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DESIGN AND IMPLEMENTATION OF DRIVER DROWSINESS AND ALCOHOL INTOXICATION DETECTION

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Abstract - *Drowsiness and drunken driving causes the road accidents. This paper proposes a real time detection of driver's drowsiness as well as alcohol intoxication and subsequently alerting them. The main aim of this proposed system is to reduce the number of accidents due to driver's Drowsiness and alcohol intake to increase the transportation safety. The proposed system contains 8-megapixels digital USB camera, PC loaded with Arduino UNO Software, Alcohol sensor (MQ-3) is used to detect the intake of alcohol in percentage if the intoxication matching fails GSM get triggered on and transmits warming message. The PC with Open CV is serially interfaced with Arduino Uno. GSM, Bluetooth, relay circuitry and buzzers are interfaced with Arduino Uno. It will perform some task like the alarm notification and switching off the car power source.*

Key Words **: Arduino UNO, Drowsiness, Alcohol Intoxi -cation, Sensors.**

1.INTRODUCTION

Most of the road accidents are caused because of drowsiness and drunk driving and also working environments, reduced sleep and time factor. Driver drowsiness and fatigue drunk driving reduces the driver decision making capability and perception level. These two situations affect the ability to control the vehicle. There are some techniques which are used to detect drowsiness in drivers like by sensing of driver operation or physiological characteristics of driver like or vehicle movement etc. Traffic survey shows that driver fatigue may be a contributory factor in up to 20% and due to alcohol drinking it is about 31% of all road accidents. The primary purpose of this drowsiness and alcohol detection system is to develop a system that can reduce the number of accidents from drowsiness and drunk driving of vehicle. In the first part of this project is detection of drowsiness, for that we use a camera for detecting image or face, Eye detection is the important part of this project will be done using Open CV. The Input 8-megapixel camera, which is capable of capturing real time images and video. The captured frame is to be processed by PC with Camera. Algorithm is implemented using Python. Eye close detection is based on Haar cascade classifier and canny edge detection technique and performs several comparisons from a database of positive value and negative value of images and returns a red border rectangle over the detected area on matching. Eye closing rate is calculated after each 10 seconds, and if it crosses a predefined threshold value, then PC s sends a high pulse signal serially to its slave device Arduino Uno.

2. MOTIVATION

The main aim & the motivation of this project is used to prevent from drunk and drive accident so that we are using alcohol sensors Apart from alcohol sensors, we also include eye blink sensors. The drivers in tied and some work pain so they get drowsy it is find by eye blink, If eye count speed becomes less the sensor knows that driver is in sleep it alerts by buzzer to wake up and to drive normal and over speed controller sensors. These alcohol sensors will identify the driver is drunk or not and the over speed controller will check the car speed & if the car crosses the speed limit the over speed controller will reduce the speed of the vehicle. It will also send the SMS to the car owner in case of drunk & drive.

3. RELATED WORKS

They used the Haar algorithm to detect objects and face classifier implemented in OpenCV libraries. Eye regions are derived from the facial region

high pulse signal, the Arduino performs a set of tasks like Alarm by buzzer or send message to its car owner. On the other hand, alcohol sensor (MQ-3) is work as a breathalyzer and calculates blood alcohol content (BAC) from breath alcohol content (BrAC). The Arduino is interface with MQ-3, Bluetooth, buzzer and relay. Arduino continuously checks alcohol content present in the air and also computes blood alcohol content in Percentage from it. If the calculated percentage BAC crosses the threshold limit, at that time it will get alarm through buzzer and will turn off the relay. If over limit drunk that time send message through GSM to car owner. with anthropometric factors. Then, they detect the eyelid to measure the level of eye closure. By exploiting the phenomenon of bright pupils, an algorithm for detecting and tracking the driver's eyes has been developed. When drowsiness is detected, the system warns the driver with an alarm message. The localization of the eye is done by locating facial landmarks such as eyebrow and possible face center. Morphological operation and K-means is used for accurate eye segmentation. Then a set of shape features are calculated and trained using non- linear SVM to get the status of the eye. define a system for detecting the eye states in real time to identify the driver drowsiness state. The face region is detected based on the optimized Jones and Viola method. The eye area is obtained by a horizontal projection. Finally, a new complexity function with a dynamic threshold to identify the eye state. This system locates the face with a vertical projection function, and the eyes with a horizontal projection function. Once the eyes are located the system calculates the eyes states using a function of complexity.

