IOT BASED BLACK BOX FOR AUTOMOBILES

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ABSTRACT

The growth in scientific knowledge has made our lives easier. The approach of technology has made rise in the traffic dangers and the road accidents take place more often which leads huge loss of life and property because of the poor emergency facilities. This project will provide an efficient solution to this draw back. The vehicle has two copper wires on the sides which on connecting with each other generates a signal of accident detection. Microcontroller sends the alert message through the GSM MODEM including the location coordinates detected by GPS MODEM to registered telephone number. So the location can be immediately traced through the GPS MODEM, after receiving the information and thus necessary action can be taken. The project also includes a Proximity Sensor which varies the speed of the vehicle. Temperature sensor is also interfaced with the microcontroller, which keeps a check on the temperature of the vehicle and after a threshold value, buzzer is turned on. The project can be useful for investigation purposes.

Keyword : - *ATMEGA 16, GPS MODEM, GSM MODEM, inductive proximity sensor, temperature sensor, buzzer*

1. INTRODUCTION

Most people associate black boxes with airplanes but they are not only used in the investigation of airplane accidents but also for various automobiles. Like Black Box of airplane, Automobile Black Box (known as Event Data Recorder) is used to record information related to accidents and also prevent them. Automobile black box records driving data, visual data, collision data and position data before and after the accidents so that it can be utilized to analyze the accident easily and to settle many controversies related to car accident such as crash prosecution, insurance settlements. It can be used to not only recondition what happened before an accident, by Insurance agents and police but also improve vehicle design, roadway design and emergency medical service by government and hospitals.

In addition to the basic function, the automobile black box is equipped with GSM communication system using GPS which can send accident location information to care taker, whose telephone number is been registered . Therefore drivers who want help can receive service quickly by police and hospital ambulance. Black Box detects a crash automatically, and also records the motion of the vehicle and driver's actions during a preset time period before and after the accident. The automobile in which the black box system is been implemented has two parallel copper plates on all the sides of the vehicle body. Whenever there is an impact on any side of the vehicle body the two copper plates get connected and a signal of accident occurrence is sent to the microcontroller. The Black Box also consists of a proximity sensor that changes the speed of the vehicle. Whenever the inductive n-p-n proximity sensor senses a metal, it slows down the speed of the vehicle and increases it back when it again senses the metal. The speed of the

motors is varied by using PWM. It can be used to control the speed in certain low speed zones like School, Hospitals etc.

2. METHODOLOGY

| SR. NO	NAME	OUTLOOK
1	ATMEGA 16	
2	Proximity Sensor (n-p-n)	
3	DC motors	
4	Temperature sensor (LM35)	
5	Buzzer	
6	GSM MODEM (SIM900A)	
7	GPS MODEM (200A)	
8	LCD 16x2	

9	Accelerometer	

The prototype model of an automobile black box system using GSM and GPS modem using ATMEGA16 working will be made in the following steps:

1) The layout of whole setup will be represented in the form of a block diagram.

2) Accelerometer connected on the sides of the automobile will sense the occurrence of accident and give its output to the microcontroller.

3) The Accelerometer that will get connected will help in determining the position of the impact.

4) The GPS MODEM detects the latitude and longitude position of the vehicle.

5) The location coordinates detected by GPS MODEM are sent as a message through the GSM MODEM using AT commands to registered phone numbers which are saved in EEPROM of ATMEGA16.

6) The Proximity Sensor controls the speed of the vehicle, using PWM and thereby the speed can be controlled in certain low speed zones.

