ENHANCEMENT THROUGH MACHINE LEARNING & IOT FOR DRIVER DROWSINESS AND ALCOHOL DETECTION SYSTEM

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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 probabilities 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.

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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.LITERATURESURVEY

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 checks 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. [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 machine learning model detects the eye boundaries from that real-time video stream [2].

3] In An Arduino based Embedded System in Passenger Car for Road Safety they build 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. 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 [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 [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 videos. 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. [5]

6] In Design of a Vehicle Driver Drowsiness Detection System through Image Processing using MATLAB they implemented a drowsiness detection system which extracts the essential features of the driver through image processing using MATLAB to determine the drowsiness level [6].

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

8] In Combined EEG-Gyroscope-CST 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 Alco Wear : Detecting Blood Alcohol Levels from Wearable they implemented a Alco wear 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. Alco Wear 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.METHODOLOGY

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. 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.

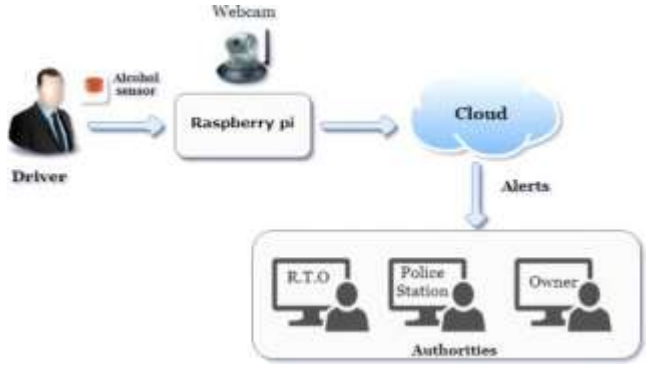

Fig 1. Architecture Diagram

In the Drowsiness detection system we are using Eye detection algorithm for image processing. In this algorithm First, the image of the driver is captured, and the color compensation is performed and after face detection edges are identified from the image and from face portion edges of eyes are identified. It mainly focuses on the drivers eye and by applying training data sets 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.

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 chromatists 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

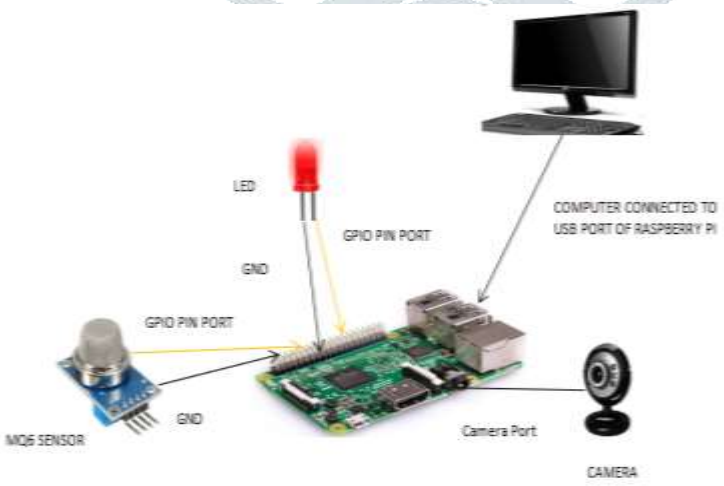

Fig.2. Implementation using Raspberry pi 3

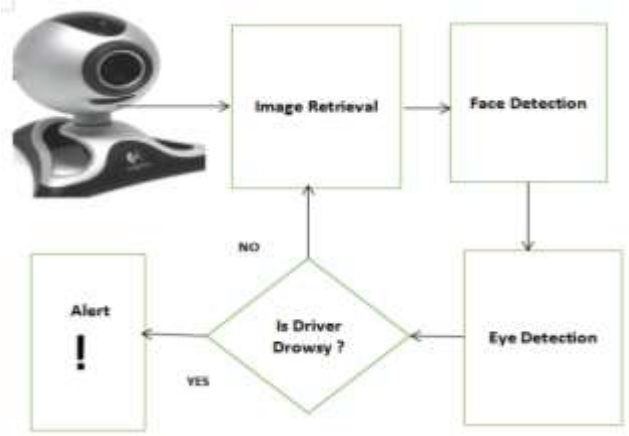

Fig.3. Generalized system diagram of Eye and Face Detection.

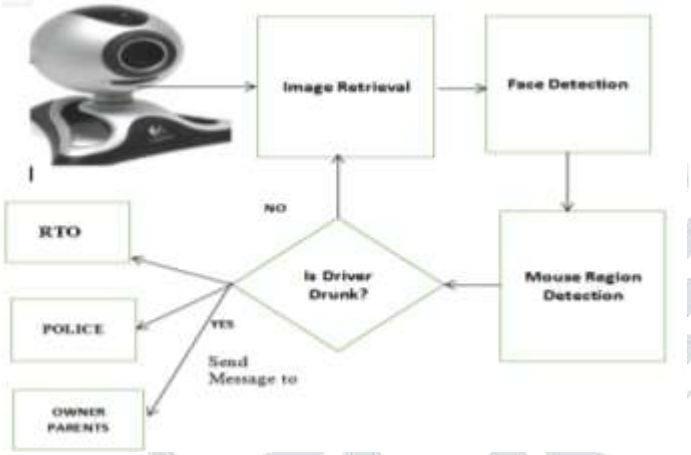

Fig.4. Generalized system diagram of Eye and Mouth Detection.

In fig 3, for drowsiness detection, we will be concentrating on the Visual Feature-based approaches as its proven to provide better results than physiological and driver behavior methods. Visual features consist of capturing Eye State, Head Position, and Yawning. Drunken state detection would be done using an Alcohol sensor to detect, whether the driver is drunk or not. An analysis of Eye state by using a camera for monitoring awareness of the driver. The system is work in real time finding the eye and pupil centers from a face captured by a camera. The detection of face and eyes was done using the CNN algorithm. In fig 4, visual features such as Eye Index (EI), Pupil Activity (PA), were computed from a video segment of 4 sec. duration. An SVM classifier was trained with the visual features of EI, PA, which was used to learn the driving patterns of the driver to classify if the subject was either in alert or non-alert state. The non-alert state represented that the driver is either drowsy or distracted.

IV. 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.

V. APPLICATIONS

1) Indian Railway:- In Indian Railway system driver drive for longer time thus it has been observed that numerous train accidents are occurred so for that reason this system will be useful.

2) Smart Cities:- In Smart cities we can also use this system for alertness of driver while driving and if the driver drunk is gives message to the police to avoid fatal road accidents.

3) Long Distance driving (Travels, goods vehicle, transportation vehicle):- For transportation purpose where driver has to driver for a longer time we can use this system.

VI. RESULTS

Fig.10.Eye and Face Detection Process

In above figure, a USB camera is connected to raspberry pi is loaded using Raspbian OS and Python with Open CV installed in SD card. The detection program can detect image of driver using camera, face region with Blue rectangle, red rectangle are the region of interest that shows the mouth region and green color square boxes shows eye region. If the closed eye frame detect more than 5 frames in a program at that instant warning alarm through buzzer is generated. The prototype has been implemented using Raspberry pi board. The input from the camera is connected to Raspberry pi, which runs these algorithm the on the input to detect drowsiness in the user The system can be made more powerful and fast by using processing boards that posses higher processing capacities.

VII. CONCLUSION

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Ehp[is use 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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