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 safety of the driver. Driver fatigue often becomes a direct cause of many traffic accidents. Therefore, there is a need to develop 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 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 safety automatic 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[1] 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 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 check the eyeball movement of the driver while he/she driving the car whether a driver is sleepy or not [3].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 [11].

II. LITERATURE SURVEY

A. [1] Jesudoss A, Vybhavi R and Anusha B in Design of Smart Helmet for Accident Avoidance design a smart helmet for accident avoidance and alcohol detection.

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. Mems sensor is using 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.

B. [2] Jang Woon Baek, 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 needs of Driver States Monitoring (DSM) systems. DSM systems provide the drivers with warning for the drowsiness or fatigue. The DSM systems uses a camera sensor installed on near dashboard, which estimates the eye blink, head poses,

or pupil states in the image from the camera. In this paper they proposed a algorithm that uses MCT AdaBoost classifier for the face detection and LBF regressor for the face landmark detection because they are very fast and accurate so as to be running on the embedded device. The algorithm detects the face in the preprocessed image using MCT AdaBoost classifier. They use two-stages cascade classifiers which is composed of weak classifiers. The first stage classifier consists of three pixel position weak classifiers which have the upper high weights. Almost all of the non-objects are filtered out by the first stage classifier. It is determined by the sum of the weights of three weak classifiers whether or not the vehicle is true. The second stage classifier consists of the remaining weak classifiers and determine whether or not the vehicle passed through the first stage classifier is true.

C. [3] Rahul Atul Bhope 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.

D. [4] Kalpana seelam, Ch.Jaya Lakshmi 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 Zone- Control 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. They use MQ3 Alcohol sensor, for alcohol detection this alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time Sensor provides an analog resistive output based on alcohol concentration.

E. [5] Muhammad ramzan, Hikmat ullah khan, Shahid mahmood awan, Amina ismail, Mahwish ilyas, and Ahsan mahmood

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

F. [6] Fouzia, Roopalakshmi R, Jayantkumar A Rathod, Ashwitha S Shetty, Supriya k

In Driver Drowsiness Detection System Based on Visual Features 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.

III. PROBLEM STATEMENT

Increasing accident ratio is a major problem in every country. This usually happens when a driver has not slept enough, but it can also happen due to untreated sleep disorders, medications, drinking alcohol, shift work or long late night drives, so mostly accident will happen. So we develop the desire system to reduce the above problem using the different sensors, to overcome this problem.

IV. PROPOSED SYSTEM

There are several different algorithms and methods for eye tracking, and monitoring. Most of them in some way relate to features of the eye (typically reflections from the eye) within a video image of the driver. The original aim of this project was to use the retinal reflection as a means to finding the eyes on the face, and then using the absence of this reflection as a way of detecting when the eyes are closed. Applying this algorithm on consecutive video frames may aid in the calculation of eye closure period. Eye closure period for drowsy drivers are longer than normal blinking. It is also very little longer time could result in severe crash. So we will warn the driver as soon as closed eye is detected.

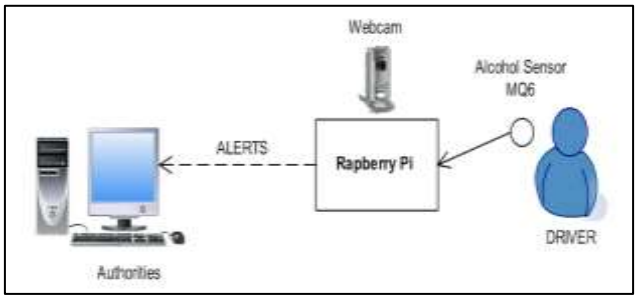

Fig. 1: Architecture Diagram

A. Module-I: Drowsiness Detection

In this module, we are performing some basic operation on human face to get proper image for processing.

In this module, we are perform certain operation like grey-scale conversion, smoothing, edging and image segmentation to get proper and clean image. In this module, we are performing algorithm on human face like eyes

B. Module-II: Alcohol Detection

In this module, we are using IOT sensor to detect the alcohol. If alcohol detected then system will inform to police station, owner and RTO for fine alert.

V. METHODOLOGY

Eye's Detection Algorithm: Eye state analysis is an important step in fatigue detection. An algorithm that analyzes the state of the eye and mouth by extracting contour features is proposed. First, the face area is detected in the acquired image database. Then, the eyes are located by an EyeMap algorithm through a clustering method to extract the sclera-fitting eye contour and calculate the contour aspect ratio. In addition, an effective algorithm is proposed to solve the problem of contour fitting when the human eye is affected by strabismus. Meanwhile, the value of chromatism s is defined in the RGB space, and the mouth is accurately located through lip segmentation.

Based on the color difference 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 judgment mechanism is considered to determine whether the driver is tired. This paper is based on the three different databases to evaluate the performance of the proposed algorithm, and it does not need training with high calculation efficiency.

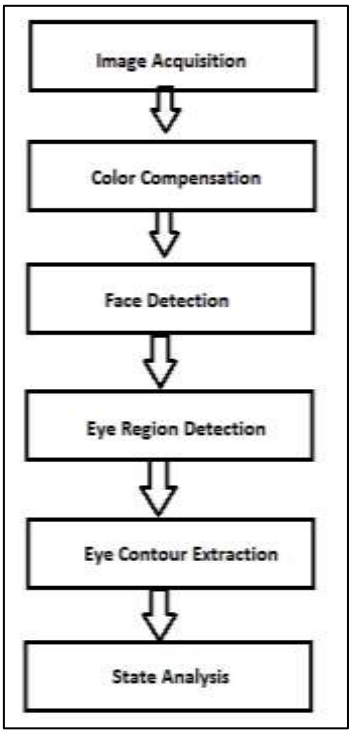

Fig. 2: Eye's Detection

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VI. CONCLUSION

In summary, we are going to propose a 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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