

Black box For Vehicles

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Abstract The Black box is designed to save million people deaths due to road accidents. The main purpose of our project is to design and develop a system of the “Black Box for vehicles” that can be installed into any vehicle. This system can be designed with information needed for better accident analysis. Essentially it monitors the cause of accidents, incident of accident and location of the accident. It records the data and provide an analysis as feedback to the driver and control room. This system also provides indications on the indicator panel in the vehicle.

Keywords — *Accident switch, Android App, Bluetooth, Buzzer, Green LED, Hall Effect sensor, Red LED, Touch sensor.*

I. INTRODUCTION

According to the World Health Organization, more than a million people in the world die each year because of transportation-related accidents. To solve this problem, we have to design the Black Box. "Black Box" technology can now play a key role in motor vehicle crash investigations, like flight data recorders and cockpit in aircraft. A number of vehicles on the roads contain electronic systems that record the event of a crash. It is important to have recorders that objectively track what goes on in vehicles before, during and after a crash.

Car Black Box is used to record information related to accidents, like Black Box of airplane. It can be used to analyze the accident easily and it can also be used to settle many disputes related to car accident for e.g. crash litigation, insurance settlements. A black box in commercial airplanes, records data from crash or near-crash accidents situations.

II. LITERATURE SURVEY

A model consisting of different sensors that measures the parameters for vehicle monitoring like proximity sensor and temperature sensor [1].

To develop the embedded controller for Car Black Box using SoC (System on Chip) technique. System on Chip (SoC) is the effective method to implement embedded system like car black box [2].

The purpose of designing Car black box controller with the Global Positioning System (GPS) in a very simple and efficient way for positioning and tracking. The system is designed to provide information about location which can be helpful for services along with the emergency services [3].

The better crash research that may produce improved driver education programs, safer road designs and improve highway safety which includes sensors like pressure sensors , leakage sensors etc. this paper gives us feature of audio and video recording [4].

III. SYSTEM ARCHITECTURE

The system consists of cooperative components like microcontroller unit, hall effect sensor, steer touch sensor, Bluetooth and Android app that consists of various features like audio/video, GPS/GSM.

The main objective of black box for vehicle is to monitor parameters of vehicle

- RPM sensor measure the speed of vehicle.
- Steering touch sensor will warn the driver whenever he feels drowsy and his hands are out of the steering.
- Accident sensor checks if there is an impact on the vehicle.

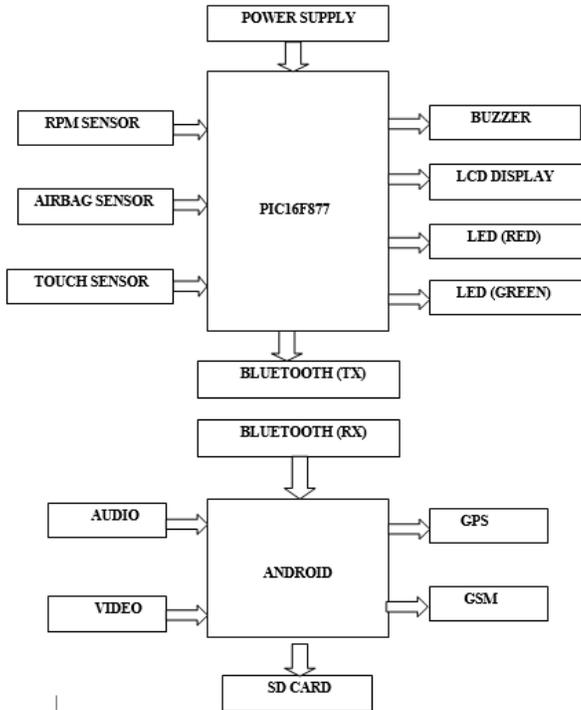


Fig. 1 System Architecture

The system consists of audio/voice recorder which will be stored in a SD card using android. Whenever driver enters into the car, he'll first connect his android phone to the black box system via Bluetooth. After having connection, when the driver will start driving this black box system will start to monitor various parameters and if any of the parameter is found to exceed its limit (threshold) and indication of red led will continuously glow on the dashboard and a buzzing alarm will also be given to alert the driver. These measures are taken to prevent car accidents which will possibly decrease the death rates due to car accidents.

This system also consists of feature like audio/video that will capture a video as soon as there is an impact on airbags and they get opened so that we can get a clear scenario of what had happened at the time of accident. Also when these airbags are opened the parameters monitored at the time of accident

are stored and a message is sent to the control room along with location of accident with the help of GPS/GSM so that people who suffered from an accident can get an immediate help.

