



ISSN: 2278 – 0211 (Online)

## Design And Implementation For Crash Recovery Of Vehicles By Using Arm 7

**Subbarao Thotakura**

Student, M.Tech (Embedded Systems)

Malla Reddy Institute Of Engg. & Technology, JNTUH, India

### **Abstract:**

Security in travel is primary concern for everyone. This Project describes a design of effective alarm system that can monitor an automotive / vehicle / car condition in traveling. This project is designed to inform about an accident that is occurred to a vehicle to the family members of the traveling persons. This project uses a piezo-electric sensor which can detect the abrupt vibration when an accident is occurred. This sends a signal to microcontroller.

This Project presents an automatic vehicle accident detection system using GPS and GSM modems. The system can be interconnected with the car alarm system and alert the owner on his mobile phone. This detection and messaging 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 LPC2148 controller processes this information and this processed information is sent to the user/owner using GSM modem A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number and informs about this accident. This enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the location of accident.

The project is built around the ARM7 LPC2148 controller. This micro controller provides all the functionality of the SMS alert system. It also takes care of filtering of the signals at the inputs. The uniqueness of this project is, not only alerting the neighbors by its siren, but also it sends a caution SMS to four mobile numbers. These numbers can be changed at any time by using the coding. These numbers are stored in EEPROM. When the accident occurs, the vibration sensor is activated then automatically vehicle door opens.

### **1.Relevance Of Paper To The Journal's Scope And Aims**

The Scope of the project is the system can be made automatic by installing cameras at VEHICLES which can automatically read the area where accident have took place and we can able to use the vibration sensors all the sides of the vehicles so that it will send the message if accident takes place to around the vehicles.

ARM7TDMI is an advanced version of microprocessors and forms the heart of the system. This autonomous robot is used to sense the obstacle and navigate the robot in forward, backward, left, right directions

The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

This project uses 12v (Lead Acid Battery). This project uses two power supplies, one is regulated 5V for modules and other one is 3.3V for LPC2148. 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 230/12V step down transformer.

