WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Survey on Vehicle Blackbox

Anuj Jain[1], Omkar Phadke[2], Advait Chandorkar[3]

1 2 3 Electronics and Telecommunication Engineering Pune Institute of Computer Technology

ABSTRACT

In this fast-paced world, tracking and logging information has become the need of the time. With the introduction of internet in our day-to-day things with the help of IoT, there is a flow of countless data. Also, as the internet is becoming more and more accessible to common man, there is a boom in the smartphone industry with most of the people becoming users of a smartphone. This project aims to bring the live parameters of the vehicle right in the hands of the people with the help of Android Smartphone. The project involves creation of a Blackbox system which will contain ESP32 microcontroller, SIM 800L GSM Module, Thermocouple sensor and other devices like EPROM for storing data which will log the information. This information will then be sent on a remote server using the standard MQTT protocol and a corresponding broker via internet. In case of absence of internet, the data will get stored inside the EEPROM so that it can be uploaded once the internet connection resumes. This uploaded data can then be fetched inside an Android Application. The end user can then view the stats of the vehicle using the admin-user login system. To prevent data loss during extreme situations where the vehicle is damaged, burned or even submerged in water, the Blackbox will be covered by potting Epoxy Material. This will make the Blackbox robust and prevent shutting down even in harsh conditions. This Blackbox will be powered by lithium-ion rechargeable battery. The lithium-ion battery will be recharged from the car battery itself by introduction of a step-down chopper in between to maintain and supply the correct voltage levels to the battery and the rest of the project components.

Keywords - vehicle tracking, monitoring, GPS, microcontroller, GSM.

Introduction

As commercial businesses grow day by day, their need for transportation has increased rapidly too. With increased transportation, it has become the need of the hour to maintain records of the vehicles that carry such goods so that in the situations of any mishaps, the information about the vehicle can be recovered including its latest stats. This project uses ESP32 microcontroller along with SIM 800L module so as logging the vehicle information is possible. We have used a certain degree of hardware in our project to meet the requirements set by the Electronics and Telecommunications department of Pune Institute of Computer Technology. Our project caters to the need of vehicle statistics logging and maintaining that information inside a Blackbox.

Literature Survey

[1] The research article "Implementing Vehicle Black Box System using IoT based approach" published in the IEEE conference proceedings analyses the implementation of a vehicle black box system using an Internet of Things (IoT) based approach. The relevance of gathering and analysing information about accidents and vehicle performance is discussed in relation to the rising demand for vehicle black boxes. The authors suggest an IoT-based strategy that uses sensors to gather information on the operation of the vehicle and send the information to a cloud-based server for archiving and analysis.

[2] In order to reduce the loss of life and property due to vehicle accidents, this research study suggests a prototype for an automobile black box system that may be fitted into cars. The system uses 12 sensors to track several aspects of driving behaviour, including the usage of external sensors like a camera and a Global Positioning System (GPS) to gather video and location information. For later retrieval in the event of an accident, the sensor data is stored on an SD card mounted on a Raspberry Pi controller. Data encryption is used by the system's security module to protect the data saved on the SD card. To get first assistance started as soon as possible, the suggested method uses GPS to transmit a brief message containing the location of the car to a family member, emergency services, and the closest hospital. The report also offers a summary of the system's major parts.

[3] In order to gather data for more accurate accident analysis, the Vehicle Black Box System (VBBS) prototype being developed for installation in any car worldwide is described in the study. The most crucial information required following an accident is listed together with a description of the hardware and software resources devoted to VBBS. The hardware component comprises of in-vehicle sensors and a black box that collects sensor status data and stores it in the EEPROM of the microcontroller. The study also describes the several kinds of sensors utilised in VBBS, such as switches, water sensors, and speed sensors. The system's software component, which presents the user with a streamlined version of the recorded data, is discussed. The relevance of a black box system in creating safer cars, treating collision victims better, and assisting insurance companies with their vehicle crash investigations is finally covered in the report.