4. LITERATURE SURVEY

From [1] In the modern-day world road accidents have become very common. They not only cause damage to property, but also keep risk at the lives of peoples travelling. Road safety is an issue of national concern the proposed system, is supposed to have two webcams, one to detect the lane and the other to monitor the face of the driver. Now, whenever the car starts, the webcam will continuously shoot video, and the system will be sampling the videos into frames of pictures. Each picture will be fed to the processor, where using though transform, the lanes as well as the eyes will be detected as shown in the figures of the results above. Now, whenever the car crosses the lane marking without signaling, either a alarm signal will sound, or else, a brake will be applied to the wheels, to slow down the speed, just in order to avoid a possible accident. Similarly, the frames of eyes, will be continuously monitored for detecting open eyes. If, the system detects more than 10 continuous frames of closed eyes, as shown in Fig.19, then again, the system sounds an alarm or sends a braking signal to the engine to slow down the vehicle.

[2]. The National Highway Traffic Safety Administration on data show that drowsy driving causes more than 100,000 crashes a year. In order to prevent these devastating accidents, it is necessary to build a reliable driver drowsiness detection system which could alert the driver before a mishap happens. In the literature, the drowsiness of a driver can be measured by vehicle-based, behavior-based, and physiology- based approaches. Comparing with the vehicle- based and behavior-based measurements, the physiological measurement of drowsiness is more accurate. With the latest release of wireless wearable devices such as biosensors that can measure people's physiological data, we aim to explore the possibility of designing a user-friendly and accurate driver drowsiness detection system using wireless wearables. In this paper, we use a wearable biosensor called Bio Harness 3 produced by Zephyr Technology to measure a driver's physiological data. We present our overall design idea of the driver drowsiness detection system and the preliminary experimental results using the biosensor. The detection system will be designed in two phases: The main task of the first phase is to collect a driver's physiological data by the biosensor and analyze the measure data to find the key parameters related to the drowsiness. In the second phase, we will design a drowsiness detection algorithm and develop a mobile app to alert drowsy drivers. The results from this project can lead to the development of real products which can save many lives and avoid many accidents on the road Furthermore, our results can be widely applied to any situation where people should not fall asleep: from the

applications in mission- critical fields to the applications in everyday life.

[3]. The road safety is a problem which was approached by several country following a big raise of the number of road accident the accident related to the drowsiness often occur on the highway ways but also on the main road, even inside the localities. today, it's possible to direct the state of tiredness of the driver with the development of the technology of the computer vision. The result of research in physiology show that the first level of lack of vigilance appear by an increase of the frequency of the yawn. The study of the spatial-temporal descriptors of a non-stationary and non-linear signal. This approach is evaluated by both YawDD and our MiraclHB databases. The evaluation shows many promising results and shows the effectiveness of the suggested approach. The study of the descriptors used in the literature for the drowsiness detection reveals the presence of gaps on the level of various work which we have just presented. Indeed, the work of Teishing Wang etal and Yufeng require a good localization of the mouth zone in order to calculate the distances DOO and Dy.

