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SMART TRANSPORTATION

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Abstract

With the advent of GPS and the ubiquitous cellular network, real time vehicle tracking for better transport management has become possible. These technologies can be applied to public transport systems, especially buses, which are not able to adhere to predefined timetables due to reasons like overload. A unique bus system to provide safe bus transportation and to get rid of falling of persons form running bus due to overflow of persons than the capacity of bus. So in this system we are fixing sensors to detect the overflow. If such thing happens, then a complaint will be generated and sent to the nearby police stations or traffic control. The another module in our system is fixing the destination of the passengers so that the driver will get an alert message for that particular spot or place done with the help of microcontroller, GSM module and LCD. And added with that if a particular bus route is not clear or having some trouble like under construction or under severe traffic then the alternate route will also displayed to the driver. Our system is especially for the school buses, in order to avoid fall of students due to overloading.

Keywords, GPS, microcontroller, GSM Module, LCD etc.

I. INTRODUCTION

As of now everything is automated, so people have also been moving towards the automated things and also the world is moving towards the digitalized environment. So in our project we have concentrated on the people who without having proper information of arrival of stop in long travel, so they depend on public transport. Normally numbers of vehicles on the road are increasing and most of the peoples use own private vehicle, as they can go anywhere. In case unfortunately they are unable to use private vehicle, public transportation such as train, bus is the convenient one for all to reach destination. In this paper, concentrate on train. It provides a low-cost transportation, and also quickly reaches the destination. If they want to travel long distance, they prefer train only. During night time there is a possibility that train passengers can miss their destination station when travelling over long distance. Otherwise they reach unknown station. This paper will overcome this problem [1]. The GSM and GPS are a satellite based navigation system made up of a network of 24 satellites circles a earth in near circular inclined orbits. At the initial stage, the system was originally intended for

military applications, but it is now widely used for variety of applications like cars, golf carts and even cell phones, because of its versatility [5]. In 1980's, it is used for civilian application. An GPS work anywhere in the world at any weather conditions throughout the day, the GPS constellation consists of 24 satellites in 6 near circular orbit at an altitude is approximately 20,000 Km at a speed of 10,220 Km/hr, and the inclination of each orbit is 55 o. GPS signal contains 3 different bits of information. Pseudo random code which is simply a ID code to identify which satellite is transmitting information. The data which is constantly transmitted by each satellite containing important information about the status of the satellite and this part of the signal is also essential for determining its position. The NAVSTAR global positioning consists of the interacting components such as, the control segment is to control and monitoring stations is linked with the system.

II. RELATED WORKS

2.1 GSM MODEM

GSM became popular very quickly because it provided improved speech quality and, through a uniform international standard, made it possible to use a single telephone number and mobile unit around the world. The European Telecommunications Standardization Institute (ETSI) adopt the GSM standard in 1991 and GSM is now used in 135 countries.

The benefits of GSM include:

- Support for international roaming Distinction between user and device identification
- Excellent speech quality
- Wide range of services
- Interworking (e.g. with ISDN, DECT)
- Extensive security features
- GSM also stands out from other technologies with its wide range of
- services1:
- Telephony
- Asynchronous and synchronous data services (2.4/4.8/9.6 kbit/s)
- Access to packet data network (X.25)
- Telematic services (SMS, fax, videotext, etc.)

