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Design and Implementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smart Phone Application

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ABSTRACT:

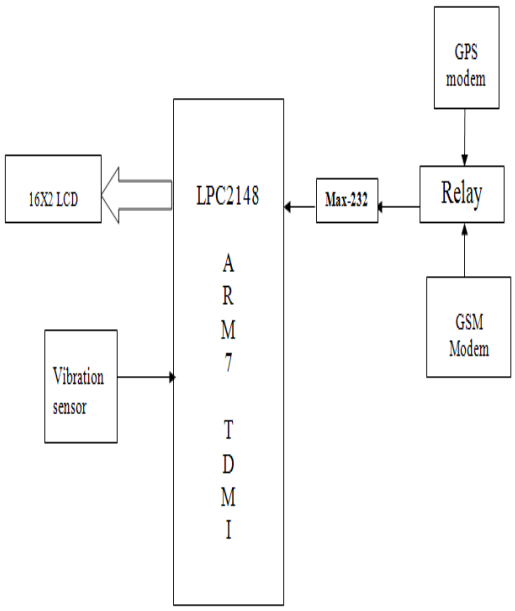
This Project presents an automotive localization system using GPS and GSM-SMS services. The system permits localization of the automobile and transmitting the position to the owner on his mobile phone as a short message (SMS) at his request. The system can be interconnected with the car alarm system and alert the owner on his mobile phone. This tracking system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent to the user/owner using GSM modem. Microcontroller also gets the speed of the vehicle and sends it to user/owner. The presented application is a low cost solution for automobile position and status, very useful in case of car theft situations, for monitoring adolescent drivers by their parents as well as in car tracking system applications. The proposed solution can be used in other types of application, where the information needed is requested rarely and at irregular period of time (when requested). This system is also can be interfaced with Vehicle airbag system. This enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the location of accident.

The Major Building blocks of this project are:

o Microcontroller based motherboard with regulated power supply.
o GPS Receiver for Location Information.
o GSM Modem/Mobile phone for remote communication.
o LED Indicators
o Local alarm/alert system in case of accident situations.

This project uses regulated 3.3V, 750mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

BLOCK DIAGRAM:



LPC2148 CONTROLLER:

General description:

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate.For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty.

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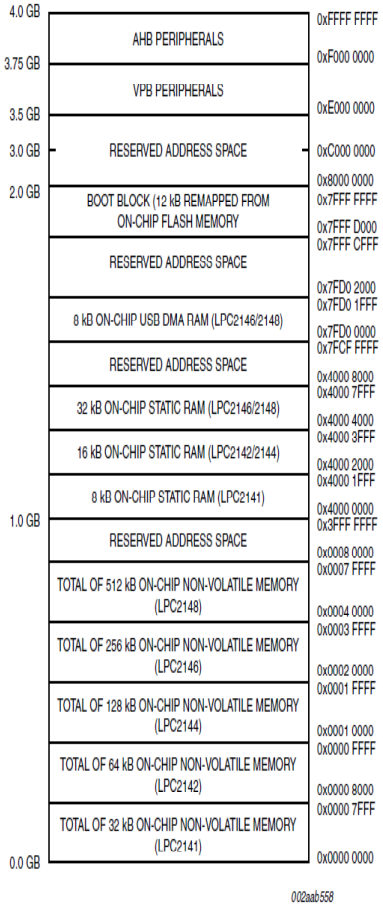
Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

Memory map:

The LPC2141/42/44/46/48 memory map incorporates several distinct regions, as shown in Figure. In addition, the CPU interrupt vectors may be remapped to allow them to reside in either flash memory (the default) or on-chip static RAM. This is described in Section 6.19 "System control".

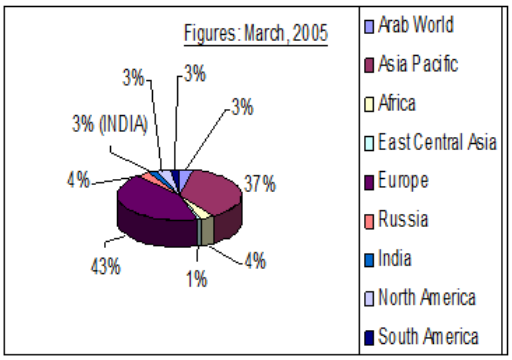


GLOBAL SYSTEM FOR MOBILE COMMUNICATION:

It is a globally accepted standard for digital cellular communication. GSM is the name of standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900MHZ.

