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CLOUD BASED BLACK BOX SYSTEM FOR VEHICLES

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Abstract – *Across the world, many people are dying because of road accidents. If the accident happens there may be arguments occur between the victims or it can turn into a court case. It will take years to resolve the issues between the victims. This system focuses on monitoring of real-time driving and which uploads the monitored data to both the black box and cloud for the further investigation in the case of an accident. The system upload data to cloud because if the vehicle burn it out or fall down from any hill station it will be difficult to recover data from Black box. Cloud storage given like the secondary storage of real-time monitoring data. The system also contains GPS module for accessing the accident location. This system helps the accident investigators, insurance companies to find out the exact cause of the vehicle accident. Which can resolve issues between the victims and can take actions quickly and also helps the vehicle owner to claim Insurance. The system contains all basic features for analyzing the accidents.*

Key Words: ARDUINO-UNO, BLACK BOX, CLOUD STORAGE, GPS ,TILT SENSOR, ALCOHOL SENSOR, HALL EFFECT SENSOR

1. INTRODUCTION

Every year the lives of approximately 1.35 million people are cut short as a result of a road accident. Nearly 20 to 50 million people suffer from non-fatal injuries, with many incurring a disability as a result of their injury. Road accident injuries cause considerable economic losses to individuals, their families, and to nations as a whole. More than 90% of road accident deaths occur in low- and middle-income countries. Road accident injuries are the leading cause of death for children and young adults aged 12-29 years. When there is an increase in average speed which is directly related to both severity of the consequences of the crash and the likelihood of a crash occurring. For example, every 1% increase happening in mean speed will be producing a 4% increase in the fatal crash risk and a 3% increase. Driving under the influence of alcohol, any psychoactive substance increases the risk of a crash that results in death or serious injuries. Those who are using mobile phones while driving gives an approximation of nearly 4 times more likely to be involved in a crash than those drivers not using a mobile phone while driving.

Like recording device placed in an airplane for the purpose of facilitating the investigation of aviation accidents. The same method is adopting to vehicles as Black Box to record the real-time data. And the data stored for 24*7 after it will remove the first entered data according to the time and date the data stored. The system uses various sensors to get the exact cause of an accident. The sensors sense the real-time incidents and stored in Black Box and cloud application. In that case, when it is difficult to recover then we can check the data that stored in cloud. The system uses .NET computer program. It will receive data from black box memory serially, presents it in real-time graphics, then saves it to a formal excel report for further use in the future. The .NET programmed application would be connected to cloud.

In order to analysis the exact cause of accident the system contains sensors like Tilt sensor, Hall effect sensor, GPS module, switch array, Alcohol sensor, Bluetooth transceiver. It will help the vehicle owners, investigation officer and the insurance examiners by finding reasons of accidents.

2. METHODOLOGY

A block diagram is used to represent the principal parts and functions by arrows connected to the blocks which shows the relationship of all the blocks contained. This is mainly used for hardware designing, software designing even for flow diagrams for better understandings.

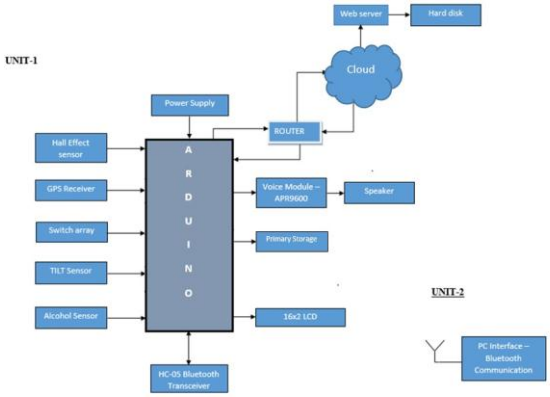

Fig-1: Block Diagram

2.1 Hall effect sensor

Hall effect sensor is designed to detect the hall effect and for calculating the magnitude of the magnetic field. The sensor is positioned to the magnetic field of tire so that the speed of the vehicle can be calculated and it will be easier to find out speed violations.

2.2 Alcohol sensor

The alcohol sensor is applicable for detecting concentration of alcohol on a person's breathe, similar to the breath analyzer. The sensor is positioned in the system. When the person breathes near to the sensor it will detect the ethanol presence in that persons breathe and records the output based on alcohol concentration.