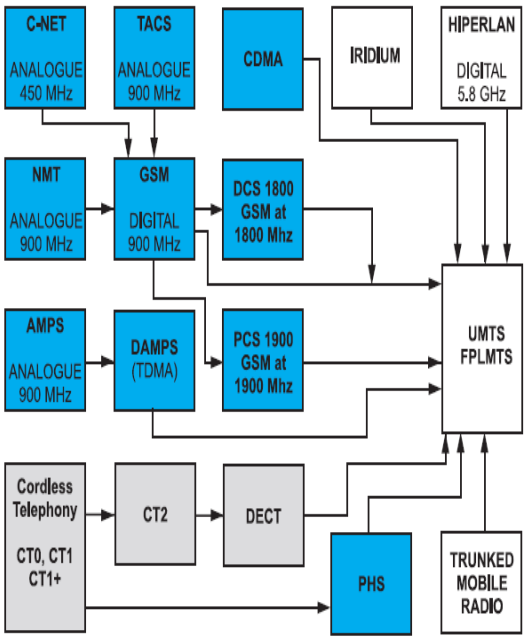


Fig2. GSM ARCHITECTURE

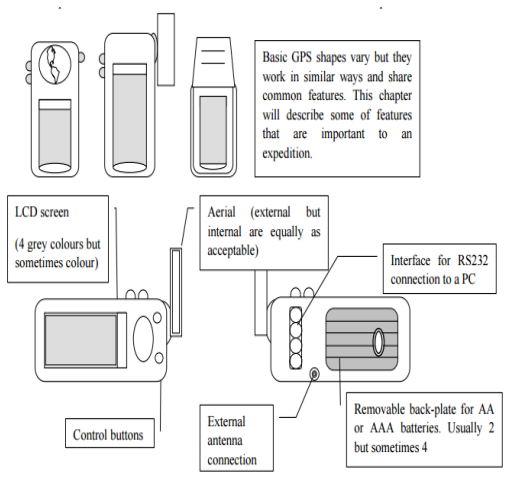
2.1 The Global Positioning System (GPS):

Principles & Concepts Over the last five years Global Positioning Systems (GPS) have changed the way fieldwork is conducted. There are two principal reasons for using GPS in the field; these are navigation and determining co-ordinates for points in the GIS.There are many different types of GPS and different methods for

using them. These differences give accuracies ranging from several centimeters to tens of meters. The appropriate use of GPS for various expeditions and teams should not always be concerned with obtaining the most accurate sets with the most features if this is not appropriate for their studies. An informed decision cannot be made without a thorough understanding of all the aspects of GPS so this chapter describes as much relevant GPS information as possible. Some of the techniques will be too involved for smaller expeditions and expeditions should study this chapter in conjunction with Chapter 11 to select the most practical and appropriate methodologies. Expeditions should not select expensive, time consuming and difficult to use navigation solutions if they are not required. Although there is always a push towards more accurate and precise methods, they should not be used if not required. Studying this chapter should help you to make an informed choice.

2.1.1GPS and field navigation

Navigation is vital to the safety of any field expedition. When combined with the necessity of fixing a location's co-ordinates for scientific research, the need for accurate, rapid and cost-effective navigation tools becomes paramount. Increasingly GPS receivers are becoming a standard – some would say essential – item of expedition equipment. Determining the co-ordinates of a point in the field can be achieved in a number of ways. The most common traditional approach involves triangulation with a map and magnetic compass. Triangulation is often very accurate but relies on accurate maps and navigable objects. The Ordnance Survey of Great Britain produces very reliable maps The result is that any triangulation achieved is relative to the map, which may in fact be quite inaccurate. Lines on navigation charts have accuracy on paper of ±1.5 mm. On a 1:10,000 chart that could be an error of 75 m. In addition, when drafting, the tools used may introduce additional errors. Triangulation is also time consuming and of limited use outside of areas of human influence i.e. those areas with manmade objects surveyed to an acceptable accuracy. Other methods have been employed to determine location but they are either difficult in the field or rely on expensive equipment, examples include sextants for astronomical positioning and various types of theodolites for astronomical triangulation. There has for some time been a move to establish Global Navigation Systems (GNS) that are quick, cost effective and reliable. GPS has been the most successful of these systems.



