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Implementation of Accident Identification System using Arm Processor

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ABSTRACT

In this modern, fast moving and insecure world, it is become a basic necessity to be aware of one's safety. Now a day it becomes difficult that an accident occurs and to locate its position where it happens. The VMSS (Vehicle Monitoring and Security System) is a GPS based vehicle tracking uses two main underlying concepts. These are GPS (Global Positioning System) and GSM (Global System for Mobile Communication). The main application of this system in this context is tracking the vehicle to which the GPS is connected, giving the information about its position whenever required and for the security of each person travelling by the vehicle. This is done with the help of the GPS satellite and the GPS module attached to the vehicle which needs to be tracked. The GPS antenna present in the GPS module receives the information from the GPS satellite in NMEA (National Marine Electronics Association) format and thus it reveals the position information system. Vehicle tracking system is one of the hot topics in embedded systems industry. By using this paper, a vehicle can be tracked anywhere on the globe.

In this paper ARM LPC2129 communicates with LCD, GPS module and GSM modem. This will be placed in a moving vehicle. The ARM LPC2129 will poll GPS module in prefixed intervals and sends the vehicle location information (Latitude & Longitude) to central station over GSM network. Whenever any accident occurs Bump sensor detects the vibration of the vehicle and sends mechanical force, to ARM, by using GPS, we will get particular location. When accident occurs, then GSM sends message to authorized member. One best feature is whenever any authorized people give message to GSM at accident location then it sends back the message of the accident location.

Key words: Accident alert, accelerometer, GSM, GPS, I2C protocol, Kiel, USART, Vehicle tracking

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INTRODUCTION

When an auto crash occurs suddenly the reaction of the emergency services now become a race between life and death. Today wireless innovation has tilted the odds in favors of success like never before. This paper details about accident of automobile emergency alert situation. In this we are trying to programs 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 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. The component details are ARM 7(LPC 2129), Vibration sensor, 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. Vehicle tracking system is one of the hot topics in embedded systems industry. In this paper a vehicle can be tracked anywhere on the globe. In this paper ARM LPC2129 communicates with LCD, GPS module and GSM modem. This system will be

placed in a moving vehicle. The ARM LPC2129 will poll GPS module in prefixed intervals and sends the vehicle location information (Latitude & Longitude) to central station over GSM network. Whenever any accident occurs vibration sensor detects the vibration of the vehicle and sends mechanical force, to ARM, by using GPS, we will get particular location where accident occurs, and then GSM sends message to authorized members. One best feature is whenever any authorized person gives message to GSM at accident location then it sends back the message of the accident location. The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

HARDWARE DESIGN

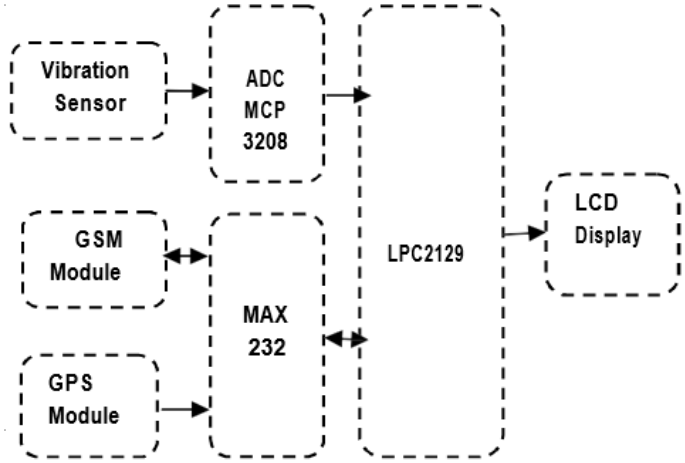

Fig. 1 Block Diagram

The heart of the system is the ARM7 which is connected to all the blocks as the GPS, GSM, Vibration sensor and other. There is also an LCD screen and some keys. The all system is connected.

ARM LPC 2129

The heart of the system is ARM-7. The ARM-7 used here in the system is ATMEGA16. The ARM-7 is preferred here than the microprocessor because of their small size and high-speed operation to each other.

Power Supply

Power supply is the first & most important part of the system. In the system the power supply circuit is used to provide the regulated supply to the microcontroller, LCD etc. used in the system. Power supply circuit consists of center taped step-down transformer, rectifier circuit, filter circuit & voltage regulator IC.

LCD Display Section

This section is basically meant to show up the status of the system. This system makes use of Graphical Liquid Crystal Display to display the running mode, percentage of the power supplied.

GPS Module

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map. It is a space- based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

GSM Modem

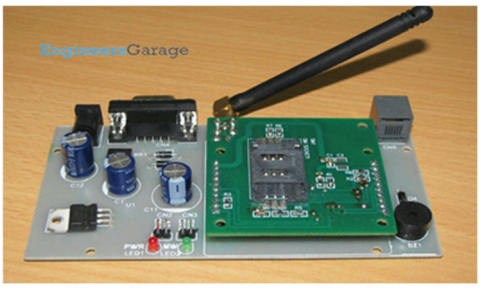

Fig. 2 GSM Modem

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 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 system.