[4] The article talks about how important it is to drive safely and introduces a new black box device that can be installed in any kind of car to record what happens in an accident. The concept of intelligent transportation systems (ITS) and safety applications that help prevent accidents or respond appropriately in the case of an accident are explained in the article. The article examines the deployment of safety applications in networks of vehicles with On Board Units (OBUs) and Road Site Units (RSUs). The taxonomy of safety apps is based on communication type, and they are split into two categories: event-based applications, which rely on event recording to gather data and transmit alerts, and communication-based applications, which need a specialised infrastructure made up of OBUs and RSUs. The essay also discusses fundamental safety principles and how VANETs depend on dedicated short-range frequencies (DSR) and the global positioning system because they are latency-sensitive (GPS). The usage of specialised infrastructure or intelligent vehicles is not necessary for the new black box system described in the article.

[5] The design and creation of a "Black Box for vehicles" that can be installed in any vehicle to track the origin, occurrence, and location of accidents are covered in the article. The system includes several sensors, such as RPM, steering touch, and accident sensors. It also has an audio/video recorder that starts recording as soon as the airbags deploy in the case of an accident. When an accident occurs, the system logs the parameters it was tracking at the moment, and it also uses GPS/GSM to send a message to the control centre containing the accident's location. According to the report, this method could enhance driver safety and avoid auto accidents, ultimately lowering the fatality rates from incidents involving transportation.

[6] A prototype black box for vehicles that may be fitted in any vehicle is discussed in the study paper. The black box technology can be crucial to car crash investigations, similar to flight data recorders in aircraft. The prototype offers comprehensive information about the vehicle, including a navigation system that works in tandem with Google Earth and artificial intelligence support through a channel of communication between the user and the vehicle. The report also covers the use of car-to-car communication to assess abruptness in the approaching vehicle prior to a collision. Also covered are the hardware and software resources needed for the black box system. Better crash research, collision data for research, limiting the speed of the car in accident-prone areas, and wireless communication through the transmission of an alert message in the event of a collision along with the time and location coordinates through GSM are all applications of the black box system.

[7] The development of an Arduino-based black box system for vehicles is covered in the article. In the case of an accident, the system is designed to identify incidents and send an alert message to a pre-coded number. The article also emphasises the need for technology to assist stop the loss of life and property due to the rise in traffic accidents around the world. The black box system logs many aspects of driving data and is linked to an open-source cloud. According to the article, the device is installed inside the car, which shortens the time it takes for emergency personnel to reach the scene of the accident. The technology employs a GPS module to locate the accident's position and sends that information to the pre-coded number via message.

[8] The development and application of a digital driving system for a semi-autonomous car that enhances the driver-vehicle interaction and incorporates black box features are discussed in the article. The system converts all control data from analogue to digital format using an ADC and displays it on an LCD using an Arduino-based data acquisition device. It incorporates GPS, GSM, and ESP01 for a variety of functions and utilises embedded networking through CAN for effective data transfer. The black box is physically mounted within the vehicle, connected to a GPS system, and equipped with a number of sensors that measure various data in order to pinpoint the root of any problems. The system also consists of MCP2515 modules for data transfer, and received data is passed by Arduino NANO to I2C LCD. A review of the literature is included in the methodology section of the paper and covers topics like programming an Arduino to accept messages from the CAN bus, simulating and testing an automotive CAN bus, and various hardware and software methods for collecting data from CAN buses. Keywords like "Black Box," "Passengers," "Incident Detection," "Data Parameters," "Micro Controller," etc. are used to summarise the content.

[9] The article suggests a prototype for an Automotive Black Box System that may be fitted in cars to investigate the origin of auto accidents and lessen the loss of life and property. The E-Black Box, wireless black boxes using MEMS accelerometers, and GPS tracking systems are only a few of the works in the field that are reviewed in this study. The method promises to increase security by avoiding tampering with the Black Box data and sending an alert message via Short Message Service (SMS) to a pre-stored mobile number in the event of an accident. The significance of utilising Black Box technology to reduce traffic accidents and enhance public safety is emphasised in the article.

[10] This research study examines an improved black box for cars that can communicate with the driver and provide comprehensive information about the vehicle, including a navigation system that works with Google Earth and artificial intelligence help. In addition to outlining the value of black box technology in automobile crash investigations, this study also introduces a prototype that can be built with the fewest possible circuitry. Together with live analysis through tests, the prototype is also intended to allow car-to-car communication for assessing abruptness in the approaching vehicle before it wants to collision. The paper discusses the hardware and software resources employed by the black box system and its applications, such as better crash research, enhanced driver education programmes, safer road designs, and wireless communication by transmission of alert messages in the event of collisions along with the time and location coordinates through GSM.