This work shows a failure when the driver turns its head. This rotation even if it is tiny affects the localization of the mouth. Once the interest zone is located by the method of Viola and Jones, comes the stage of the descriptors lips extraction. This stage is essential to manage to detect the yawning states. In fact, the goal of this stage is to detect the external contour of the lips. The approaches known as contour making it possible to segment the lips are primarily based on deformable models of contours. This method represents a robustness on the level of the segmentation and the follow-up of the non-rigid objects in real-time, in our case the lips of the driver. This type of method consists in choosing a mathematical model so that it adapts to contours of the interest object. The deformation of the initial model is guided by the minimization of an energy function. This function is made up of an energy internal term, describing the geometrical properties of contour and an energy external term, calculated starting from the properties of the image. This function represents the principle of active contours.

[4]. Driver drowsiness detection system using visual behavior of the driver. The estimation of driver's vigilance is successfully made by combining facial and eye symptoms using fuzzy logic controller. Experimental result using fuzzy- logic simulation in MATLAB show the performance of the developed approach in term of robustness and reliability. A person when he or she does not have a proper rest especially a driver, tends to fall asleep causing a traffic accident. It is why the present work wants to realize a system that can detect the drowsiness of the driver, in order to reduce traffic accidents. For that system, it will take the processing of images through a camera which will focus on the driver. In that, it is going to analyze the changes that happen in the face and then will be processed through a program in order to detect drowsiness to send an alert to the driver. There are many methods for driver drowsiness detection that can be divided into three categories: First category is related to vehicle-based method, by measuring steering wheel movement, standard deviation of line (SDLP), pressure on the acceleration this type of measure is usually affected by external factor such as lighting conditions. The second one is a physiological based measure, by measuring EEG, ECG, EOG, EMG, skin conductivity, despite the accuracy of this method their intrusive nature remains a challenge. The last category deals with the behavioral based method, by continuously monitoring driver's face through a camera and extracting symptoms.

[5]. The existing techniques into three categories: behavioral, vehicular, and physiological parameters-based the pros and cons and comparative study of the diverse method are discussed. In addition, the research frameworks are elaborated in diagrams for better understanding. In the end, overall research findings-based techniques. Second, top supervised learning techniques used for drowsiness detection are reviewed. Third, on the extensive survey are concluded which will help young researchers for finding potential future work in the relevant field the goal of our approach is to carry out the localization and the segmentation of the interest zone in order to extract a signal who describes various states of the mouth and consequently to identify the states of driver yawn. The represents the stages of tiredness detection states based on the

analysis of the spatial-temporal descriptors. In this stage, which consists in connecting the camera with the MATLAB software, so it emits a command called "imaqhwinfo". This command permission is to know the name of the camera in the software, in this case, it is called "WinVideo". And, finally, the "imaqhwinfo ('WinVideo', 1)", the command is executed to check the characteristics of the connected camera, as well as the resolution. For the capture of the images, two environments are chosen, the first is considered in the day and the second in the night. At the time of image acquisition, it focuses on the driver's face. In the software, an algorithm is developed generating a frame with a rectangle to the face, which indicates that there is a face to be processed. This process is done to more effectively produce the detection of the patterns of drowsiness.

[6] and [7] The existing techniques into three categories: behavioral, vehicular, and physiological parameters-based techniques. Second, top supervised learning techniques used for drowsiness detection are reviewed. Third, the pros and cons and comparative study of the diverse method are discussed. In addition, the research frameworks are elaborated in diagrams for better understanding. In the end, overall research findings based on the extensive survey are concluded which will help young researchers for finding potential future work in the relevant field. This method represents a robustness on the level of the segmentation and the follow-up of the nonrigid objects in real-time, in our case the lips of the driver. This type of method consists in choosing a mathematical model so that it adapts to contours of the interest object. The deformation of the initial model is guided by the minimization of an energy function. This function is made up of an energy internal term, describing the geometrical properties of contour and an energy external term, calculated starting from the properties of the image. This function represents the principle of active contours. These techniques measure drivers' fatigue through behavioral parameters of driver such as eye closure ratio, eye blinking, head position, facial expressions, and yawning. The Percentage of eye Closures (PERCLOS) is one of the most frequent used metrics in drowsiness detection based on eye state observation. PERCLOS is the ratio of eye closure over a period, and then on the result of PERCLOS, eyes are referred as open or closed. Yawning based detection systems analyze the variations in the geometric shape of the mouth of drowsy driver such as wider opening of mouth, lip position, etc. Behavioral based techniques used cameras and computer vision techniques to extract behavioral features. The general framework of process in behavioral pattern-based drowsiness detection techniques.

