



AN EFFICIENT TOOL TO TACKLE SAFETY MEASURES IN VEHICLE USING RASPBERRY PI

Ranganatha Kulkarni¹, Rachana R², Shwetha N³, Soumya D. Kamath⁴, Vaishnavi Prabhu⁵

¹ Asst. Professor, ^{2,3,4,5} Research Scholars,

Department of ISE, Canara Engineering College, Benjanapadavu, Mangalore, India

Abstract

The main purpose of this paper is to develop the similar concept of a Black Box in an aircraft. This would be useful for diagnosis of any vehicle as soon as the device is installed in vehicle. This system can be designed with minimum number of circuits and with the real time video recorder. The accident is detected by the Accelerometer, it will sense the change in the vehicle behavior and detects the accident has occurred. The proposed system consists of GPS device and GSM model, if the accident occurs with help of these devices the location with the time will be tracked and the message will be sent to the emergency services.

Keywords: Vehicle, Arduino uno, Accelerometer, Raspberry pi3, GSM, GPS, Camera, PC.

I. INTRODUCTION

Increasing instances of accidents are evidenced during peak hours of traffic where everyone is in a hurry to reach their office places, thereby overriding the traffic rules. There is no specified track/guided lines for specific vehicles, besides over speeding in marked zones also add to the cause of accidents. Many new safety standards are being introduced by the Government from time to time. However, many times people die because of belated medical help. The proposed system replicates the mechanism used in tracking aircraft movement in a "Black Box". The concept was introduced when the video recording was not available at our disposal. This idea was bought down more precisely into the daily traffic world in many developed countries. With the introduction a new technology, it is now possible to integrate many techniques into a

reality such as loop recording (video) under affordable concept called "Black Box". This paper is an attempt to make Black Box concept for vehicles affordable to all the mid income group to safeguard their interest. Therefore, it's important to have a recorder that records and track what goes on in vehicles before and after a crash. Cameras are mounted to capture the instances of every second.

II. LITERATURE SURVEY

Although there have been many experiments conducted to reduce the cause of accidents, Black Box system was the first step taken to identify and solve the problem. Black Box can play key role in motor vehicle crash investigations. It helped in collecting and detecting the information from the vehicles. It helped in presenting the data to the user in the simplified way. But it failed to locate the location of the vehicles that the accident has been occurred, given the technological tools available in those days [8].

The driver assistance and alert were introduced for the further improvement of the existing system. In this system if there is an accident, then the system will automatically activate itself but it will wait for one minute for user to respond. In case the user is out of danger and everything is under control then the user has to deactivate the system by own. In case of any serious problem then the system will switch to emergency mode. But every time the user had to deactivate the system and it would continue to create emergency situation if not deactivated, which was the main drawback of the system [9].

III. METHODOLOGY

The basic principle of the black box is to collect the data and store the record data in the memory unit. The storage unit of the black box works such that it will always store the data of at least 30 minutes before the crash and 30 minutes after the crash, thus ensuring an overall improved data availability that supports detailed investigation of a crash incident.

Black Box is a device which is used to record the parameters of a vehicle. Information from these devices can be collected after a crash and analyzed to help determine what the vehicles were doing before, during and after the crash or event.

This Black Box System Classified into three sections. This classification can be done by the System working functionality they are:

1. Data capturing i.e. Recording through video cameras
2. Data Storage
3. Looping

1. Recording section: Recording section has camera and adapter. Cameras a series of individual pictures are captured and then presented in rapid succession to give the illusion of having captured motion. In this way we can have the actual video recording of the accident from the drivers view.

2. Storage section: The storage section has Raspberry pi 3 in safe box. In this system raspberry pi 3 connected to camera which record videos and store the data in raspberry pi 3 in terms can be connected to computer devices by using a port to monitor and backup will be saved co

3. Loop recording works on an in-car camera: The basic process assumes that the "oldest video footage" present on a memory card is of no use, and can therefore be deleted if the memory card becomes full. In order to do this, there are normally various loop recording options present on the cameras settings menu, which define exactly how much (in terms of minutes) of the total video can be deleted when more space is required as a journey continues. For example, if the setting for loop recording is "1 Minute", then the camera will create video clips of 1 minute and a 1 minute clip will be deleted when the camera needs more memory. If the setting is "5 Minute", the camera will create video clips of 5 minutes in length, and a 5 minute clip will be

deleted when the camera needs more memory. Since we have to keep data safely even after accident, we will be storing in a Raspberry pi 3 and keeping in a safe box. Thus chopping a bit more of video off the start of the journey. This is built on software FILO loop.

