

Acci- lertsystem



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Abstract—

In India, road accidents are on the rise owing to the increasing number of vehicles on the road, over speeding, rash driving, falling asleep amidst driving, and various other causes. While preventing road accidents is the best solution, it is not feasible. The main reason for the loss of life in road accidents is the delay in alerting the concerned authorities. The time taken for the response team to reach the accident spot increases the chances of mortality. An automatic alert system for a vehicle is proposed-Accident detection and alert (Acci-lert) system; the main objective of this proposed idea is to detect car accidents and provide a communication system via SMS and web application which will inform nearest Hospitals and Police, as well as the relatives about the driver's condition a long with the location of the accident. In case of minor accidents, there is also a set which when pressed within 30 seconds revokes the alert system. In addition to this, the proposed system permits engine ignition only after putting on a seat belt, thus ensuring the safety of the traveler's right from the start of the journey.

Keywords—Road safety, Acci-lert, Victim Analysis, Camera, GPS, GSM, Web Application

INTRODUCTION

The development of a transportation system has been the generative power for human beings to have the highest civilization. Automobiles have great importance in our daily life. We utilize it to travel to our workplace, keep in touch with our friends and family, and deliver our goods but it also can bring disaster to us and even can kill us through accidents. Despite many efforts taken by different governmental and non-governmental organizations all around the world to make citizens aware about careless driving, accidents are taking place now and then. India recorded 3,74,397 accidental deaths in 2020 with road crashes constituting over 35 percent of such fatalities, according to government data. The rate of 'accidental deaths' per lakh population stood at 27.7 in 2020. A jump of 10% is witnessed where the number of fatal road accidents rose from 347 in 2020 to 389 in 2021. In 2020, due to fatal road accidents 375 people were killed and 409 people died because of timely inadequate medical attention. One of the prime reasons for the spike in numbers is due to heavy traffic volume owing to relaxation of lockdown restrictions. In the second half of the year, the overall mobility increased as business started to function; 50 percent staff back to office were called back to office; and schools and colleges opened up. In the speedy-moving world, no one is ready to look at what is passing around them. Indeed when an accident occurs nothing cares about it. Still, numerous lives could be saved if the emergency service could get the crash information in time. Similarly, effective automatic accident discovery with automatic announcement to the emergency service with the accident position is a high need to save precious mortal life.

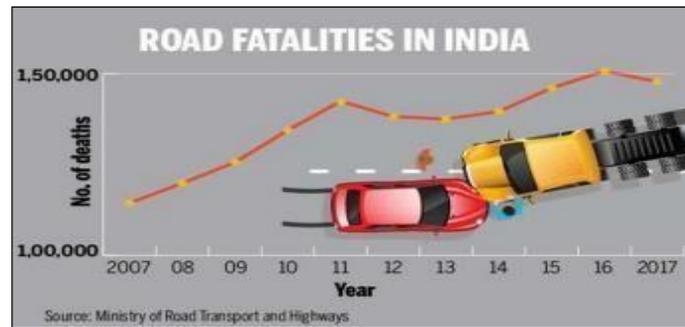


Fig1.FrequencyofRoadAccidents

LITERATURE SURVEY

The rapid increase in technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards. Therefore, road accidents frequently happen which cause loss of life and property due to the unavailability of emergency facilities at the proper time and place. When an accident occurs, the Micro Electro-Mechanical System (MEMS) sensor will detect the signal. Arduino will analyze the signal. It sends an alert message through the GSM Module, with the location to the police control room or a rescue team. So, the police can immediately trace the location through the GPS Module, after receiving the information. Then after confirming the current location necessary action will be taken. But, it has some disadvantages: not applicable at remote places where the network is poor, severity of accidents cannot be identified and MEMS sensors are expensive [1]. The linked accelerometer inside the automobile senses the tilt of the automobile. This seriousness of the accident is detected via a coronary heart beats sensor that is located inside the user's body. Thus the system will make the decision and deliver the statistics to the smart phone, through the Bluetooth connected to the accelerometer and heart beat sensor. The Android software program in the smart phone will deliver text messages to the nearest medical center and friends. The software program moreover shares the precise vicinity of the accident location which will save time. The pendulous accelerometer has basic performance but unfortunately is especially large [2].

Despite the efforts in prevention, car accidents are however one of the critical reasons of death. Thus, to avoid casualties, help and assistance have to be acquired from medical team as fast as possible. This can be enabled by rapidly detecting the accidents and reporting them to the related legit units. To serve this purpose, an accident detection device is proposed which makes use of an Inertial Measurement Unit (IMU) and a 3G mobile module. The detection approach combines both IMU sensory data and odometry to detect an accident and then deliver the location coordinate over a mobile network to be reported on a map. The preliminary result based on test conditions proves the practicality of the approach with notable detection rates. The drawbacks of the tool are insufficient detection algorithm, high-pace turns and sudden braking that may falsely trigger the detection, low-cost IMU sensor are prone to noise [3].

