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Survey on car black box system for accident avoidance and detection

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Abstract

This project presents an advanced step to the concept of car black-box in developing a comprehensive vehicle safety system which would not only record the video and audio, but also try to prevent a possible collision by limiting the speed of the vehicle in accident-prone areas. In case of an accident, the time and location (co-ordinates) is sent through GSM to a preset number for immediate rescue and treatment. Recorded data can also be used for forensics, revealing the problems that caused the accident and give manufacturer an idea for improvement. So the motto is to develop an embedded integrated system consisting of a microcontroller, a power supply unit, sensors, memory, a motor driver unit and a GPS/GSM modem.

Index Terms: *GSM, GPS, black box, accident, ARM, vehicle etc.*

1.INTRODUCTION

In today's system it is very hard to detect if vehicle get stolen or get accident with vehicle. Because there is not any smart system in it, so police also face many problem in theft detection. Calling a police then observing situation and after detection also sometimes there is no result. The Black Box will give us instant feedback for any physical anomalies, and will also give the command center access to the data on the Black Box. Because the Black Box is designed to withstand a large impact, it will also secure the data in the Black Box.

The total equipment of this project is placed inside the car and not visible to others. Ultrasonic sensor used which will detect the any obstacle surrounding the car and intimates the microcontroller and controller calculates the distance between the obstacle and car. if distance is less then it will stop the car automatically .but if in case accident occurs The data from ultrasonic sensors are given to ARM processor.

A camera is present for video and audio recording. The GSM/GPS module is also connected to the processor. Here we use GPS module to track the location of the vehicle where the accident has occurred. GPS can get the graphical location of the vehicle and these location values are displayed on the LCD (Liquid Crystal Display).The location values are given to microcontroller. Controller gives this information to GSM module. By using GSM we can send the message to family members, emergency medical service and nearest hospital.
The accident hidden key is a circuitry which senses abnormal readings and triggers the system. Various sensors such as the temperature and speed sensor are converted from analog to digital and given to the microcontroller .through temperature sensor which are interfaced to the micro controller we can measure amount of Temperature exhausted from the vehicle. Speed control sensor senses the speed.

Depending on various inputs given and bi-directional connectivity with the ARM processor, the controller takes decisions. The controller not only recognizes the crash through the interrupt pin connected with the accident switch when car collision is detected, but also moves the data of the memory buffer to the SD card. The recording camera comprises of CMOS sensors having advantages like low power consumption, small size, direct digital output and simple design compared to traditional ones. recording web camera record the video of how and which met the accident . The GPS (Global Positioning System) continuously tracks the car's position and keeps record of accurate time. The SD card used was selected keeping in mind newly emerging audio video consumer electronic devices. It can support easy interface allowing a PC to be connected without any special devices making it more portable.

In this project we are using ARM7 and Cloision sensor etc. whenever collision is occur means the sensor get activeted at that time Data collected by all the sensor(temprature, methane and ultra sonic) sens through GSM to an number also give a buzzer sound for some sec. The transmeted information will also display on LCD.

2. THEORY

Development of crash box for passenger car with high capability for energy absorption in 2005 using the FEM system in which temperature sensor speed control part and GSM /GPS are used. Vehicle Black Box System in which Microcontroller PIC16F877A seatbelt and speed control section is used. This implemented in 2008. Black box for vehicles in which speed control and seatbelt was implement in 2012 and car black box speed control in collision avoidance different areas. In this seatbelt sensor with speed control, GPS \GSM, and camera for video capturing is used.
Design of car black box based on ARM in which only seatbelt and camera used. Car black box system for accident prediction and crash recovery in which arm LPC 2148 used for controlling the temperature of engine and GPS/ GSM system is also used. ARM 9 AT91SAM9260 Evidence collecting system from car black box in which two component are using for evidence collection those are camera and GSM/GPS system. Proof Collection from car black box using smart phone in which only temperature sensor and GSM/GPS is used. Study and literature survey for evidence collection system for car in which LPC 2148 processor is used in which the temperature sensor, camera, and GPS/ GSM are used. Research paper on upgraded black box system in which aurdino processor or technology used it was implement the temperature sensor camera for video and GPS GSM System for communication. It was implemented in 2016.

