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Comprehensive Study on IOT Based Accident Detection Systems for Smart Vehicle

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ABSTRACT: With population growth, the demand for vehicles has increased tremendously, which has created an alarming situation in terms of traffic hazards and road accidents. The road accidents percentage is growing exponentially and so are the fatalities caused due to accidents. However, the primary cause of the increased rate of fatalities is due to the delay in emergency services. Many lives could be saved with efficient rescue services. The delay happens due to traffic congestion or unstable communication to the medical units. The implementation of automatic road accident detection systems to provide timely aid is crucial. Many solutions have been proposed in the literature for automatic accident detection. The techniques include crash prediction using smartphones, vehicular ad-hoc networks, GPS/GSM based systems, and various machine learning techniques. With such high rates of deaths associated with road accidents, road safety is the most critical sector that demands significant exploration. In this paper, we present a critical analysis of various existing methodologies used for predicting and preventing road accidents, highlighting their strengths, limitations, and challenges that need to be addressed to ensure road safety and save valuable lives.

KEYWORDS: Accident detection, smart modules, research, CNN, Evolutionary many-objective optimization, evolutionary multi-objective optimization (EMO).

I. INTRODUCTION

1.1 OVERVIEW

Due to rapid growth of world population, the demand for vehicles has increased tremendously, resultantly problems of traffic congestion and road accidents has also increased. The general population's life is under high risk, if any accident occurs there's a long reaction time which increments the number of deaths, therefore an automatic accident detection system must exist to overcome this situation. There can be multiple causes of road accidents, some of them are, driver negligence due to drowsiness, driving while intoxicated over speeding etc. Some studies show that weather conditions can also contribute towards the severity of an accident such as fog, rain, high winds. High winds can directly influence the vehicle which may deviate the vehicle from road, or indirectly due to obstruction dangers present on the roads such as trees, walls etc. Road crashes can be seen as a collision between any on road vehicles, obstacles or pedestrians. The survival rate of victim is highly reliant on how long an ambulance takes to reach the site of the accident and then carry the patient to the hospital. In most cases of road accidents, the injuries are not severe and the life of the victim can be rescued, however due to late arrival of the rescue teams, the injuries turn deadly.

1.1.1 Motivation

The consequences of road accidents are not just constrained to the loss of human lives yet, also incorporate the destruction of property, traffic blockages, and immense economic loss. Thus, automatic accident detection systems are the need of time, which can speed up the rescue operations and limit the casualties after the mishap and numerous lives can be saved. This paper features existing mechanisms to

detect accidents, its working, and limitations. Furthermore, accident prevention methodologies, accident contributing factors are highlighted as well. This study critically reviews existing literature on accident detection and prevention techniques, with the objective that smart systems can be developed with improved accuracy and better strategies to control accident-causing factors while watching out SAE Department of Computer Engineering 2021 3 for the existing challenges in the current systems.

1.1.2 Objective

- 1. Immediate information will be send to relatives of accident victim.
- 2. Immediate help will be send to the accident location through SMS.
- 3. Complete coordinates of accident location will be provided to nearby ambulance.

II. LITERATURE SURVEY

1.Paper Name: 1.An IOT Based Smart System for Accident Prevention and Detection Author: Samita khairnar,sayanee nanda Abstract :- : Nowadays, the number of accidents has increased rapidly. About 17 accidents take place every hour. Bike accidents constitute a major chunk of all accidents; this is because two-wheelers do not have as many safety parameters which are included in four-wheelers. Reasons causing it can be due to not wearing a helmet, feeling drowsy while driving, alcohol consumption, two vehicles coming into closer proximity without both drivers' notice, breaking of traffic signals, driving without a valid or no driving license, careless driving, unintended triggering of the acceleration pedal, etc. The main objective of this paper is to propose a system which can effectively help in preventing any kind of mishaps and if such conditions occur then how it detects and informs the concerned authorities and people, so that the situation can be taken care of immediately.

2.Paper Name:- Vehicle Collision Detection and Avoidance with Pollution Monitoring System Using IoT Author: Mahesh A.Rakhonde,S.A.Khoje Abstract : The increase in population leads to increment in pollution and accident as well. Technological development makes great efforts to detect the accident and monitor the increasing pollution. This paper is based on enhancement in the smart vehicle system. Different units implemented in this paper which enhance the vehicular system. The main objective is to detect accidents in real time and minimize the response time of medical help. For accident avoidance, tire pressure is measured whereas in accident detection is implemented with the help of node MCU. MQ7 is used in order to monitor the pollution. The proposed system is useful in reducing the vehicular accidents and pollution monitoring will help to know the environmental status.