Vibration Sensor

Accelerometers operate on the piezoelectric principal: a crystal generates a low voltage or charge when stressed as for example during compression. (The Greek root word "paesani" means "to squeeze".) Motion in the axial monitoring today contains internal amplifier.

SOFTWARE DESIGN

The embedded platform discussed above is programmed in C language with KeilμVision4 to follow the program logic shown in Fig 3 as follows:

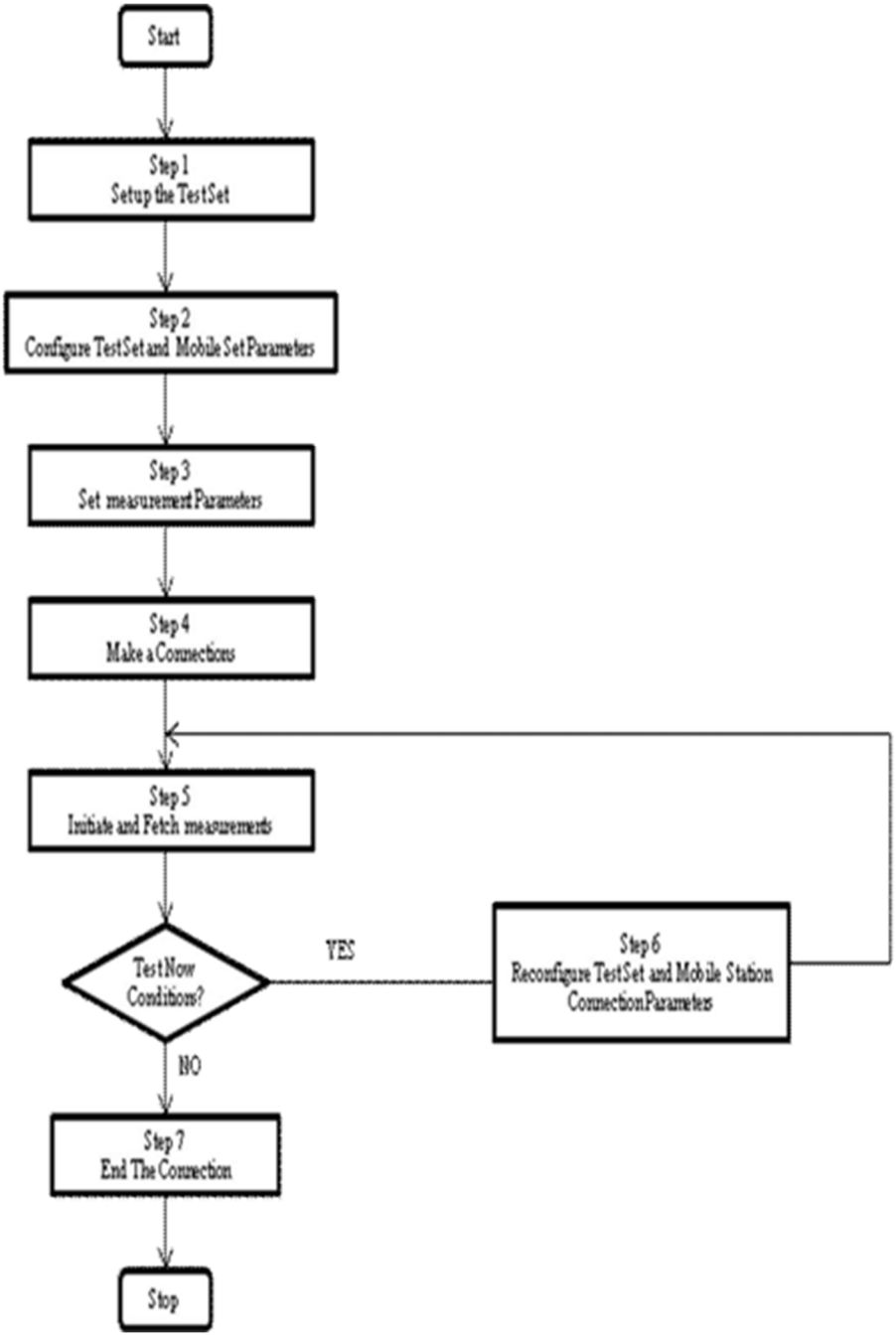

Fig. 3 Realization of flow of tasks for the proposed system

SOFTWARE USED

There is various software used for software implementation. They are as follows

Keil µVision4

The LPC2129 is programmed with KeilµVision4. It is a window-based software platform that combines a robust and modern editor with a project manager and make facility tool for development. It integrates all the tools to develop embedded applications including a C/C++ compiler, macro assembler, linker/locator, and a HEX file generator. Vision helps expedite the development process of embedded applications by providing the IDE (Integrated Development Environment). KEIL is used to create source files; automatically compile, link and covert using options set with an easy-to-use user interface and finally simulate or perform debugging on the hardware with access to C variables and memory. Unless we have to use the tolls on the command line, the choice is clear. This IDE i.e., KEIL Greatly simplifies the process of creating and testing an embedded application. The user of KEIL centers on projects. A project is a list of all the source files required to build a single application, all the tool options which specify exactly how to build the application, and if required how the application should be simulated. A project is exactly the binary code required for the application. Because of the high degree of flexibility required from the tools, there are many options that can be set to configure the tools to operate in a specific and desired manner. It would be very tedious to have to set these options up every time the application is being built; therefore, they are stored in a project file. Loading the project file into KEIL informs KEIL which source files are required, where they are, and how to configure the tools in the correct way. KEIL can then execute each tool with the correct options. Source files are added to the project and the tool options are set as required. The project can then be saved to preserve the settings. The project is reloaded and the simulator or debugger started, all the desired windows are opened [6].