[11] The article talks about a black box system for contemporary transportation vehicles that logs information on things like position, fuel level, speed, and engine parameters like temperature and pressure. The system uses measurement, identification, analysis, and reporting as its four data collecting and analysis layers. A pressure sensor, temperature sensor, tachogenerator, fuel tank, and GPS receiver are just a few of the sensors that the first layer uses to gather data. A microcontroller processes the gathered data, which is then entered into a database. Based on the data gathered in the database, the last layer offers feedback. In order to give analysis as feedback to the driver and/or other parties, the system intends to capture information on the technical state of the vehicle and how it was operated.

REFERENCES

[1] S. Sethuraman and S. Santhanalakshmi, "Implementing Vehicle Black Box System by IoT based approach," 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184), Tirunelveli, India, 2020, pp. 390-395, doi: 10.1109/ICOEI48184.2020.9142906.

[2] M. J. Prasad, S. Arundathi, N. Anil, Harshikha and B. S. Kariyappa, "Automobile black box system for accident analysis," 2014 International Conference on Advances in Electronics Computers and Communications, Bangalore, India, 2014, pp. 1-5, doi: 10.1109/ICAECC.2014.7002430.

[3] A. Kassem, R. Jabr, G. Salamouni and Z. K. Maalouf, "Vehicle Black Box System," 2008 2nd Annual IEEE Systems Conference, Montreal, QC, Canada, 2008, pp. 1-6, doi: 10.1109/SYSTEMS.2008.4519050.

[4] E. jaidane, M. Hamdi, T. Aguili and T. -h. Kim, "An infrastructurless vehicle blackbox system," 2018 International Conference on Internet of Things, Embedded Systems and Communications (IINTEC), Hamammet, Tunisia, 2018, pp. 1-5, doi: 10.1109/IINTEC.2018.8695279.

[5] Car Black Box Manish Bhelande, Viraj Chaudhari, Prathamesh Gore, Raj Dhure, Abhishek Bhayye Asst. Professor, Dept. of Information Technology, Shah and Anchor Kutchhi Engineering College, Chembur, India1, Student, Department of Information Technology, International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 3, March 2016

[6] A RESEARCH PAPER ON UPGRADED BLACK BOX FOR AUTOMOBILES Sharvin Pingulkar1, Haroondeep Singh Sandhu2, Jayant. R. Mahajan3 1BE Student, Electronics and Telecommunication Engineering Rajiv Gandhi Institute of Technology, Mumbai 2,3Professor, Electronics and Telecommunication Engineering ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-3, ISSUE-2, 2016 INTERNATIONAL JOURNAL OF CURRENT ENGINEERING AND SCIENTIFIC RESEARCH (IJCESR)

[7] "Vehicles Black Box System Using Arduino ", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.8, Issue 2, page no.1498-1501, February-2021, Available :http://www.jetir.org/papers/JETIR2102178.pdf

[8] Vehicle Black Box Based on Can and IOT Protocol 2 Jayesh Rathod, Sanjana Thakur, Shital Waghotkar , Mala Yadav, Prof. Priyanka Sharma, IJRASET42362, Pub. IJRASET.

[9] Automobile Black Box System for Accident and Crime Analysis Narendra Tallapaneni, Gudapati Krishna Hemanth, K. Venkatesh International Journal of Scientific Research & Engineering Trends Volume 7, Issue 4, July-Aug-2021, ISSN (Online): 2395-566X

[10] A RESEARCH PAPER ON UPGRADED BLACK BOX FOR AUTOMOBILES Sharvin Pingulkar1, Haroondeep Singh Sandhu2, Jayant. R. Mahajan3 1BE Student, Electronics and Telecommunication Engineering Rajiv Gandhi Institute of Technology, Mumbai, ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-3, ISSUE-2, 2016

[11] Rajendra Balsara, Rushikesh Gadhave, Aditya Kanojia, Charansingh Patil, 2015, Black box for Transport Vehicles, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) ICONECT – 2015 (Volume 3 – Issue 06),