IV. ARCHITECTURE AND WORKING

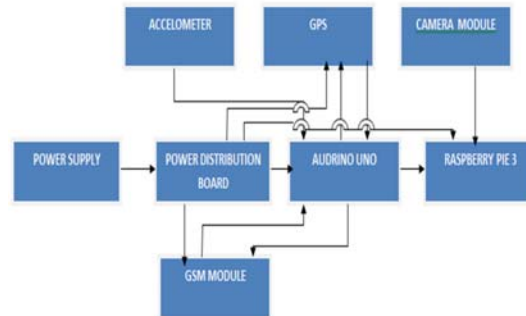


Figure 1: Block diagram of a proposed system

- Power Supply Supplies electrical energy for various sensor and board as shown in figure 1. It is directly connected from car battery.
- Power distribution board system consists of different modules (sensors) and boards, which requires power supply. It is used to divide and distribute the power supply system consists of different modules (sensors) and boards, which requires power supply. It is used to divide and distribute the power supply.
- Raspberry pi 3 interfaced with camera that records footage and saves the video on the external memory.
- For every 90mins previous captured frames will be deleted and new frames will be stored in external memory. This process is known as loop recording. This type of setup in a car is known as dash board camera that continuously records the view through the wind shield. The camera will provide video evidence in the event of an accident.
- Accelerometer is the rate of change of velocity of an object. Whenever changes in an accelerometer or GForce occur, accelerometer measures this and when there is a large change in G-Force Arduino uno comes to know that there is an accident. In the case of an accident, there will be a larger change in the GForce when compared to a normal drive.

- When the Arduino uno comes to know that there is an accident, it identifies the location of the incident using GPS device and with the help of GSM module, the message will be sent which contains the location of the accident along with time. Another the way in which GSM can be used by sending directly to the emergency services.

V. HARDWARE AND SOFTWARE SPECIFICATION

- **GPS & GSM:** GPS has features that allow the Arduino Uno to use GPS sensor and internet feature to start logging the latitude and longitude of location of the car and allow the user to give the real time location of the car. User can use these locations to analyze the nearby police station and contact them with the message with the help of GSM module.
- **Accelerometer:** It is a sensor for measuring the acceleration of a moving or vibration body which would help us to measure the gravity forces. When there is a large change in G force arduino uno will detect the accident occurred. Accelerometer works on 3 modes.
 1. As an internal measurement of velocity and position.
 2. As a sensor of inclination, tilt, or orientation in 2 or 3 dimensions as referred from the acceleration of the gravity.
 3. As a vibration or impact sensor.
- **Arduino uno:** It is computer hardware and Software Company which designs and manufactures micro controller kits for building digital devices and interactive objects that can sense and control the objects in physical world. Arduino board designs use a variety of microprocessor and micro controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board's features are serial communication interfaces, including universal serial bus (USB) on some modules, which are also used for loading programs from personal computer.
- **Raspberry pi 3:** It is a quad core A53 processor is described as 10 times the performance of the Raspberry pi 1. This was suggested to be highly dependent upon task

threading and instruction set use. Benchmark showed the Raspberry pi 3 to be approximately 80% faster than the Raspberry pi 2 in parallelized tasks. □

- **Python:** It is a programming language embedded in many software products as a scripting language. We are using this language code as our backend.

VI. CONCLUSION

The system can detect the type of an accident from accelerometer. After an accident is detected, short alert message is sent which includes data such as the location with time in latitude and longitude, using which the location of the accident can be found for quick rescue. The proper sensor devices are connected along with the system for detecting the accident. As soon as the driver runs the motor, this system will begin saving the event of the corresponding vehicle. This system is a great help for research activities related to increase the safety methods. This paper also offered a user friendly embedded program to analyze the data of the accident and improve the safety of vehicles.

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