A Review: Intelligent Mobility Solution

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Abstract -- For individuals, their families, and nations overall, road traffic accidents result in significant economic losses. These catastrophes result from treatment costs as well as lost productivity for those murdered or incapacitated by their injuries, as well as their families. A system that can send an SMS alert to the vehicle owner or loved ones as soon as any symptoms of an accident or that may cause an accident are recognised has been devised since road traffic accidents cost nations 3% of their GDP. In addition, the system archives all readings that occurred prior to and during the accident so that investigators can investigate the specific causes of the disaster in order to avoid similar incidents in the future. A GPS tracking system is created for unintentional monitoring. As soon as the driver starts the engine, the system starts recording the events of the corresponding car using a black box recorder. Together with GPS, a GSM system is used to send SMS alerts to the family, ambulance, and police. Arduino and a number of sensors are used to do this.

Keywords:-GPS technology, GSM, Car black box, Arduino;

I. INTRODUCTION

Currently, road traffic accidents claim the lives of almost 1.3 million people. There are an additional 20 to 50 million people who suffer non-fatal injuries, many of whom go on to develop disabilities as a result of their physical condition. An increase in the number of automobile accidents is being attributed to drivers' reckless behavior, such as driving while intoxicated or fatigued, etc. Given that, according to investigations, more people die in auto accidents than in airline crashes, a black box for a car is built with logical features. Recording the condition of the car before, during, and after the collision is crucial for a thorough inquiry. Research was done to determine the primary data required for improved accident analysis and characteristics to be taken into consideration in order to determine what kind of sensors should be fitted into the vehicle. The place of the collision, the speed being measured, the condition of the car's brakes, and its engine are the key factors taken into account. Black boxes are a grouping of numerous distinct recording technologies. An "event data recorder" is a car black box. The system makes use of a number of sensors, including GPS and GSM technology, vibration, alcohol, temperature, and gyroscope sensors.

II. LITERATURE SURVEY

Antonio et al. [1], this research uses a Raspberry Pi microprocessor and an Internet of Things module to build and construct a car's black box system. This system was created using the Raspberry Pi microcontroller in conjunction with a number of sensors, such as a GPS, camera, audio, and alcohol sensor module, as well as signals from the electronic control unit. Data storage on a secure digital card and in the cloud were both accomplished using the Wave share SIM7600G-H 4G module. The findings indicate that this embedded system is capable of gathering and analyzing information about GPS, alcohol concentration, speed, temperature, and other characteristics. In order to process the stored files, a graphical user interface was eventually created. Similar to an airplane's black box, which employs a particular algorithm to capture every flying detail, this system records all relevant flight data. As a result, when necessary, authorities can retrieve the recorded flight data.

Sangala et al [2] proposed a vehicle-installable prototype of an Automobile Black Box System. This prototype's minimal circuit design makes it possible to build safer automobiles, treat accident victims better, assist insurance companies in their vehicle collision investigations, and improve road conditions, all of which help lower the death rate. Additionally, it concentrates on keeping track of how you're driving in real time and records and retains the information you're tracking in case there's an accident. Every sensor detail is calculated and kept in memory after the accident has occurred.

Kiranmayee et al. [3], the purpose of this wireless black box project is to develop a vehicle black box system that can be installed in any car anywhere in the globe. A wireless black box is simply a device that

records and displays all of the characteristics of a car crash, including temperature, location, vibration, blood alcohol level, and other factors. The message will be delivered to the registered mobile numbers via the in-car system, and will include emergency contact information for the owner, family, and other parties, as well as police and hospital emergency numbers.at the time of the accident. Sensors come in many different varieties, such as the temperature sensor, which measures temperature. A vibration sensor measures the car's vibrations during an accident. The driver's intoxication level is detected by an alcohol sensor on the steering wheel. In an accident, tilt is indicated via a gyroscope sensor. The project's employment of the GSM and GPS modules aids in the presentation of the results.

Apoorva et al. [4] Event Data Recorder and Evidence Collecting System developed which employs a variety of sensors, GPS, and GSM modules to offer real-time data on the engine temperature, front obstruction, speed, and location of the vehicle, as well as alcohol detection. The controlling or monitoring station will be provided with the data gathered by the ARM7 processor. The processor is connected to a variety of sensors and modules, aiding in information retrieval. This system also collects information in real time, making it easier to assess accidents and address other car-related issues like driver efficiency, vehicle upkeep, and insurance clearance.