2.1.2 GPS functions

GPS use satellite data to calculate an accurate position on the earth. These calculations can relate the user's position to almost any map projection within mille-seconds. All GPS work in a similar manner but they often look very different and have different software. The most significant

difference between GPS receivers is the number of satellites they can simultaneously communicate with. Most receivers are described as 12 channels meaning they can communicate with 12 satellites. Older models may be 8 or even 5 channels with more modern receivers capable of communicating with 14 – 20. Given the current (2005) makeup of the GPS satellite's constellation 12 channels is more than adequate

2.1.2.1Basic guide to gps models

Another major issue in VANET since data transmitted in wireless environment is vulnerable and intruder can perform attacks like eavesdropping and active attacks like tampering, spamming etc. VANET shall satisfy requirements like authentication of message and integrity, non repudiation of message, authentication of entity, access control, confidentiality of message and availability, privacy and susceptibility identification. Except from these, VANETs are facing routing attacks like Grey hole attack, Worm hole attack, Black hole attack.

GPS-based Vehicular Networks

Vehicles gain benefit of Global Positioning System (GPS) in, an Offline and Online Mode too. A device - GPS receiver-embedded on vehicles was deemed in both modes, which can receive the satellites' signals and estimate the position of the vehicle. An MMC Card is required for each vehicle to save data in an offline mode, whereas in the online mode, a GMS is exploited to send data to the station by the SMS format. The data stored in the MMC Card can be retrieved via sophisticated software. For the online mode, an industrial mobile hardware is used for data interpretation [2].

Disadvantages:

a) GPS's signals are under the effect of the following which attenuate them:

1. Delay of Troposphere (the lowest portion of Atmosphere) and Ionosphere: Satellites signals become weak when they pass through the atmosphere.

2. Multiple Signals; occurs when GPS signals reflect by the buildings or rocks before reaching to the receiver.

3. Receiver Periodical Errors: Surely receiver's time is not working as proper as GPS satellites; therefore it is prone to high errors about time meters.

4. Orbit Error: Temporary data might not report the exact location of the satellite.

5. Obstacles: Some other satellites, buildings, bus, electronic obstacles, crowded trees can prevent signals.

6. Satellites Geometry: Satellites geometry is pointed to the proportional location of satellites. When the satellites are on the same way or they are in the small groups, some geometry errors happen.

7. Satellite's signal intentional corruption: This was made by Defence Organization to prevent using of robust signals of GPS satellites by unauthorized people.

b) Hardware constraints:

1. The necessity of additional hardware as GPS receivers, MMC Card, SIM CARD,

2. Less accuracy (up to 15 meters in positioning and 0.5 km/h for velocity).

3. Dependency on GPRS system in online mode. 4. Failure of MMC Card in the offline mode. Therefore, GPS cannot be a good solution.

III.EXISTING SYSTEM

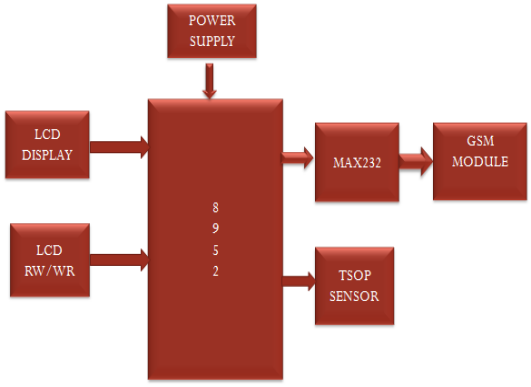
In the existing system, if a bus that is few meters away from the bus –stand is identified by this passenger infotainment system and the details of that particular bus is provided to the passenger. The bus identification process involves usage of Radio Frequency technology and bus details are announced by Voice and displayed in Liquid Crystal Display (LCD) unit. The summary of current research provides details about the integration between Microcontroller and RF transceiver, LCD display and Voice Announcement. In this method they developed an embedded system, is designed with passive RFID reader (U2270), 125KHz RFID tags (TK5530), 8051 family micro-controller AT89C52, multichannel Voice module (APR33A3), 16X2 LCD display, 433MHz ASK RF transmitter and Receivers, HT16 series encoders and decoders. In this project, every bus is equipped with passive RFID stickers for the purpose of identification at the bus terminals. And also, every bus contains LCD display and Voice processor unit for displaying and announcing the upcoming stations details. Each and every bus stop is assigned with a unique ID which is transmitted up to some distance around it using RF transmitters, when a bus with RF receiver approaches the bus stop coverage area, it receives the RF signal generated by the stop and indicates the next coming station to the passengers in the bus. When the bus arrives the station, the details of the bus is read through the RFID sticker attached to it and the same is transmitted to the next stop for the passengers there to plan their options for travel. This existing method is used for only short distance communication and real time tracking is impossible.

