Arm11 Based Accident Alert and Vehicle Tracking Using GSM and GPS

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ABSTRACT:

Traffic accidents are one of the leading causes of fatalities. An important indicator of survival rates after an accident is the time between the accident and when emergency medical personnel are dispatched to the accident location. By eliminating the time between when an accident occurs and when the first responders are dispatched to the scene decreases mortality rates, we can save lives. One approach to eliminating the delay between accident occurrence and first responder dispatch is to use in-vehicle automatic accident detection and notification systems, which sense when a traffic accident is likely to occur and immediately notify emergency occurred.

These in-vehicle systems, however, are not available in all cars and are unaffordable to retrofit in older vehicles. In this paper, such a system is described the main application of which is early accident detection. It can automatically detect traffic accidents using accelerometers and immediately notify a central emergency dispatch server after an accident, using GPS coordinates. Along with the data it will send the number of the vehicle too. This paper provides the following contributions to detecting traffic accidents via ARM7 controller. Here it is seen how arm controller, accelerometer, GSM connections, and GPS can be used to provide situational awareness responders. The codes are written and compiled in Keil ARMIDE.

1. INTRODUCTION:

The web technology has begun to have a rapid development in the field of embedded systems in the post-PC era. The application of embedded web technology in the remote monitoring system has given rise to the technological change in the field of industrial control. Nowadays the management of the domestic laboratories in the research institute and universities has issues of poor real time, high cost and low precision .

It is difficult to determine the quality of the environment of the laboratory. So the Laboratory Intelligent Monitoring System should be developed to implement early warning, remote control, real-time monitoring and other functions. This paper comes up with a design solution of an embedded web-based remote monitoring system for the environment in the laboratories, which realizes the local management and remote publishing applications for large-scale dynamic data of sensor networks and video images.

Here, we propose the design and implementation of low cost web based remote monitoring system with built-in security features. Due to the usage of an embedded intelligent monitoring module which is the Samsung S3C2440 32-bit ARM Samsung processor as its main controller, the performance and frequency of which are suitable for real-time video image capture and processing applications. This micro controller works for a voltage of +3.3V DC and at an operating frequency of 400 MHz, The maximum frequency up to which this micro controller can work is 533 MHz making it very much suitable for a portable system. Later programming is done on this Board to make it act as an embedded web server.

5.1 EXISTING METHOD:

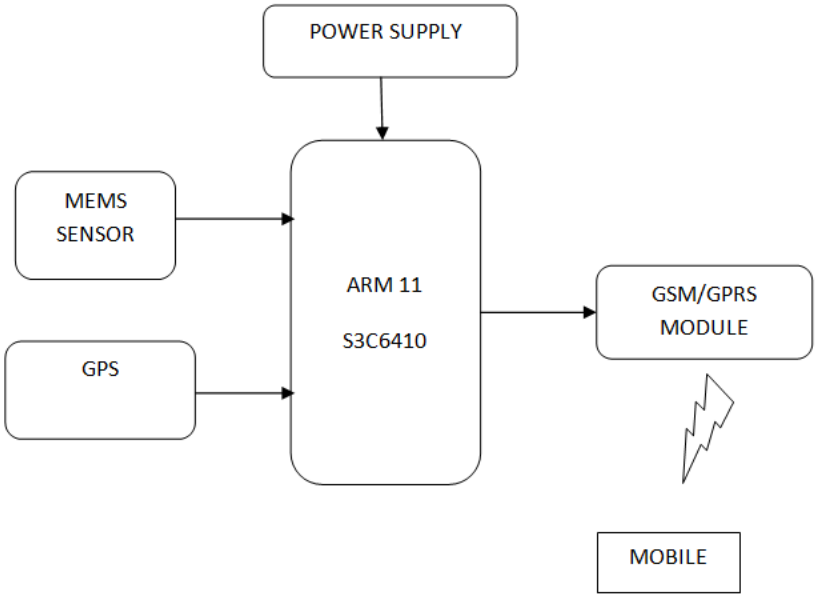
Currently Accident Site relief mechanism is totally Government and Police people hand. Government has established patrolling vans and Police Post at various places on the highways. But there is no mechanism to inform to some people till police notice the accident site. Many times at Accident site people will not get any help till some another vehicle not come on that road. So if the road is not main highway road then the possibility of vehicle coming is reduced and accident site people stay there without any help. So many people expired because of not getting timely medical treatments. In night time if some vehicle goes in valley then even some vehicle comes on that road after some time they don't come to know about the accident.