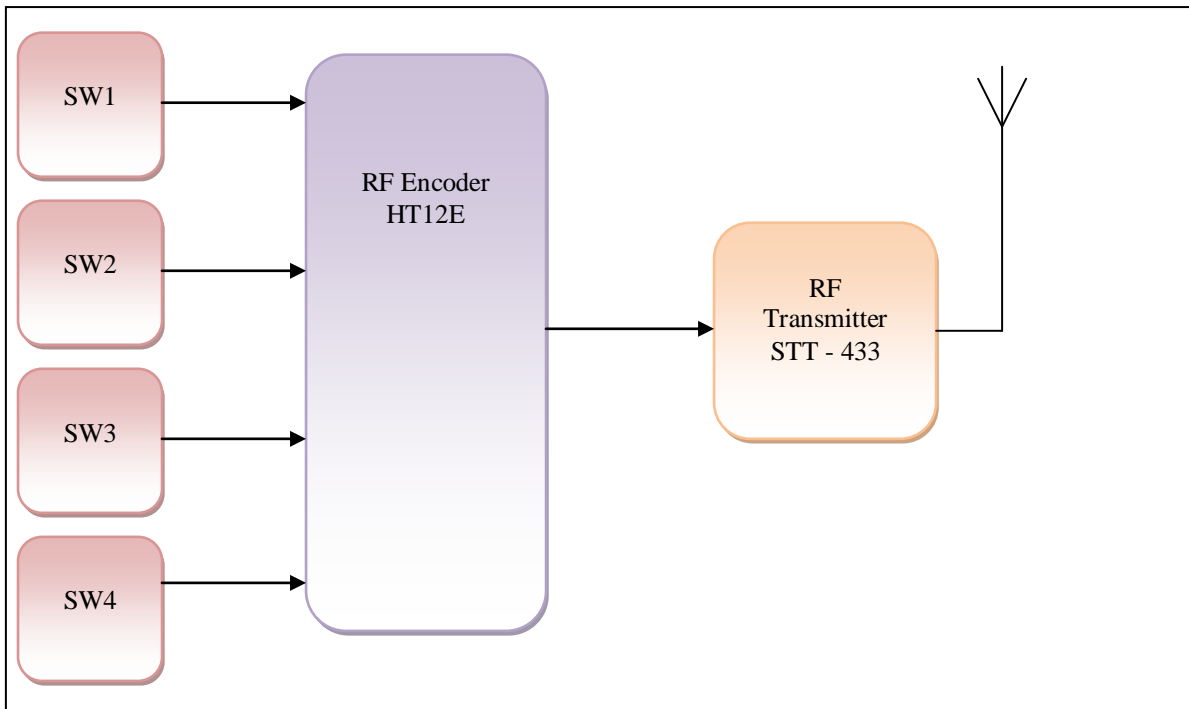


Figure 1: Transmitter

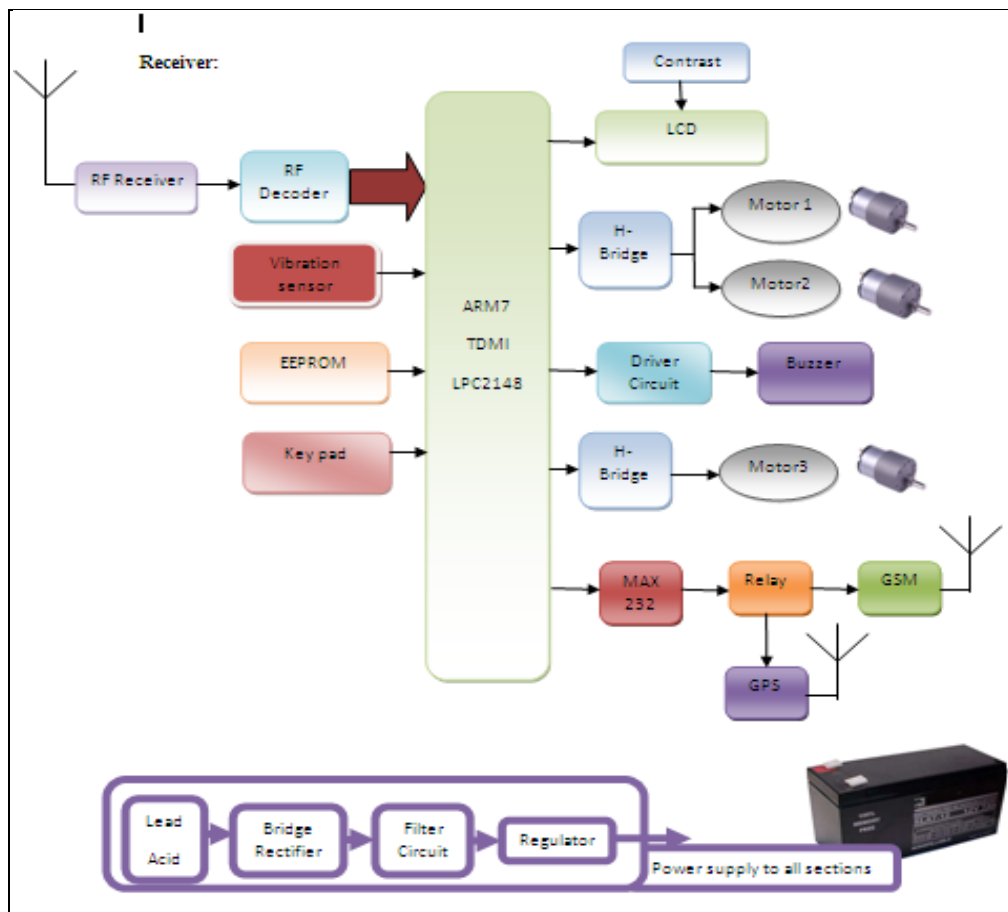


Figure 2: Receiver

1.1. Advantages

- Sophisticated security
- Monitors all hazards and threats
- Alert message to mobile phone for remote information
- Mobile number can be changed at any time

### 1.2.Applications

- Automotives and transport vehicles
- Security, Remote monitoring, Transportation and logistics
- This system is also can be interfaced with Vehicle airbag system.

