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Accident Prevention and Detection System Using Image Processing and IoT

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***Abstract*—**Drivers United Nations agency don't take regular breaks once driving long distances run a high risk of turning into drowsy a state that they usually fail to acknowledge early enough according to the experts. Both driver somnolence and distraction, however, might need identical effects, i.e., shriveled driving performance, longer response time, associated a redoubled risk of crash involvement. Driving may be a complicated task wherever the motive force is accountable of observance the road, taking the correct decision on time and finally responding to other driver's actions and different road conditions. A Studies show that around one quarter of all serious motorway accidents is attributable to sleepy drivers in need of a rest, meaning that drowsiness causes more road accidents than drink-driving. Attention assist will warn of inattentiveness associated somnolence in an extended speed vary and apprize drivers of their current state of fatigue.

The signs of the driver drowsiness are.
•Driver may be yawn frequently.
•Driver is unable to keep eyes open.
•The driver can't able to remember driving the last few miles. So, these can prevent the cause of major accidents.

***Keywords*—** Face Detection, Mouth Detection and Yawning Detection

I. INTRODUCTION

The project titled "ACCIDENT PREVENTION AND DETECTION SYSTEM USING IMAGE PROCESSING AND IOT".

Now a days it has been an accepted fact that major part of the accidents is due to the uneven interruptions, inappropriate driving by the drivers. Driving is a complex task. Drivers need to use a number of skills while driving. For this reason, developing systems that actively monitors the motive force and alerting the motive force of any insecure driving condition is important for accident hindrance. Many efforts are reported within the literature for developing an energetic safety system for reducing the amount of cars accidents because of reduced vigilance. The objective of this paper is to reduce the road accidents by sending the alert signals. The proposed system focuses on the analysis of the eye blinking and yawning of the driver.

II. LITERATURE WORK

PAPER1:Accident Prevention Using Eye Blinking and Head Movement suggested that, This paper describes a real-time online prototype driver-fatigue monitor. It uses remotely located charge- coupled-device cameras equipped with active infrared illuminators to acquire video images of the driver. Various visual cues that typically characterize the level of alertness of a person are extracted in real time and systematically combined to infer the fatigue level of the driver. The visual cues employed characterize eyelid movement, head movement, and facial expression. A probabilistic model is developed to model human fatigue and to predict fatigue based on the visual cues obtained. The simultaneous use of multiple visual cues and their systematic combination yields a much more robust and accurate fatigue characterization than using a single visual cue.

PAPER 2: Accident Prevention System Using Face

Recognition suggested that, This project aims to create one more step towards solving this serious problem. Driver fatigue affects the driving ability in the following three areas, it impairs coordination, it causes longer reaction times and it impairs judgment. This project provides a real time monitoring system for Accident Prevention using face/eye detection techniques in image processing. Further, to ensure real-time computation, face detection technique is used for drowsy/fatigue detection. This software project uses some Android API's to interact and get the output of local camera. It may be a webcam or any other attached camera. The API's is to get the camera video input to our smart phones. We then use the video data to manipulate and recognize faces in real time. It will detect the face/eye of the driver if it go beyond the certain limit the alarm will be generated. This helps to wake up or alert the driver that the is sleeping or drowsy. Assessed against solid baselines by means of a client study and tests on different data sets from different areas.

PAPER 3: Yawning Detection of Driver Drowsiness Volume 2, Issue 3, March 2014, suggested that, This paper describes about driving with drowsiness is one of the main reasons for increase in road accidents. Drowsiness will impair drivers' abilities of reaction, information processing, and judgment. It is very helpful to remind them of resting or improving vigilance when drowsiness comes. Visual detection of driver's fatigue as a non-intrusive method is a promising but challenging work. Micro sleep is a typical characteristic of driver drowsiness, which features on seconds of eye closure. So most of previous research focuses their methods on eye blinking detection. The system will be more robust if yawning together with eye blinking is integrated to make joint decision. To the best of our knowledge, little research has been made on this aspect. Yawning detection is obstinate because of inter-person difference of appearance, variant illumination, and especially complex expression and widely changing pattern of mouth. Lip corners are detected and tracked in, but yawning is not used as a cue for determining driver inattention.

PAPER 4-Garima Turan, Shefali Gupta, Road Accidents Prevention system using Driver's Drowsiness Detection suggested that, Driver Fatigue is one of the most common reasons for fatal road accidents around the world. This shows that in the transportation industry especially, where a driver of a heavy vehicle is often exposed to hours of monotonous driving which causes fatigue without frequent rest period. Due to the frequent incidence of driver fatigue this has become an area of great socioeconomic concern. Consequently, road accidents prevention systems by detecting driver's drowsiness, which measure the level of driver inattention and provide a warning when a potential hazard exists, have received a great deal of attention as a measure to prevent accidents caused by driver inattention. In this paper an efficient driver's drowsiness detection system is designed using yawn detection by taking eye detection and mouth detection into consideration simultaneously so that road accidents can be avoided successfully. Inside an ego vehicle, frequencies of eye blinking and eye closure and yawning frequencies are used as the indication of sleepy driver and warning sign is then generated for recommendation.

