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Ingenious Design of Bus Tracking and Fuel Monitoring System Including Breath Analyzer

R.Josphine leela¹, M.Alagguaravind², R.Saravanan³, R.Vignesh⁴

Professor, Department of Information Technology, Panimalar Institute of Technology, Chennai, Tamil nadu, India¹

U.G. Students, Department of Information Technology, Panimalar Institute of Technology, Chennai,

Tamil nadu, India^{2,3,4}

ABSTRACT: Well congenial development of technology acquires many advantages. This advantage has also increased the traffic in main cities cause's passengers to wait for their buses. Our project will be a good solution to avoid wasting their precious time. In our project, an efficient ingenious bus tracking system is designed to position and track the location of the bus by using GPS. The use of the fuel sensor in this system is to monitor the fuel level by an authorized person in order to avoid fuel theft and alcohol sensor is sense breath of the driver to ensure he did not consume any alcohol. This system is an embedded application that will monitor the bus and transmit to the user on demand. For doing so we have used Arduino Uno(Atmega 328) in which GSM transmitter and GPS receiver is serially interfaced. GPS is employed to track the location by returning important parameters like latitude, longitude for the navigation system. GSM is to send location, fuel details to the requested person. When the request from a user is sent to the number at the GSM modem in SMS format, the system will automatically respond with the location details of the requested bus. On clicking the coordinate information, it opens the Google Map to display the live location of the bus. By using our system introduced in this project, the bus can be tracked efficiently and accident due to drunk-and-drive can be minimized.

KEYWORDS: Bus track; Arduino; GPS; GSM; Fuel.

I. INTRODUCTION

Navigation system has been a necessity of human's life. Navigation or tracking system also known as Vehicle tracking system had been used in shipping industry initially, because the people on the shore wanted to know where the ship was traveling on any particular time. Due to the rapid advancement in technology it had been designed and implemented almost in every vehicle nowadays. It is an electronic device that tracks the vehicle's location. Our project is about to design and implement a cost effective and efficient bus tracking system in order to avoid bus passenger(s) unnecessary waiting in the bus stops. Our proposed system send the exact location of the bus using Google map so that people can calculate timing according to that they can play their journey to reach the bus stop. Fuel monitoring system help the administrator to know the exact amount of fuel content of the bus, so fuel theft could be avoided and administrator could maintain the fuel more efficiently. In addition to that alcohol sensor is used in order to sense the breath of the driver to sense whether he has drunken or not. This could minimize the risk of drunk-and-drive accidents. Current position of the vehicle was acquired by Global Position System (GPS) receiver. GPS receiver and GSM module is serially interfaced with Arduino Uno which collects all the data from fuel sensor, GPS and alcohol sensor and transfer through GSM transmitter via transmission channel in a form of SMS to the request from user or an administrator. When the user sends the code belonging to particular bus, system responds the user with the geographical coordinates(i.e., latitude and longitude) of the bus tracked via SMS. On clicking the values Google map opens and position the exact location of the bus. The user need not wait for long time on bus stops they can get the location of required bus from their current location so that they could plan their departure accordingly. Furthermore, an administrator could ensure the fuel level along with the location details based on his request to the particular bus.



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II. RELATED WORKS

All around the globe many vehicle tracking systems were developed in different forms with different techniques under various names at different time according to their requirements. Number of papers has been published on the development of vehicle tracking system using GPS and GSM Modem. In, differential GPS algorithm that is capable of providing real-time.

RFID based tracking system [1] presents a design depend on the using RFID stickers which installed on every bus, these stickers are installed for identification at bus terminals. Every bus stop is assigned by a unique ID, this unique ID is transmitted around some distance around it RF transmitters and when the RF receiver on the bus comes within the range of the transmitters, it will receive signal that is generated by bus stop and it will indicate the passengers the next stop.

Bus Locator via SMS using Android Application [2] uploads the current location of the bus to the server. The server then sends an SMS to all the registered students those are about to board at the bus stop. Here the driver's mobile phone is used as a GPS receiver. It is a tiresome process where the details of all the students are to be kept and updated time to time. The server is overloaded every now and then to get details of student at every stop.

