BLACK BOX FOR VEHICLE INVESTIGATION AND MONITORING
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Abstract - *Black box refers to collection of several different recording devices . Car black box is "Event Data Recorder". Black Box records the relevant details about a Vehicle such as Engine Temperature, Distance from obstacles, Speed of Vehicle, Detect vibration of the vehicle Detect orientation or inclination of vehicle. The design select ARM7(LPC 2148)as embedded controller, UART is the common peripheral found microcontroller widely used for Real Time Clock, GSM module, GPS module. The record data are decode by using SD card*

Key Words : Black Box ,UART,GSM,GPS,ARM7,RTC, Data recorder ,GLCD ,SD card and sensors.

1.INTRODUCTION

The vehicle accident is a major public problem in many countries. This problem is still increasing due to rider's poor behaviors such speed driving, drunk driving, riding   without sufficient sleep etc. Car black boxes is having logical feature considering that more people are die in car accidents than an airplane crashes of investigation .The causes of car accident are not to difficult to investigate as plane crashes but there are cases   that are very difficult to solve due to contradictory stories of drivers .black box in aircraft help to determine the cause of an airplane accident ,car black box helps to determine what has caused a car accident .They are particularly valuable when no witness are present at the scene of accident and when each drivers has his/her own version of event .Car black box is digital electronics device, which records and store vehicles speed ,vehicle location ,vehicle temperature ,vibration, distance from obstacles ,real time and vehicle other status information .It help to discover and to analyze the reason of an accident easily and to settle many disputes related to car accident such as crash and insurance settlements .data is recodede using EEPROM.
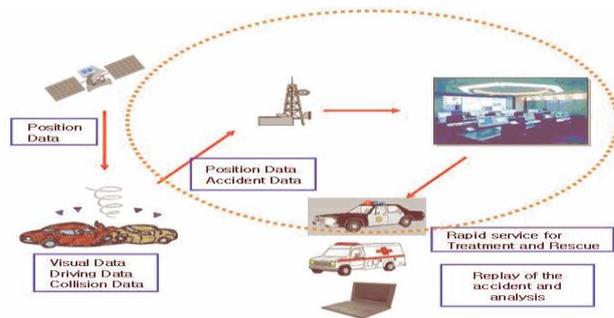

Fig1 : concept of car black box

1.1 BLOCK DIADRAM:
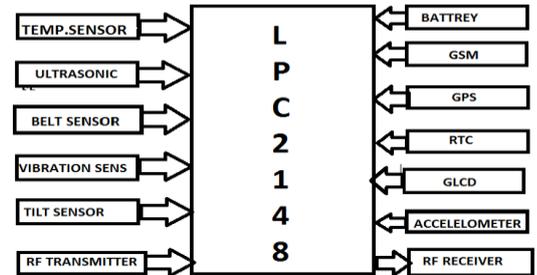
2. HARDWARE DESCRIPTION

2.1 ARM 7 (LPC2148) : ARM 7 TDMI processor the system uses ARM7 (LPC2148) microcontroller as a master   controller. 32- bit ARM & TDMI microcontroller

FEATURES **:**

- 40 kB on chip static RAM .
- 512kB on chip flash program memory.
- One or two 10-bit ADCs provide a total of 6/14 analog inputs ,with conversion time

as low as 2.44 µs per channel, single 10-bit DAC provides variable analog output.

- Multiple serial interfaces including two UARTs(Universal Asynchronous Receiver and Transmitter), Two Fast I2c-bus(400 Kbit/s), SPI(Serial Peripheral Interfaces) with buffering and variable data length capabilities.

