ISSN 2395-1621

A SURVEY ON DRIVER DROWSINESS AND ALCOHOL DETECTION USING IOT AND MACHINE LEARNING

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ABSTRACT

Driver drowsiness detection is a key technology that can prevent disastrous car accidents caused by drowsiness of the driver. Determining the sleepiness and alcohol taken by the driver is one of the definite ways of mapping driver fatigue. This project uses an existing prototype of the drowsiness detection system and an alcohol detection system. This mechanism examines the eyes of the driver and triggers an alarm when he/she is drowsy. Driver exhaustion often becomes a direct cause of many traffic accidents. Therefore, there it is essential to implement the systems that will examine and notify a driver of her/him the bad psycho-physiological situation, which could significantly reduce the number of fatigue-related car accidents. One of the technical probability to implement driver drowsiness detection systems is to use the vision-based approach. This report exhibits the driver sleepiness and alcohol detection system. This system acquires the face, but mainly focuses on the eyes of the driver and detects the drowsiness. Using machine learning the system detects and examines drowsiness and after detection, if the driver found sleepy the system triggers an alarm. This system senses the alcohol using MQ3 sensor.

Keywords: Alcohol Identification, Drowsiness Identification, Computer Vision, Machine Learning, IoT

ARTICLE INFO

Article History

Received: 5th March 2020

Received in revised form :

5th March 2020

Accepted: 9th March 2020

Published online :

12th March 2020

I. INTRODUCTION

The number of motor vehicles and cars in developing countries has been gradually raised over the ten years. Official investigation reports of traffic accidents point out that dangerous driving behavior, such as drunk and drowsy driving, accounts for a high proportion of accidents. Therefore, the real-time monitoring of the driver status and consequential feedback need to be integrated to further improve the safety car systems. Everyday road accidents are that dangerous driving behavior, such as drunk and drowsy driving, accounts for a high proportion of accidents. Therefore, the real-time monitoring of the driver status and consequential feedback need to be integrated to further improve the safety car systems. Everyday road accidents are happening all over the world according to the statistics (20–40) a percentage of road accidents are happening due to drunk & driving and rash driving[1] and another important cause of the accident is Drowsiness, often also called "fatigue" or "sleepiness". Drowsiness can be defined as the neuro-biological need for sleep, while fatigue is related with physical labor; although the intension of fatigue and sleepiness may be different, their effects on driving performance are very similar. If the driver drunk or he may felt sleepy means he/she will be unconscious they will not able to train themselves in that condition if they drive the car means it can affect them and others also. Some of the drivers will be over velocity after they are drunk. There are dissimilar modules to prevent these road accidents. Our system consists of two detection system that is Drowsiness and Alcohol detection system. In this system eye blink sensors and alcohol detection sensors are used. The eye blink sensors are used in the steering wheel of the car it will check the motion of the eyeball of the driver while he/she driving the car whether a driver is sleepy or not [3]. By detecting signs of drowsiness warning messages is send to the driver as well to the RTO office, local police and to his

relatives as well can prevent road accidents and thus save lives. In Alcohol Detection system, alcohol detecting sensors are fixed in the steering of the car so that it can detect the driver is devour alcohol or not, if the driver consumes the alcohol means it will send the SMS to the relatives of the driver and it will also send the SMS to the local police as well fine will be charged against driver. This process is happening through Computer Vision and IoT [11].

II. LITERATURE SURVEY

1] In Design of Smart Helmet for Accident Avoidance they design a smart helmet in order to detect the Accidents as well alcohol detection and also it verifies two important criteria before bike starts. First, it check whether the user is using a helmet and not just keeping it. It can be sensed by using the IR sensor. Second, there must be no alcoholic substance present in user's breath. It can be noticed by using gas sensor. It is placed in the helmet. When the person is highly consumed the alcohol, the gas sensor will sense the riders breathe to detect the amount of alcohol content. Third, when a person meets with an accident, If the accident is major then the sensor will identify the bike's condition and the person's location will be sent to nearby hospitals through GPS to the main server of the hospital. If the accident is minor, there is a button present in the bike should be pressed by the person. This intimates that the person is not injured, and the bike will start. The helmet can identify an accident, utilizing the locally available vibration sensor. A locally available gas sensor additionally examines the breath of the rider to distinguish if the present level is over the estimate limit. MEMEs sensor is use to avoid rash driving. It detects the motion of the handle and it is based on the handle bar control of the vehicle. System is precise in recognizing accidents by using the vibration, load monitoring, MEMEs and high alcohol consumption [1].