III. EXISTING SYSTEM

Driver operation and vehicle behaviour are enforced by observance the hand wheel movement, accelerator or brake patterns, vehicle speed, and lateral acceleration. These too are non-intrusive ways of detecting sleepiness; however square measure restricted to vehicle kind and driver conditions. The final technique for detection temporary state is by observance the response of the motive force. This involves sporadically requesting the motive force to send a response to the system to point alertness. The problem with this method is that it'll eventually become tedious and annoying to the motive force. In this system the driver's fatigue goes to discover with the assistance MATLAB based eye monitoring. In MATLAB method we tend to use digital camera to watch the iris of the driving force once image acquisition; face detection is that the initial stage of process. Then symptoms of hypo-vigilance are extracted from the eyes. If eyes are blinking normally no warning is issued but when the eyes are closed for more than few seconds this system issues warning to the driver in form of alarm.

IV. PROPOSED SYSTEM

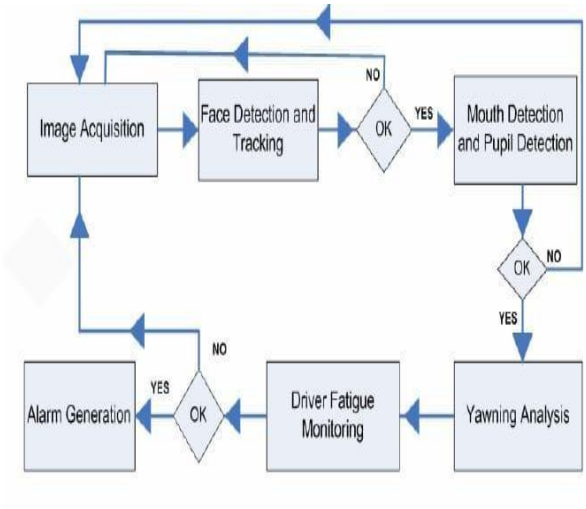
OpenCV provides in depth support for effort effort and process live videos. It is also possible to choose whether the video has to be captured from the inbuilt webcam or an external camera by setting the right match, then an error is thrown. This error can be countered, by overriding the default value, which can be achieved, by manually specifying the resolution of the video being recorded. The driver fatigue detection procedure consists of different phases to properly analyze changes in driver's physical gestures and each phase will lead us to detect drivers yawning state accurately.

In the existing method, a head gear is being used which is always to be wearer in the head while driving. It is difficult to always wear in head and also economically it is cost. So, here we have used a webcam in front of the driver to monitor the pupil and motion such as yawning .The monitoring of the pupil is done by mapping six coordinates around the eye and then it is calculated by using a Euclidean distance formula to monitor the accurate movement of the

eyelids. This software project uses some API's to interact and get the output of local camera. It perhaps a digital camera or the other connected camera.

We then use the video information to control and acknowledge faces in real time. It will find the face/eye of the motive force if it transcends the sure limit the alarms are going to be generated. This helps to awaken or alert the motive force that the is sleeping or drowsy. Driving is a complex task where the driver is responsible of watching the road, taking the correct decision on time and finally responding to other driver's actions and different road conditions. Image process may be a technique to convert a picture into digital type and perform some operations on that, so as to induce associate degree increased image or to extract some useful information from it.

V. WORK FLOW DIAGRAM



VI. IMPLEMENTED METHODOLOGY

OpenCVprovides intensive supportfor effort and process live videos. It is also possible to choose whether the video has to be captured from the inbuilt webcam or an external camera by setting the right match, then an error is thrown. This error can be countered, by overriding the default value, which can be achieved, by manually specifying the resolution of the video being recorded. The driver fatigue detection procedure consists of different phases to properly analyse changes in driver's physical gestures and each phase will lead us to detect drivers yawning state accurately. These phases are introduced in detail in the following sections:

- Face Detection
- Eye Detection
- Mouth Detection
- Face Tracking
- Yawning Detection

The details of every single step will be further explained in the following subsections.

VII. MODULES DESCRIPTION

Considering "ACCIDENT PREVENTION AND DETECTION", there have been five major modules which are as follows

FACE DETECTION

Once the frames with success extracted succeeding step is to notice the face in every of those frames. It contains a number of features of the face, such as height, width and thresholds of face colours. It is constructed by using a number of positive and negative samples. Cascade file detects all the possible objects of different sizes in the frame. to cut back the quantity of process, rather than police investigation object of all attainable sizes, since the face of the car driver occupies an outsized a part of the image, Now, the output the detector is stored in an array. Now, the output of the sting detector is then compared with the cascade file to spot the face within the frame. Since the cascade consists of both positive and negative samples, it is required to specify the number of failures on which an object detected should be classified as a negative sample. The output of this module may be a frame with face detected in it.