3.Paper Name: IoT based framework for Vehicle Over-speed detection Author: Mohammad Ahmar Khan,Sarfraz Favaz khan abstract : Automatic vehicle monitoring has turned out to be a very crucial scenario in the current years. It may develop into possibility by executing the following technologies. This project targets to propose a system, which detects speeding vehicles over a specific speed limit and immediately report to concerned authorities. At present, road accidents rates have raised so, there is a necessity for developing a system that detects an over speeding vehicle. The implementation of present Smart Vehicle Overspeeding Detector using Internet of Things determines all the road traffic information automatically with intelligence. The smart vehicles are suitable with overspeeding detector that has capability for recording, storing and information sharing about the vehicle's speed. The system contains GPS module, Radar, Google maps and IoT module.

4.Paper Name: An Internet of Things(IoT) based smart helmet for accident detection and notification Author::-sneha chandrashekar abstract : The objective of the smart helmet is to provide a means and apparatus for detecting and reporting accidents. Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilised for building the system. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud based service. The vehicle location is obtained by making use of the global positioning system. The system promises a reliable and quick delivery of information relating to the accident in real time and is appropriately named Konnect. Thus, by making use of the ubiquitous connectivity which is a salient feature for the smart cities, a smart helmet for accident detection is built.

5.Paper Name: An IoT-Based Vehicle Accident Detection and Classification System Using Sensor Fusion Author: Nikhil kumar,devya lohani Abstract: Road accidents are a leading cause of death and disability among youth. Contemporary research on accident detection systems is focused on either decreasing the reporting time or improving

the accuracy of accident detection. Internet-ofThings (IoT) platforms have been utilized considerably in recent times to reduce the time required for rescue after an accident. This work presents an IoT-based automotive accident detection and classification (ADC) system, which uses the fusion of smartphone’s built-in and connected sensors not only to detect but also to report the type of accident. This novel technique improves the rescue efficacy of various emergency services, such as emergency medical services (EMSs), fire stations, towing services, etc., as knowledge about the type of accident is extremely valuable in planning and executing rescue and relief operations. The emergency assistance providers can better equip themselves according to the situation after making an inference about the injuries sustained by the victims and the damage to the vehicle. In this work, three machine learning models based on Naïve Bayes (NB), Gaussian mixture model (GMM), and decision tree (DT) techniques are compared to identify the best ADC model. Five physical parameters related to vehicle movement, i.e., speed, absolute linear acceleration (ALA), change-in-altitude, pitch, and roll, have been used to train and test each candidate ADC model to identify the correct class of accident among collision, rollover, falloff, and no accident. NB-based ADC model is found to be highly accurate with 0.95 mean F1-score.

6.paper Name: Real Time Safety Alert System for Car Author: Himanshu Arora, Samyak Jain, Sanket Anand, Dharmveer Abstract: —Driver’s lethargy is one of the main causes of car accidents nowadays. We have discussed fatigue, object detection in hand, head pose estimation and siesta detection. This paper is focused on extracting and analyzing the various factors to alert the driver while driving the car. We have implemented real time face detection by using CNN. We have used light forbearance model as it will be easy to implement in real time situation. Eye tiredness by calculating percentage of eyelid closure over t h e pupil (PERCLOS), object detection in hand by tensor flow. Object is detected when the driver uses mobile phone and/or holds substance abuse material while driving. Mouth geometric movement detection is implemented by Deep Neural Network. This aims to reduce road accidents and the loss of life. In every 25 second a person dies in road accidents. We have proposed a method to reduce accidents by implementing certain factors. This will alert us whether or not the driver is in the proper condition for driving.

III. PROBLEM STATEMENT

We have observed that in many severe accident cases immediate help is not send which leads to death of victims; in some cases, the family members of victims are informed after a long period of time; and in some rare cases the identity of victims remain unknown. This problem is usually faced with two-wheeler vehicle where safety measures are not included yet whereas in 4-wheeler vehicle there are certain safety measures like airbags, emergency breaks, etc, hence, there is requirement for immediate help for two-wheeler vehicle.

IV. SYSTEM ARCHITECTURE

In our proposed system we use CNN algorithm for the accurate result.

