Design and Implementation of a Car's Black Box System Using an Arduino

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Abstract - The main purpose of this paper is to develop a prototype of the Car Black Box System. Black Box can be installed into any vehicle all over the world. This prototype can be designed with minimum number of circuits. The Black Box System can contribute to constructing safer vehicles, improving the treatment of crash victims, helping insurance companies with their vehicle crash investigations, and enhancing road status to decrease the death rate. In addition, the Black Box sends an alert message to a pre-stored mobile number via Short Message Service (SMS) through mobile app in the case of occurrence of an accident.

Index Terms – Arduino Board, GPS, Mobile App, Flutter.

I. INTRODUCTION

One of the most critical issues in the world is a car accident. The World Health Organization estimates that over a million people a year pass away in accidents involving transportation. Despite several initiatives taken by different automakers to enhance car safety, the issue persists for the aforementioned reasons. Since the Delays in medical care and high fatality rates place a financial and social burden on those affected. "Black box" technology now plays a significant part in motor vehicle accident investigation, much like aircraft data recorders on a plane. An electronic device that is specifically used to record and save information is referred to as a "black box." The similar idea was applied when a black box was installed in a vehicle for help.

In this case, the black box is utilized to record and store real-time vehicle acceleration, temperature, pressure, interruption values, and driving data. The driving circumstances of the car and the accident can be examined and tracked. An analogue to digital converter was employed to gather the analogue data gathered by the sensors and transform it into a digital value that can be fed into the microcontroller.

II. LITERATURE SURVEY

Abhirup Das ; Abhisek Ray ; Abhisek Ghosh Swarasree Bhattacharyya ; Debaleena Mukherjee ; T. K. Rana 2015. Vehicle accident prevent cum location monitoring system. This Paper represents and shows us that.

Accidents on road increasing day by day at a faster rate. Accidents can be avoided by knowing the psychological state of a driver. Major accidents usually occur during night which will be due to drowsiness of the driver of the vehicle. Eye blinking of the driver can be monitored to reduce such accidents; the drowsiness can be understood by the blinking of eye. And drowsiness will also take away the concentration of driver from any obstacles located on road. And blinking of eye will even help in knowing the drunken state of the driver as well. The above alarm condition is activated by using the automatic pre-cautionary system. [5]

The assortment of the ongoing information after the recognition of impact around the vehicle condition and break down the gathered information to have the end with respect to the crash and at the same time transmitting the information over the remote system. The Evidence Collection System is vehicle based gadget, which is use to gather the information like speed, motor temperature, Brake status, LPG sensor, Alcohol content, quickening, GPS position, wiper development, and time and so forth. This information can be utilized to explore the wrongdoing, salvage activity and protection claims. This information at that point transmitted to the database server with the goal that web application can have the option to get to this data at better places like police headquarters, Insurance Company [7]

A Black Box is intended for mishap examination, and its usefulness is same as that of plane Black Box. Their examine shows a model of a discovery framework that can be introduced into vehicles. There framework utilizes 5 unique sensors to record distinctive driving parameters. The ARM 7 microcontroller is utilized to direct these sensors. Which additionally comprise of a worldwide situating framework, to get land co-ordinates of vehicles. If there should be an occurrence of mishap the Black Box a message is sent to a preinstalled number utilizing SMS. The proposed framework likewise intends to record sound and video utilizing outer camera and amplifier. The gathered information from various sensors and modules are put away in the memory card, and can be recovered back.

Black Box Unit is a gadget to record driving history which can be utilized for vehicles (vehicle, truck, and lorry) crash examination. This gadget is introduced in vehicles to record data identified with vehicle accidents or mishaps. Brilliant discovery stores motor temperature, hindrance identification, speed of vehicle, brake status, liquor substance, time and date utilizing gps or gsm.. This diminishes labor, time and multifaceted nature over customary framework.

III. METHODOLOGY

A car black box is a device that records various data related to the operation of a vehicle, such as speed, acceleration, braking, and other sensor inputs. In this scenario, the car black box is configured to work in conjunction with an Android app that has been developed using the Flutter framework.

