An Advanced Obliging System for Quick Rescue In Automobile Mishaps

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Abstract- This project proposes a novel intelligent system which is able to automatically detect road accidents, estimate its severity and the information are sent to emergency services in a much faster way. The accident information is also sent to the concern persons relative. To attain our proposed system a crash sensor, a MEMS sensor, GPS, GSM, ZigBee is used. The severity of the accident is found using MEMS sensor and crash sensor. GSM sends the accident information to the emergency service and the ZigBee is used to transmit the information to the other vehicles on road which are in and around the accident spot. When accident occurs vehicle motor (engine) will stop automatically.

Index terms- MEMS Sensor, GPS, GSM and ZigBee.

1 INTRODUCTION

Accident is a major public problem in many countries. In spite of awareness measures this problem is still increasing due to rider's poor behaviour. The number of death and disability are very high because of late assistance to people who were injured due to accident. When accident occurs we need quick rescue services to save who were injured the accident. In this technological revolution world there is no time for anyone to know what is happening around them, they keep on moving without any care. As they give importance to their work alone. Due to reduce in moral values one cannot get proper help when they need. This can be solved by the technology itself. Due to delayed rescue many lives are in risk. To reduce the number of death, automatic accident detection and victim analysis plays an important role. Providing quick rescue services 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 the victims safety will be more. Till date mobile is common electronic device that is present with everyone and this problem can be solved by it. By the short message service(SMS) in the mobile will help to solve this problem. To reduce the number of fatalities during accidents a much faster rescue services are mandatory.

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This is possible only if the accident information reaches the emergency services quickly. For this we use GSM technology along with the ZigBee in the vehicular networks. The focus of the project is to fasten the rescue service to the accident spot, sending information regarding the accident to the nearby vehicles and to the persons(who met with the accident) relative. The information which is sent follows an ad-hoc method. An ad hoc network is made up of multiple "nodes" connected by "links." Minimal configuration and quick deployment make ad hoc networks suitable for emergency situations like accidents. In ad hoc method the information is passed from one node to another, the information is continuously passed along the chain of nodes.

Now we discuss briefly:
Section [2] Related works
Section [3] Proposed System
Section [4] System Requirements
Section [5] Conclusion

2 RELATED WORK

Previous developments in the automatic detection of the road accidents have not been effectively implemented. Author Gerard Preziotti,Arthur Carter,Joseph Kanianthre "Enhancing Post-Crash Vehicle Safety Through An Automatic Collision Notification System" this paper proposes an idea to provide rescue service after the accident using wireless communication only to the emergency services. Author Bruce R.Donnelly ,David Schabel,Alan.J.Blatt,,Arthur Carter,"The Automated Collision Notification System" this system sends data message to the public safety answering point after which

voice message is sent. Author Nitin Thakre,Nitin Raut,,Abdulla Shaik "Design And Development Of Automatic Vehicle Accident Detection & Localization Of Automobile Using Bluetooth Technology" this paper proposes an idea to track vehicles using Google earth application which is an android application developed for android mobiles. Bluetooth will be fixed on the vehicle with sensors to detect the accidents.Author Manuel Fogue, Piedad Garrido,Francisco J.Martinez,Juan -Carlos Cano,Carlos T. Calafate,Piatro Manzoni "A Realistic Prototype for Automatic Accident DetectionAnd Assistance through Vehicular Networks" this paper proposes an idea of sending the accident information to the other vehicles on road using a wireless interface as a medium of communication. Author Chris Thompson,Jules White,Brian Dougherty,Adam Albright and Douglas C" Using Smartphones To Detect Car Accidents and Provide Situational Awareness To Emergency Responders" this paper implements an idea of using Smartphones with on board sensors to find the accidents ,it takes photos of the accident spot and sends it to the emergency contacts. Author Jeffrey Augenstein,Kennerly Digges, Elana Perdeck,George Bahouth,Oliver Pieske " Enhanced Automatic Collision Noitification System- Improved Rescue Care Due To Injury Predection-First Field Experience" this paper detects accidents and transmit the data regarding the accident using and transmit data regarding the accident using GSM. Author Ch.RamyaKeerthi,G.Shanmukh,Dr.R.Sivaram"Various Accident Technologies And Recovery Systems With Victim Analysis " this paper suggests various ideas like GSM,GPS,GPRS to send the accident information to the desired location.

3 PROPOSED SYSTEM

In the proposed system accidents is detected automatically and the severity of the accident is estimated. The project has three sections namely Vehicle section, Other car section and On road section. When accident occurs the information is sent to the On road section and to the Other car section respectively. Thus once accident occurs ,the vehicle section sends the message to the On road section and to the Other car section section (nearest car). Then the information from the other car will pass to some other car. The on road section will transmit the signals which contains the accident information to all vehicles within its signal range. The (accident) information will be sent to emergency services and to the relative from the vehicle section using GSM technology. The advantages of the proposed system are

1. Fast response
2.Easy to rescue
3.Traffic collision avoidance
4.Information regarding the accident is sent to the concern persons relative.

