ARM 7 BASED SMART ACCIDENT DETECTION AND TRACKING SYSTEM

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Abstract – *Day by day there is increase in population lead to rush of vehicle. So, people are facing the problem like accidents, heavy traffic, theft of vehicle. This project is based on accident detection and tracking system. As peoples are busy in their life so many times peoples don't wants to interfere in police case or accidental matters. So we have to do struggle for our own life. As accident occurs our system will work for our help itself. This project presents a system which is not smarter but economical. ARM 7 LPC2148 is the base for interfacing of various sensor used such as alcohol sensor, temperature sensor, limit switch etc. so we use GPS ,SIM800A to track the location and GSM to convey message to coded number. Temperature sensor for measuring temperature of engine. Message will be displayed on LCD if driver has drunk or not. To carry the desirable operation, without any error, a proper program is installed into LPC2148 processor.*

Key Words: ***LPC2148, GSM, GPS, Accelerometer, Temperature Sensor, Alcohol Sensor, Limit Switch, LCD.***

1. INTRODUCTION

As per the survey of few years the death rate of road accidents from four wheelers are more as compare to two wheelers. To protect their lives after the occurrence of accident, this system will going to help the victim. Our main purpose is to provide emergency help to the spot as early as possible. The system consists of hardware as well as software part. The main component used in it is ARM7 Lpc2148 , GPS module, GSM module, accelerometer, temperature sensor, liquid crystal display, Power supply .Further more details such as components, their functions and the description of the system is presented here.

2. METHODOLOGY

2.1 WORKING

 When a vehicle crashes from the front side, then the relay will be pressed and will become activate and sends a signal to the arm-7 then at instant this processor will become activated and will send message via GSM and GPS to the stored EMERGENCY helpline number and the link of exact location will be sent to them. And if by chance the vehicle gets flipped then the accelerometer will send message to the processor (arm-7) and a message with latitudinal, longitudinal, alcohol test and the temperature of engine will

be sent to the EMERGENCY helpline number. Further they will take action for the detailed scenario.

2.2 LPC2148:

Lpc2148 ARM7 (Advanced RISC Machine) contains 40 kb of on chip RAM (static), 512 kb of on-chip flash program memory, 60 MHz clock is available from PLL. On chip 8 kb RAM for USB by DMA. It has 32- bit microcontroller which is 4 times faster than 8085. It is having 32-bit ALU, 32- bit data bus. It does not allow misaligned data. It is not flexible it means it is having lot of rigidity means performance oriented i.e. all instructions are fetched in one performance. It is having seven operating modes

The LPC2148 microcontroller is build on a 32/16 bit ARM7TDMI-S CPU with Real - time emulation and embedded trace support that combines the microcontroller with Embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide Memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. Due to its small size and low power consumption, LPC2148 is ideal for Applications where miniaturization is a key demand, such as access control and Point-of-sale.

2.3. GPS- Global Positioning System

GPS abbreviates global positioning system and this is use to detect latitude and longitude of particular position. GPS is used for tracking planes, ships, cars and trucks also. The system provides critical abilities to military and civilian users around the globe. GPS provides continuous real-time information. The GPS module continuously transmits serial data in the form of serially according to NEMA standard. The latitudes and longitudes values of the location contained in the GPGGA set of event. To transmit information over UART or USART, we just required three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground). So as to interface UART with LPC2148, we just need the basic signals. We then need to receive the data from satellite to LPC2148 primer board by using GPS module through UART0.the serial data is get accept from the GPS unit by means of MAX232 into the SBUF register of LPC2148 arm processor. The consisting the data from the GPS receiver is taken by using the serial interrupts of the processor. This data made up of in particular order NMEA sentences from which GPGGA sentence is identified and proved

Fig.1- GPS Module

2.4 GSM- Global System for Mobile Communication

GSM is a mobile communication modem; it is stand for global system for mobile communication (GSM). A GSM modem requires a SIM card to be performed and operates over a network range subscribed by the network operator. In this project we use SIM 800A GSM module. It has ability of gathering information from GPS satellites and then calculating the device's geographical position. GSM uses TDMA system.