Detecting Driver Drowsiness and Alerting the Driver

Considering Eye Detection Module, it contains a number of features of the face, such as height, width and thresholds of face colours. The threshold value of the eye is 0.25. If the value of eye becomes less than 0.25 then the alert message will be shown. This module is implemented by using the OpenCV technology. In this module we have used Euclidian formula for detecting the blinking of eye. The six co-ordinates will be marked from the eye, starting from the left eye corner. If the value is less than the threshold value then the alarm via speaker will be notified to the driver.

$$EAR = \frac{||p2-p6||+||p3-p5||}{2\,||\,p1-p4\,||}$$

The p1 in the area of eye indicates the left eye corner and it moves in clock wise direction.P4 indicates the right eye corner. To increase the accuracy six co-ordinate points are used.

MOUTH DETECTION

The next step towards planned methodologies is to seek out the placement of mouth and lips. The region containing mouth, i.e. mouth window, are often detected victimization methodology supported intensity or colour info. A region is roughly calculable from face location

supported previous information, 1) mouth residing lower half of face region; 2) Lip corners have a long way from the border of face region and 3) Lower lip has bound distance from chin. The calculable region is looking area for mouth region detection, which decreases the searching space and avoids the disturbing of the background pixels with similar colour.

YAWN DETECTION

Yawn Detection Module performed by using the OpenCV technology. A region is roughly calculable from face location supported previous information, 1) mouth residing lower half face region 2) Lip corners have a long way from the border of Face region and 3) Lower lip has certain distance from chin. The threshold value for the yawn detection is 20. If the resulted value is greater than 20 then the alarm will be ringing in the required field. Normal mouth threshold value is 2.0.This can be identified.
By marking the distance from the upper lips to the lower lips.

Top lip=48-54(50-53) && (61-64)

Bottom lip=55-60(56-59) && (56-59)

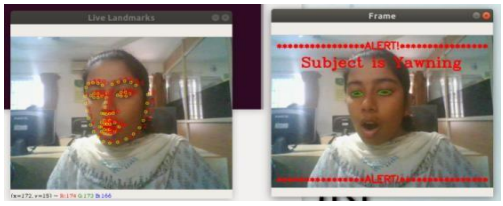


Figure 2.shows the identification for yawning

ALERT

If the application detects the driver is in Drowsiness it will alert the driver via play a sound in a loop. It will stops by pressing the ok button in the dialog box. It also makes a call to the person who is in driving to avoid accidents. In future it will send a message to the nearby check post about the drowsiness of the driver.

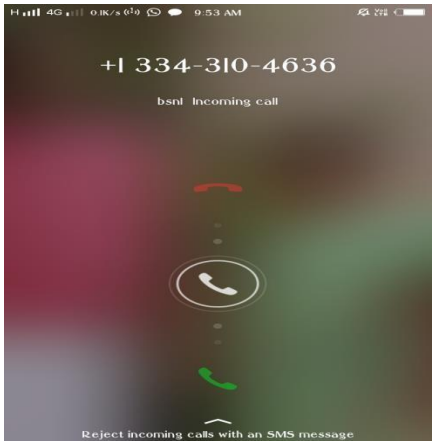


Figure 3. Shows the call alert to the use

VIII. PROS OF EAR

In the existing system MATLAB and Head gear are used but carrying head gear is inefficient and in proposed method instead of head gears, EAR formula is used which is more efficient to use.

1. Convenient, social acceptability 2. More users friendly, Inexpensive 3. Accurate focusing, ensuring that the important Parts of a picture, typically faces, are in focus 4. Improved Exposure optimizes automatic exposure control 5. Avoiding running the picture reduces over and under exposure for image capture 6. No need to use Focus Lock feature and recomposing the frame.

IX. RESULTS & DISCUSSIONS

In this project we have used both the Eye and Yawn detection. In Existing project, they have used only the eye detection so the accuracy to prevent the accident is less. To increase the accuracy, we have implemented the Euclidian formula for the eye detection instead of head gear. So, it is an advantage for the driver. This project has 90% accuracy because the eye can be detected by using the six co-ordinate points. And the yawn can be detected by using sixty-eight co-ordinates points by splitting the lips into bottom and the top lips to get more accuracy.

X. CONCLUSION & FUTURE ENCHANCEMENT

The system projected during this analysis provides correct detection of driver fatigue. This application is enforced within the real time to scale back traffic accidents rate thanks to drowsy drivers and it can even facilitate drivers to remain awake once driving by giving a warning once the driving force is sleepy headed.

A System will be improved in many dimensions some of which are discussed including the other parameters of the driver like yawning etc. to get the higher vigilance standing of the motive force. The idea behind this paper will prevent the drivers who travel for long distance especially during night hours. This will save the life of driver's. The successful implementation of this project will restrict the number of accidents.

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