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MULTI-FUNCTIONAL MONITORING SYSTEM TO FORESTALL CAUSALITIES

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Abstract: In today's world where people tend to drive vehicles being alcoholic, there is a dire need of getting the vehicles equipped with proper safety systems to decrease accidents. The system must keep track of the safety measures like alcohol levels of the driver, seat belt insertion etc... The Vehicle's engine will not be allowed to turn on when the driver is alcoholic or inadvertently neglect to insert the seat belt. In addition to the above said, in this paper there is CO level overseeing system to control poisonous effects of effluents form vehicle and an obstacle detection monitoring system by using ultrasonic sensors. Additionally the system is equipped with an advanced GPS technology which keeps track of the locations and in case of accidents the location will be sent to the nearest control room or medical Centre using GSM module.

Key Words: ARM 7 (LPC2148), Global Positioning System, Alcoholic sensor, Accelerometer, Ultrasonic sensor, Carbon Monoxide sensor

I.INTRODUCTION

The major part of the causalities that occur around the world is due to road accidents. Drivers with a disparaged Concentration levels suffer from disability in identification of vehicles and poor vehicle control abilities pose a serious danger to their own lives and the lives of the other people. Also, the other reasons to get injured in such accidents are the negligence of the driver and the pillion riders are drunk driving, not wearing a seat belt which reduces the effect of accident. The other Considerable percentage of accidents occurs due to presence of obstacles. Also, the major reason for pollution is pollutants like CO (Carbon monoxide). This gas is highly released by the vehicles. If the amounts of CO released are more than the safer level, it implies that the vehicle is unfit for driving. These vehicles sometimes cannot be handled properly which leads to an accident without any interference of the driver. To overcome these problems as well as check the CO levels and presence of any obstacles, a revised system is proposed.

This system continuously monitors for the following conditions:

Using an alcohol sensor for detecting the presence of mind of the driver

Seat belt checking sensor to check if all the riders are following the safety precautions.

CO Sensor to check the fitness of the vehicle Temperature sensor for the purpose of detecting and intimating the owner about the engine temperature.

Ultrasonic sensor to check the presence of obstacles in the way.

If any of the conditions is met, then a message is sent to the pre-fed numbers in the GSM Module.

II.SYSTEM DESIGN AND IMPLEMENTATION

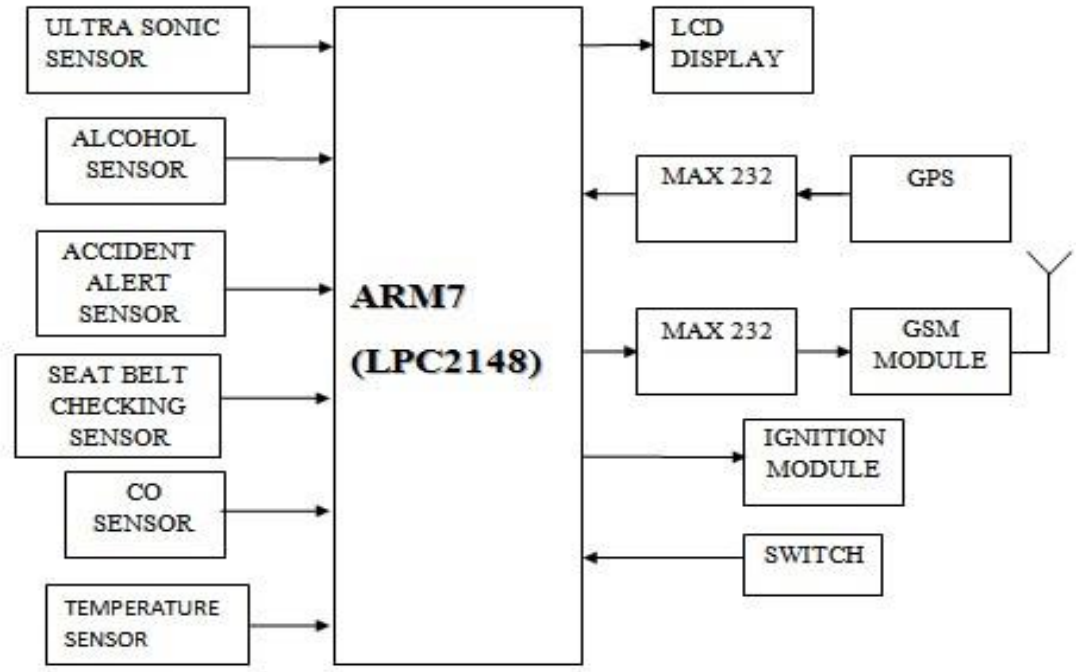

Fig 1: Block Diagram

2.1 Accelerometer

The ADXL335 measures acceleration with a minimum full-scale range of ±3 *g*. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis. The property is made use for intimating the nearest medical center with the displacement sensed as soon as the accident occurs.