2] In Computer Vision based drowsiness detection for motorized vehicles with Web Push Notifications proposes a Computer Vision-based drowsiness system for motorized vehicles with Web Push Notifications to notify the driver before any accident occurs. In this paper a real-time video system captures the face of the driver and a pre-trained machine learning model detects the eye boundaries from that real-time video stream.
Then each eye is represented by 6 – coordinates (x,y) starting from the left corner of the eye and then working clockwise around the eye. The EAR or the Eye Aspect Ratio is used to detect a closed eye state and then the buzzer and a Web Push notification is used to alert the user. The EAR (Ear Aspect Ratio) is calculated for 20 consecutive frames, which if less than a threshold sounds an alarm and sends an alert on your mobile device through a Web Push Notification. The alert when opened also shows some coffee shops near the driver's location to increase the driver's alertness [2].

3] In An Arduino based Embedded System in Passenger Car for Road Safety they buid an Arduino based embedded system which makes the passenger's journey even safer and more secure by Vehicle Speed Control in school Zone and also controlling the speed of the vehicle in different zones such as bridges, highways, cities and suburbs. It also includes Horn Control of Vehicle in No Honking ZoneControl horn disturbances in horn prohibited zones such as hospitals, public libraries, courts, schools and Alcohol detection to detect drunken driving. In this paper they tackles some major causes of road accidents such as breaking traffic signals and drunken driving. For alcohol detection they use MQ3 Alcohol sensor and this alcohol sensor is suitable for detecting alcohol concentration on your breath, same as your common breathalyzer. It has a high sensitivity and fast response time Sensor provides an analog resistive output based on alcohol concentration [3].

4] In A Survey on State-of-the-Art Drowsiness Detection Techniques classify the existing techniques into three categories: behavioral, vehicular, and physiological parameters-based techniques and top supervised learning techniques used for drowsiness detection are reviewed also the pros and cons and comparative study of the diverse method. The Driver Drowsiness detection system continuously monitors the drivers' physical behavior, vehicular movement pattern or environmental conditions based on the technique being used.
Drowsiness detection methods are generally classified into three main categories: 1) Behavioral parameter-based techniques. 2) Vehicular parameters-based techniques. 3) Physiological parameters-based techniques [4].

5] In Driver Drowsiness Detection System Based on Visual Features paper they has solved the existing systems problem of less accurate result due to low clarity in images and vedios. They proposed a driver drowsiness detection system which makes use of eye blink counts for detecting the drowsiness. Specifically, the proposed framework, continuously analyzes the eye movement of the driver and alerts the driver by activating the vibrator when he/she is drowsy. When the eyes are detected closed for too long time, a vibrator signal is generated to warn the driver. The experimental results of the proposed system, which is implemented on Open CV and Raspberry Pi environment with a single camera view, illustrate the good performance of the system in terms of accurate drowsiness detection results and thereby reduces the road accidents propose a novel drowsiness detection algorithm using a camera near the dashboard [5].

6] In Design of a Vehicle Driver Drowsiness Detection System through Image Processing using MATLAB they implemented a drowsiness detection system which extract the essential features of the driver through image processing using MATLAB to determine the drowsiness level. The system controls the state of drowsiness of the driver through webcam with night vision to track the driver in real time and when drowsiness is detected the warning message is send. As this system uses MATLAB for image processing but MATLAB is slow and less responsive it works on laptop which also makes it unreliable for use in real environment [6].

7] In Real-time Drowsiness Detection Algorithm for Driver State Monitoring Systems they proposed an algorithm for

Drowsiness detection. Firstly, the face will be detected in the image which is captured through camera and various landmarks are estimated on the face region. The algorithm uses the Ada Boost Classifier based on Modified Census Transformed feature for detection of face and uses regressing Local Binary Features for face landmark detection. In this system, MCT Ada Boost classifier algorithm is used which sometimes lead to low margin and over fitting [7].

8] In Combined EEG-Gyroscope-tDCS Brain Machine Interface System for Early Management of Driver Drowsiness they developed a system named as Brain Machine Interface it is similar to smart watch which displays the levels level 0,level 1 and level 2 for drowsiness. When the drowsiness is detected at level 0 gently warning message is given at level 1 little bit high warning message is given and at level 2 highly warns. These system was able to improve the driver's alertness if he/she was becoming drowsy but could not stop the progression of drowsiness[8].

9] In AlcoWear : Detecting Blood Alcohol Levels from Wearables they implemented a Alcowear system that uses a drinker's smart phone and smart watch to passively sense their intoxication level from their gait i.e walk for alcohol detection. AlcoWear infers the drinker's BAC level by classifying accelerometer and gyroscope sensor features gathered from their smart phone and smart watch simultaneously using a machine learning approach[9].