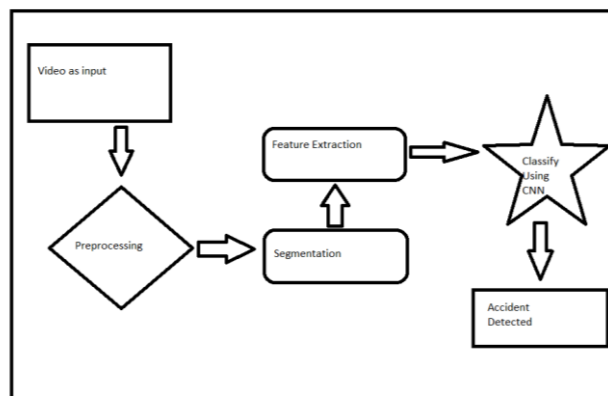


FIGURE 1: ARCHITECTURE OF PROPOSED SYSTEM

Module

- Admin

- In this module, the Admin has to log in by using valid user name and password. After login successful he can do some operations such as View All Users and Authorize, View All E-Commerce Website and Authorize, View All Products and Reviews, View All Products Early Reviews, View All Keyword Search Details, View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

- View and Authorize Users

- In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

- View Charts Results

- View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

- Ecommerce User

- In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password Once Login is successful user will do some operations like Add Products, View All Products with reviews, View All Early Product's reviews, View All Purchased Transactions.

V. RESULT

Pre-processing :

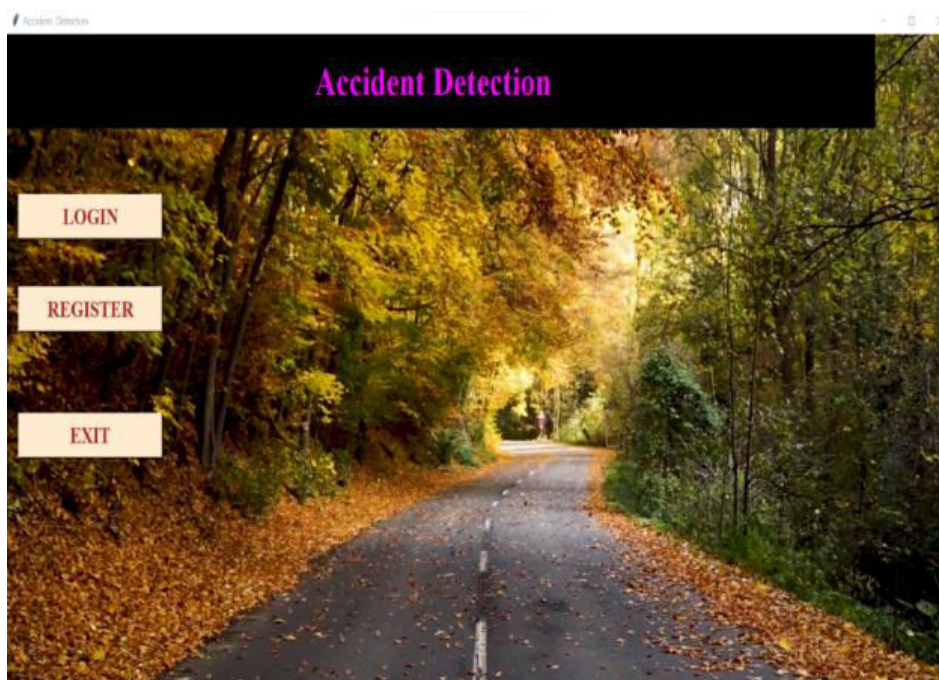


Fig : First Page

A screenshot of a web browser window titled "REGISTRATION FORM". The page has a dark blue background with a glowing "REGISTER" watermark. The form contains the following fields: Full Name, Address, E-mail, Phone number (with a "0" in the first input), Gender (with radio buttons for Male and Female), Age (with a "0" in the first input), User Name, Password, and Confirm Password. A red "Register" button is at the bottom.

Fig : Registration Form

A screenshot of a web browser window titled "Login Form". The page has a solid blue background. It features a "Login Here" button at the top, followed by input fields for "User Name" and "Password". A red "Login Now" button is at the bottom.

Fig : Login Form

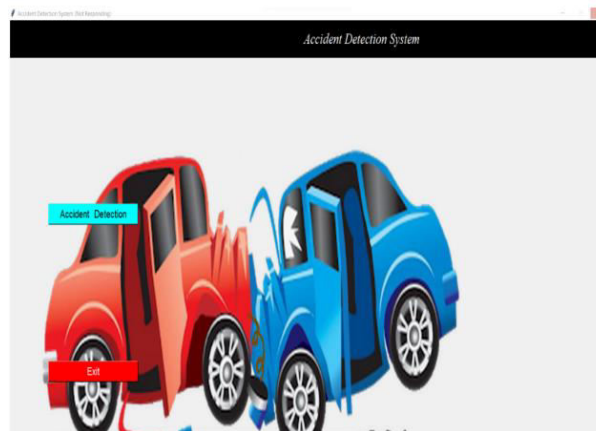


Fig : Output

VI. CONCLUSION

A system to process real-time CCTV footage to detect any Anomaly activity will help to create better security and less human intervention. Great strides have been made in the field of human anomaly Activity, which enables us to better serve the myriad applications that are possible with it. Moreover, research in related fields such as Activity Tracking can greatly enhance its productive utilization in several fields.

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