

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 fatal car accidents caused by drowsiness of driver. Detecting the drowsiness and alcohol taken by the driver is one of the surest ways of measuring driver fatigue. This project uses existing prototype of drowsiness detection system and alcohol detection system. This system captures and examines the eyes of the driver and triggers an alarm when he/she is drowsy. The priority is on improving the protection of the driver. Driver fatigues one the main reason of many traffic accidents. Therefore there is a requirement to make the systems that will detect and notify a driver of her/him bad psycho-physiological condition, which could significantly reduce the number of fatigue-related car accidents. One of the technical possibilities to develop or implement driver drowsiness detection systems is to use the vision-based approach. This report presents the currently used driver drowsiness detection systems and alcohol detection system. This system captures the human face, but mainly focuses on eyes of the driver and detects the drowsiness. Using machine learning the system detects and examines drowsiness and after detection if driver found sleepy the system triggers an alarm. This system detects the alcohol MQ6 sensors.

KEYWORDS: Alcohol Detection, Drowsiness Detection, MQ6, Machine Learning, IOT

I. INTRODUCTION

The number of motor vehicles and cars in developing countries has been gradually increased over the decade. Official investigation reports of traffic accidents point out that dangerous driving behaviour, such as drunk and drowsy driving, account for a high proportion of accidents. Therefore, the real-time monitoring of the driver status and a consequential feedback (e.g. alarms or automatic safety procedures) 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) percentage of road accidents are happening due to drunk & driving and rash driving and one more important cause of accident is Drowsiness, often also called “fatigue” or “sleepiness”. Sleepiness can be defined as the neuro-biological need for sleep, while fatigue is associated with physical labour; although the causes 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 control themselves in that situation if they drive the car means it can affect them and others also. Some of the drivers will be drive over speed after they drunk. There are different modules to prevent these road accidents. Our system basically consists of two detection system that is Drowsiness and Alcohol detection system. In Drowsiness Detection 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 continuously check the eyeball movement of the driver while he/she driving the car whether a driver is sleepy or not. By detecting signs of drowsiness warning message 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 consuming 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 all process is happening through the Computer Vision and IOT.

II. RELATED WORK

The concept of Drowsiness detection was first introduced by [1] Jang WoonBaek, Byung-Gil Han, Kwang-Ju Kim, Yun-Su Chung and Soo-In Lee in Real-time Drowsiness Detection Algorithm for Driver State Monitoring Systems propose a novel drowsiness detection algorithm using a camera near the dashboard.

To reduce the accidents due to driver's drowsiness, there is a need of Driver States Monitoring (DSM) systems. DSM systems provide the drivers with warning for the drowsiness or fatigue. The DSM systems use a camera sensor installed near the dashboard, which estimates the eye blink, head poses, or pupil states in the image from the camera.

[2] Rahul Atul Bhoje 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.

[3] Muhammad ramzan, Hikmatullah khan, Shahid Mahmoodawan, Amin Aismail, Mahwishilyas, and Ahsan Mahmood A Survey on State-of-the-Art Drowsiness Detection Techniques classify the existing techniques into three categories: behavioural, 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 behaviour, vehicular movement pattern or environmental conditions based on the technique being used.

Drowsiness detection methods are generally classified into three main categories:

- 1) Behavioural parameter-based techniques.
- 2) Vehicular parameters-based techniques.
- 3) Physiological parameters-based techniques.

III. METHODOLOGY

Eye's Detection Algorithm: Eye state analysis is an important step in fatigue detection. An algorithm that scans and analyzes the state of the eye and mouth by removing contour features is proposed. First, the face area is identified in the acquired image database. Then, the eyes are caught by an EyeMap algorithm through a clustering technique to extract the sclera-fitting eye contour and compute the contour aspect ratio. In addition, an effective algorithm is proposed to resolve the problem of contour fitting when the driver's eye area is affected by strabismus. Meanwhile, the value of chromaticity is determined in the RGB space, and the mouth is correctly located through lip segmentation.