IV. PROPOSED WORK

A unique bus system to provide safe bus transportation and to get rid of falling of persons form running bus due to overflow of persons than the capacity of bus. That is the seat allocated in the bus which may cause some accidents while travelling in the foot boards. If such thing happens, then a complaint will be generated and sent to the nearby police stations or traffic control. The another module in our system is fixing the destination of the passengers so that the driver will get an alert message for that particular spot or place. And added with that if a particular bus route is not clear or having some trouble like under construction or under severe traffic then the alternate route will also displayed to the driver.

Our system is especially for the school buses, in order to avoid fall of students due to overloading.

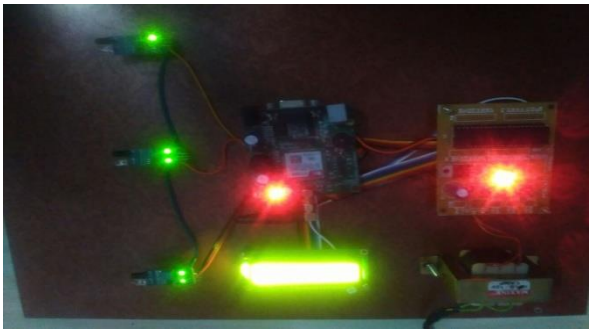
PROPOSED SYSTEM ARCHITECTURE

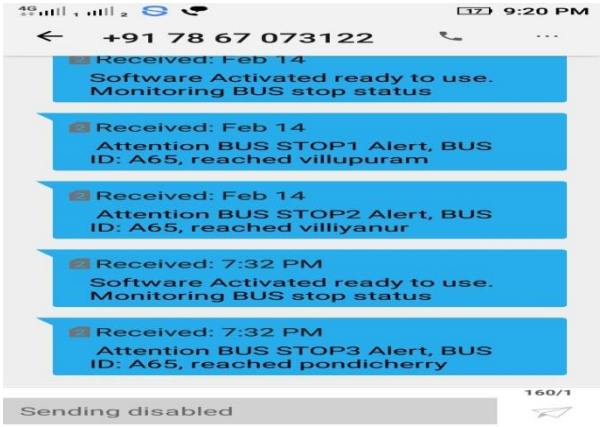


IMPLEMENTATION PROCEDURE

This project consists of an 8051 microcontroller, a GSM Modem, TSOP or IR sensors and a LCD Display. This entire circuit is placed inside a bus. The power supply provides the voltage to entire circuit. The GSM modem helps to send and receive the message to the system and it will display both in LCD that is placed inside of the bus and also to the Mobile Phone. In our project, we have used TSOP sensors for finding the location. After finding the location with the help of TSOP sensor in order to display it has been converted into TTL level with the help of MAX 232. This project is helpful for the people who are new to a city.In our project we have also concentrated on the seat allocation. For this we are using the load balancing technique to calculate the total capacity of the bus. Then, according to the capacity we will allocate the total number of seats. If the total number of people boarding in the bus exceeds than the actual seat allocated then it will automatically generate a complaint and send to the Educational Department.We also display the total number of seats available in the bus with the help of LCD in front of the bus.This is all about the GSM modem and microcontroller-based project for bus location announcement system that uses TSOP.

V.SCREENSHOTS





VI.CONCLUSION

This paper an automated station announcement system designed to make announcements and display at stations codes. The main aim of this paper to make an automated place announcement system for bus using LCD display and the GSM MODEM for tracking the station data. It can be extended to any number of stations.

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