Design of punctuality enhanced bus transportation system using GSM and Zigbee [3] proposed, Design of punctuality enhanced bus transportation system using GSM and zigbee. In this way service quality of operational efficiency is improved and passenger is also able to get the information about the respective bus.

Hybrid GPS-GSM Localization of Automobile tracking system [4] An integrated GPS-GSM system is proposed to track vehicles using Google Earth application. The remote module has a GPS mounted on the moving vehicle to identify its current position, and to be transferred by GSM with other parameters acquired by the automobile's data port as an SMS to a recipient station. The received GPS coordinates are filtered using a Kalman filter to enhance the accuracy of measured position. After data processing, Google Earth application is used to view the current location and status of each vehicle.

III. METHODOLOGY

The architecture of the system in this paper is shown in fig.1. It provides the bus arrival time depending on the user source and destination. The overall outcomes functionality of the system comes from the interaction between the system components, which are a device on the bus and users mobile. A device on the bus consists of Arduino, GPS, GSM, fuel sensor and alcohol sensor. The GPS receive the coordinate information from satellites and send it the Arduino, the fuel and alcohol sensors used to measure the fuel level and senses whether the driver had drunk or not and send it to the Arduino, which collects all the data and send it to the user via SMS through the GSM on demand. He/she can select the station where he/she has stopping or the route want to go. After that, all buses that belongs to the particular route, the time will take to reach that location will get displayed.

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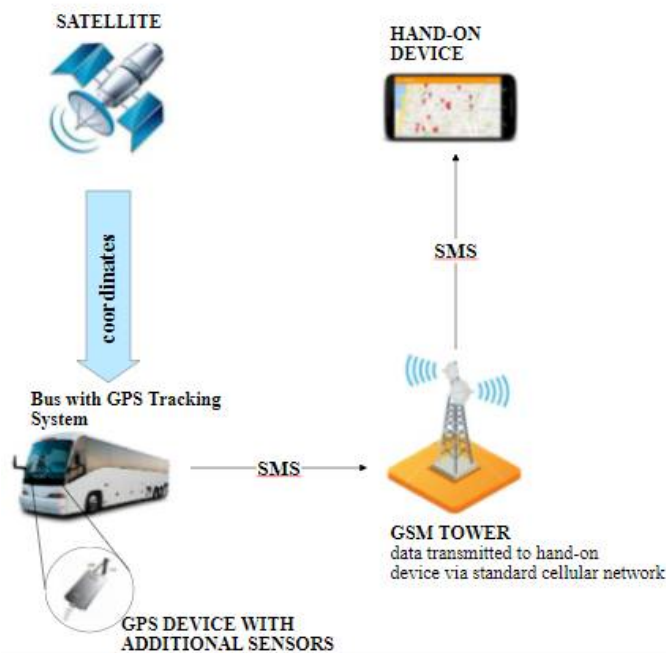


Fig 1: Architecture diagram

The components that used are:

A. GPS Technology

GPS or Global Positioning System is a satellite navigation system that provides location and time information irrespective of climate conditions to the user. The system gives critical abilities to military forces and civilian users around the world. GPS provides continuous real time, 3D positioning, timing and navigation, worldwide. The GPS is a satellite-based navigation system consists of a network of 24 satellites located into orbit as shown at figure 4. To estimate 2D position and track movement a GPS receiver must be located on to the signal of maximum of three satellites. The user's 3D position (latitude, longitude and altitude) can be determined with four or more satellites. Once the vehicle position has been determined, the GPS unit can determine other information like time, distance to destination, speed and other. GPS receiver provides data in National Marine Electronics Association (NMEA) 0183 format with a 1Hz update rate. Generally message received by GPS is in NMEA message format and NMEA0183 protocol [12].

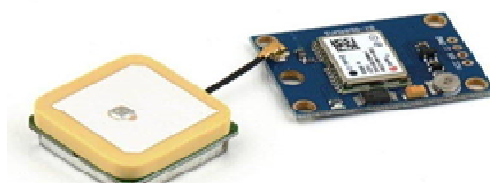


Fig 2: GPS receiver.

