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Original Article

Black Box - Car Accident & Alcohol Detection System

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Abstract: *The primary goal of this study is to dismantle a prototype accident detection device using a black field. If an accident occurred and the driver or passengers suffered injuries, there may be fatalities as a result of a delay in medical attention. This prototype can be created with a small number of diverse circuits. The VBBS can help make cars safer, improve how collision victims are treated, help insurance companies with their auto crash investigations, and improve traffic conditions to lower the death rate. This task is to identify the frequency of any accident and report the area of chance to the previously coded wide variety so that right now.*

Keywords: *Study, Safer, Traffic, Lower, Report.*

INTRODUCTION

According to the arena fitness organization, more than a million people worldwide pass away every year as a result of incidents related to transportation. Due to the consumption of alcohol by the driving force or person, accidents occur frequently in the afternoon. Due to this, drunk driving is the primary cause of injury in almost every country on earth. The task of recording informational data, such as vehicle speed, engine temperature, and other factors, has evolved. to transform the field of research onautomobile accidents. With the aid of GPS and GMS technology, it can also be used for vehicle mapping and accident alarm. The black box gadget makes the first move to address this issue, which transcends national boundaries and jeopardizes the safety and health of people everywhere. As we comprehend the present ratio of fate. The twist of fate was brought about for unique reasons. After a twist of fate, we want to put together the practical components for every coverage and policy claims. Policies contain anumber of clauses, including Claims We require the appropriate documents in order to fulfil every provision. That black container will help us get what we want. Black box will help you and the insurance company so that you can finish processing claims. Additionally, a twist of fate tracking gadget will be available. This device will support maintaining human life. Technically, a black container is utilized as a safe to accurately save machines. It will remain in any environmental situation as it is. Special automobile parameters are kept in memory cards using black containers. On this paper, we describe the hardware assets in segment II and the phase III difficulty with the software component.

LITERATURE SURVEY

In 2022, Punyavathi et al. [9] presented IoT-based vehicle detection and tracking techniques. The detection of vehicles can be achieved through both traditional techniques and deep learning methods. In the first method, the traditional Scharr-Sobel edge detection is utilized. A second technique is to develop an algorithm that detects blobs and analyses them. In the third method, a deep learning model Yolo v3is employed. When flows are high, it is difficult to locate and distinguish. To support statistical flow recalculation and real-time detection, the network structure is modified using the spatial consolidation principle. Finally, the DL model yolov3 outperforms the traditional model and provides better accuracy.

In 2021, Raad et al. [10] developed a system to track the vehicle using RFID and mobile data for school vehicles. The system is built around RFID readers that are placed inside buses, close to bus halts, and at pick-up locations at school entrances. For mobile access, the system database is hosted on the cloud and is managed by a dedicated administrator. The app is linked to a MySQL database that is running on the cloud platform of Heroku. In addition, the system provides a secure Java GUI that allows stakeholders to communicate securely internet about the bus route.In 2018, Dashora et al. [11] presented a model for the detection of vehicle accidents using IoT. A device was designed that uses a WiFi module to continuously feed data to the control room to detect automobile accidents automatically. 'Thingspeak' is used for online clouds that are run by third parties. The Arduino IDE software uses a serial monitor to monitor the data and determine whether the data being directed to the cloud is accurate or not. It gives the precise information that the controller's accelerometer measures. The parameters were established, and it can determine whether or not the accident is critical.

In 2018, Anil Kumar et al. [12] developed a system to investigate the cause of an accident using black box and cloud storage. Millions of people suffer accidental deaths. This paper addresses ways to make cars safer as well as a system that can warn drivers to drive carefully. and also provide This study describes continuous IoT-based monitoring of driver behavior and vehicle performance via sensors. The vehicle's black box gets data from several sensors such as acceleration, a breath analyser, and the distance between the vehicle in with push and panic button. Messages are transmitted to emergency contacts when the driver's alcohol consumption surpasses the maximum level. If an accident occurs, the location of the vehicle is tracked using GSM and GPS, and the information is forwarded to the police and a local hospital. This location is always tracked using IoT technology's cloud platform service. Panic andPush buttons are utilized to notify the 24/7 management to request emergency assistance.

In 2018, Mallidi and Vineela [13] developed a smart vehicle monitoring system (SVMS) via IoT. SVMS controls remotely and monitors the vehicle using IoT. The Raspberry Pi (RPi), is equipped with sensors to detect accidents. RPi's are also equipped with cameras that can detect accident severity. SVMS uses an image classification to alert authorities of the severity. To track vehicles, the SVMS is also equipped with GPS technology. The GPS allows the SVMS to continuously track the location of the vehicle. This information will be used to locate the vehicles in the event of an accident or theft. Yet the model utilized only two sets of training images for image classification due to a lack of data.