Singh and co. [5] Black Boxes are frequently employed in aviation, but with increasing atomization and traffic accidents, they may potentially be used in the automotive industry. The black box is a device that records all the information a car produces, such as its speed, engine temperature, tyre pressure, acceleration, headlight intensity, position, etc. The need to preserve all of this data necessitated using Firebase to store it on the cloud because there was a significant danger of data loss due to an accident. As the gadget should function on terrains like mountains or deserts, the positioning and range of the sensors were taken into consideration. The sensors must be able to endure the varied environmental factors. The other feature consists of maintenance reminders, which are used to inform the user about the status of the vehicle's servicing. This information can then be utilized to increase or defend the resell value. The user will alert Transport Corporation if the car violates a specific limit as part of alerts for parents and vehicle owners.

According to Devi et al. [6], the work given in this study seeks to provide a practical, affordable solution for the design and development of an event data recorder, which has primarily been taken from the aviation industry while taking into account the necessity and the resulting advantages. The paper provides an integrated design of the black box with the fundamental data recorder features that may be very helpful for domestic vehicles. It also contains a number of additional features that could help to reduce the number of accidents, or at the very least, will serve as an analysis tool to prevent future accidents by looking at the past mishaps. The black box also offers an automatic accident notification system that aids in alerting the closest hospital and the traffic authority by supplying not only the accident's coordinates but also the precise address or location for urgent medical assistance, which can save countless lives every day. In addition to many additional features, the black box offers comprehensive online tracking at any time and from any location. By combining such a number of features, the overall cost is thereby greatly optimized.

Keerthi *et al* [7] discussed the problem of road accidents caused by reckless driving and the lack of awareness about these accidents. An intelligent vehicle-tracking system has been created using the Raspberry Pi controller, GSM, and GPS technologies to address this problem. The system uses a number of sensors, including light, temperature, MQ135 alcohol, video recorder, limitations with sensor, GPS, and GSM modems, to detect crashes and warn drivers. The Raspberry Pi controller is equipped with all the necessary connections for the sensors, and an SD card is available for storing and collecting sensor data. In case of an accident, the system sends an SMS to a pre-registered number, and the collected data can be used to investigate the accident and prevent it from happening again. The system also alerts the driver when any sensor records a value beyond a specified limit, such as crossing the lane line, not wearing a seatbelt, or driving too close to other vehicles.

Nawathe *et al* [8] This paper highlights the problem of car accidents and their significant impact on human life, with over a million people dying each year due to these accidents. The solution proposed in this paper is to implement a black box concept in cars as a first step to reduce the rate of accidents. The car black box system is designed to record various information, including alcohol content, car speed, engine temperature, seat belt usage, and exact accident location, using different sensors and GPS data. The recorded data can be transferred to emergency services using a GSM module, which can detect the accident

and send data through GSM. The car black box system is a compact solution for both before and after accident events.

Chavan *et al* [9] this describes the purpose of the paper, which is to improve vehicle safety by using continuous monitoring of the vehicle's performance and the driver's behaviour through the use of IoT. Many sensors, including an alcohol breathalyser and acceleration sensors, provide data to the vehicle's black box system. When the driver's alcohol consumption reaches the maximum limit, the system sends SOS messages to emergency contacts. The report generated by the system describes the cause of the accident and sends alerts or information to the driver using a CAN-based communication protocol. The system is capable of sending alerts or information to the driver to avoid future complications and ensure safety.

Gandhi *et al* [10] this paper provides information about a paper that suggests a black box system for cars that would warn registered mobile numbers when an accident occurred. Due to the inclusion of a GIS component, the black box system also sends the location of the car to registered cell-phone phones in addition to being connected to other sensors to identify vehicle problems. A warning message is furthermore delivered to the closest hospital through the black box system. To an Arduino chip are all the sensors linked.

III.   CONCLUSION

Based on a review of the literature, it has been determined that using a smart vehicle system is an effective way to detect and notify emergency services and family members about accidents by SMS and phone. Ambulance and police services are not offered by the current systems. The voice call functions found in this system are not present in the previous ones, and in addition to offering them, it also notifies the concerned parties of the accident's location. Detection and recording of events using a black box recorder, which is crucial for accident investigations, are tasks that the system conducts simultaneously. Using sensors that monitor the vehicle's status, it carries out these tasks.

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