III. PROBLEM STATEMENT

The rising accident percentage gradually is a major problem in every country. This usually happens when a driver has not slept enough, however, it can also happen due to untreated sleep disorders, medications, alcohol inhalation, shift work or long late-night drives, so most accidents will happen. So we develop the system to diminish the above issue using the contradictory sensors, to overcome this problem.

IV. PROPOSED SYSTEM

There are several algorithms and methods are used for eye tracking and monitoring. Most of them in some ways related to the characteristics of the eye within a video image of the driver. In this project, we are using the retinal reflection as a method for identifying eyes on the face, and then using the lack of this reflection as a method of detecting when eyes are closed. Using this algorithm on continuous video frames may help in calculating the eye closure duration. The eye closure duration for drowsy drives is more than the normal blinking. If the eye closure duration is more than the assign threshold than it would result in a serious impact. If Drivers eyes are closed or drowsiness is detected than system will alert the driver.

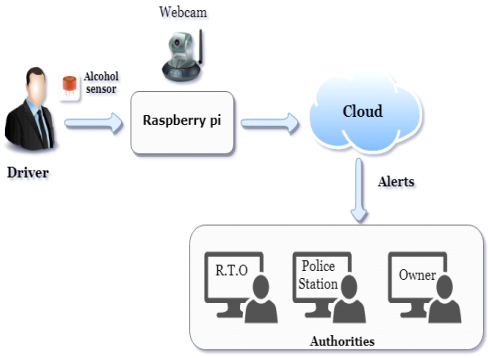

Fig 1. Architecture Diagram

In the Drowsiness detection system we are using Eye detection algorithm for image processing. In Eye detection algorithm some tasks are performed on the human face to get the proper image for further processing. In this algorithm First, the image of the driver is captured, and the color compensation is performed in which the image is converted too grayscale to detect the face of driver. After face detection edges are identified from the image and from face portion edges of eyes are identified. This algorithm mainly focuses on the drivers eye and by applying training dataset it identified that the driver is drowsy or not? In alcohol detection system MQ3 sensor is used to detect whether the person is drunk or not? If alcohol is detected then the system will notify a police station, owner and RTO for a fine alert.

V. METHODOLOGY

Eye's Detection Algorithm: Eye state analysis is an essential step in tiredness detection. An algorithm that analyzes the state of the eye and mouth by extracting essential features is proposed. First, the face area is identified in the convict image database. Then, the eyes are evaluated by an Eye Map algorithm through a clustering method to evoke the scleroses-fitting eye contour and calculate the contour aspect ratio. Also, an effective algorithm is proposed to solve the problem of curve fitting when the human eye is affected by strabismus. Meanwhile, the value of chromatisms is defined in the RGB space, and the mouth is correctly located through lip segmentation. Based on the color contrast of the lip, skin, and internal mouth, the internal mouth contour can be fitted to analyze the opening state of mouth; at the same time, another unique and effective yawning discrimination mechanism is considered to determine whether the driver is tired.

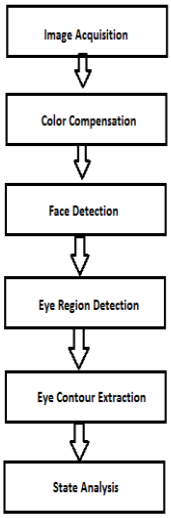

Fig.2. Eye's Detection Algorithm

VI. ADVANTAGES

[1] Recognition of drowsiness and alcohol consumption of the driver.

[2] Safe driving: There are many accidents in which the driver often loses his precious life due to the inhalation of alcohol.

[3] Prevention of breaking traffic rules: A person under the influence of alcohol doesn't have control over his actions as an effect, he/she violates the traffic guidelines which can prove to be fatal.

[4] Send the address of the car to the Owner, RTO, and Police Station.

VII. APPLICATIONS

[1] Indian Railway

[2] Smart Cities.

[3] Long Distance driving (Travels, goods vehicle, transportation vehicle).

[4] This project can be used in every vehicle currently on road to ensure the safety and reduce the possibilities of an accident due to drowsiness and alcohol inhalation of driver.

VIII. CONCLUSION

This paper talks about a Machine learning and IOT based approach to detect drowsiness and alcohol consumed by driver to prevent accidents. Raspberry Pi Controller with Camera Interface and Audio-Video support is used for detecting drowsiness and alcohol inhalation of driver. A buzzer is used to alert the driver if he or she is drowsy. An MQ3 sensor is used to determine the driver is drunk or not. If alcohol inhalation is detected data would send to Police Station, Owner as well as RTO office. Then RTO sends an appropriate fine message to the owner.

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