AUTOMATIC BUS RECOGNITION THROUGH MOBILE

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Abstract:
This paper presents a GPS (Global Positioning System)to track the vehicle in the Remote areas. Here based on the latitude and longitude values of the vehicles anywhere on the globe, a microcontroller which will process the information and switch the GSM (global system for mobile communication) to send SMS to the users about present location, time, date, speed of the vehicle. In this method we give mobile number, bus number, line number, speed, date, to the controller center. Those who are subscribed to the controller Centre it automatically sends the SMS to the user through GSM modem. Here we create a program to the controller center to send an SMS message to a User. Whenever it arrives near to the junction or crosses the junction it automatically update the further information regarding the location by using the GPS system and sends the SMS to the user by using the GSM modem. GSM modem and micro controller are combined for the purpose of automatic bus recognition with a smart phone. The method works in real time applications in terms of recognition rate and reliability.

Keywords—GPS,GSMModem, Microcontroller, SMS

I. Introduction

In this modern era of communication and automation usage of every new Technology is increased. In this speed age usage of vehicles increased whenever we are waiting for a bus at the bus stop ,when the bus arrives but that bus go through another way. In which way the bus goes one doesn't know and finally waiting for the bus becomes wastage of time so, in order to reduce these types of problems we use Automatic bus recognition through mobile. In this, we use GSM Modem, GPS, and Microcontroller for broadcasting the bus number, time, date, mobile number, and information about the route map given to these modem. The system described can be used to localize and recognize text in urban scenes; the system employs a GSM Modem and GPS placed in bus, and an antenna that is mounted on top of the bus. In most urban scenarios, people every day faces difficulty in getting into the right bus. In this paper, we propose an innovative method for localizing and recognizing in completely automatic bus recognition through mobile. In this method use only a standard smart phone no specific device is required. The method employs a careful combination of GSM Modem and GPS by which a satisfactory recognition performance is achieved.

II. Block Diagram

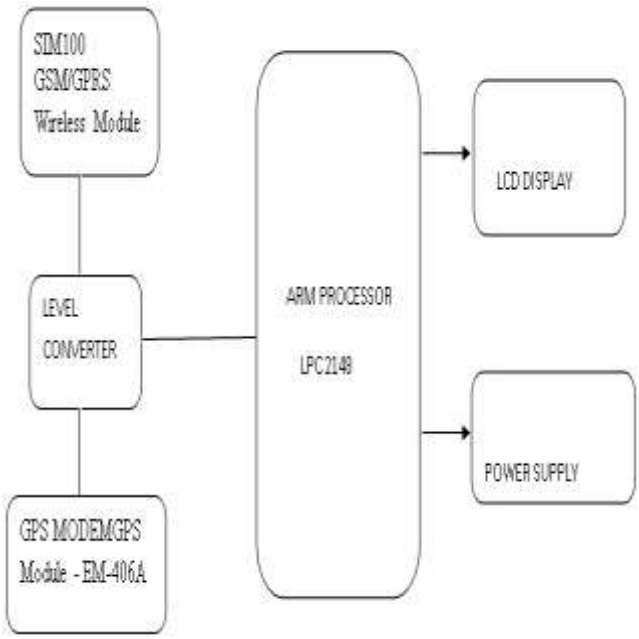

Figure 1: Block diagram

A. Control Unit:

The LPC2148 microcontroller is based on a 32/16 bitARM7TDMI-S CPU with real-time emulation and embedded trace support that combines the microcontroller with embedded high speed flash memory ranging from 32

kB to 512 kB. It is cost effective and reliable. Pipelining is employed in order to simultaneously operate all parts of processing and memory systems.

B. GPS Module:

The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information. Using GPS technology, one can determine location, velocity and time, 24 hours a day, in any weather conditions anywhere in the world for free.

C. GSM Module:

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 Kbit/s, together with the transmission of SMS (Short Message Service).

D. LCD Display:

It is used to display the position of the bus. A LCD dot matrix display is a display device used to display information on machine, clock, and many other devices requiring a simple display device of limited resolution.

E. Power Supply:

It is used to give the power supply to all components.

F. Level Converter:

It is used to transfer the data.