2.2 Global Positioning System

GPS module used here is SIM900 Quad-band GSM / GPRS, a compact, high performance, and low power consumption GPS engine board. It can track up to 32 satellites at a time and perform fast calculations to low signal environments. This is a suitable one for portable electronic devices such as automotive, handheld navigation devices, mobile phones, Navigation devices, and other GPS applications. The GPS module that is used here is to detect the location of accident. In order to compute its location in three-dimensional space, a GPS receiver has to be able to lock onto signals from at least four different satellites. The receiver must maintain its lock on each satellite's signal for a period of time that is long enough to receive the information encoded in the transmission of the data. Achieving and maintaining a lock on more than three satellite signals can be impeded because each signal is transmitted at a frequency (1.575 GHz) that is high enough to bend around or pass through solid objects in the signals path. GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity.

2.3 Ultrasonic Sensor:

Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to

determine the distance to an object. This feature is made use in the paper for tracking the vehicles next to or behind the car and intimates when distance from other vehicles is less than 1feet. Pin Definitions

2.4 Alcohol Sensor (MQ-3 gas sensor):

CO Gas Sensor Module (#27931)

The CO Gas Sensor Module is designed to allow a microcontroller to determine when a pre-set carbon monoxide gas level has been reached or exceeded. Interfacing with the sensor module is done through a 4-pin SIP header and requires two I/O pins from the host microcontroller. The sensor module is mainly intended to provide a means of comparing carbon monoxide sources and being able to set an alarm limit when the source becomes excessive. Parallax does not provide gas calibration data on the module and such data and alarm setting is the responsibility of the user to define. For information on user calibration please.

2.6 Seat Belt Sensor

Seat belts are now used by all airlines and in almost all automotive vehicles with the possibility that they may become mandatory for buses and trains as well. In recent years the limit switch sensor has been discovered by safety belt designers as being perhaps the best and most reliable way to detect when a seat belt has been engaged.

2.7 Temperature Sensor (LM35):

The LM35 has an advantage over linear temperature sensors calibrated in ˚ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The sensor is used in such a way that, upon exceeding a considerable temperature the user is intimated with the buzzer preventing the loss of efficiency and burning of the engine

III. HARDWARE & SOFTWARE

3.1 Microcontroller (ARM7LPC2148):

ARM 7 LPC 2148 TDMI ARM7 series has the Thumb 16-bit instruction set providing improved code density compared to previous designs. The commonly used ARM7 designs implement the ARMv4T architecture. All these designs are based on Von Neumann architecture, thus has versions comprising a cache that does not separate data and instruction caches. The LPC2148 microcontrollers are based on 32-bit ARM7TDMI-S CPU founded by NXP, with real-time emulation that combines the microcontroller with 512 kb of embedded high-speed flash memory. It has a 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at its maximum clock rate. So for critical performance in interrupt service routines and specific DSP algorithms, this increases performance up to 35 % over Thumb mode. The LPC2148 is suitable for multi-purpose serial communication applications. SB full speed device with 4 kb of endpoint RAM ,two CAN channels, four UARTs, an SPI interface, three I2C-bus interfaces, an External Memory Controller (EMC) an I2C-bus interface, and two Synchronous Serial Ports (SSP),. This blend of serial communications interfaces combined with an on-chip 4 MHz internal oscillator 16 kb SRAM, SRAM of 32 kb, for Ethernet, together with 2 kb battery powered SRAM make this device suited for communication gateways 8 kb SRAM for USB and general purpose use, and protocol converters. Various 32-bit timers, an improved 10-bit ADC, PWM unit, CAN control unit 10-bit DAC, a, and up to 104 fast GPIO lines with up to 50 edges and up to four level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