The device includes an onboard unit (OBU) for detecting accidents. The notification of the detected accidents is made either via vehicle and the roadside infrastructure (V2I) or among vehicles (V2V) communication. The destination of the information is an external control unit (CU) that will handle the warning notification, estimating the severity of the accident and communicating the incident to the appropriate emergency services. But, this system must be incorporated into the vehicles by manufacturers. Also, since the functionality of the system relies on internet, it is prone to hacking that is hackers can access and control the vehicle [4].

PROPOSED METHODOLOGY

The accident detection and alert (Acci-Alert) system includes Temperature sensor (DS18B20), Accelerometer Sensor (MPU6050), BPM sensor, LCD display (LM016L), GPS module (NEO-6M), GSM module (SIM800L), Vibration Sensor, Reed switch, Button and buzzer [Fig 7].

The fundamental controller used is Arduino Mega and all of the sensors are interfaced to it. GSM module is used to send notification through SMS. Web application is used to visualize and examine the victim's physiological parameters that is incorporated to the hardware by the use of Node MCU (ESP8266). Cameras are located at the front and rear ends of the car to get live video stream, to analyze the accident. So, if there's any abnormality in the vibration sensor parameters it may be detected as an accident and an alert will be sent, if the reset button is not being pressed within 30 seconds. By understanding the severity of the accident and time it takes for the affected person to reach the hospital, facilities may be reserved for the incoming affected person in advance. The real-time vicinity allows the hospital to understand the condition of the affected.

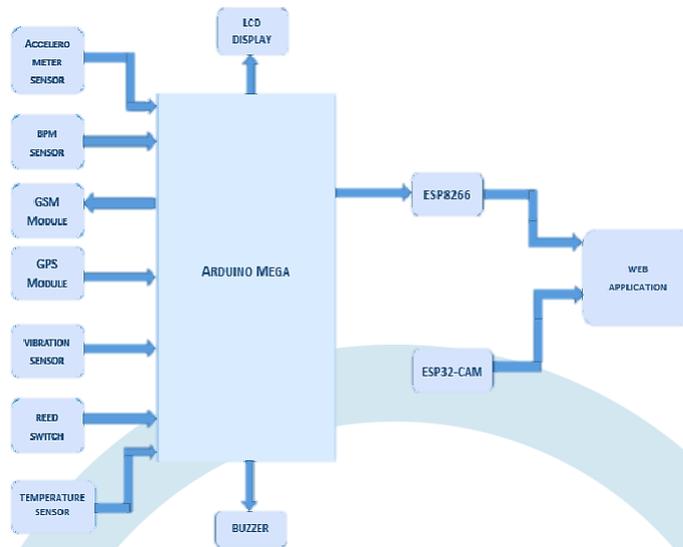


Fig2.BlockDiagram

WORKING

A. SeatBeltCheck

Initially checks whether the driver has put on his/her seat belt [Fig 4]. The driver can start the car only if the seat belt is buckled and an alarm sound is generated until done.

B. AccidentDetection

When an accident occurs in a city, vibration sensors will be activated as they are placed at certain positions similar to the airbag sensor location. A reset button is provided which can be pressed within 30 seconds of the collision/accident to stop the alert system if it is not severe [Fig 5].

If the reset button is not pressed, then a message is sent automatically to the registered mobile numbers through the GSM module and also sends the same to a server using MQTT protocol, immediately after 30 seconds.

C. AccidentAlert

The physiological parameters are measured with biomedical sensors which also include a coma stage status module to detect the driver's movement. The collected information is sent to the emergency care centers via SMS and web application. ESP32 camera is also incorporated at the front and rear ends of the car to analyze the accident. When the accident occurs, the information is transferred to the registered number through the GSM module. The GPS system will help in finding the location of the accident spot. In SMS, message that an accident is detected along with location is sent to emergency care centres, friends, relatives; while in web application detailed information about the accident is sent (along with live stream) to hospitals and police [Fig 6]



PRESENTATION OF DATA

The safety of four –wheelers and immediate assistance to accident victims to reduce the number of road fatalities is the main idea of the proposed system. Therefore, the proposed prototype utilizes the three-modules, namely (1) Seat Belt Check (2) Accident Detection (3) Accident Alert system. The system is implemented using a combination of hardware and software. The vibration sensor is placed at certain positions of the vehicle in proximity to airbag sensors to detect an accident when above a certain threshold value. The data collected by biomedical sensors (temperature, BPM, coma status) from the victim's body and location (latitude, longitude) from GPS is displayed in serial monitor of Arduino Mega. Fig 3 shows the flowchart. This processed data is sent to the ESP8266 module which is then sent to the website using MQTT protocol. The web applications a login-based system; accessing it requires an username and password. The details are displayed in tabular format in the commit accidents tab and on clicking 'check' for a particular accident it leads to accident check page with the victim's parameters to all hospitals with commit button. The hospital nearest to the patient accept the patient and then the data of the victims available only to that hospital.

