Automatic Accident Detection and Ambulance Rescue with Intelligent Traffic Light System Using Zig-bee Module

Shuchi Shukla[1], Mukti Awad[2]

[1]M.Tech Research Scholar, Department of ECE, A.I.T.R., Indore
[2]Assitant Professor, Department of ECE, A.I.T.R., Indore

Abstract — The project deals with the accident avoidance and security providence for the both vehicle driver and vehicle. Wireless communication between the vehicle body control unit and instrument cluster unit for indicate the vehicle functionality of the vehicle, sensor unit used for safe distance measurement For Simulation purpose the Vehicle unit consider as ARM controller unit and the instrument cluster hardware will be designed with AVR controller for interfacing and design of functional process of the vehicle, this proposed system tends to provide efficient Traffic Management System in which the traffic light functioning will flip as ambulance or emergency vehicle moves towards instrument cluster.

*Keywords--LPC2148, LCD Display, IEE 802.15.4Zigbee module, (AVR) ATMEGA328, sensors*

I. INTRODUCTION

There is a drastic increase in the number of vehicles in these days which also cause a steep rise in the number of accidents with a lot of people losing their lives. As per the Commission for Global Road Safety (2012), road vehicle accidents kill an estimated 1.3 million people and injure 50 million people per year globally, and the global road fatalities are forecast to reach 1.9 million by 2020. India's road accidents records 16% of the world's road accident deaths, whereas India has only 1% of the world's road vehicles. Today road traffic injuries are one of the leading causes of deaths, disabilities and hospitalizations with severe socioeconomic costs across the world. It is due to the increase in the number of vehicles without a subsequent increase in the road facilities required for it. In most of the accident cases, the victims lose their lives because of the unavailability of medical facilities at the right time. In large companies with a large number of vehicles, the drives use the company's vehicle seven for their own purposes and impact a loss to the company. To solve problems like these, this project came into existence.

This project is mainly used to track the position of the vehicle by the owner or also can be used in the public transportation system by the people to know the location of the buses or trains. In case of any accidents, the system sends automated messages to the pre- programmed numbers. We can send messages to any number of mobile. The owner of the vehicle, police to clear the traffic, Ambulance to save the people can be informed by this device. This uses a GPS(Global positioning system) to know the exact position of the vehicle with an accuracy of a few feet.GSM is used to receive SMS from the user and reply the position of the vehicle through a SMS, A Microcontroller (MC) is used to control and co-ordinate all the parts used in the system. When there is any accident, an accelerometer sensor is triggered and its sends signal to the MC. The MC processes the input and sends the appropriate output according to the programming done. The main concept in this design is introducing the GSM and GPS Technologies into the embedded system. The designed unit is very simple & low cost. The entire designed unit is on as single chip. This new technology, popularly called vehicle Tracking Systems which created many wonders in the security of the vehicle. This hardware is fitted on to the vehicle in such a manner that it is not visible to anyone who is inside or outside of the vehicle. Thus it is used as a covert unit which continuously or by any interrupt to the system, sends the location data to the monitoring unit. When the vehicle is stolen, the location data from tracking system can be used to find the location and can be informed to police for further action. Some Vehicle tracking System can even detect unauthorized movements of the vehicle and then alert the owner. This gives an edge over other pieces of technology for the same purpose. This accident alert system in it detects the accident and the location of the accident occurred and sends GPS coordinates to the specified mobile, computer etc.

II. ACCIDENT ALERT SYSTEM

This system is based on new technology, its main purpose is to detect an accident and alert to the control room, so the victim can find some help. It can detect accidents the intensity of the accident without any visual contact from control room. If this system is inserted in every vehicle then it is easy to understand how many vehicles are involved in a particular accident and how intense is it. So that the help taken from control room . The present board designed has both vehicle tracking and accident alert systems, which make it more valuable and useful. This board alerts us from theft and on accident detection also. This device detects fire accidents also by placing fire detector in one of the interrupt pins.
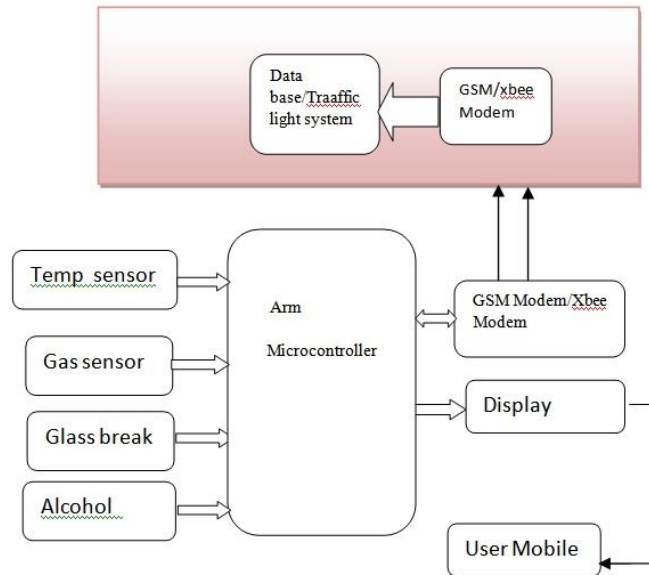
Fig. 1. Automatic Accident Alert

III. KEY COMPONENTS OF AUTOMATIC ACCIDENT ALERT

> **Micro controller:**

In this system LPC2148 Microcontroller is used. 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 micro programmed 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:

- Standard 32-bit ARM set.
- 16-bit Thumb set.

> **Liquid Crystal Display:**

LCD is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

> **Temperature Sensor:**

A thermistor is a type of resistor whose resistance is dependent on temperature. Thermistors are widely used as inrush current limiter, temperature sensors (NTC type typically), self-resetting over current protectors, and self-regulating heating elements. The TMP103 is a digital output temperature sensor in a four-ball wafer chip-scale package (WCSP). The TMP103 is capable of reading temperatures to a resolution of 1°C.

Fig. 2. Temperature Sensor LM 35

➢ **Zigbee**

The XBee/XBee-PRO RF Modules are designed to operate within the ZigBee protocol and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between remote devices. The modules operate within the ISM 2.4 GHz frequency band and are compatible with the following:

Advanced Networking & Security
- Point-to-point, multipoint topology.
- Self-routing, self-healing, mesh networking and fault-tolerant.

Low Power
- TX Current: 295mA
- RX Current: 45mA
- Power-down Current: < 1μA

CONCLUSION

The proposed system based on ARM microcontroller is found to be more compact, user friendly and less complex, which readily be used in order to perform several tedious and repetitive tasks. As various sensors are used to continuously monitor the various vehicle parameters which can create mishap and also remedies if emergency conditions, by sending and logging a message along with the GPS coordinates to the Control Unit. This project also uses a memory storage device to continuously store the details obtained from the sensor like temperature value, glass breakage, alcohol values and gas content. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications.

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