In 2019, SahayaAnselin Nisha et al. [14] presented a system for communication using Zigbee and a microcontroller. For this purpose, it is critical to process the status data received every minute in a real-time application. Because of its high speed, data efficiency and large memory, a modern technology LPC 2148 based Advanced RISC Machine (ARM7) Central Processing Unit were employed in this system. Voice frequency is measured using an ARM7 CPU, voice recognition board, and RF module in global wireless communication. Speech recognition is used to detect human commands, which are processed by the LPC2148 microcontroller and sensor loads are loaded according to the programmer's instructions. These commands are transmitted via ZigBee wireless technology from the transmitter to the receiving part [15]. These commands are conveyed using ZigBee wireless technology from the transmitter section to the receiving section. The voice recognizer kit and the controller in this device send the order from our speech to the receiver portion through ZigBee.The controller on the receiver side uses the commands from the transmitter and ZigBee to control the loads after receiving them from the ZigBee on the receiver side.

In 2022, Saleem et al. [23] proposed the system to detect an Accident by applying the YOLOv3 algorithm. After detection the system will send accident pic and accident video to Rescue systems like Police Station and Ambulance through Android Application. Also they will get Geolocation of the incident place and route guide with help of Google Maps to reach faster as possible. The system efficiently worked with invariant lighting and camera location conditions and camera quality.

In 2019, Costa et al. [24] proposed a non-intrusive system to monitor the driver in terms of fatigue, distraction, and activity. The proposed system explores state-of-the-art sensors, as well as machine learning algorithms for data extraction and modeling. In the domain of fatigue supervision, we propose a feature set that considers the vehicle’s automation level. By comparing the performance of Support Vector Machines against Decision Trees, conducted experiments indicated that our system can predict the driver’s state with an accuracy ranging from 89% to 93%

In existing systems with vehicle safety models, very few sensor parameters were measured. Mostly all the solutions have either SD Card storage or a few cloud storage but not both. Hence a new investigation system is required for vehicle safety with much more information. This has been discussed in the remaining chapters.

SYSTEM REQUIREMENTS

Controller:

The ARDUINO ATMEGA-328 microcontroller has 14 input and output analogue and virtual pins, of which 6 are regarded as PWM pins. There are also 6 analogue inputs and one virtual input left over. The ARDUINO board is connected to the computer using an energy jack connector. The ARDUINO microcontroller is connected to a battery externally for power delivery. Due to the that ARDUINO is an open microcontroller, it lacks any internal comments.

Temperature Sensor:

The microcontroller width is ready 53.4mm, and the ARDUINO board's length is sort of about 68.64mm.The ARDUINO microcontroller is 20g in weight, and it is displayed to the user in a clear and simple manner.

Alcohol Sensor:

If the character's interior vehicle has consumed alcohol, the Alcohol sensor will detect it. The MQ3 alcohol sensor is employed in this research. One of a number of simpleto-use gasoline sensors that may immediately be linked to an ARDUINO is the MQ3 alcohol sensor.

Speed Sensor:

Speed sensors are used to gauge an object's motion, typically a moving vehicle. Depending on the operating medium, different speed sensor systems are employed for various types of transportation vehicles. Potentiometer are used to control speed using speed sensors.

Switches:

Push buttons are used to activate coincidence sensors and belt sensors. They feature three pins: one for the standard (C), two for the alternates (usually closed (NC) and generally open (NO), and one for the standard. The black box device included nine push buttons. One of them serves as a belt sensor, and the other eight serve as coincidence sensors.

GSM Module:

It is a commonly utilized mobile communication device on a global scale. To the touch variety, an alarm message can be delivered. We utilize a synthetic RS232 module from RHYDOLABZ for the task. SIMCOM Make SIM900 is used. The modem operates on the 850MHz, 900MHz, and 1900MHz frequencies. that device operates in car band mode with the lowest WIFI baud rate. You can use the instructions to place different baud rates between 960 and 11520.The SIM900 is a complete quad-band GSM/GPRS solution that can be incorporated in customer programme and is available as an SMT module

GPS Module:

Area and time facts are shown in all weather conditions, everywhere on or near the earth, through a space-based, fully functional navigation and positioning system. There is a unique and WIFI "address" for every location on the earth. The gadget GPS is a navigational tool that determines the exact location of any object on the earth using a network of 24-32 satellites. The satellites are in an orbit that is 12,000 miles above the surface of the earth. There are currently 27 to 32 Global Positioning System (GPS) satellites orbiting the planet. Three of them serve as fallback. A standard GPS signal is transmitted by each satellite via radio waves in the microwave region of the electromagnetic spectrum. Each GPS satellite broadcasts a navigation message continuously at a rate of 50 bits per second at a microwave carrier frequency of about 1600 MHz. networks operate at around 5000 MHz and 2400 MHz more specifically, whereas all satellites broadcast at 1575.42 MHz (which is the L1 signal) and 1227.6 MHz (which is the L2 signal). FM radio, by comparison, is transmitted between 87.WIFI and 108.0 MHz.

