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Design of Vehicle Positioning System Based On ARM

Gogikar Sandeep
M.Tech (Embedded Systems)
Farah Institute of Technology, Chevella,
R.R. Dist, Telangana State, India.

Harshavardhan Velagapudi
Assistant Professor
Farah Institute of Technology, Chevella,
R.R. Dist, Telangana State, India.

ABSTRACT:

Design of Vehicular monitoring and tracking system based on ARM using GSM and GPM is proposed. The vehicular module is used to track, monitor, and surveillance and finds the accident spot and intimate to the monitoring station.

In this project, if we want to identify our vehicle location, we will send a SMS to the GSM modem which is interfaced with the LPC2148. The GSM modem will receive the message and switch on GPS Module and receives the position of the vehicle in terms of latitude and longitude. And the same information will be send back to the predefined number. The architecture and working theory of this system is introduced in details, and introduces the vehicle location system which uses the LPC2148 as a control unit to combinative with GPS and GSM modules.

INTRODUCTION

This project can be used to control the thefting of vehicles, track the thefted vehicles and finding the location of vehicle and also implement the scene of accident alarm system. In this we are trying to program a GPS/GSM module incorporating an accelerometer to report occurrences of accident automatically via the GSM communication platform (using SMS messaging) to the nearest agencies such as hospitals, police stations, fire services and so on, giving the 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 controller is used to coordinate all the activities in the system. The components details are ARM 7(LPC 2148), GPS module , and GSM module (SIM 900).

SYSTEM ARCHITECTURE

Block Diagram:

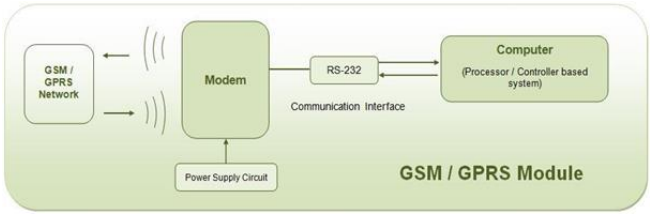

Fig.1

ARM (LPC 2148) :

ARM stands for Advaced RISC Machine developed by ARM Ltd which is most widely used in number of Embedded systems. Today ARM family accounts for approximately 75% of all embedded CPUs making it one of the leading architecture in the world. Previous designs used 8 bit/16 bit devices, but the designers are looking for highly integrated high performance ARM based 32-bit microcontroller. Heart of the design is ARM 32 bit RISC processor, hence brief description was given about its specifications below.

The basic block diagram of the system is as shown in fig 1, In this project, if we want to identify our vehicle location, we will send a SMS to the GSM modem which is interfaced with the microcontroller. The GSM

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modem will receive the message and switch on GPS Module and receives the position of the vehicle in terms of latitude and longitude. And the same information will be send back to the predefined number. The architecture and working theory of this system is introduced in details, and introduces the vehicle location system which uses the LPC2148 as a control unit to combinative with GPS and GSM.

The LPC2148 board consists of ARM7TDMI as its core and it is designed by NSK. ARM7TDMI family has good performance in situations where the energy consumption is critical design goal. LPC2148 has ARM7TDMI as its core is called CPU core. The modules inside are connected by the CPU high performance bus called Advance High performance bus (AHB) and the peripherals are connected by VLSI peripheral bus (VPB).

LCD DISPLAY:

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as DVD players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence. The LCD screen is more energy efficient and can be disposed of more safely than a CRT. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in colour or monochrome. Liquid crystals were first discovered in 1888.[2] By 2008, annual sales of televisions with LCD screens exceeded sales of CRT units worldwide, and the CRT became obsolete for most purposes.

GSM Module

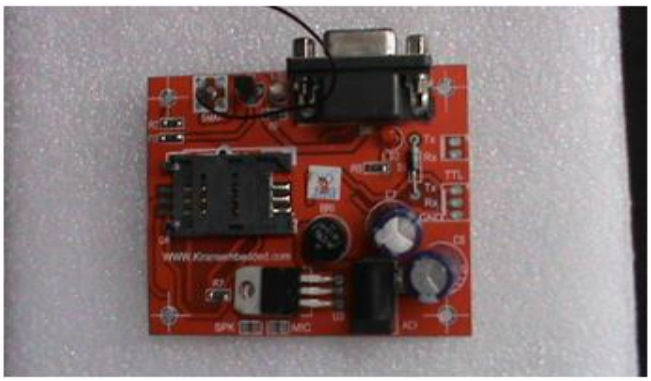

Figure: GSM Modem

GSM supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3G in Australia, Canada and many South American countries. By having harmonized spectrum across most of the globe, GSM's international roaming capability allows users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 218 countries. Terrestrial GSM networks now cover more than 80% of the world's population. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.

GPS Module:

Wireless communication module. This design adapts the current leading GPS technology and the integrated positioning chip LEADTEK LR9548S. 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

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an addition of relevant circuit at the periphery, positioning information including time, longitude, latitude, rate, moving direction, etc, can be output through the serial.

