information is transmitted to tracking server using GSM/IOT. Tracking server stores this information in database. The user can view the location of the college bus with the help of android application, which he can see it through the Google maps integrated in it. By using RFID reader, the system identify whether the student paid the transportation fees or not. If they are not paid the fees, the information will be sent to the tracking server via IOT. The proposed technology allows organizations to track real-time information about their organizational vehicle during travel. GPS based vehicle location and tracking system will provide effective, real time vehicle location, mapping and reporting this information back to monitoring device. During vehicle motion its location update can be continuously reported to a server using IOT/GSM service. The application also shows the distance between the student locations to bus location. Can identify whether the student paid the transportation fees or not. If a student not travelling in a bus the message will be sent to their parents and respective mentor that your son/daughter is not travelled in their buses.

4. HARDWARE REQUIREMENTS:

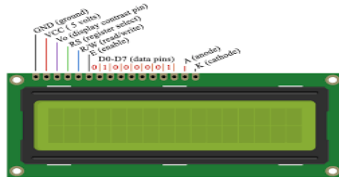
- Raspberry pi 3 model
- GPS
- RFID Reader
- LCD
- Buzzer
- Transformer
- RFID Tag
- Switch

5. SOFTWARE REQUIREMENTS

- CCS (Custom Computer Service) Compiler - Program Compile & Execute
- Proteus - Circuit Design
- MySQL server

Liquid crystal display:

Display: 20×2 character
 Outline: $116.0 \times 37.0 \times 13.5$
 VA: 91.6×18.6
 Controller: SPLC780D
 Character: 3.20×5.55
 Driver: 1 / 16
 LCD: STN Yellow Green
 Backlight: Yellow Green LED



RFID:

This module directly connects to any microcontroller UART or through a RS232 converter to PC. It gives UART/Wiegand26 output. This RFID Reader Module works with any 125 KHz RFID tags

Specifications:

5VDC through USB
 Current: $<50\text{mA}$
 Operating Frequency: 125Khz
 Read Distance: 10cm
 Size of RFID reader module: $32\text{mm}(\text{length}) \times 32\text{mm}(\text{width})$
 *
 $8\text{mm}(\text{height})$



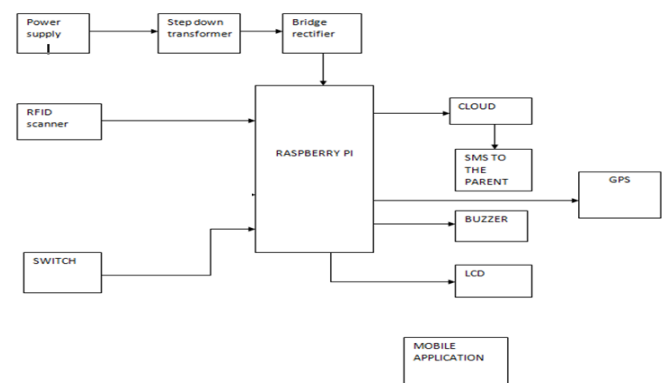
Raspberry pi:

- Broadcom BCM2837 64bit ARMv7 Quad Core Processor powered Single Board Computer running at 1.2GHz
- 1GB RAM BCM43143
- Wi-Fi on board Bluetooth Low Energy (BLE) on board
- 40pin extended GPIO
- 4 x USB 2 ports 4 pole Stereo output and Composite video port Full size
- HDMI CSI camera port for connecting the Raspberry Pi camera DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data Upgraded switched Micro USB power source (now supports up to 2.4 Amps) Expected to have the same form factor has the Pi 2 Model B, however the LEDs will change position

Raspberry pi 3 specification:



Module:



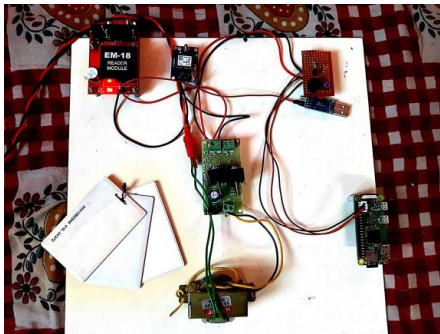
Work plan:

In this project first the power supply is reduced by using step down transformer and given to bridge rectifier. then the Raspberry Pi board will start doing all process like RFID scanning, tracking location and sending sms to parents using IOT.

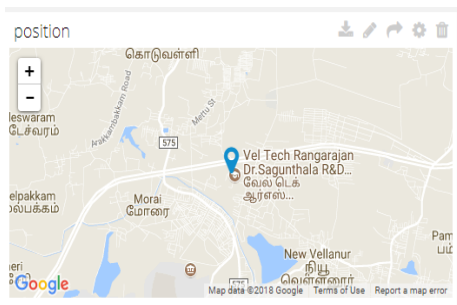
IOT:

The Internet of things is the internetworking of physical devices, vehicles, buildings, and other items— embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications.

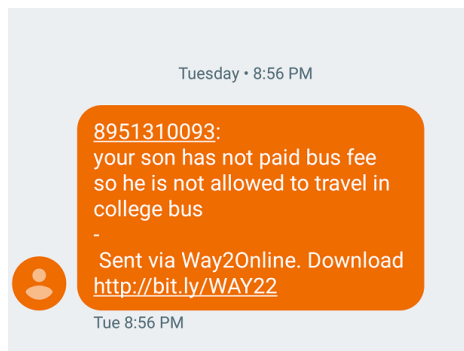
FINAL OUTPUT:



A) Raspberry pi board with RFID reader



B) Google Map live tracking



C) Notification for not paying bus fees

6. CONCLUSION:

In this paper we have reviewed a various existing techniques of college bus tracking. By implementing this idea, we can improve the transportation safety and the quality of services to the college buses. The system will have latest technology and optimized algorithms with moderate cost. The android application gives the information about the college bus for students and staffs. The proposed system is more user friendly than existing system. And it also gives greater performance. The system may focus on accurate arrival time prediction and real time position of bus. The system can be installed in android phones.

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