B. GSM module

GSM expand as Global System for Mobile communication is a specialized type mobile communication modem. GSM is an open and digital cellular technology used for transmitting voice and data services operates at the 850MHz,

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900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, and sends it down via a channel with two different streams of client data, each in its own particular time slot. The digital system has a potential to carry 64 kbps to 120 Mbps of data rates. A GSM modem requires a SIM card to be operated and it operates over a network range subscribed by the network operator. It just like a cellular phone. It is like our mobile phone without display [13].

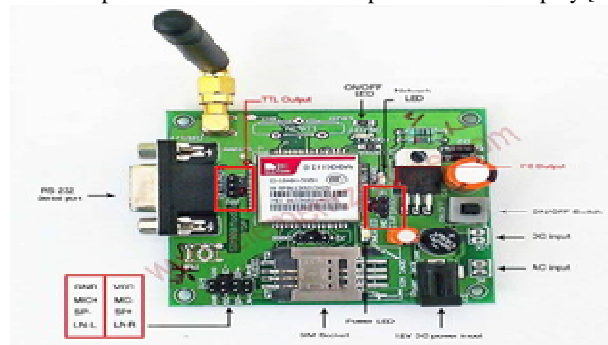


Fig 3: GSM modem

C. Arduino microcontroller

The Arduino Atmega328 as shown in Figure3.6 is a microcontroller board based on the Arduino Uno R3[11].It has 14 digital input/output pins(of which 6 can be used as PWM outputs), 6 analog inputs, a power jack , a 16 MHz quartz crystal, a USB socket, an ICSP header and a reset button. It possess everything needed to support the microcontroller, just it has to be connected to a computer with a USB cable or it can be powered with an AC-to-DC adapter or battery to get started. The reasons of using the Arduino board which comes with ATmega328 is for easy interfacing with the GPS and GSM module and for easy programming (in embedded C) of the microcontroller. The Arduino boards come with a library for interfacing with module and for dealing with analog or digital inputs and outputs.



Fig 4: Arduino Uno

D. Fuel sensor

The Fuel sensor is used to monitor the fuel content and fuel tank. Fuel sensor consists of sending unit, variable resistor. The sending unit is located in the fuel tank of the car. It consists of a float, connected to a thin, metal rod. The end of the rod is mounted to a variable resistor. The more resistance there is, the less current will flow. In a fuel tank, the other end of variable resistor is connected to the ground. When the float is near the top of the tank, the wiper on the variable resistor rests close to the grounded (negative) side, which means that the resistance is small and a relatively large amount of current passes through the sending unit back to the fuel gauge. As the level in the tank drops, the float sinks, the wiper moves, the resistance increases and the amount of current sent back to the gauge decreases [14].

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Fig 5: Fuel sensor

E. Alcohol sensor

This alcohol sensor is suitable for detecting alcohol concentration on your breath. It is a semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO₂, whose conductivity is lower in clean air. Its conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.



Fig 6: Alcohol sensor

F. Google Maps API

A Google maps API is used to display a vehicle location on a Smartphone application in real-time using an HTTP request [15].The Google maps API automatically handles access to the Google Maps servers, displays map, and responds to user gestures such as clicks and drags. The legs array contains information about two locations within the given route. “distance” and “duration” fields from the legs array are used in the Google directions API [18]. Those fields provide users with the calculated distance and time information between the current location of a vehicle and the user location within the given route. “start_address” and “end_address” fields are used to indicate an address of a vehicle and a user, respectively.

IV. RESULTS AND DISCUSSION

Successfully completed system of bus tracking system locking it remotely using GPS and GSM technologies. The developed kit of our system will be as in the following figure:



Fig7: Bus tracking kit

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The kit encompasses of all the above mentioned components such as GPS, GSM and sensor connectivity. It is set up in a bus the GPS receiver will continuously obtain the correct location through GPS receiver when end user request for the location by a SMS to the SIM in the GSM modem. LED in the system is to display the status of the system and current action of the system. The process starts after the kit is embedded into the bus with some adjustments in the mechanical connections. Now all the sensors are connected to Arduino. Message from the user is send to the number of the SIM in GSM module.