IV. SIMULATION

Simulation gives us working demonstration of the system. The software used for simulation is Proteus. In this software we have built our system and checked whether our system is working as per our requirements without any errors and without implementing it using hardware. The results of simulation of our system is as shown below, where initially we can see on LCD displaying value of speed and no steering. As driver starts driving the car, the speed will change and if his hands are placed on steering the “no steering” message will not be displayed. If accidents occurs such that the airbags are opened then “Accident” message will be displayed below speed and data transmission will take place via Bluetooth.

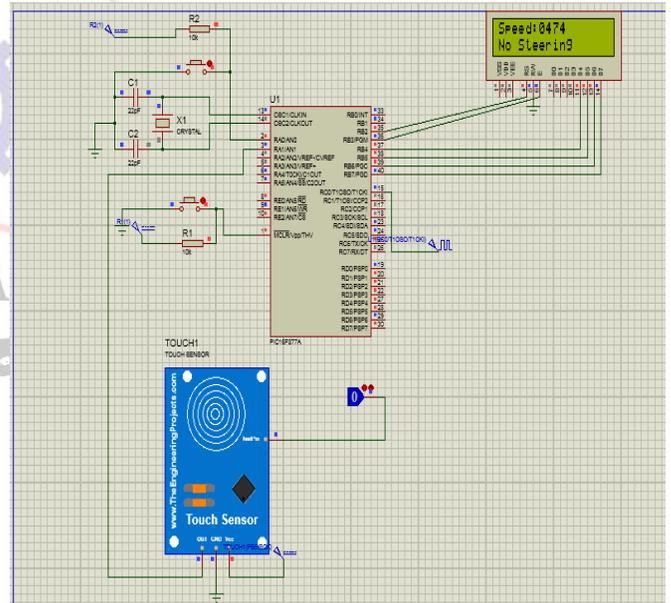


Fig. 2 Simulation

V. SYSTEM OVERVIEW

The above system shows black box for vehicles. Initially the LCD will display speed as “0000” and “No steering”. As soon as driver will start driving the speed will vary as per speed of car. If driver’s hand is on steering no message will be displayed on the LCD else “No steering” will be displayed

and red LED will start to glow and an alarm will be given to driver. Under normal conditions green LED will continuously glow and whenever any of the parameters exceeds its threshold limit red LED will glow and buzzer will start to ring to alert the driver.