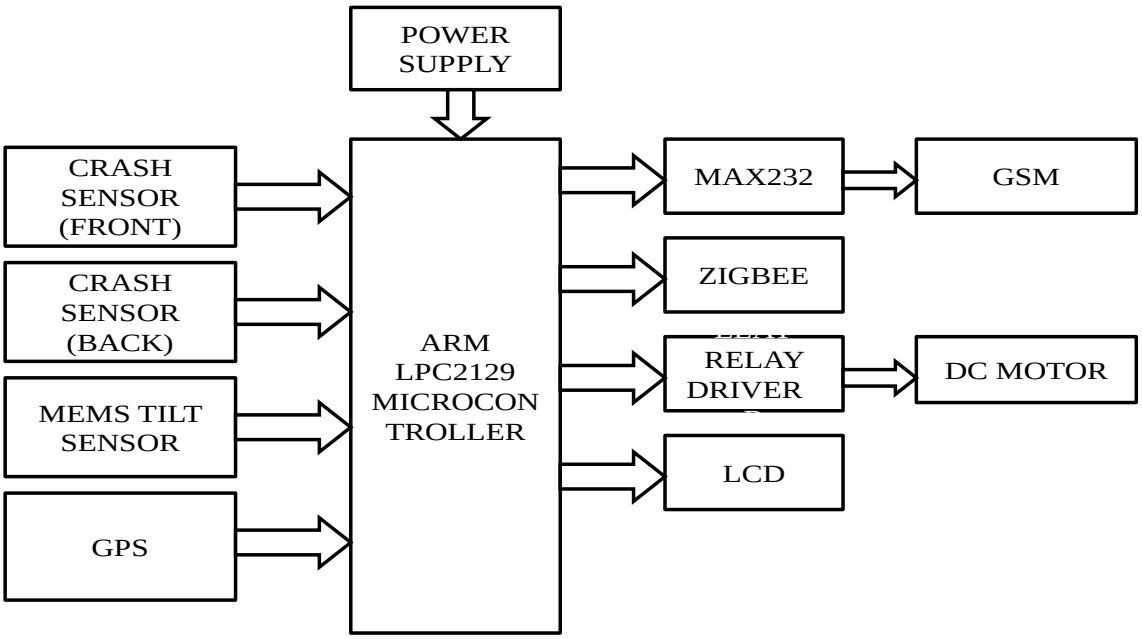

Fig 1: Vehicle Section

4 SYSTEM REQUIREMENTS

4.1 HARDWARE REQUIREMENTS

1. ARM LPC2129
2.8051 Microcontroller
3.MEMS SENSOR
4.GSM Modem
5.Crash Sensor
6.Tilt Sensor
7. GPS
8.LCD
9.ZigBee
10.Buzzer
11.DC Motor
12.Solar Panel
13.Battery

ARM [LPC2129]

The LPC2119/2129/2194/2292/2294 are based on a 32 bit ARM7TDMI-STM CPU with real-time emulation and embedded trace support, together with /256 kilobytes (kB) of embedded high speed flash memory. A 128-bit wide internal memory and a special accelerator architecture enable 32-bit code execution at maximum clock rate. For code size which are critical, the optional 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty.

The 64 and 144 pin packages, reduced power consumption, different 32-bit timers, combination of 4-channel 10-bit ADC and 2 advanced CAN channels or 8-channel 10-bit ADC and 2 advanced CAN channels (64 and 144 pin packages respectively), and up to 9 external interrupt pins these microcontrollers are particularly suitable for control of industry, medical systems, control of access and point-of-sale. Number of available GPIOs goes up to 46 in 64 pin package. With the 144 pin packages the number of available GPIOs tops 7 through 112 (single-chip application).The enhanced wide range of serial communications interfaces, they suit very well for communication gateways, convertors of protocol and embedded soft modems as well as many other general-purpose applications.

8051 MICROCONTROLLER

8051 is an 8-bit microcontroller which means that most available operations are limited to 8 bits. 8051 has 4 KB on chip program memory,128 bytes on chip data memory(RAM) [32 bank reg + 16 bit addressable reg + 80 general purpose reg],4 reg banks,128 user defined software flags,8-bit data bus,16-bit address bus,16 bit timers (usually 2, but may have more or less).,three internal and two external interrupts, Bit and byte addressable RAM consists of 16 bytes, Four 8-bit ports, (short type have two 8-bit ports), data pointer ,16-bit program counter ,1 Microsecond instruction cycle which has 12 MHz Crystal.