Based on the color difference of the lip, skin, and internal mouth, the internal mouth contour can be fitted to inspect the opening state of mouth; at the same time, another unique and constructive yawning judgment mechanism is referred to identify whether the driver is tired. This paper is constructed on the three separate databases to obtain the performance of the proposed algorithm, and it does not require training with high calculation efficiency.

IV. EXPERIMENTAL RESULTS

Figures show the results of drowsiness detection from an image and video streaming by using IOT based eye detection and experimentation convey clearly that the eyes are a significant factor for drowsiness classification in any circumstance. In images where the eyes are obstructed by wearing sunglasses, the classification accuracy drops a few percentages. Another factor that was found to affect the classification accuracy is the luminance on the subject's face which when increased tends to display the features on the face much more clearly. Images that lack clarity due to uneven lighting or darkness is an important performance factor since the error rate increases by 3% using Drowsiness Detection based on CNN and Facial Detection. The main concept and contribution behind this work is to create models that are low in calculations capacity requirement so that it can be utilized in embedded systems. The experimental results show that the accuracy averages at 83.33% using the D2CNN-FD method while maintaining a very small model size.

Preprocessing the dataset :-

Extracting landmark coordinates from images: In order to locate and represent salient parts of the face such as eyes, mouth, nose and the jawline, facial landmarks are used. These landmarks are essential for head pose estimation, blink

detection, yawning detection, etc. An open-source C++ library, Dlib] has pre-written functions that are used to obtain facial landmarks. This library is programmed to find the x, y coordinates of 68 facial landmarks to map the facial structure as shown in (Figure 2).

Dlib Library utilizes the power of OpenCVsHaar Cascades to detect facial landmarks. Paul Viola and Michael Jones introduced this technique which was optimized over the years as an Open Source initiative by OpenCV library contributors based on machine learning. This technique uses many images that are either positively or negatively marked for the presence of an object that is to be detected. In our case, this object would be a face. From this, the algorithm will be able to detect new facial images that are fed into the algorithm.



Fig. 1. Facial feature detection

The system was able to detect Face from images captured on a camera device and pass it to a CNN-based trained Machine Learning model to detect drowsy driving behavior. The achievement here was the production of a machine learning model that is small in size but relatively high in accuracy.

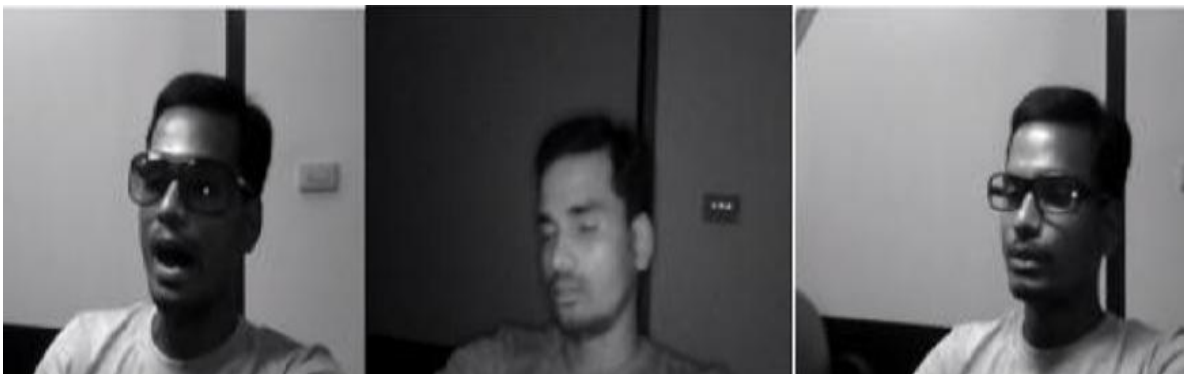


Fig. 2 Drowsy Face detection

V. CONCLUSION

In summary, we are going to propose Machine learning, IOT and computer vision based approach to detect drowsiness and alcohol taken by the driver. In Drowsiness detection system, the system will detect whether the eyes of the driver is drowsy and if it is then the system will trigger an alarm. On the other hand, Alcohol Detection System, if the alcohol taken by the driver is found then using mq6 sensor it is detected and it will send the fine to driver. Similarly data is also send to police station and RTO through notification messages.

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