Throughout the evolution of cellular telecommunications, various systems have been developed without the benefit of standardized specification. This presented many problems directly related to compatibility, especially with the development of digital radio technology. The GSM standard is intended to address these problems.

GSM IN WORLD:



Characteristics of GSM Standard

- Fully digital system using 900,1800 MHz frequency band.
- TDMA over radio carriers(200 KHz carrier spacing.
- 8 full rate or 16 half rate TDMA channels per carrier.
- User/terminal authentication for fraud control.
- Encryption of speech and data transmission over the radio path.
- Full international roaming capability.
- Low speed data services (upto 9.6 Kb/s).
- Compatibility with ISDN.
- Support of Short Message Service (SMS).

OPERATION OF GSM:

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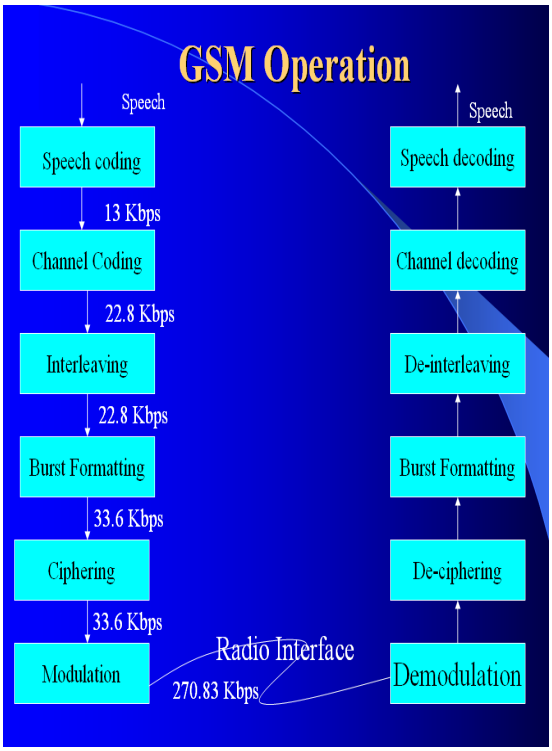
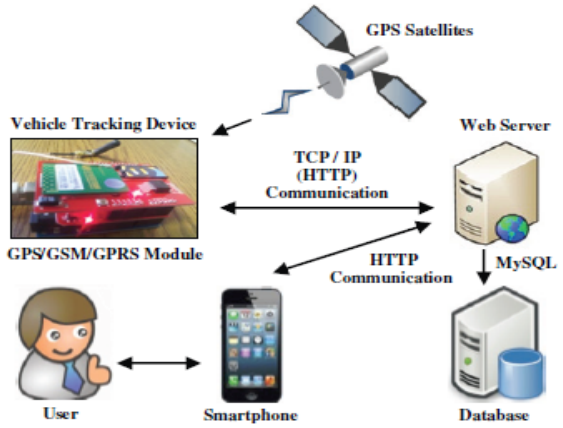


Basic concept of GPS:

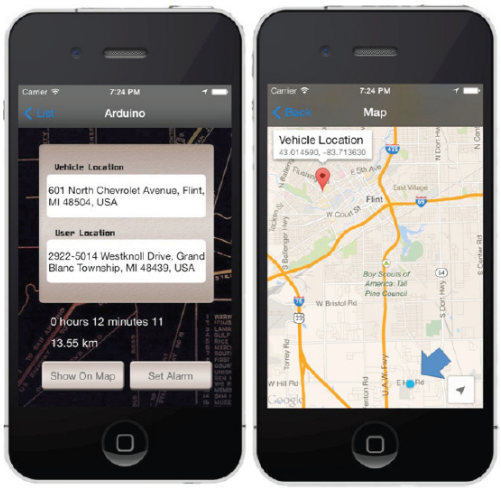
A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits messages which include

- the time the message was transmitted
- precise orbital information (the ephemeris)
- The general system health and rough orbits of all GPS satellites (the almanac).



The receiver utilizes the messages it receives to determine the transit time of each message and computes the distances to each satellite. These distances along with the satellites' locations are used with the possible aid of trilateration to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included.