Simulator / Debugger

The simulator / debugger in KEIL can perform a very detailed simulation of a micro controller along with external signals. It is possible to view the precise execution time of a single assembly instruction, or a single line of C code, all the way up to the entire application, simply by entering the crystal frequency. A window can be opened for each peripheral on the device, showing the state of the peripheral. This enables quick trouble shooting of mis-configured peripherals. Breakpoints may be set on either assembly instructions or lines of C code, and execution may be stepped through one instruction or C line at a time. The contents of all the memory areas may be viewed along with ability to find specific variables. In addition, the registers may be viewed allowing a detailed view of what the microcontroller is doing at any point in time.

Embedded C Language

The Keil µVision4 platform put forward the options for assembly language and high-level language programming. C language being the most convenient language to access different port pins of LPC2148, we programmed the algorithm to control the FIM3030 fingerprint module through host controller LPC2129 in C language. The program follows the control actions as shown in the flowchart. The program segments to access UART, LCD, RTC, ADC, DAC, are included by linking through UART0.h, LCD.h, RTC.h, ADC.h, DAC.h header files respectively.

Flash Programming Utility

For downloading the application program into Flash ROM, this utility tool is necessary. The program code generated in C language after processing produces object code in hex form. It is referred as .hex file. To dump this hex code in the flash ROM of the controller the facility is provided with Keil version 4. For programming with older versions, the same task is completed with the help of software called Flash Magic.

APPLICATIONS

1. It is used for vehicle tracking.
2. Whenever any authorized people give message to GSM at accident location then it sends back the message of the accident location long and let values.

RESULT

Fig 4 shows the hardware setup for proposed system. It has been demonstrated successfully using GPS Module, GSM Modem and LPC2129 (ARM 7 Microcontroller).

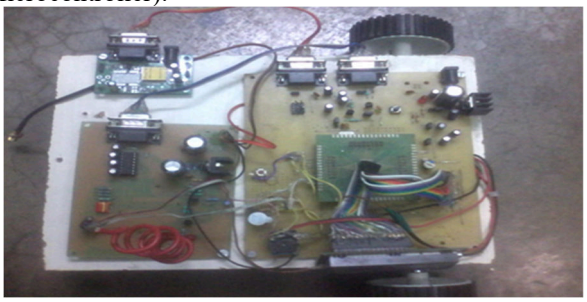

Fig. 4 Hardware setup developed for the proposed system.

Fig 5 shows the successful output for proposed system showing vehicle location information in terms of Latitude & Longitude.

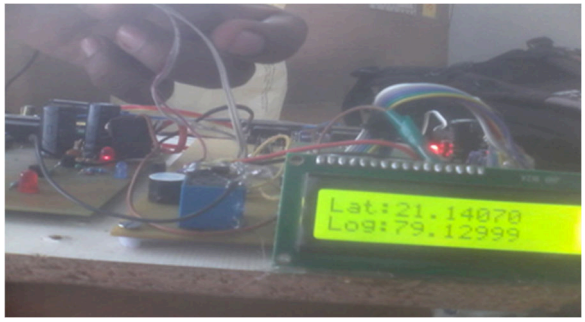

Fig. 5 Successful Output for the proposed system.

In this technological revolutionary world, there is no time for anyone to know what happening round them they keep on moving without any care. As they give importance to their work rather than others. Due to reduce in moral values once cannot get proper help when they need. This can be solved by this technology itself. Due to time laps many lives are in risk. To reduce this risk factor automatic accident detection and victim analysis plays an important role. Reducing the time laps will reduce the death rate. As reducing the time taken to take first aid will reduce the effect of accident on the victim. Probability of victim security will be more. As now a day's mobile is common electronic gadget that is present with everyone and this problem can be solved by it only.

CONCLUSION

The proposed work is the prototype which has delivered very reliable results of accident identification, location and messaging and locking. The entire works have to be integrated with the automobile to validate its functionality and reliability. Thus, this work will reduce the accident death ratio in considerable amount even in rural roads. Then it has a great importance in day-to-day life of the people in the country like India. The complete integration with automobile, the accident identification module will be fastened. This will optimize the proposed technology to the maximum extent and deliver the best accident identification system. So, the present work will be fastened with this existing system to provide the enhanced and instant result. Thus, this work will provide vital information about the accidents even in unpopulated area. So, the emergence care center could be able to serve to the victims with better facility.

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