2.3 Tilt sensor

A tilt sensor measures the tilting position according to the gravity and helps for inclination detection so that the depth of accident can be measured. Accident varies according to the impact made during the collision. Tilt sensor acts upon the situation while collision happens and provide the depth of the accident.

2.4 GPS Receiver

GPS receiver in a phone listens for signals, it is a system of more than 30 navigation satellites circling earth. When the receiver attached to a system or a phone calculates its distance from five or more GPS satellites, it can find out where we are. As the vehicle moves the GPS receiver reads the parameters such as latitudes, longitudes, speed and distance traveled. The devices use customized algorithms to determine whether or not safety-relevant events have occurred or whether pre-set parameters have been exceeded. These algorithms are as varied as the devices themselves.

2.5 Bluetooth Transceiver

Bluetooth is a communication protocol without wire designed for low power consumption, it is short range based and cheap rate transceiver microchips in each device.

3. WORKING PART

The current black boxes store video and sound during a specific period only. Video offers a means for accident analysis to a limited extent, but does not provide the accurate cause. In addition, the data cannot be collected if the black box is damaged. Therefore, additional data other than video are required to accurately analyze the accident cause. In addition, because data cannot be collected if the black box is damaged in a severe accident or a car fire, a new system is required to allow analysis of the data in the case of a severe accident. The sensors as well as the other devices are directly connected to the Arduino. When ever the vehicle starts it automatically detects alcohol if the person is drunk and save the data, speed will be calculated by the hall effect sensor and if an accident occurs the tilt sensor measures the depth of accident and an alert will be passed to the control room or to a rescue team through the help of GPS(Global Positioning System)attached to the system. All the information will be stored in the primary memory and to the cloud. If the accident causes a major destruction it will leads to loose all the datas in the black box system and exact cause of accident cannot be revealed , even insurance company and the person applying for the insurance will be in trouble. All these problems will be solved by the cloud feature added to the system which will store all the datas than primary memory and it can be accessed any time by the investigation team or insurance company even the black box is completely destructed.

4. RESULTS

In these days technologies plays a very important role in human's life. Our duty is how these technologies can be utilized for a better tomorrow.

CLOUD BASED BLACK BOX SYSTEM is mainly focuses in road accidents. Road accidents are one of the major cause for increased death rate and for injustice happening for many victims of accidents. The analysis of a car accident requires physical evidence, including clear evidence from

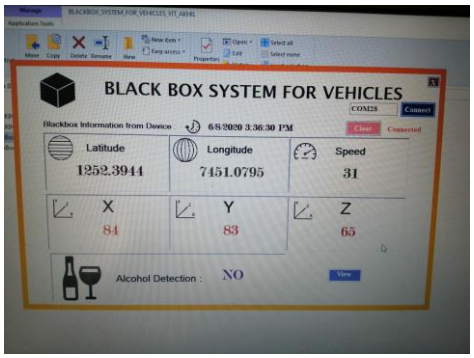

Fig-2: Result screenshot

the accident site, a witness, and a trace of the vehicles. In many cases, however, insufficient evidence is collected, and it is difficult to accurately identify the accident cause and the victims or offenders. Thus, even crimes using car accidents are happening. Proud to say that those problems can be solved to a level by a cheap rate. Our society can reduce the death rate, people and our justice system can reduce the burden of accidents and cases related to those accidents. Saving human lives is one of the major benefit of our system for a better tomorrow.

5. CONCLUSION AND FUTURE WORK

According to WHO millions of people die each year because of transportation-related accidents. The black box system helps to solve this problem that crosses national boundaries and threatens the safety and health of the people. This black box can be installed to any vehicles all over the world to improve the treatment of crash victims, road status to decrease the overall death rate, constructing vehicles with more safety, and helping insurance companies with their vehicle accidents investigations. The black box will collect all the information and stores in the cloud, primary memory in the system so that at any time the data can be accessed. Alcohol detection will be done by the black box system that will help the investigation team to get the primary medical report of the victim which makes a better scope for future vehicles.

Engine Control Unit(ECU) also called as Engine Control Module(ECM) which calculates the optimal engine performance. In future the works done by the ECU can be included to the black box system so that ECU can be completely avoided.

Cameras can be included to the system so that live recording can be saved. It will be very helpful when ever an accident occurs for the investigation team as well as insurance company.

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