III.Proposal Method

To design the BUS Navigation System, we combined the GPS's ability to Pin point location along with the ability of the Global System for Mobile Communications(GSM) to communicate with a control Centre in a wireless fashion. The system includes many GPS-GSM Mobile Navigators and a base station called the control Centre. In this method we give mobile number, bus number, line number, speed, date, to the controller Centre. Those who are subscribed to the controller Centre it automatically sends the SMS to the user through GSM modem. Here we create a program to the controller Centre to send an SMS message to a User. The program directs the GPS-GSM mobile navigator to read and delete an incoming short message. The print command is a BASCOMAVR instruction that sends output to the serial port. The RS-232_r subroutine is used to read input from the serial port. When a bus enters into the city automatically it will send SMS to all users. Whenever it arrives near to the junction or crosses the junction it automatically update the further information regarding the location by using the GPS system and sends the SMS to the user by using the GSM modem. GSM modem and micro controller are combined for the purpose of automatic bus recognition with a smart phone. The method works in real time applications in terms of recognition rate and reliability.

IV. Related work

Many researchers have proposed the use of cutting edge technologies to serve the target of vehicle tracking. These technologies include: Communication, GPS, and GIS, Remote Control, server systems and others. The proposed tracking system in this paper is designed to track and monitor automobiles' status as shown in figure 2. The proposed system consists of: in-vehicle GPS receiver, GSM modems (stationary and in-vehicle), and embedded controller. The users of this application can monitor the location graphically on Google Earth; they also can view other relevant information of each automobile in the fleet

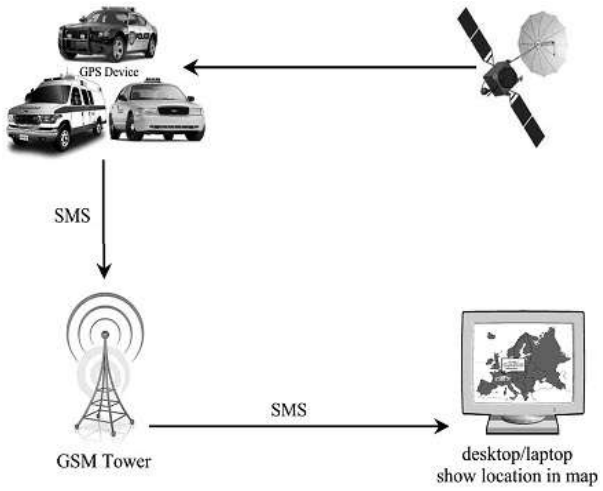

Figure 2: The block diagram of GPS tracking system

The implemented tracking system can be used to monitor various parameters related to safety; emergency services and engine stall. The paper shows an implementation of several modern technologies to achieve a desirable goal of fleet monitoring and management.

V.System overview

The system has two main modules, as shown in figure 3. The first Module is the tracking device which is attached to the moving automobile. This module composes of a GPS receiver, Microcontroller and a GSM Modem. The GPS Receiver retrieves the location information from satellites in the form of latitude and longitude real-time

readings. The Microcontroller has three main tasks: to read certain engine parameters from automobile data port (OBD-II), to processes the GPS information to extract desired values and to transmit this data to the server using GSM modem by SMS. The chosen engine parameters are: RPM, engine coolant temperature, vehicle speed, percent throttle. The second module consists of a recipient GSM modem and workstation PC. The modem receives the SMS that includes GPS coordinates and engine parameters. This text is processed using a Visual Basic program to obtain the numeric parameters, which are saved as a Microsoft Office Excel file. The received reading of the GPS is further corrected by Kalman filter. To transfer this information to Google Earth, the Excel file is converted to KML (Keyhole Markup Language) format. Google Earth interprets KML file and shows automobile's location and engine parameters on the map. The system's efficiency is dependable on the sufficiency of the used communication network. An additional setting could be implemented to interface the system to the car's alarm to alert the owner on his cell phone if the alarm is set off. The automobile's airbag system can also be wired to this system to report severe accidents to immediately alert the police and ambulance service with the location of the accident.

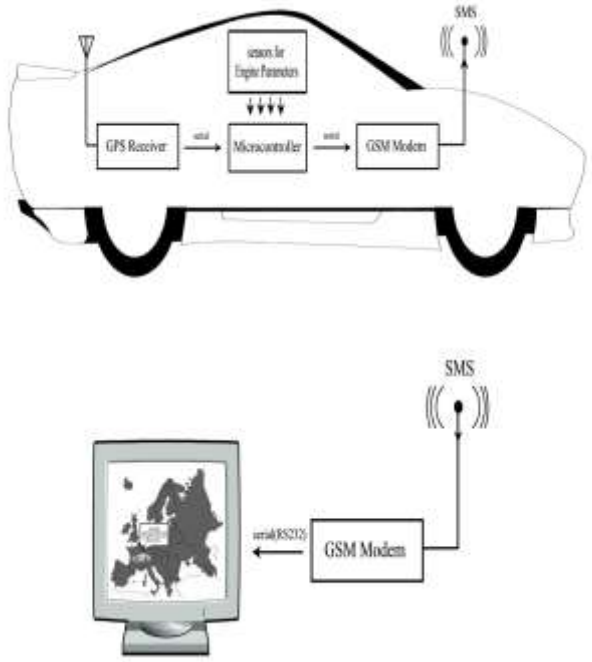

Figure 3: The system architecture: GPS Tracking and GSM Modules.