## 2.Adequacy Of Literature Review

It is only contribution of mine and my name is Subbarao.Thotakura pursuing my M.Tech (Embedded Systems) from Malla Reddy Institute of engineering and technology. My project is describes to send the messages to the phone numbers when ever accident takes place by using the GPS and GSM modems by using ARM 7 Microcontroller..We can able to send the 4 distinct numbers at a time. GPS will able to locate the Latitude and Longitude values then send the values to our mobile numbers. Then we can easily find the location and easily saves the lives of the people.

## 3.Interpretation Of Findings

### 3.1.GPS

The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth which has an unobstructed view of four or more GPS satellites.

GPS is made up of three segments: Space, Control and User. The Space Segment is composed of 24 to 32 satellites in Medium Earth Orbit and also includes the boosters required to launch them into orbit. The Control Segment is composed of a Master Control Station, an Alternate Master Control Station, and a host of dedicated and shared Ground Antennas and Monitor Stations. The User Segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial and scientific users of the Standard Positioning Services.GPS satellites broadcast signals from space that GPS receivers use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time.

### 3.2.GSM

Global System for Mobile (GSM) is a second generation cellular standard developed to cater voice services and data delivery using digital modulation.

### 3.3.GSM-History

Developed by Group Special Mobile (founded 1982) which was an initiative of CEPT (Conference of European Post and Telecommunication???)

- Aim: to replace the incompatible analog system
- Presently the responsibility of GSM standardization resides with special mobile group under ETSI (European telecommunication Standards Institute)
- Under ETSI, GSM is named as “Global System for Mobile communication “
- Today many providers all over the world use GSM (more than 135 Countries in Asia, Africa, Europe, Australia, America)
- More than 1300 million subscribers in world and 45 million subscribers in India.

### 3.4.LPC 2148 Microcontroller

Founded in November 1990, it is spun out of Acorn Computers, it Designs the ARM range of RISC processor cores. Licenses ARM core designs to semiconductor partners who fabricate and sell to their customers. ARM does not fabricate silicon itself, it also develop technologies to assist with the design-in of the ARM architecture. Software tools, boards, debug hardware, application software, bus architectures, peripherals etc.

The ARM processor core originates within a British computer company called Acorn. In the mid-1980s they were looking for replacement for the 6502 processor used in their BBC computer range, which were widely used in UK schools. None of the 16-bit architectures becoming available at that time met their requirements, so they designed their own 32-bit processor.

## 4.Architectural Overview

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of microprogrammed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit Thumb set.

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. 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.

### 5. Significance Of Findings

GPS, GSM, Microcontroller, Vibration Sensor, Phone Numbers.

### 6. Conclusion

This project presents a LPC2148 based "Design and Implementation for crash recovery of vehicles by using ARM7". In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of GSM and GPS modems using sensors.

The biggest advantage of using this project is, whenever the sensor is activated we will be getting the acknowledgement from GSM modem to our mobile numbers which are stored in EEPROM and GSM network operators have roaming facilities, and finding the location and sending information to user so that they can often continue to use their mobile phones when they travel to other countries etc..

### 7. References

1. Microcontroller Website; NXP Semiconductors.
2. "NXP, ARM sign long term Cortex-M processor deal", New Electronics, February 28, 2011.
3. ARM7TDMI-S Specification Summary; ARM Holdings.
4. LPC2100 Series; NXP Semiconductors.
5. Factsheets : GPS Advanced Control Segment (OCX)". Losangeles.af.mil. October 25, 2011.
6. Astronautica Acta II, 25 (1956).
7. "GPS and Relativity". Astronomy.ohio-state.edu. Retrieved November 6, 2011.
8. "GSM". etsi.org. European Telecommunications Standards Institute. 2011. Archived from the original on 5 May 2011. Retrieved 5 May 2011. "GSM was designed principally for voice telephony, but a range of bearer services was defined...allowing circuit-switched data connections at up to 9600 bits/s."
9. "GSM World statistics". gsmworld.com. GSM Association. 2010. Retrieved 8 June 2010.