5. SYSTEM ARCHITECTURE

In our proposed system, The real time application with computer vision is very effective and efficient challenging task that needs processing powerful system. OpenCV is open source software, which is used for creating computer vision. OpenCV is available in C, C++, and Python and Java programming languages extension. Raspberry controller small sized ARM 11 open source controller with the GPU provides up to 1.5Gpixels of graphics processing and processing700 MHz It can be over clocked maximum 1500MHz PC with OPEN CV can work with Raspbian operating system, which is a light weight Linux. Raspbian OS is loaded with programming software and OpenCV. It supports interfacing of various low level and high-level peripherals including USB camera and GPIO's. In case of driver is in sleepy or finding fatigue, the message will be sent by using GSM and buzzer will be turned on till the GSM positive message from car owner. Fig. shows the basic block diagram of the proposed system. Haar Feature based Cascade Classifier technique, it is a machine learning based approach where a cascade function is trained from a lot of positive and negative images, and this positive image is used for detecting face region and eye region the update of region of interest ROI. Open CV is packed with a trainer as well as detector. The open CV is used for creating user defined object classifier. The object classifier that has been created is stored in.xml file extension classifier can be used in the later stages of programming. Also, in this paper we use canny operator edge detection for recognize exact coordinate of eyes region. On the other hand of the system Arduino is used for detection of the alcohol consumption by the person, alcohol gas sensor

or breathalyzer MQ-3 is interfaced. Arduino will detect samples of the person who is driving drunk or not. Based on the output from Arduino, an alarm will be turned on and the car's ignition power source can be cut down through a relay to stop the car or preventing the driver to start the car. If driver is in over limit drunk then the message will be sent by using GSM and buzzer will be turned on till the GSM positive message from car owner.

Face landmark : is a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene.

Face Detection : it has the objective of finding the faces (location and size) in an image and probably extract them to be used by the face recognition algorithm.

Face Recognition : with the facial images already extracted, cropped, resized and usually converted to grayscale, the face recognition algorithm is responsible for finding characteristics which best describe the image.

➢ The face recognition systems can operate basically in two modes:

Verification or authentication of a facial image : It basically compares the input facial image with the facial image related to the user which is requiring the authentication. It is basically a 1x1 comparison.

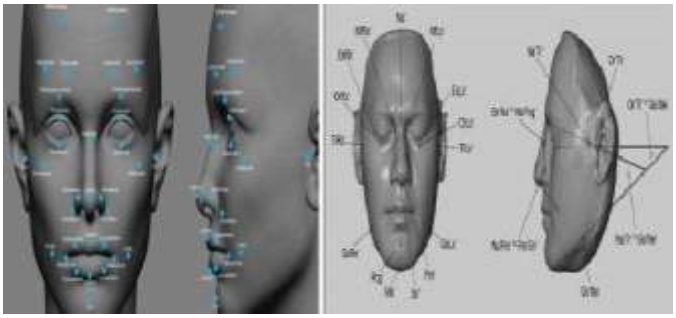

Fig – 1 : Facial Landmark Recognition

Identification or facial recognition : It basically compares the input facial image with all facial images from a dataset with the aim to find the user that matches that face. It is basically a 1xN comparison.

