

Intelligent ARM Based Accident Identification & Vehicle Tracking System Using GPS and GSM Technology

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Abstract— Road accidents on highways & in cities have made the technologists to deeply think & design an embedded system which when installed on a vehicle will help to identify an accident & provide the emergency medical service to the victim at the earliest. Today thousands of people die due to road accidents. In this paper an attempt has been made to design such system using ARM7LPC2148, GPS receiver, GSM module and accelerometer sensor. The most important parameter is to reduce the time required by medical personal to reach the accident location. When an accident occurs, an SMS is sent to the nearest hospital, police station & to the owner of the vehicle. It contains the latitude & longitude of the accident location. With the help of GPS coordinates the medical personal will be able to reach the accident location at the earliest & we can save lives. One more important feature of this system is vehicle tracking. This project uses regulated 5V, 750Ma power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/18V step down transformer.

Index terms: Accident Identification, GPS, GSM, Vehicle Tracking.

I. INTRODUCTION

When a vehicle accident occurs suddenly the reaction of the emergency services now become a race between life and death today, wireless innovation has tilted the odds in favor of success like never before. This paper details about accident of automobile emergency alert situation .In this we are trying to program a GPS/GSM module incorporating an accelerometer to report occurrences of accident automatically via GSM communication platform (using SMS messaging) to the nearest agencies such as hospitals, police stations, fire services and so on giving exact position of the point where the crash had occurred. This can provide early response and rescue of accident victims saving properties and lives the whole paper is based on arm controller this component details ARM 7(LPC 2148) Bump sensor (Accelerometer MMA7660), GPS module, GSM module. A vehicular accidents locator system is provided including a plurality of sensor assemblies. The sensors are mounted throughout the body of the vehicle. The major accident occurs in school zone and college zone because of high speed of vehicle. The main objective of the system is to provide security for the vehicle user and also detects the accident if occurred and informs the respective authority through wireless technology if any accident occurs in highway. The accident information system will get activated and message will be transmitted to respective authority. It gives the security system for our vehicle, other system prevent from unwanted and give information to the nearer or recorded security system give late information while GSM based security system give information at the time.

II. DESIGN OF HARDWARE

1) System Structure

Vehicle positioning System consists the HCI unit, which is formed of ARM System. A) GSM module

B) GPS module Chinese LCD and the keyboard. The Vehicle terminal can be connected to the phone handset for voice transmission.

The dedicated GPIO interfaces can be connected to the vehicle control circuit for the detection of a variety of vehicle status data. The block diagram of the terminal board is shown in given figure no.1

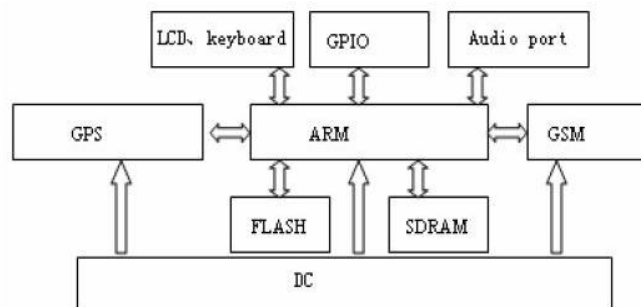


Figure 1 System structure

2) Hardware Structure

The hardware structure of the system is dominated by ARM controller LPC2148, GPS module, GSM module, Antenna, GPIO interface and power management unit and other components. The hardware structure is shown in Figure 2

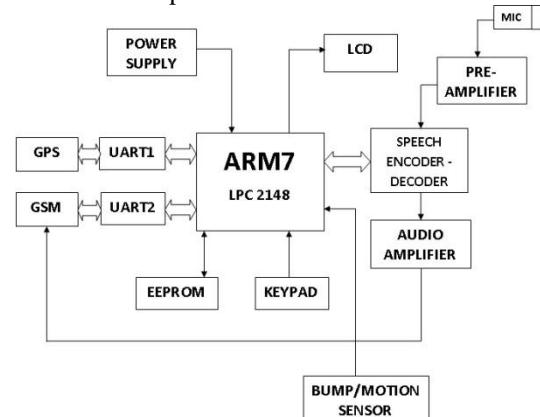


Fig 2 Hardware structure

3) ARM-7 CONTROLLER LPC-2148

ARM controller: In Vehicle terminal, as a central processing unit of the system, ARM embedded system has critical influence on overall performance. So introduced by Philips, the 16/32-bit ARM7 TDMI-S core LPC2148 microcontroller with simulation and tracking. Support is used. It has 32K bytes of static RAM and 512kbytes of embedded high speed Flash memory. In the 64-pin package, 45 GPIO can be used. The Conversion Time of 4 10-bit A / D converter can be as few as 2.44us. It has Real-time clock and watchdog. A maximum operating frequency of 60MHz of the CPU can be achieved through the on-chip PL, and the rich on-chip resources can meet the needs of general industrial control. LPC2148 not only works stably and faster, but also has dual serial, so is accessible to the plan.