VI.Hardware specification

The tracking unit, as shown in figure 4, consists of two main inputs: The First received input is the GPS output, which has a sentence based on NMEA 0183 standard. The other input is obtained by the automobile data port, typically called ON Board Diagnostics port, version II (OBD-II). The unit sends an SMS using Hayes command (AT Command).On-Board Diagnostics port (OBD-II) is a universal automotive protocol supported by modern automobiles to retrieve diagnostic errors over a Controller Area Network (CAN) bus of the microcontroller (MCU).The used GSM module is of type SIM900D, this module supports standard AT command and compatible with several GSM networks. Transmission parameters are set to: Baud rate is set at 19200 bps, the data is 8N1 format, and flow control is set to none. For this study, we chose certain parameters to show the status of the engine: RPM, engine coolant temperature, vehicle speed and percent throttle.

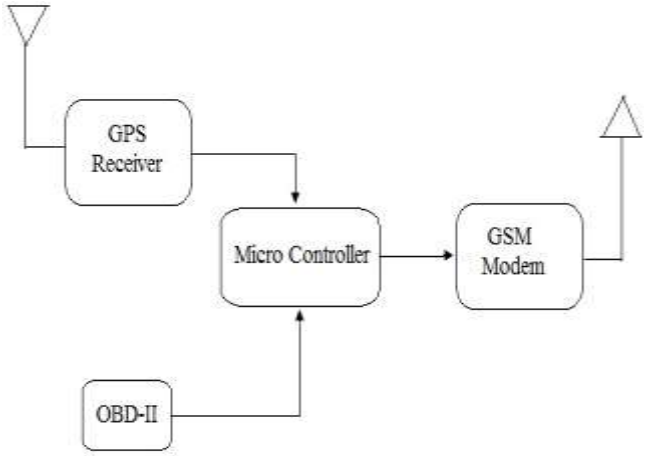

Figure 4: Schematic diagram of in-vehicle tracking unit.

The GPS receiver is a MediaTek MT3329. The GPS module supports up to a 10Hz update rate. The microcontroller is the main operational unit of the tracking device. The GPS receiver collects the latitude, longitude and speed information and forwards them to the microcontroller. The GSM module communicates with the microcontroller to send the information package to another GSM Module at the recipient station, all information appears on Google Earth after processing.

A. GSM transmits Data:

For point to point SMS, a message can be sent to another subscriber to the service, and an acknowledgment of receipt is sent to the sender. SMS also can be used in Cell Broadcast mode to send messages such as traffic or news updates. Messages can be stored on the SIM card for later

retrieval. First, initialize the GSM module with AT commands AT+CSCA and AT+CMGF. Using the former sets the SMS center number to be used with outgoing SMS messages. Remember, the number will be saved on the SIM card just like in normal mobile phones. There are two different modes—Text mode and Protocol Data Unit (PDU) mode—for handling short messages. The system default is PDU mode; however, Text mode is easier to understand. So, use the AT+CMGF=1 command to set the module to the GSM07.05 standard SMS Text mode. The AT+CMGS command is used to send a short message. The format of this command is: AT+CMGS=<da><CR>Message Texts<CTRL-Z>Here,<da> is a subscriber's mobile phone number that you want to send the short message to. The GSM module can receive incoming short message and save them on the SIM card automatically. You can use the AT+CMGR command to read an incoming short message from the SIM card storage, and then use the AT+CMGD command to delete it when you're finished. If you want to read an SMS message, then send a AT+CMGR=x command to tell the GSM module which short message you want to read. Next, check the serial port to receive the message from the GSM module. Rs232_r is a subroutine used to receive data from the UART.

Figure 5: GSM Modem

B. GPS Receiver:

The hardware interfaces for GPS units are designed to meet NMEA requirements. The GPS receiver provides data in NMEA 0183format with a 1Hz update rate. Generally message received by GPS is in NMEA [National Marine Electronics Association] message format and NMEA protocol which is most commonly used is NMEA0183 protocol. GPS sentences beginning with the following specifications: $GPGGA, $GPGSA, $GPGSV, $GPRMC, and $GPVTG.