LCD Display:

All the parameters are continuously displayed on the screen using LCD. An electronic display module is an LCD screen. A 16*2 LCD display is a very fundamental module that is frequently included into many different devices and circuits. These modules are preferable over multisegment LEDs with seven segments and additional segments. The rationale behind this is that LCDs are affordable and simple to programme. An LCD that is designated as a 16*2 LCD may display up to 16 characters on each of its two lines. Each character on this LCD is displayed using a 5 by 7 pixel matrix. Both the command and data registers are present in this LCD. The command register keeps track of the commands issued to the LCD. A command is a directive provided to an LCD to carry out a specific task, such as initializing it, cleaning its screen, or storing the data seen on the LCD in a register. Thecharacter's ASCII value, which will be displayed on the LCD, is the data.

PROPOSED SYSTEM

Consistently the existences of roughly 1.3 million individuals are cut short because of a road traffic crash. Somewhere in the range of 20 and 50 million additional individuals experience non-fatal injuries, with many

causing a disability because of their physical issue. Road traffic injuries make high economic losses for people, their families, and to countries in general. These misfortunes emerge from the expense of treatment as well as lost efficiency for those killed or crippled by their injuries, and for family individuals who need to get some much needed rest work or school to really focus on the harmed. Road traffic crashes cost most nations 3% of their GDP. So here we design a system that can alert the vehicle owner/loved ones over sms as soon as any signs of accident or may lead to an accident are detected. As well as the system stores all readings that lead and happened during the accident so that investigators may study exact causes of accident to avoid further such instances.

This System provides the following advantages:

- Instant data Capture from Sensors
- Instant SMS alert for Drunk Driving Detection
- Instant SMS Alert for Fire or Accident Detection
- Accident Data Storage for Investigation

The system makes use of Temperature sensor for fire detection in car, Vibration sensor to detect any impact force or heavy vibrations, Alcohol sensor to check if driver was drunk, gyro scope sensor to record data if vehicle tilted or turned over during accident and a GPS and GSM modem to send SMS with GPS Coordinates about the incident. This complete system is now powered by an Arduino Mega to operate the system.The system also has 2 Motors used to demonstrate as car engine. We can increase the speed of Motors using Trimpot. As we increase the speed beyond set limit, the system detects over speeding and sends an SMS Message with over speeding alert and GPS coordinates to registered number. The system monitors all sensor data to check for any abnormalities. If the fire sensor detects a fire, the controller operates the interfaced GSM modem to send an SMS to the registered contact number informing about the event and also starts recording data. Similarly, if the vibration sensor detects heavy vibrations, the controller sends SMS to registered number informing about the event to the registered user. Is alcohol sensor is triggered the controller similarly sends an SMS notification with alcohol data and GPS Coordinates on Map link for easy vehicle location tracking.In case of any sensor triggers an abnormal activity the black box starts storing all sensor data on a second by second basis in an SD card so that investigation team may recover the data and study exactly what went on during the accident.

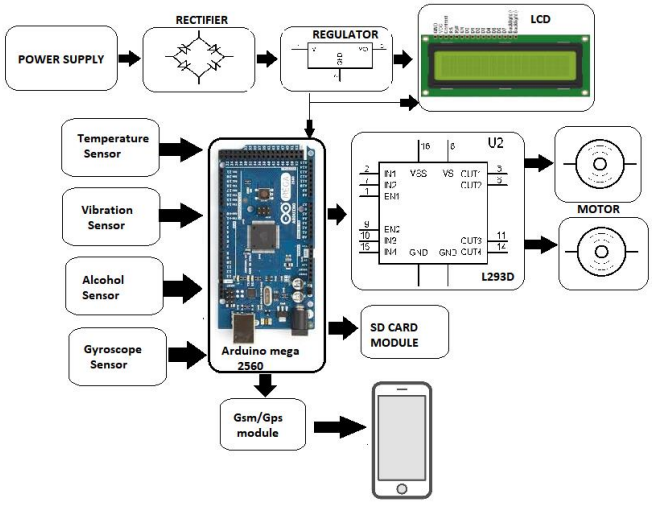

Figure 1: Block Diagram for Proposed System

RESULT AND ANALYSIS

Monitoring of vehicle parameters like engine temperature, speed, and vehicular damage and also monitoring the driver parameters such as pulse rate, alcoholic consumption, and capturing of the driver periodically are done. Pulse sensor is used for monitoring the driver's pulse rate parameter. Authenticating the driver using a fingerprint sensor is also executed. In this investigation, necessary parameters are stored in the Blackbox and also in the cloud and so the data can later be viewed through a platform called IoT cloud data.

Two pages namely the admin and client pages are created in cloud storage which sends Save Our Soul (SOS) messages to nearby hospitals and organizations when an accident occurs.

CONCLUSION AND FUTURE SCOPE

The main goal of our project is to create a working prototype of a universal black box for automotive diagnosis. The prototype can be built using the fewest possible circuits. In order to reduce the death rate, this can help create safer automobiles, monitor the driving abilities of the driver, improve the care for collision victims, assist insurance companies with their vehicle crash investigations, and improve road conditions.

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