4) GPS MODEM -87

GPS Wireless communication module. This design adapts the current leading GPS technology and the integrated positioning chip LEADTEKLR9548S. Specifically Designed for OEM Applications; it is a GPS receiver module with high sensitivity, low power consumption, and 20 channels. Compared with other independent GPS solutions GPS9548 is able to help Users gain and continuously track GPS signals at a very low signal intensity, which means GPS9548 can be used in the environment where it has never been thought to be accessible, Such as Buildings of the city building, dense forest, garage, and many indoor environment, with a positioning accuracy of less than 10 meters. With only an addition of relevant circuit at the periphery, positioning information including time, longitude, latitude, rate, moving direction, etc, can be output through the serial.

5) GSM MODEM -300

GSM (Global System for Mobile Communications originally from grouped special mobile)The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephony. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS). GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency range for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and the United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems. Most 3G networks in Europe operate in the 2100 MHz frequency band. For more information on worldwide GSM frequency usage, see bands. It is the most popular standard for mobile telephony systems in the world.

III. DESIGN OF SOFTWARE

When using GPS to position, each satellite will send to the receiving terminal three key messages: Satellite number, satellite position, and time. The receiving terminal store and use the received information, which is also used to fix the time on the GPS receiver. By comparing the difference of the time when each satellite signal is received and the time when the satellite is sent, The GPS receiver calculate the distance from each satellite to the receiver. When the receiver can contact enough satellites, it can use trigonometric formulas to calculate the location of the receiver. Three satellites can be able to operate 2D

Positioning (longitude and latitude), while four or more can be able to operate 3D positioning (longitude, latitude, and height). The key indicator of positioning is the accuracy. The horizontal position accuracy of most Civilian GPS receivers is about 5 to 10m. Using differential technique, cm level even mm-level positioning accuracy can be achieved.

IV. PROGRAM FLOW

The key of software design is to write function Functions. Functions are realized by calling the corresponding function, which includes four parts: GPS data analysis and extraction, encoding and decoding PDU messages, sending and receiving text messages, and parsing and executing the command.

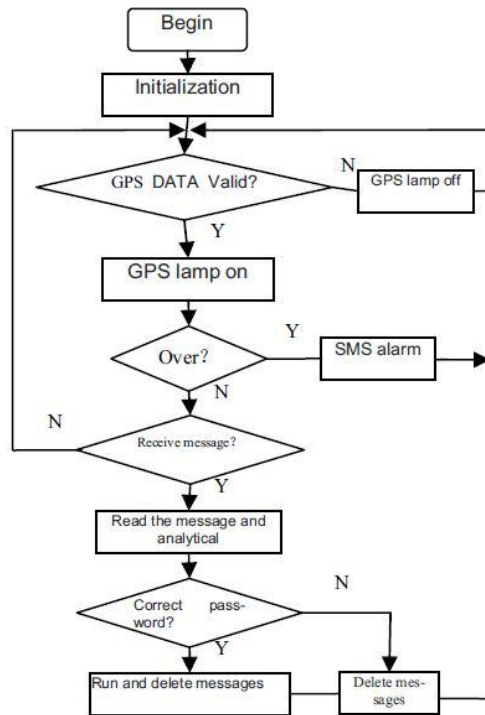


Fig 3 Program Flowchart

After the first boot of the device, the locator is firstly initialized, including selecting pin function of the controller LPC2148, setting the serial port work, initializing interrupt vectors and TC35i, and setting the working mode. Then the program enters the five links of loop command: 1) test valid GPS data. Wait until the GPS receiver module LR9548S has received validate, at the same time the GPS light is lit. If the data is invalid, the GPS status indicator will always be off. 2) Verify overrun. If the vehicle is overrunning, the gauge instantly sends a SMS to predefined mobile phone users. 3) Check if you receive a new message. If you do not receive a new message, then return to 1). If you receive a new message, you have to read the new message where it is stored and decode the contents of the received SMS. 4) Verify the password. If the password is incorrect or non-command text, then delete the message and return to the article 1). If the password is the correct command, then start parsing the messages, and execute the corresponding subroutine command. 5) After the treatment, remove the message in order to avoid the situation that the full storage space cannot accept new messages.

V. APPLICATION

- 1 Accident Identification
- 2 Tracking the vehicle position

VI. CONCLUSION

Taking ARM as platform, and GPS and GSM as wireless data communication platform, Vehicle Positioning System is small, stable and reliable, with small delay, which can effectively overcome the past disadvantages of poor realtime and high operating costs existed in the system. Vehicle positioning system is trying to achieve complexion of positioning technology, integration of positioning systems, and network of location-based services in the form of the current Client / Server. It is believed that the system will have broad application prospects.

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