Figure 6: GPS Receiver

VII.Software specification

Google Earth currently supports most GPS devices. The engaged GPS Module has NMEA 0183 Protocol for transmitting GPS information to a PC. This protocol consists of several sentences, starting with the character $, with a maximum of 79 characters in length. The NMEA Message to read data with both position and time is: $GPRMC. Therefore, only the $GPRMC information is used to determine the location of the automobile to reduce SMS text. The status of the automobile along with $GPRMC information is sent by the GSM modem of type MediaTek MT3329.Consequently, the recipient GSM, also has NMEA 0183 protocol, receives the transmitted SMS to obtain GPS coordinates and status information of the automobile. The transmitted GPS data is processed by a Visual Basic program using a Kalman filter to correct the current position. The resulted data of corrected position and automobile parameters is sorted in an Excel sheet. The Excel file is exported to a KML file that is compatible with Google Earth program. Hence, Google Earth will view the location and status of the automobile on the map by reading the KML file. Figure 7 illustrates the block diagram of the recipient module in the system. The KML file, developed for Google Earth, is used to save geographic data that includes navigation maps and other driving instructions.

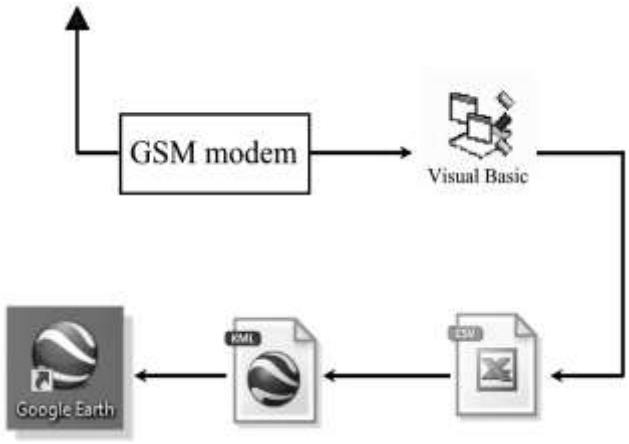

Figure 7: The block diagram of the recipient module in the system.

Figure 8: shows the live location of an automobile in terms of latitude and longitude, and the engine parameters retrieved by OBD-II: RPM, engine coolant temperature, vehicle speed, percent throttle.

Figure 8: Google Earth Snapshot showing the live location and engine parameters of the tracked automobile.

Furthermore, Google Earth provides the ability to track an object and view the related information at any position as shown in figure 9 The track shows the travel locations of the vehicle form the beginning of the route. All data is saved in a separate excel data sheets.

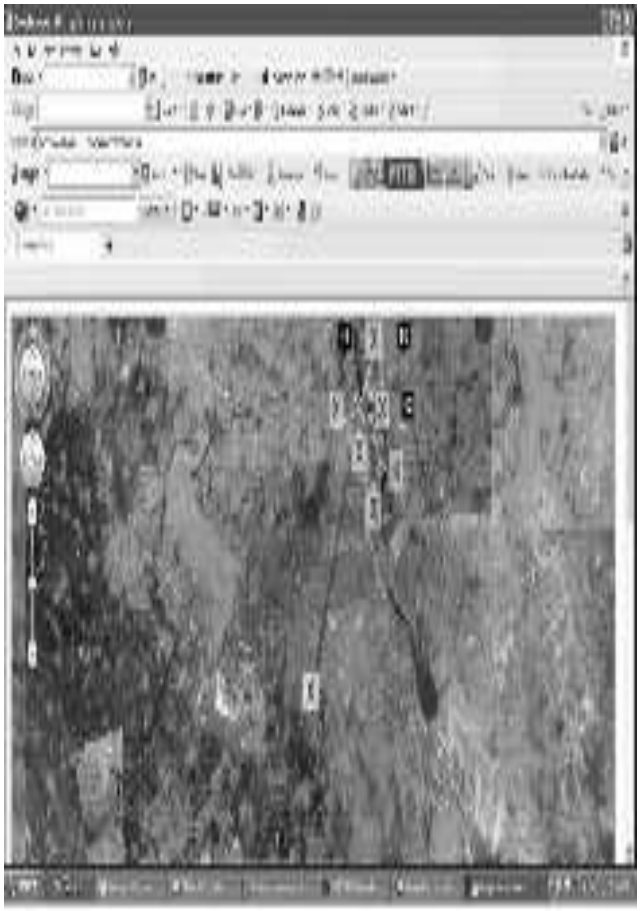

Figure 9: Google Earth Snapshot showing live tracking of targeted automobile.