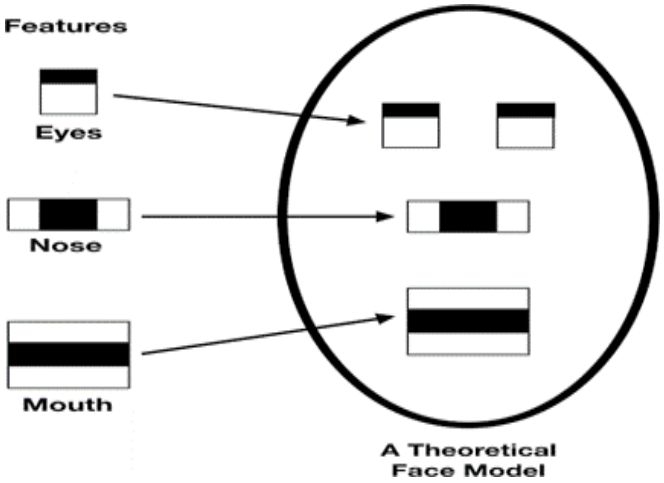

Fig – 2 : Theoretical Face Model

Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed for "Rapid Object Detection using a Boosted Cascade of Simple Features". It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images.

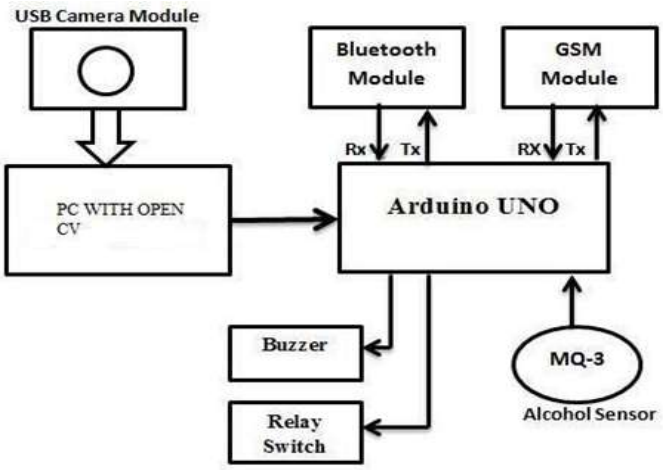

Fig – 3: Architecture of the Proposed System

The above figure shows the some of components like USB camera Module used to capture the image, Bluetooth is used to the driver using mobile or not , GSM Module used to send the message to car owner, Buzzer is used to alert the driver to drive the car, Relay Switch is used to off the running vehicle, Alcohol sensor is used to find the driver is drunk or not, Arduino UNO used to connect all the devices.

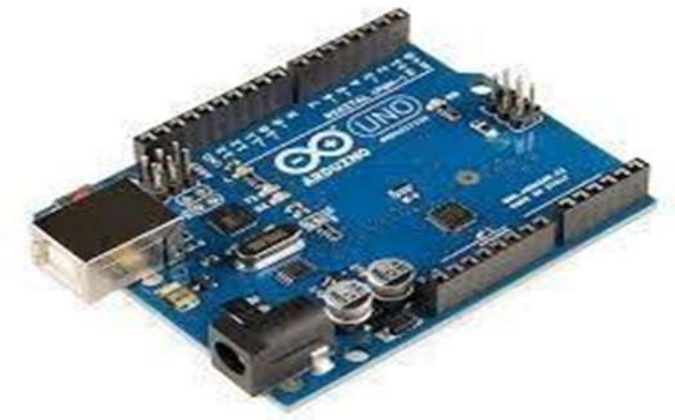

Fig – 4 : Arduino UNO Board

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

6. CONCLUSION

In the present research we have presented the application of computer vision with embedded systems and targeted for reducing road accidents due to driver drowsiness and alcoholic intoxication. Monitoring and detecting the driver's behavior to ensure road safety is important because road accidents take place. Hence it is important to capture driver behavior which will control the accidents due to rash driving under the influence of alcohol. The proposed system deals with detection of Alcohol and Drowsiness using sensors and accordingly precautions are taken.

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