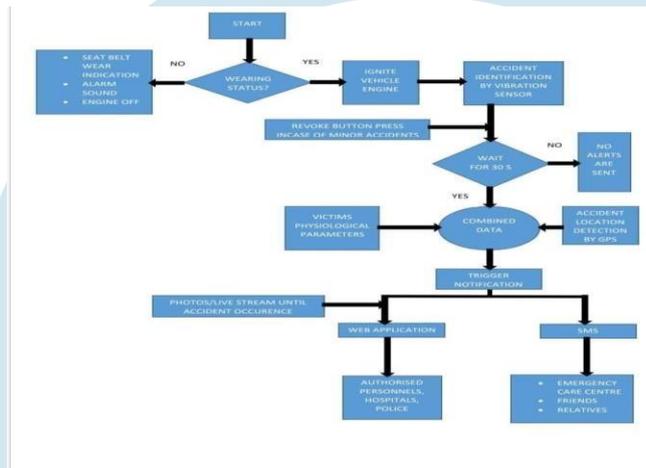


Fig3.Flowchart of the system

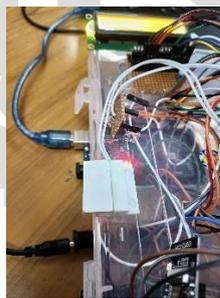
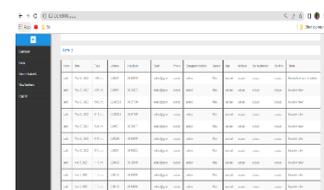
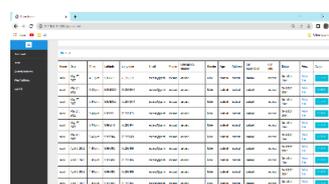
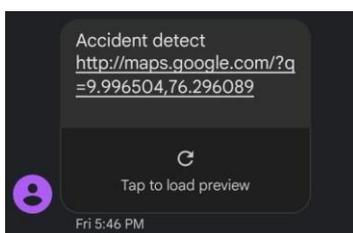


Fig4.Seat belt check

Fig5.The LCD display indications of various operations of the system



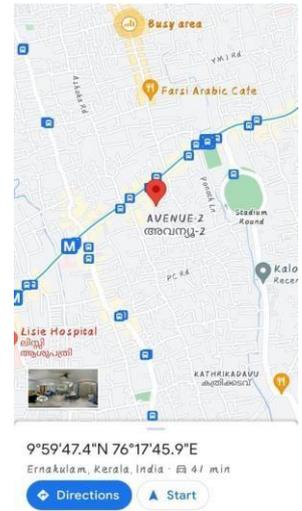
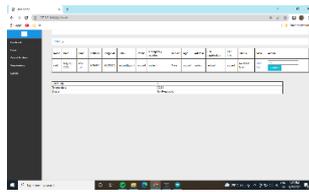


Fig6. Photograph of messages sent, location of accident, WebPages

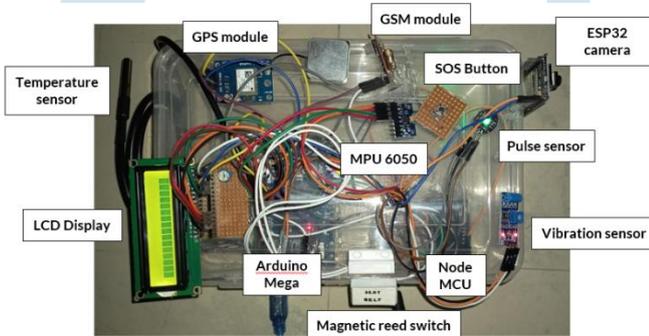


Fig7. Acci-lert system

CONCLUSION AND FUTURE SCOPE

The proposed work is the prototype which has delivered reliable results of accident identification, location and physio logical parameters monitoring and transmission. The entire works should be incorporated with the car to validate its functionality and reliability. Thus this prototype will reduce the accident death ratio by a considerable amount even in rural roads/unpopulated areas. So, the emergency care centers will be able to serve the patients with better efficiency and they can have critical first aid kits which should be delivered collectively with the m to the accident spot.

The proposed prototype of accident identification system can be advanced as per the requirements of the users; validation has to be finished with the help of automobile industries and the specialists in the relevant area. Thus this prototype ensures the reduction of fatalities within countries like India and moreover has a greater importance in daily life. As future scope, all the modules are to be incorporated within the automobiles for better performance.

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