VIII.Micro Controller

A smaller computer, On-chip RAM, ROM, I/O ports. Example ARM perfectly fits many uses, from automotive industries and controlling home appliances to industrial, instruments, remote sensors, electrical door locks and safety devices. It is also ideal for smart cards as well as for battery supplied devices of its low consumption EEPROM memory makes it easier to apply microcontrollers to devices where permanent storage of various parameters needed. Low cost, low consumption, easy handling and flexibility make ARM applicable. The LPC2131/2132/2134/2136/2138 micro-controllers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the

microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. Flow chart 9 for overall system as shown in figure.

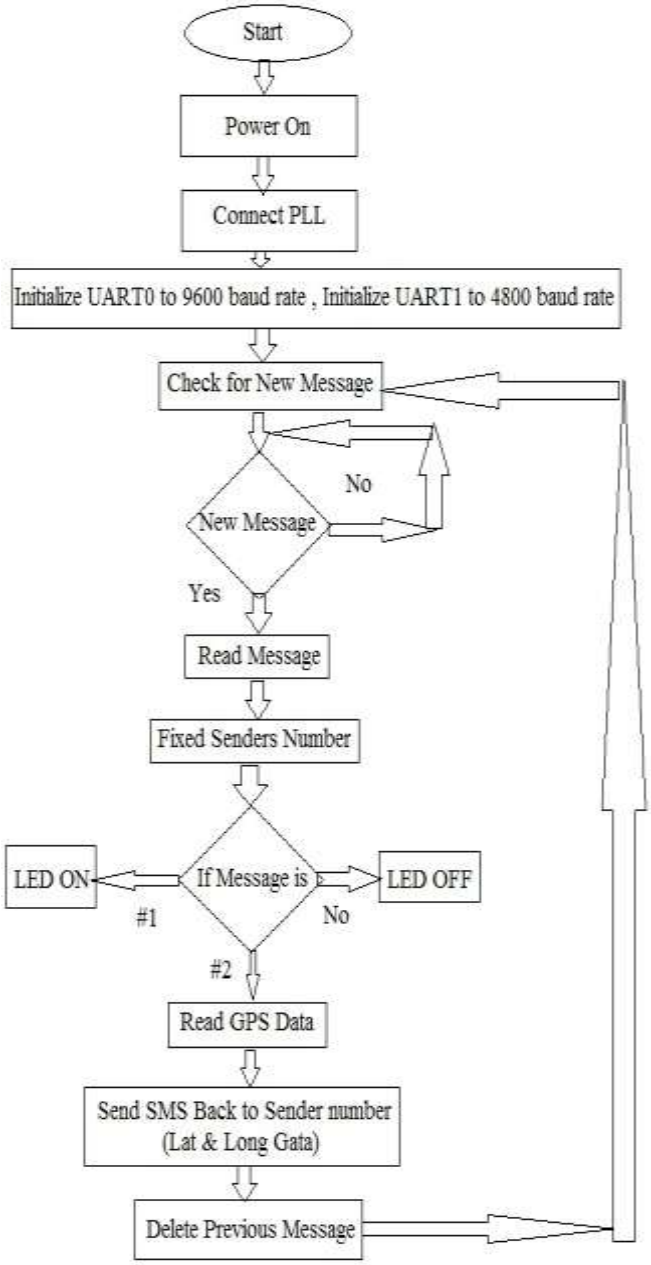

Figure 9: Flow Chart

Algorithm

Step1→ Start of process.

Step2→ First is power on.

Step3→ Initialize System PLL.

Step4→ Initialize UART0 at 9600 and UART1at 4800baud rate.

Step5→ Check for new message. Yes Then go to step 7 else wait for new message.

Step6→ Start reading the message

Step7→ First read sender number.

Step8→ And read data in message .If Message contains #0 then LED OFF and if #1 then LED ON and if #2 goes to step 9.

Step9→ Start reading GPS message.

Step10→ Send longitude and latitude Information to sender back.

Step11→ After sending message delete Previous message and go to step no. 6 again for repeating process.

IX. Conclusion

By implementing AUTOMATIC BUS RECOGNITION THROUGH MOBILE the physical work of the human can be reduced to a maximum extent. The user can get the valuable message from the GSM MODEM through GPS. The time can be saved to some extent by the implementation of the above described paper.

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XI.References

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