PROPOSED METHOD:

In this project, if we want to identify our vehicle location, we will send a SMS to the GSM modem which is interfaced with the microcontroller. The GSM modem will receive the message and switch on GPS Module and receives the position of the vehicle in terms of latitude and longitude. And the same information will be send back to the predefined number. The architecture and working theory of this system is introduced in details, and introduces the vehicle location system which uses the LPC2148 as a control unit to combinative with GPS and GSM.

Program Flow:

Before running the main program, LPC2148 controller must initialize the runtime environment, which is, writing start code for ARM chips, including the exception vector table, stack initialization, the storage system initialization and target board initialization, usually written in assembly language. If you use the GPRS services developed on the basis of GSM while using the SMS service for delivery of positioning information, the program flow chart is shown in figure.

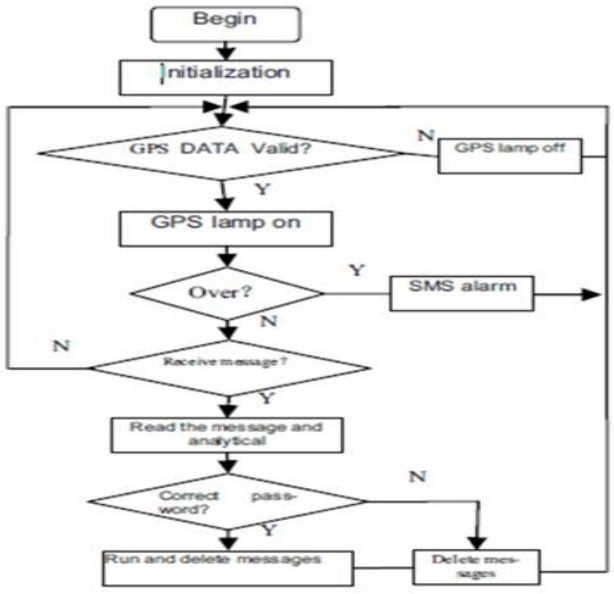

Figure 4.2: Program Flow

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. 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 valid data, 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 can not accept new messages.

EXPERIMENTAL RESULTS

- Latitude: 1753.8336,N;
- Longitude: 7952.4904,E;
- Latitude: 1752.9632,N;
- Longitude: 7952.2323,E;

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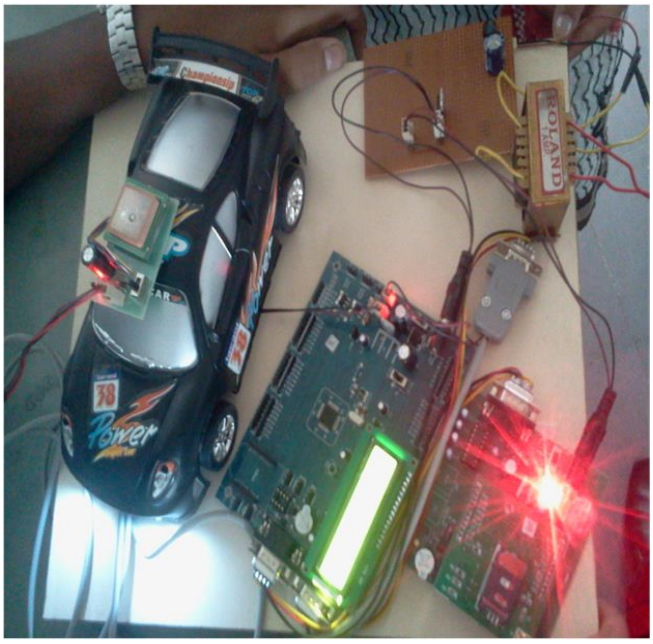
SNAP SHOT:



CONCLUSION AND FUTURE SCOPE

Vehicle increasingly important in large cities and it is more secured than other systems. Now a day's vehicle Theft is rapidly increasing, with this we can have a good control in it. The vehicle can be turned off by only with a simple SMS .Since, now a days the cost of the vehicles are increasing they will not step back to it, This setup can be made more interactive by adding a display to show some basic information about the vehicle and also add emergency numbers which can be used in case of emergency .Upgrading this setup is very easy which makes it open to future requirements without the everything from scratch, which also makes it more efficient.

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Author details

Gogikar Sandeep
Persuing M.Tech (Embedded Systems) in Farah Institute of Technology, Chevella, R.R. Dist Telangana State, India and Graduated in B.Tech (Electronics and Communication Engineering) in 2013 from JNTU Hyderabad.

Harshavardhan Velagapudi
Working as Assistant Professor in ECE Dept. in Farah Institute of Technology, Chevella, R.R. Dist Telangana State, India. Post Graduated in ECE (Embedded Systems) M.Tech. from VIGNAN'S UNIVERSITY, Vadlamudi, Guntur, A.P . He Graduated in ECE B.Tech. from JNTU kakinada. His research interests include Wireless Communications, Embedded Systems. He has published 1 research papers in International Conferences, Journals.