3.2 GSM module (SIM 900):

SIM900 can be seen as a quad-band GSM/GPRS engine that works on many frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM900 has features of GPRS multi-slot class 10/ class 8 (optional). It will also support the GPRS coding schemes such as CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24mm x 24mm x 3mm, SIM900 can meet almost many of the

space requirements in many of applications, such as smart phone, M2M, PDA and other mobile devices. The physical interface to the mobile application is done as a 68-pin SMT pad, which can provide all hardware interfaces between the modules to customers' boards. Serial port and Debug port easily develop various applications. One audio channel includes a microphone as input and a speaker as output. The SIM900 equipped with power saving feature so that the current consumption is low as 1.5mA in SLEEP mode. The SIM900 is usually integrated with the TCP/IP protocol or extended TCP/IP. AT commands helps customers to use the TCP/IP protocol easily, and is very useful for those data transfer applications. Single supply voltage is in the range of 3.4V to 4.5V. Typical power consumption in SLEEP mode is seen as 1.5 mA. The frequency bands are set by AT command.

3.3 GPS MODEM:

In this paper a GPS MODEM of analog devices is used. Whichever the modem is used, it works based upon the NMEA 0183 protocol. This device has to be powered. It will give continuous data as output. The data can be taken in to the controller by using UART protocol. Then this data can be analyzed and we can find out the longitude and latitude of the current location

3.4 Keil

The KEIL MDK-ARM is a complete software development environment for ARM7 (LPC 2148) and ARM9 processor-based devices. Can flash the device using FLASH MAGIC, software by NXP

IV RESULTS

Various results are obtained at different stages. As it is a combination of different modules, they have been checked individually. And the resultant output is shown below. On checking the accelerometer, it shown different values on the HyperTerminal for various shake. For the GPS modem, the values ware extracted using controller and the values ware displayed on the HyperTerminal. The GSM modem was given set of AT commands. It was able to send the messages. Finally it was tested for the interface of all modules. Here the accelerometer detected a higher value of threshold then the alarm started to ring. If the reset was not pressed even after 30 seconds then the message was send. If the switch is pressed then the sending action is cancelled.

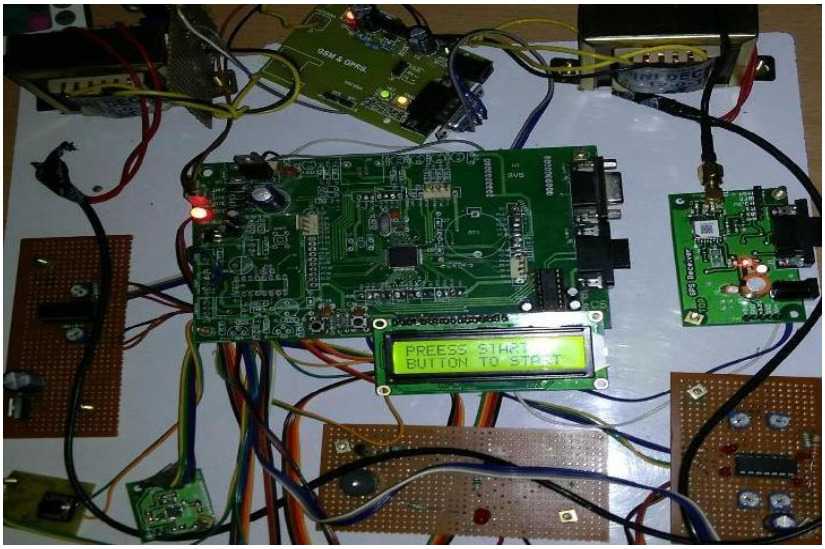

Fig 2 : Final Result

V.CONCLUSION & FUTURESCOPE

This vehicle accident detection and alert systems provide emergency responders with crucial information at the earliest possible time. Reducing the time between when an accident takes place and when it is detected can reduce mortality rates. Conventional in-vehicle accident detection and

notification systems, such as On Star, are effective in reducing the time gap before first responders are sent to the scene. These systems, however, are expensive and not available in all vehicles. To further increase the usage of automatic accident detection and notification systems, this system can be used to indirectly detect accidents through sensors, such as accelerometers.

In future we can interface different sensors with this paper, such as somnolence detector, heart rate detector, etc. In terms of these we can really prevent accident and save life. Security sensors to identify theft can also be added. It can be reprogrammed to switch off vehicle and track the vehicle in conditions of theft.

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