5.2 PROPOSED METHOD:

This demonstration shows how to effectively collect and manage information obtained from vehicle accident location. A vehicle-based MEMS sensor which detect occurrence of accident. These data can be used for accurate car accident location and useful for providing medical help at accident site. In this proposed project we are using MEMS sensor.MEMS gets activated when accident happen and give signal to ARM microcontroller.

ARM microcontroller with the help of GPS module send the location information of the vehical to some predefined mobile numbers using GSM/GPRS modem.This information may include car RTO registration number, location where vehicle is located. The captured data is very useful to provide medical help to the people who get injured in the accident. The system uses a compact circuitry built around ARM microcontroller.

BLOCK DIAGRAM:



LIMITATIONS OF PROJECT:

- The main limitation of the project is cost.
- The cameras are much more sensitive to breaking after being dropped or hit.
- ARM11 is not binary compatible with x86. This means we are not going to be running windows any time soon.
- In our project one of the drawback is data can be monitored only in a local area network.
- The storage space also less that's why we cannot maintain database to record the data.

ARM processor:

ARM is a 32-bit RISC processor architecture developed by the ARM corporation. ARM processors possess a unique combination of features that makes ARM the most popular embedded architecture today. First, ARM cores are very simple compared to most other general-purpose processors, which means that they can be manufactured using a comparatively small number of transistors, leaving plenty of space on the chip for application specific macro cells. A typical ARM chip can contain several peripheral controllers, a digital signal processor, and some amount of on-chip memory, along with an ARM core. Second, both ARM ISA and pipeline design are aimed at minimising energy consumption — a critical requirement in mobile embedded systems.

Third, the ARM architecture is highly modular: the only mandatory component of an ARM processor is the integer pipeline; all other components, including caches, MMU, floating point and other co-processors are optional, which gives a lot of flexibility in building application-specific ARM-based processors. Finally, while being small and low-power, ARM processors provide high performance for embedded applications.

For example, the PXA255 XScale processor running at 400MHz provides performance comparable to Pentium 2 at 300MHz, while using fifty times less energy.

13. HARD WARE COMPONENTS:

13.1 SENSORS:

Micro-electromechanical systems (MEMS) are Freescale's enabling technology for acceleration and pressure sensors. MEMSbased sensor products provide an interface that can sense, process and/or control the surrounding environment.

Freescale's MEMS-based sensors are a class of devices that builds very small electrical and mechanical components on a single chip. MEMS-based sensors are a crucial component in automotive electronics, medical equipment, hard disk drives, computer peripherals, wireless devices and smart portable electronics such as cell phones and PDAs.

13.2. DEVICES:

The National Marine Electronics Association (NMEA) has developed standards that describe the interface between various marine electronic equipments. The standards allow marine electronics to send information to computers and to other marine equipments.

GPS receivers also work on these NMEA Standards. Most of the computer programs and devices which provide position and other related information expect the data to be in NMEA format.

The data given by the GPS receiver includes many information like position (latitude and longitude), altitude, speed, time etc. In its standards, NMEA has specified to send a series of data in a sentence. A particular sentence is totally self-reliant and is independent from other sentences.

There are standard sentences for particular type of data and for various categories of devices. NMEA has also provided the functionality for individual companies to write their own sentences.