2.2 TEMPERATURE SENSOR:

Engine temperature is the important in engine control unit if this values goes to abnormal ,some unwanted gases exhaust from vehicles due to improper combustion. In this project in order to obtain the vehicle engine temperature, we have used LM35 temperature sensor this temperature sensor continuously read the engine temperature and fed to the microcontroller .It convert temperature value into electrical signal. Its temperature sensing range is -55 to +150 ºC.
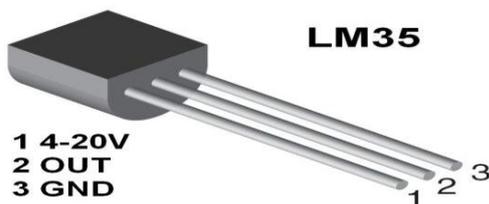

Fig 3: Temperature sensor.

2.3 ULTRASONIC SENSOR :

The ultrasonic sensor is to measure the minimum distance from the vehicle. Ultrasonic sensor generate high frequency sound wave and evaluate echo which is received back by the sensor.Its distance sensing range is 2cm to 3cm.

Fig 4: UV sensor

2.4 VIBRATION SENSOR:

The vibration sensor which is useful for a varity of different fields, has the ability to detect vibration in a given in area. To detect how much vibration are increased in car. Its vibration dynamic range is $\pm 2g$ to $\pm 200g$.
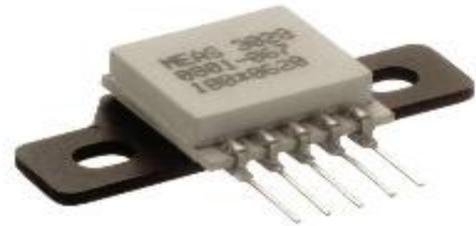
Fig 5: vibration sensor.

2.5 BELT SENSOR:

It indicates whether seat belts are fastened. This is ensured by checking if the button connected is pressed or not .One push button is used to detect place of the seat belt during the drive. The push button is placed on the seat belt and gives logic 'zero' when the belt is used and logic 'one' when the belt is not placed by the driver.

2.6 GSM MODULE:

Single pole,double throw switches are used.one swithch on each side to detect the accident direction.If anyone switch is pressed then GSM module send the SMS to relative person when accident is occurres and also display on GLCD.

2.7 RTC MODULE :

RTC module consists of IC DS1307,with coin cell battery backup.In DC1307 serial RTC,address and data are transferred serially through an I2C bidirectional bus and clock provides second,minutes,hours ,day,date months,year information and it operated in 24 hours or 12 hours format with AM/PM indicator.

2.8 GPS MODULE:

Global positioning system for mobile module,sensor for sending a short message. If any accident is occurred then location of the vehicle is traced by the longitude and latitude values of GPS and sends a SMS to the nearest hospitals and family members so that they can be ready for the treatment.

2.9 GLCD :

Graphics LCD is used for displaying all data of black box for good understanding 128*64 graphices LCD are used.

2.10 DATA RETRIVING FROM EEPROM:

After the accident is occurred then every details of sensor is calculated and stored in memory. These values are very useful to know How the accident is occurred. To obtain these values or data black box is connected to personal computer by using RS232 cable and windows hyper terminal .

3 ADVANTAGES:

Car black boxes help to determine what has caused a car accident . They are particularly valuable when no witness are present at the scene of the accident and when each driver has his/her own version of the events. The benefits of car black box is reconstruction of the event before accident are also emphasized by accident investigators.

Fig 6: car crashing

5 FUTURE ENHANCEMENTS:

we can enhance the present system to check other parameters like fuel level, tyre pressure and working of headlight before starting the vehicle.
Many other critical parameters can be read and stored in the memory .another useful add-on the present system could be camera on front and backside which keep recording live images and storing them in memory. this video Data would be must useful for accident investigation.

5 CONCLUSION:

The proposed system would serve as an effective source of information at the event of an accident When any type of accident occoures due to any reason car black box provides necessary data to generate the report of accident and about it's causes.This paper has offered a user friendly program to analyze the data of the accident .This black box system built can be implemented in any vehicle .As soon as the driver runs the motors ,this system will be begin to collect the the data from all the sensors as stores in EEPROM with the data and time .The data saved can be retrieved after the accident for privacy purposes using serial transmission the EEPROM and display it to the user by using RS232 cable and MAX232 user

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