8051 has two Timer/Counter. They are T0 and T1.The purpose of timer and counter is to measure the time and count the external events. They are also used for generating clock pulses which is used in serial communication, this is called as baud rate. The most powerful feature of the microcontroller is the UART. This feature is otherwise called as serial port. A full duplex port is the one which transmits and receives data simultaneously ,this occurs at different baud rates. Without UART serial data transmission occurs by writing to the SBUF register and serial data reception occurs by reading the SBUF register. In case memory (RAM or ROM) built in the microcontroller is not sufficient, an optional method is to add two external memory chips with capacity of 64Kb each which is possible. I/O ports namely P2 and P3 are used for their addressing and data transmission.

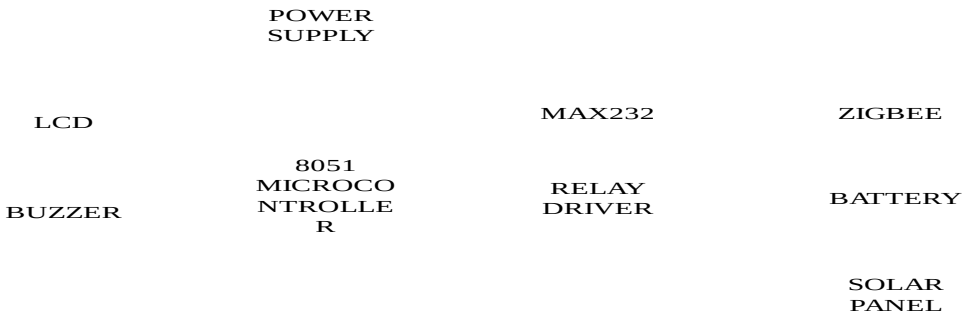

Fig 2: On Road Section

MEMS SENSOR

Micro-Electro-Mechanical Systems is MEMS, this technology that in its most general form can be defined as miniaturized mechanical and electro-mechanical elements (i.e., devices and structures) that are made using the techniques of micro fabrication. This is a breakout board for Free scale's MMA7361L three-axis analog MEMS accelerometer. The sensor needs a very low amount of power and has a g-select input which switches the accelerometer between ±1.5g and ±6g measurement ranges. Other features of the sensor include a signal conditioning, sleep mode, single pole low pass filter, it compensates the temperature which is known as temperature compensation, self analysis which is self test and 0g-detect which detects linear freefall. Zero-g offset and sensitivity are set by the factory and does not require any external devices.

GSM

A GSM modem is said to be a wireless modem that works with a wireless network(GSM). This wireless modem behaves like a dial-up modem. The important distinguishing feature between them is that a dial-up modem sends and receives data by means of a fixed telephone line while a wireless modem sends and receives data with radio waves. The working principle of GSM modem is based on AT commands, the commands always start with AT (which means Attention) and will end with a <CR> character. Consider the dialling command is ATD<number>; ATD3398629080; here the dialling command ends with semicolon. The AT commands are sent to the GSM modem with the help of controller or PC. The GSM modem can be interfaced serially with the controller, with the help of MAX232. Here max 232 acts as driver which converts TTL levels to the RS 232 levels. For serial interface GSM modem requires the signal based on RS 232 levels.

CRASH SENSOR

Crash sensors collect the data necessary to make decisions about air bag deployment. Crash sensors measure how quickly a vehicle slows down in a frontal crash or accelerates for a side crash. Some vehicles are equipped with a sensing system designed to detect the onset of a rollover crash. Frontal crash sensors may be located in the front of the vehicle near the engine area, in the passenger residing compartment or sometimes in the electronic control unit (ECU). Side-impact crash sensors may be fixed in the engine control unit, at the door, the doorsill or between the front and rear doors. Rollover crash sensors may be located in the ECU or at the vehicle's center of gravity. Severe or panic braking alone cannot cause an air bag to deploy; air bags deploy only in crashes. Sensor is mounted at the bottom of the unit. The unit should be fixed with the vibrating body firmly the sensitivity is adjusted for the required vibration/ shock is detected the output goes low and the delay is provided for proper operation vibrating frequency and amplitude can be detected.

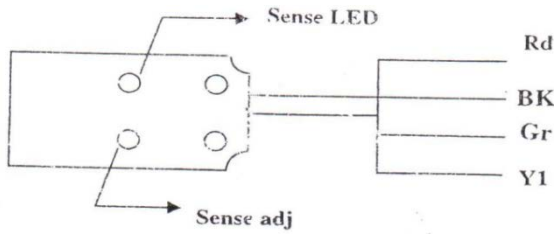

Fig 4: Crash Sensor

SPEC:
Supply- DC +2v ripple free
Output current-PNP 100ma
Analog o/p- 10ma
Sensors available to detect the flame / fire smoke flow level speed position Temp Bio medical application.
Special sensor can be developed against specific requirement.