3. ANALYSIS OF PARAMETERS

3.1 Temperature sensor

The LM35 series are precision integrated circuit Calibrated Directly in Celsius (Centigrade) temperature devices with an output voltage linearly. Linear + 10-mV/°C Scale Factor proportional to the Centigrade temperature. Suitable for Remote Applications from the output to obtain convenient Centigrade Low-Cost Due to Wafer-Level Trimming scaling. If the thermometer detects an increase in room temperature, it sends control signal to the microcontroller interfaced to it, hence the microcontroller take necessary action like turn the fan on which is work as an air-conditioning to maintain the room temperature at the desired value.

3.2 Ultrasonic Sensor

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively.

3.3 Seat Belt Testing

One push button is used to detect the place of the seat belt during the drive. The seat belt of the driver is only taken into consideration in this paper, but can be extended to include all the belts of the vehicle, depending on the traffic regulations of each country. The push button is placed on the seatbelt and gives logic 'zero' when the belt is used and logic' 1' when the belt is not placed by the driver.

3.4 Alcohol Sensor

In this, MQ-2 gas sensor is used for alcohol detection. It is high sensitive to alcohol, simple drive circuit, stable and long life. If driver has drunk, then alcohol sensor sends signal to microcontroller. The

output of MQ-2 is given to LPC2148and message is displayed on LCD.

MQ-6 LPG gas sensor sends signal to microcontroller. The output of MQ-6 is to LPC2148.

Sr. No.	***Year***	***Title of paper***	***Processor / controller***	***Temper -ature sensor***	***Speed control***	***Seat belt***	***Video recording***	***GSM & GPS***
1.	2005	Development of crash box for passenger car with high capability for energy absorption	FEM system	√	√	×	×	√
2	2008	Vehicle Black Box System	PIC16F877 A	×	√	√	×	×
3.	2012	Black box for vehicles	LPC2129	√	√	√	×	×
4.	2012	Car black box with speed control in desired areas For collision avoidance	ARM processor	√	√	×	√	√
5.	2013	Design of car black box based on ARM	ARM 7LPC 2148	×	√	×	√	√
6.	2014	Car black box system for accident prediction and crash	ARM7 LPC 2148	√	×	×	×	√

3.5 LPG Sensor

In this, MQ-6 gas sensor is used for LPG detection. It is high sensitive to LPG. If the level of LPG is more,

3.6 Accelerometer sensor

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage

		recovery						
7.	2014	Evidnce collecting system from car black box	ARM 9 AT91SAM9 260	×	×	×	√	√
8.	2015	Proof Collection from car black box using smart phone	89V51RD2	√	×	×	×	√
9.	2016	Study and literature survey for evidence collection system for car	ARM LPC 2148	√	×	×	√	√
10.	2016	A research paper on upgraded black box for Automobiles	Aurdino	√	×	×	√	√

Tabel 1: Literature Review

outputs. The product 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.

3.7 Door status sensor

In this, limit switch is used for door status. A limit switch is electromechanically device that consists of actuator mechanically linked to set of contact with actuator, device operates the contacts make or break electrical connection.

3.8 Smoke sensor

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke

detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

4. CONCLUSION

An innovative wireless system using microcontroller and GPS tracking system has been developed for vehicle accident detection and reporting. This vehicle accident detection and reporting systems provide crucial information to emergency responders in the earliest possible time. The crucial time between the accident and getting victim medical attention can often be the difference between life and death. This system provides better safety rather than no safety.

5. FUTURE SCOPE

In future we can interface with vehicle airbag system. This will optimize the proposed technology to the maximum extent and to deliver the best accident avoidance and detection system.

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