Fig.2- GSM Module

2.5 ADXL335 (accelerometer)

The ADXL335 is a total 3-axis acceleration measurement system. The ADXL335 has a measurement scope of ±3 *g* mini-mum. It consist of a polysilicon surface-micro machined sensor and signal conditioning circuitry to implement an open-loop acceleration measurement architecture. The output signals are analog voltages that are directly proportional to acceleration. The accelerometer can calculate dynamic acceleration resulting from motion as well as the static acceleration of gravity in tilt sensing application. The ADXL335 uses a single construction for sensing the X, Y, and Z axes. As a result, the three axes' sense directions are highly orthogonal and having small scale cross-axis

sensitivity. Mechanical misalignment of the sensor die to the package is the chief origin of cross-axis sensitivity.
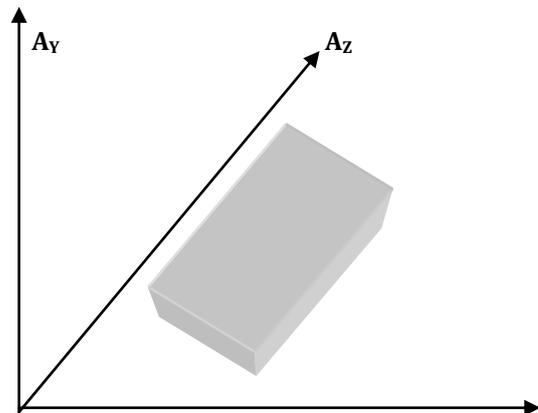

Fig.3: Axes of Acceleration Sensitivity; Corresponding Output Voltage Increases When Accelerated Along the Sensitive Axis.

2.6 LM-35 (Temperature Sensor)

This type of sensors is used to identify the temperature rises against cold and burning, the LM35 has very extent reactance and sequential output and calibration which make control circuitry easy.

LM35 **i**s precision IC temperature sensor with its output proportional to the temperature (in ^oC). It also control low self-heating and does not cause more than $0.1\,^oC$ temperature rise in still air. Its operating temperature range is from -55°C to 150°C.No extra components required to interface LM35 to ADC as the output of LM35 is linear with 10mv/degree scale.
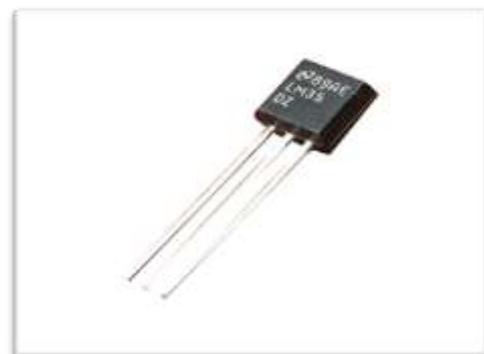
Fig.4: Temperature Sensor

2.7. Alcohol Sensor:

This sensor is made using Alcohol Gas Sensor MQ3. It is having a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO_2, whose conductivity is lower in unpolluted air. Conductivity of these sensor increases as the concentration

of alcohol gases increases and has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. It provides both digital and analog outputs. The advantage of MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, and Raspberry Pi etc.

This alcohol sensor is having capability for detecting alcohol concentration on your breath, just like your common breathalyzer. It gives a high sensitivity and fast response time. It provides an analog resistive output based on alcohol concentration. The drive circuit of this sensor is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC

Fig: Alcohol sensor

3. Software Requirement:

The Kiel Software is used for writing and implement the program. It includes C/C++ compiler, debuggers. It consist of middleware libraries & RTOS, and evaluation boards.

4. Result:

Here the various results obtained in different stages of the work can be. As it is a combination of different modules, they have been checked individually.

Case 1: If vehicle is heated on the object due to some external force, limit switch is active, at instant time GSM, GPS, Alcohol sensor are active. Sending message through GSM, and display on LCD. Message is send to the mobile number which is registered at ARM processor.

Case 2: If vehicle is tilt by 45 degree right or left, then accelerometer is active, at instant time GSM, GPS, Alcohol sensor are active. Message is send through GSM and it can be seen in mobile.

4. ADVANTAGES:

1. Accident alerts are given to the nearest control station on the very first moment of collision.

2. A message will be send to a selected contact to inform about the accident.

3. The alert message will include the GPS location so that it will directly locate on the map.

4. Immediate help can be provided.

5. Accident rate can be reduced.

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4) I make discussion with Prof. V.S. Gawali Sir from him I got some ideas about future modeling of the circuit and our own creative thoughts are included.