Flutter is a popular open-source UI framework developed by Google, used for building cross-platform applications. It allows developers to write code once and deploy it on multiple platforms, including Android and iOS. By utilizing Flutter, the Android app can be developed to have a consistent user interface and experience across different devices.

The car black box, often equipped with various sensors and a GPS receiver, collects and stores data about the vehicle's performance and behaviour. This data can be accessed and analysed through the Android app. The app is designed to communicate with the car black box using a communication protocol, such as Bluetooth or Wi-Fi, to retrieve the recorded data.

Once connected to the car black box, the Android app can display real-time information about the vehicle's speed, location, fuel consumption, and other relevant parameters. It can also provide historical data and generate reports based on the collected information. The app may have additional features, such as trip logging, driving behaviour analysis, and notifications for maintenance or potential issues detected by the black box.

The Flutter framework enables the Android app to have a visually appealing and responsive user interface, with customizable widgets and smooth animations. It allows developers to leverage a single codebase to create an app that works seamlessly on different Android devices, reducing development time and effort.

Overall, the combination of a car black box and an Android app built with Flutter provides a powerful solution for vehicle monitoring and analysis. It allows users to access valuable insights about their driving habits and vehicle performance, enhancing safety, and facilitating maintenance and troubleshooting.
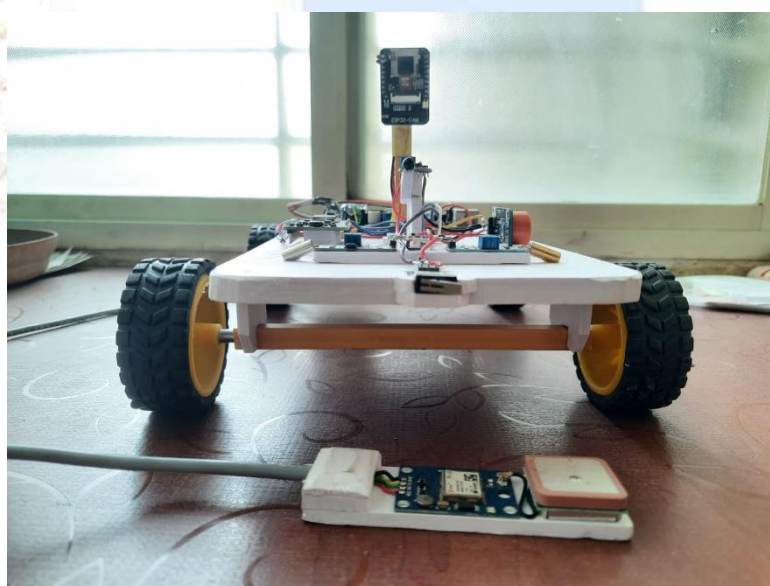

Fig 1 - The Model of Design and Implementation of a Car's Black Box System Using an Arduino

IV. RESULTS

The design and implementation of a car's black box system using a Arduino Mega microcomputer and an Internet of things module was presented in this research. This system was built using a microcomputer Arduino Mega and different sensor, such as a GPS, camera module, alcohol sensor module, and signals from the electronic control unit. The data were stored in both a secure digital card, and in the cloud through the android app platform. The results show that this embedded system can acquire and process video, audio, GPS, alcohol concentration, speed, temperature, etc. This system can be useful when any type of accident occurs due to any reason, as the car's black box would provide the necessary information and data to generate a report of the accident and its causes.

V. CONCLUSION

In this modern era, IoT Technology is improving rapidly to help the issues mostly concern the world. This paper mainly focuses on alerting the driver from the Collision situations and using Cloud Computing Services, the location can be easily traced. Our contribution is that we proposed a low power micro-controller which can be used in the hardware implementation as its main controller in the automation of this device. with the meaningful support of the Embedded systems, IoT and Cloud computing, we strongly believe that it will be reliable, power efficient in the real time applications.

VI. REFERENCES

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