(a)

(b)

Fig.8. Vehicle Tracking Application test. The arrow indicates a user location(a) co-ordinate information of the vehicle (b) respective position of vehicle on Google map

In return it send the location information in the form of geographical coordinates as shown in the below sample image (a). if the user click the location Google map open to position the latitude and longitude on it (b). Hence the user can find where the bus is now exactly.

V. CONCLUSION

We developed a real time bus tracking system to track bus location and fuel detection in order to avoid fuel theft. This paper furnish a good design and implementation of monitoring the location of the buses which helps the people to avoid long wait in bus stops and also provide high quality of service by using alcohol and fuel sensors. The system track the location of the particular bus based on the request of user and responds to the user via SMS. The system was able to demonstrate its effective performance to track a bus, experimentally at anytime from anywhere. This design can provide the location of the busses in the Google map with an error less than 5m in the case of speed variations. In addition to that our tracking system is of low cost that is based on easily accessible electronic components.

VI. FUTURE ENHANCEMENT

We can reduce the size of the kit by using GPS+GSM on the same module at the same time accuracy can be increased up to 3m by high cost GPS receivers. With the help of high sensitivity vibration sensors we can detect the accident that is, whenever vehicle unexpectedly had an accident on the road with help of vibration sensor accident can be detected the location can be send to the owner, hospital and police.



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REFERENCES

- [1] S.Kotadia, "RFID based tracking system", International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 06 | Sept 2015.
- [2] Karan Punjabi, PoojaBolaj, PratibhaMantur, SnehaWali, "Bus Locator via SMS Using Android Application "International Journal of Computer Science and Information Technologies (IJCSIT) , ISSN :0975-9646, Volume 5, Issue: 02 | 2014.
- [3] M. Manikya Kumar, K. Rajesekhar, K. Pavani, "Design of punctually enhanced bus transportation system using GSM and Zigbee," International Journal of Research in Computer and Communication Technology, Volume: 02, Issue: 12 | December 2013.
- [4] Mohammad A. Al-Khedher, "Hybrid GPS-GSM Localization of Automobile Tracking System" International Journal of Computer Science & Information Technology (IJCSIT) Volume: 03, Issue: 6 | December 2011.
- [5] P. Verma and J. Bhatia, "Design and Development of GPS-GSM based Tracking System with Google map based Monitoring," International Journal of Computer Science, Engineering and Applications (IJCSIA), Volume: 03, Issue: 02 | June 2013.
- [6] M. Kumbhar1 and Meghana," Real Time Web Based Bus Tracking System", International Research Journal of Engineering and Technology (IRJET) Volume: 03, Issue: 02 | February 2016.
- [7] Ravi and Rohitaksha, "an Innovative Approach for City Bus Location with Route Navigation System using Android", European Journal of Advances in Engineering and Technology, Volume: 02, Issue: 03| 2015 Pg: 38-45.
- [8] Kainka, F. D. Franzis,"Starterpaket Arduino Mega 2560". Haar: FranzisVerlag. , December 2013.
- [9] G. Kiran Kumar, A. Mallikarjuna Prasad, "Public Transportation Management Service using GPS-GSM", International Journal of Research in Computer and Communication Technology, IJRCCT, Volume: 01, Issue: 03 | Aug -2012.
- [10] Mohammad A. Al-Khedher, "Hybrid GPS-GSM Localization of Automobile Tracking System", International Journal of Computer Science & Information Technology (IJCSIT) Volume: 03, Issue: 06 | Dec 2011.
- [11] "Arduino microcontroller", <http://arduino.cc>
- [12] "GPS Module", <https://maptoaster.com/maptoaster-topo-nz/articles/how-gps-works/how-gps-works.html>
- [13] "GSM Module", <https://www.elprocus.com/gsm-architecture-features-working/>
- [14] "Fuel sensors", [https://auto.howstuffworks.com/Auto/Under the Hood/Other Systems](https://auto.howstuffworks.com/Auto/Under%20the%20Hood/Other%20Systems)
- [15] "The Google Directions API" <https://developers.google.com/maps/documentation/directions/>