TILT SENSOR

A tilt sensor is used to measure the tilting in the two axes of a reference plane in two axes. While for a full motion measurement would use at least three axes and with some additional sensors. One way to measure the amount of tilting angle with reference to the earth's ground plane is to use an accelerometer. Similar applications can be found in the industry applications and in game controllers.

GPS

The Global Positioning System (GPS) is a global navigation satellite system which is a space-based system . It provides correct positioning, navigation and timing services to all users across the globe on a continuous basis in all climatic conditions, day and night, anywhere on or near the Earth. GPS consists of three parts: between 24 and 32 satellites revolving the Earth, four control and monitoring stations on Earth, and the GPS receivers belonging to the users. GPS satellites broadcast signals from space these signals are used by GPS receivers to provide three-dimensional location (latitude, longitude,

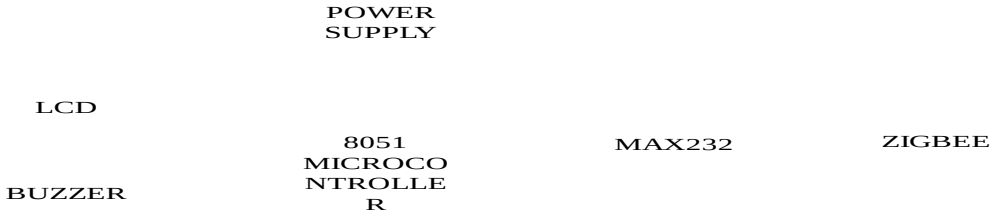

Fig 3: Other Car Section

and altitude) and the time. GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers uses this information and use triangulation to calculate the exact location of the user. Essentially, the GPS receiver compares the time of the transmitted signal by a satellite with the time at which the signal was received. The difference in time intimates the GPS receiver at what distance the satellite is. With the distance level from a few more satellites, the receiver can determine the position of the user and display it on the unit's electronic map.

Fig 5: GPS

A GPS receiver must be fixed on to the signal of at least three satellites to calculate 2D position (latitude and longitude) and track movement. With more satellites, the receiver can determine the user's three dimensional (3D) position (latitude, longitude and altitude). Once the position of the user has been determined, the GPS unit will calculate other information such as bearing, track, trip distance, speed, distance to destination, sunrise and sunset time and more.

ZIGBEE

ZigBee is a wireless technology developed as an open global standard to address the unique needs of reduced cost, low-power, wireless sensor networks. The standard uses the full advantage of the IEEE 802.15.4 specification and operates in band which are unlicensed all over the world at the frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz.

1. The power levels (down from 5v to 3.3v) to power the ZigBee module.
2. The communication lines (TX, RX, DIN and DOUT) to the appropriate voltages.

The ZigBee module acts as both transmitter and receiver. The Rx and Tx pins of ZIGBEE are connected to Tx and Rx of 8051 microcontroller respectively. The data's from microcontroller is transmitted serially to ZigBee module through UART port. Then ZigBee transmits the data to another ZigBee. The data's from ZigBee transmitted from Dout pin. The ZigBee from other side receives the data via Din pin. ZigBee is used in all the three sections. Many ZigBee's that cover long distance (up to few Kilo meters) are also available nowadays.

4.2 SOFTWARE REQUIREMENTS

KEIL software is the leading vendor for 8/16-bit development tools (ranked at first position in the 2004 embedded market study of the embedded system and EE times magazine).The KEIL C51 compiler is the de facto industry standard and supports more than 500 current 8051 device variants. Now, KEIL software provide a set of development tools for ARM.KEIL software makes compilers of C, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards for 8051, 251. The C51 Compiler translates C source files into relocatable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator. The compiler generates a listing file which may

include symbol table and cross reference optionally.

1. Nine basic data types which includes 32-bit IEEE floating-point .
2. Interrupt functions can be written in C.
3. Full use of the 8051 registers banks.
4. Complete symbol and type details for (source-level) debugging.
5. Use of AJMP and ACALL instructions.
6. Bit-addressable data objects.

5. CONCLUSION

The proposed system makes the rescue process to start as soon as accident occurs. The ad hoc method of passing information is used to send intimation regarding accident to the emergency service in a much faster way. This fastens the rescue process and the message regarding victim is sent to that concern persons relative.

However, the effectiveness of this technology can be improved with the support of intelligent systems which can automate the decision making process associated with an accident. A preliminary assessment of the severity of an accident is needed to adapt resources accordingly thereby estimating the number of people involved in the accident. An alternate device for ZigBee can be used so that installation of ZigBee at every few kilometers can be avoided.

Here is the Vehicle section which when subjected to accident ,sends the information to the On Road section and Other Car Section.

Fig 6: Vehicle part

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