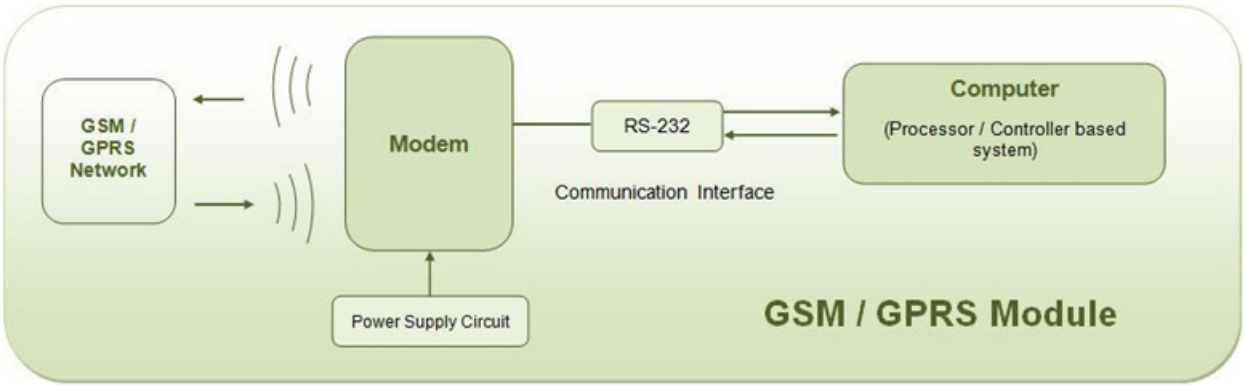
All standard devices have a two letter prefix that defines the device for which it is being used, for GPS receivers the prefix is GP. The two letter prefix is then followed by three letters which represent the content of the sentence. The proprietor sentences allowed by the NMEA always start with P and are followed by a three letter sequence identifying manufacturer code and additional characters to define sentence type. For example a Garmin sentence would start with PGRM and Sony would begin with PSNY.

Every sentence begins with a '$' sign, has about 80 characters and ends up with a carriage return/line feed sequence. Sentences are mostly framed in single lines (may run over to multiple lines sometimes) and the data items in each sentence are separated by commas. The data received is just ASCII text and varies in precision. A sentence ends with checksum which consists of a '*' and two hexadecimal digits. The checksum digits represent an 8 bit exclusive OR of all the characters between, but not including, the $ and *.

13.3 GSM:

GSM module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries.

Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM module consists of a GSM modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.



GSM MODEM:

GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM and GPRS cellular network.

15. Working Principle/Over all description of Project:

In this section, we give an overview on the proposed system architecture. The system makes use embedded board which makes use of less power consumptive and advanced micro controller like S3C6410.

We cannot get S3C6410 microcontroller individually. We will get it in the form of FRIENDLY ARM board else, we can call it as MINI 6410 board.

Our ARM board comes with integrated peripherals like Ethernet and Serial etc. On this board we are installing Linux operating system with necessary drivers for all peripheral devices and user level software stack which includes a light weight GUI based on XServer, TCP/IP stack to communicate with network devices and some standard system libraries for system level general IO operations. In this Home monitoring geographical information system we are using serial network for monitoring the environmental conditions in the home and sensors like temperature, gas are connected. Sensors are connected to sensor board. Sensor board with ARM controller connection is established via serial network which is connected to any one of the UART port avail in arm board.

After connecting all the devices, power ups the device. When the device starts booting from flash, it first loads the linux to the device and initializes all the drivers and the core kernel. After initialization of the kernel it first checks whether all the devices are working properly or not. After that it loads the file system and starts the startup scripts for running necessary processes and daemons. Finally it starts the main application.

When our application starts running it first check all the devices and resources which it needs are available or not. After that it checks the connection with the devices and gives control to the user.

RESULTS:

18. CONCLUSION:

The project "ARM11 BASED ACCIDENT ALERT AND VEHICLE TRACKING USING GSM AND GPS" has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used.

Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM11 board and with the help of growing technology the project has been successfully implemented.