Fig (a)



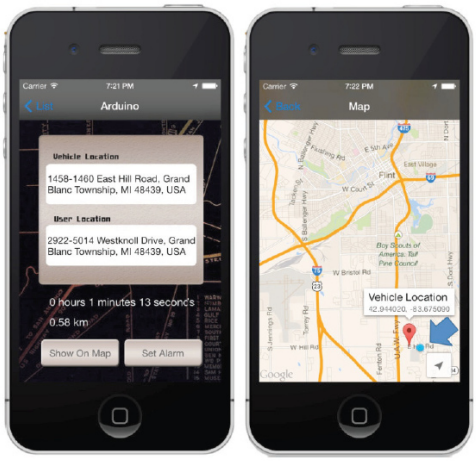


Fig (b)

Vehicle Tracking Application test. The arrow indicates a user location

(a)Initial position of the vehicle

(b)(b) The vehicle is approaching to the user.
The GPS signal allows to repeat this calculation every 6 seconds. Many GPS units show derived information such as direction and speed, calculated from position changes.

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Three satellites might seem enough to solve for position, since space has three dimensions and a position on the Earth's surface can be assumed. However, even a very small clock error multiplied by the very large speed of light the speed at which satellite signals propagate—results in a large positional error. Therefore receivers use four or more satellites to solve for the receiver's location and time. The very accurately computed time is effectively hidden by most GPS applications, which use only the location. A few specialized GPS applications do however use the time; these include time transfer, traffic signal timing, and synchronization of cell phone base stations.

Vibration sensor:

» A vibration sensor is a device that recognizes the changes in pressure, acceleration, strain or force by converting them to an electrical charge..

Advantages:

- Sophisticated security
- Monitors all hazards and threats
- Alert message to mobile phone for remote information

Applications:

- Security, Remote monitoring, Transportation and logistics.

REFERENCES:

[1] Aaron Smith, "Nearly half of American adults are Smartphone",http://pewinternet.org/~/media/Files/Reports/2012/Smartphone%20ownership%202012.pdf , 2012

[2] Jithin V mohan, Minu Balan, Sharoon Thomas, and Lynn MarietteMendonza, "Fleet Mangement System", B.Tech Degree Thesis, College of Engineering, Munnar, Idukki, Kerala, India, 2009

[3] Mohammad A. Al-Khedher, "Hybrid GPS-GSM Localization ofAutomobile Tracking System", International Journal of ComputerScience & Information Technology (IJCSIT) Vol 3, No 6, Dec 2011

[4]Saed Tarapiah, Shadi Atalla, and Rajaa AbuHania, "Smart On-BoardTransportation Management System Using GPS/GSM/GPRSTechnologies to Reduce Traffic Violation in Developing Countries",International Journal of Digital Information and WirelessCommunications (IJDIWC) 3(4): 96-105, The Society of DigitalInformation and Wireless Communications, 2013 (ISSN: 2225-658X)

[5] Muruganandham, "Real Time Web based Vehicle Tracking using GPS",World Academy of Science, Engineering and Techonogy, 37, 2010

[6] R.Ramani, S.Valarmathy, N.SuthanthiraVanitha, S.Selvaraju, andM.Thiruppathi, "Vehicle Tracking and Locking Sytem Based on GSMand GPS", I.J. Intelligent Systems and Applications, 2013, 09, 86-93

[7] G. Kiran Kumar, A. Mallikarjuna Prasad, "Public TransportationMangement Service using GPS-GSM", International Journal ofResearch in Computer and Communication Technology, IJRCCT, ISSN-2278-5841, Vol-1, Issue -3, Aug - 2012.

[8] Ambade Shruti Dinker and S. A Shaikh, "Design and Implementation Of vehicle Tracking System Using GPS", Joural of InformationEngineering and Applications, Vol 1, No.3, 2011

[9] Eddie Chi-Wah Lau, "Simple Bus Tracking System", Journal ofAdvanced Computer Science and Technology Research, Vol3, No.1,2013

[10] Montaser N. Ramadan, Mohammad A. Al-Khedher, and Sharaf A. Al-Kheder, "Intelligent Anti-Theft and Tracking Sytem for Automobiles",International Journal of Machine Learning and Computing Vol.2 No. 1,February 2012.