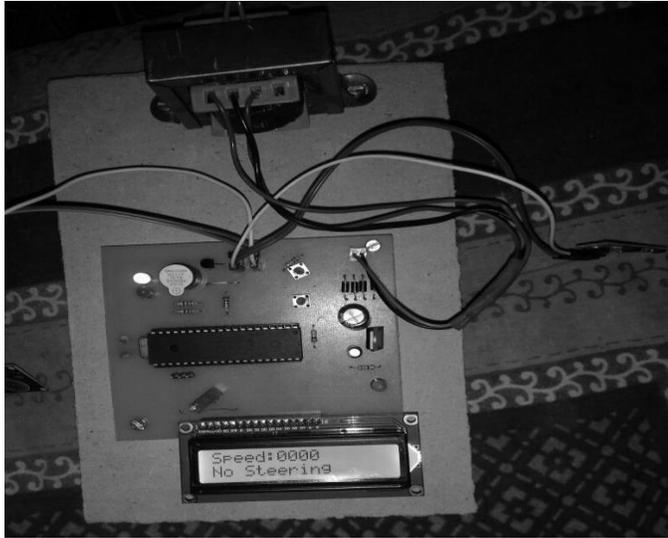


Fig. 3 Black box System Hardware

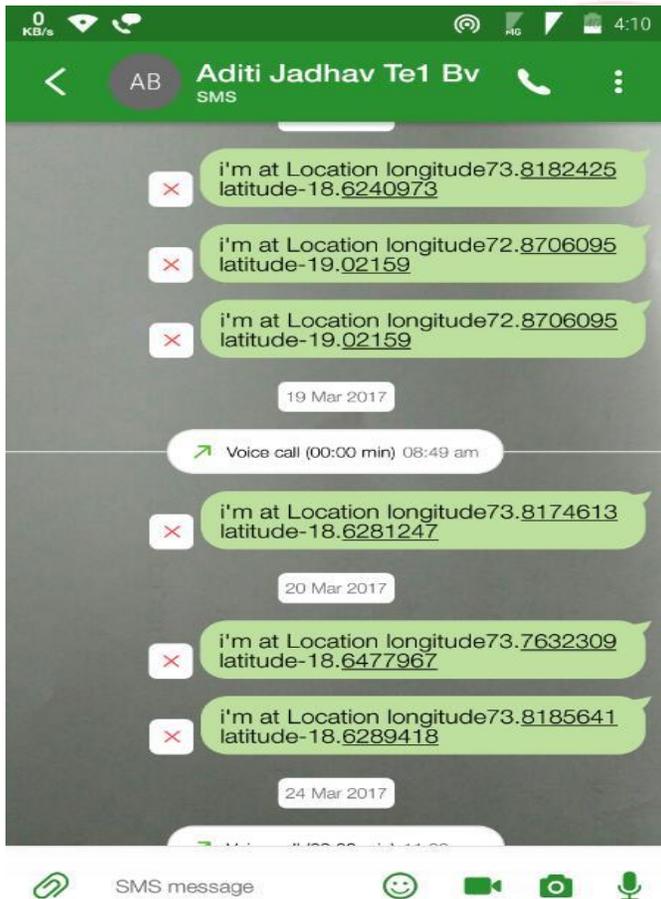


Fig. 4 Screenshot of location sent via GPS/GSM to control room

When accident occurs all data monitored will be sent to

driver's android app and audio/video will start recording and location of the accident will be sent to the control room using GPS/GSM inbuilt in the phone. The data transmission between black box system android app is via Bluetooth. Control room includes hospitals, police station, etc.

VI. RESULT ANALYSIS

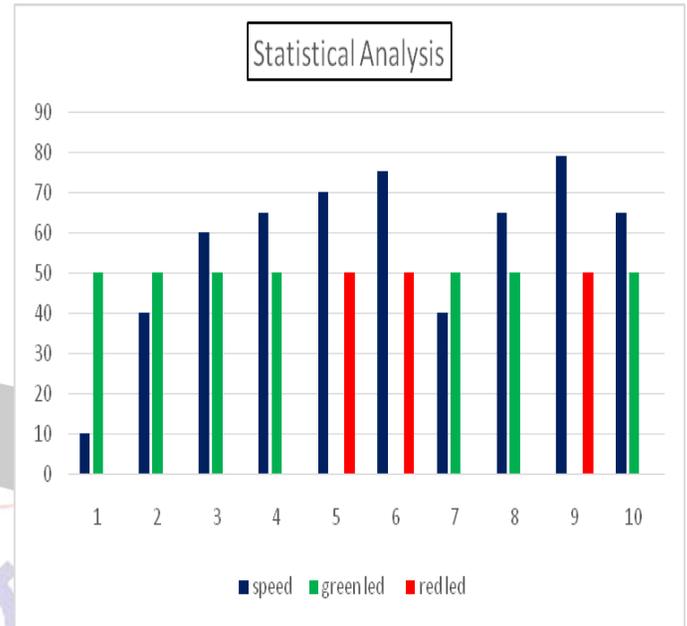


Fig. 5 Statistical analysis of what happens when speed of vehicle varies.

The fig above gives the statistical analysis of the system consisting of speed analysis.

Here, the speed of the vehicle is shown through blue color and the 2 LEDs which are used to alert the driver as soon as he crosses the limit.

For our system the limit is set to 70 km/hr.

Normally the green LED is in on state which reveals that the speed is under control. Whenever the driver crosses the speed of 70, the green LED goes off n red LED comes to on state indicating the driver to reduce the speed. With the red LED the buzzer also gets on.

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CONDITION	SPEED	STEERING	BUZZER	RED LED	GREEN LED	COMMENTS
NORMAL	BELOW 70 KM/HR	STEERING TOUCH	OFF	OFF	ON	NORMAL OPERATION OF THE VEHICLE WHERE THE DRIVER'S HAND IS ON STEERING AND SPEED OF THE VEHICLE IS BELOW 70 KM/HR
FAULTY	ABOVE 70KM/HR	NO STEERING TOUCH	ON	ON	OFF	WHEN THE DRIVER'S HAND IS REMOVED FROM STEERING AND THE SPEED OF THE VEHICLE HAS EXCEEDED 70KM/HR THEN THE ALARM WILL BE GIVEN TO THE DRIVER
ACCIDENT	----	-----	ON	ON	OFF	WHEN THE ACCIDENT HAS OCCURRED THE ALARM WILL BE GIVEN AND MESSAGE WITH LOCATION OF THE VEHICLE WILL BE SENT

Fig. 6 Summary of Black box for vehicles system.

VII. CONCLUSION

This paper presents a black box system that is very useful for automobile industry. An innovative black box is developed using various sensors like steer touch sensor, hall effect sensor and an android app that contains features of audio/video and GPS/GSM. Whenever the driver is driving car the system will begin to save the parameters and display it on LCD screen. This system also gives alarm to the driver for abruptness occurred during driving the car. In case of accident the video at the time of accident will be recorded and also message will be sent to control room that includes location of accident and the parameters recorded at the time of accident. This design of black box is very useful to resolve many disputes related to accidents.

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