GSM Based Automatic Vehicle Accident Information System using GPS

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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. The proposed design provides information regarding vehicle identity, speed, and position on real-time basis. This information are collected by the ARM7 TDMI-S core processor LPC2148 by using different modules and dispatch it to the monitoring station where it stores the information in database and display it on graphical user interface (GUI) that is user friendly. GUI is built on Microsoft Visual Studio 2010. This design provides information in real time using μc/OS-II.

Keywords: ARM, GSM, GPS.

I. INTRODUCTION

A. Project Aim and Objective

Vehicle tracking system is one of the hot topics in embedded systems industry. By using this project a vehicle can be tracked anywhere on the globe. Whenever any accident occurs, a sensor detects the vibration of the vehicle by using GPS and the buzzer will be on, we will get a particular location where accident occurs, then GSM sends message to authorized members & 108.

B. Project Methodology

In this project ARM LPC2148 communicates with LCD, GPS module and GSM modem. This system will be placed in a moving vehicle. The ARM LPC2148 will poll GPS module in prefixed intervals and sends the vehicle location information (Latitude & Longitude) to central station over GSM network. This system uses regulated 5V, 750mA power supply. 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 230/18V step down transformer.

II. BLOCK DIAGRAM

Functional block diagram of the proposed system in which how the ARM7 (LPC2148) is interfaced with GSM Modem, Buzzer and LCD display. From the Fig.1 Shows, Design of vehicular monitoring and tracking system based on ARM using GSM and GPS is proposed. The vehicle module is used to track, monitor and surveillance and finds the accident spot and intimate to the authorized persons. This information are collected by the ARM7 processor LPC2148 by using different modules. In this project ARM LPC2148 communicates with LCD, GPS module and GSM modem. This system will be placed in a moving vehicle. The ARM LPC2148 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, a sensor detects the vibration of the vehicle and sends mechanical force to ARM by using GPS and the buzzer will be on, we will get a particular location where accident occurs, then GSM sends message to authorized members.

B. Key Feature of This Design Include

- Vehicle real-time monitoring by sending “its” information regarding velocity, Position (longitude, latitude) to the monitoring station and to the user/owners mobile that should help them to get medical help if accident or the theft.
- Display that information on GUI and also at the same time these information are stored in the database.
• User/owner has an access to get real-time position of a vehicle in real time.
• Also in case of theft vehicle should be stop at the same time where this system is ported on the mobile vehicle.
• It includes a temperature sensor that gives temperature in degree Celsius for monitoring the environmental conditions around the goods or other stuff in the transport vehicle.

III. RELATED STUDY
A. GSM (Global System for Mobile Communications)
The GSM which is one of the representative wireless networks which has low-power, low-cost and convenience to use. Global System for Mobile Communications originally from Groupe Special Mobile is the most popular standard for mobile telephony systems in the world. The GSM Association, its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard as shown in Fig.2. GSM is used by over 1.5 billion people across more than 212 countries and territories. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network.

Technical Details: Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas (including the United States and Canada) use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. The rarer 400 and 450 MHz frequency bands are assigned in some countries, notably Scandinavia, where these frequencies were In the 900 MHz band the uplink frequency band is 890-915 MHz, and the downlink frequency band is 935-960 MHz this 25 MHz bandwidth is subdivided into 124 carrier frequency channels, each spaced 200 kHz apart.

Fig.2. GSM Module.

Using GSM Modem in the ATM System: In the system we will be using a GSM Modem to send and receive SMS. When the robbery occurs, it will send the message to corresponding banks and near police station (PS) according to the controller.
based on the inverse principle of piezo electricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true. Such materials are called piezo electric materials. Here in our project buzzer is used to produce sound whenever robbery occurs.

**Specifications:**
- Coil resistance: \(42 \pm 2 \, \Omega\)
- Rated voltage: 5 V
- Rated current: \(\leq 15\) mA
- Sound pressure level: \(\geq 80\) dB
- Resonant frequency: 2048Hz
- Working temperature: -20 ~ +45

**F. ARM7 Processor**
The conventional 8 and 16bit Microcontrollers has its deficiencies when compared with 32bit microcontroller. This proposed system design uses the ARM processor. 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 micro programmed Complex Instruction Set Computers. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. The Philips LPC2148 which is based on 32 bitARM7 TDMI core supporting real time simulation. When ARM processor combined with RTOS with timing constraint can be realized for the data acquisition and transmission of data with high precision.

**G. Storage**
The system includes memory card which is used to store data. The data contains vehicle ‘ID’, ‘Position’ (Longitude’, ‘Latitude’), date, time and velocity of a vehicle. The memory card can be expanded depending upon the purpose. The data storage provision is implemented using Serial Peripheral Interface (SPI) protocol supported by the LPC2148 ARM7 processor. This stored data can be access any time for monitoring (speed of a vehicle, correct path, collision etc.), comparison, and traffic analysis purpose.

**V. SOFTWARE IMPLEMENTATION**
For the software implementation, we deploy two software packages. First one is the Keil μVision 4.0. Second one is the Flash magic simulator. The Keil μVision Debugger accurately simulates on-chip peripherals (PC, CAN, UART, SPI, Interrupts, I/O Ports, A/D Converter, D/A Converter, and PWM Modules) of ARM7 device. Simulation helps to understand hardware configurations and avoids time wasted on setup problems. With simulation, we can write and test applications before target hardware is available. The system program written in embedded C using KEIL IDE software will be stored in Microcontroller. Keil development tools for the Microcontroller Architecture support every level of software developer from the professional applications engineer to the student for learning about embedded software development. The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all ARM7 derivatives. The Keil Development Tools are designed to solve the complex problems facing embedded software developers. Flash magic is used to dump the code to microcontroller from PC.

Flash Magic is a free, powerful, feature-rich Windows application that allows easy programming of Philips FLASH Microcontrollers. Build custom applications for Philips Microcontrollers on the Flash Magic platform! Use it to create custom end-user firmware programming applications, or generate an in-house production line programming tool. The Flash Memory In-System Programmer is a tool that runs under Windows 95/98/NT4/2K. It allows in-circuit programming of FLASH memories via a serial RS232 link. Computer side software called Flash Magic is executed that accepts the Intel HEX format file generated from compiler Keil to be sent to target microcontroller. It detects the hardware connected to the serial port.

**VI. CONCLUSION**
The vehicular system provides information of a vehicle like GPS, GSM module and identity of a vehicle to a monitoring station and to a mobile phone according to a definite event stored in a program or a query from a monitoring station. Whenever accident occur to the vehicle and sends this information in real time to a hospital, police station or some authorized persons. The monitoring station display these information and also stored these information in database for further process according to a program. The system is useful in many applications such as security, tracking which may installed in vehicles. The system can be used in many applications.

**Future Scope:** In today’s world accidental deaths are increasing day by day in all most all accidents the death caused due to lack of treatments in time. Because of not getting information to nearest hospitals & police station immediately due to the present existing method of calling any person to the hospital & police station. We can overcome the disadvantage of the existing method & to improve the level of management of vehicles. By sending its information regarding velocity, position (longitude, latitude) identify & temperature to the monitoring station & to the user/owner mobile that should help them to get medical help. So, we are intended to make this monitoring wireless using ARM7 hardware platform.

**VII. REFERENCES**