7) The Temperature Sensor LM35 is used to determine the temperature of the vehicle and if the value of temperature crosses certain preset threshold value the buzzer starts beeping.
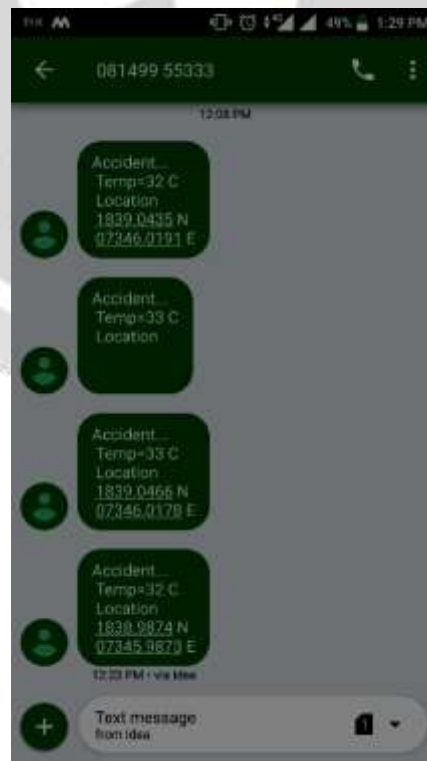
3. HARDWARE FRAMEWORK
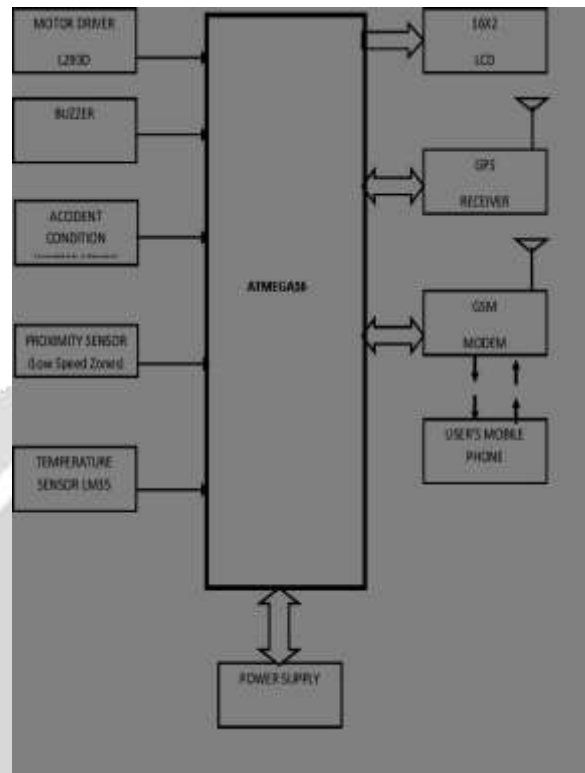
1) **ATMEGA 16**

The proposed black box system is based the operation of microcontroller. We have chosen ATMEGA 16 microcontroller as it is more compatible for applications of this project. ATMEGA 16 is a low power 8 bit microcontroller. It has 8 bit, 10 ADC channels with 512 bytes EEPROM. It also has four PWM channels.

2) **Inductive n-p-n Proximity Sensor**

The shielded M18 inductive sensor has a sensing distance of ~5 mm. This sensor has NPN-style, NO+NC contact type output. Widely applied in measuring, Counting, Rpm measuring in mechanism, chemical, paper manufacture light industry, etc. The operational voltage of this sensor is 24V. In this project this sensor is used to control the speed of the vehicle.

3) **GSM MODEM**

GSM is used as a media which is used to control   and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. GSM MODEM is built with dual band GSM engine SIM900A, works on frequency 900/1800 MHz. The MODEM is coming with RS232 interface which allows you to connect microcontroller with RS232 chip. Using this MODEM, audio calls, SMS, read SMS, attend the incoming calls can be made using simple AT commands.

4) GPS MODEM

The SkyNav SKG13C is a complete GPS engine module that features super sensitivity, ultra-low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol. Its -165 dBm tracking sensitivity extend position coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable devices like mobile phones, cameras and vehicle navigation systems.

5) Temperature Sensor (LM35)

Temperature sensor is a device which is designed specially to monitor the hotness or coldness of an object. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C).With LM35, the temperature can be measured more precisely than with a thermistor. The operating temperature range is from -55°C to 150°C.

4. CONCLUSIONS

This project presents vehicle accident detection and alert system with SMS to the user registered mobile numbers. The GPS tracking and GSM alert based architecture is designed and implemented with ATMEGA16L MCU in embedded system domain. The proposed black box system can track geographical information automatically and sends an alert SMS regarding accident. The result shows that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mobile numbers permanently. This made the project more user-friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry.

5. ACKNOWLEDGEMENT

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