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Driver's Drowsiness Detection System

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ABSTRACT: This paper presents a real-time driver drowsiness detection system for driving safety. Based on computer vision techniques , the driver's face is located from a color video captured in a car. Then, face detection is employed to locate the regions of the driver's eyes, which are used as the templates for eye tracking in subsequent frames. Finally, the tracked eye's images are used for drowsiness detection in order to generate warning alarms. The proposed approach has three phases: Face, Eye detection and drowsiness detection. The role of image processing is to recognize the face of the driver and then extracts the image of the eyes of the driver for detection of drowsiness. The Haar face detection algorithm takes captured frames of image as input and then the detected face as output. Next, CHT is used to tracking eyes from the detected face. If the eyes are closed for a predefined period of time the eyes of the driver will be considered closed and hence an alarm will be started to alert the driver. The proposed system was tested on a Raspberry pi 3 Model B with 1GB RAM with use of Logitech HD Webcam C270. The experimental results appears quite encouraging and promising. The system could reach more than 15 frames per second for face and eye tracking, and the average correct rate for eye location and tracking could achieve 99.0% on some test videos. Thus, it can be concluded that the proposed approach is a low cost and effective solution method for a real-time of driver drowsiness detection.

KEYWORDS: Hidden Markov Model, Linear Clustering, Entropy Estimation and Decision Tree.

I. INTRODUCTION

Motor vehicles, bus and truck accidents is a major problem in World. Fatigue and drowsiness among the drivers has been identified as one of the main reason behind fatal crashes and injuries especially driving in long and monotonous motorway. Now a day's accident happening in India is mainly due driver's fatigue, drowsiness; in which the driver feelings very drowsy and cannot concentrate on road and within a fraction of seconds accidents happens. Motor vehicle accidents also known as road traffic accident which involves cars, motor cycle and public transport is measure problem in India.

Driving fatigue which is describe as a feeling of drowsiness due to extended driving period monotonous road condition, adverse climatological environment or driver's individual characteristics are direct or contributing factor to road accidents.

Signs of falling asleep behind the steering wheel. If you notice them, it's time to take urgent action.

1. Vigilance reducing: Thoughts begin to wander far from the topics quite a trip, come back memories …
2. Reducing of attention: You stop understand the readings, you stop notice the signs, intersections, landscape.
3. Lack of concentration and tension in the hands and feet. On the straights you want to steer with "one finger".

No desire to make sharp movements, this list could be continued but the result is same, Eyes become "heavy" and blink time is greatly increasing. You want to keep your eyes closed "at least a few seconds."

Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy or if he is alcoholic. Driver drowsiness is recognized as an important factor which leads to enormous fatal accidents. The driver loses his control when he falls asleep which leads to accidents. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents. But the life lost once cannot be re-winded. Advanced technology offers some hope avoid these up to some extent.

II. LITERATURE SURVEY

According to analysis reports on road accidents of recent years, it's renowned that the main cause of road accidents resulting in deaths, severe injuries and monetary losses, is due to a drowsy or a sleepy driver [8]. Drowsy state may be caused by lack of sleep, medication, drugs or driving continuously for long time period. An increase rate of roadside accidents caused due to drowsiness during driving indicates a need of a system that detects such state of a driver and alerts him prior to the occurrence of any accident.

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During the recent years, many researchers have shown interest in drowsiness detection. Their approaches basically monitor either physiological or behavioral characteristics related to the driver or the measures related to the vehicle being used [6].

To deal with such kind of problem A. Rahman et al. [1] propose an eye blink monitoring algorithm that uses eye feature points to determine the open or closed state of the eye and activate an alarm if the driver is drowsy. Detailed experimental findings are also presented to highlight the strengths and weaknesses of our technique. An accuracy of 94% has been recorded for the proposed methodology.

The paper of Taner Danisman et al.[2] presents an automatic drowsy driver monitoring and accident prevention system that is based on monitoring the changes in the eye blink duration. Their proposed method detects visual changes in eye locations using the proposed horizontal symmetry feature of the eyes. Their new method detects eye blinks via a standard webcam in real-time at 110fps for a 320×240 resolution. Experimental results in the JZU eye-blink database showed that the proposed system detects eye blinks with 94% accuracy with a 1% false positive rate.

It is a difficult problem to make drivers drowsiness detection meet the needs of real time in embedded system; meanwhile, there are still some unsolved problems like drivers' head tilted and size of eye image not large enough. So, the paper of Tianyi Hong et al. [3] proposes an efficient method to solve these problems for eye state identification of drivers' drowsiness detection in embedded system which based on image processing techniques. This method break traditional way of drowsiness detection to make it realtime, it utilizes face detection and eye detection to initialize the location of driver's eyes; after that an object tracking method is used to keep track of the eyes; finally, we can identify drowsiness state of driver with PERCLOS by identified eye state. Experiment results show that it makes good agreement with analysis.

This paper of Jang Woon Baek et al. [4] proposed a novel on drowsiness detection algorithm using a camera near the dashboard. The proposed algorithm detects the driver's face in the image and estimates the landmarks in the face region. In order to detect the face, the proposed algorithm uses an AdaBoost classifier based on the Modified Census Transform features. And the proposed algorithm uses regressing Local Binary Features for face landmark detection. Eye states (closed, open) is determined by the value of Eye Aspect Ratio which is easily calculated by the landmarks in eye region. The proposed algorithm provides real time performance that can be run on the embedded device. We obtained the dataset using video records from the infrared camera which is used the real- field. The proposed algorithm tested in the target board (i.mx6q). The result shows that the proposed algorithm outperformed in the speed and accuracy.

A new approach towards automobile safety and security with independent region based automatic car system is proposed in this concept. Dr.S. Deepa et al. [5] proposed three distinct but closely related concepts namely, a Drowsy Driver Detection system and a traffic detection system with external vehicle violation avoidance-based concept. In recent time's automobile fatigue related crashes have really magnified. In order to minimize these issues, they have incorporated driver alert system by monitoring both the driver's eyes as well as sensing as well as the driver situation based local environment recognition-based AI system is proposed.

III. PROPOSED METHODOLOGY

In above block diagram, Raspberry Pi controller is interfaced with camera, buzzer, alcohol sensor, LCD by using python programming language. 5-volt DC supply is fed to the raspberry pi.

The live video is recorded and sends for the image processing technique, our system has an image training set for the comparison to get the robust result. After the processing of the image this result is given to the controller.

For the image processing we are using Haar cascade algorithm, Open CV and I2R algorithm. Controller decides whether the drowsiness is detected or not. if the percentage of eye closeness is high then the buzzer alarms if not buzzer is at off state.

Algorithm :

1) Start
2) Is camera is detected. Start the video stream thread.
3) Driver face detected. Open the window of the video.
4) Draw the contour on driver's eye (Both left and right eye contour).
5) Calculate average EAR ratio.
6) If EAR is greater than 0.3 then give "Drowsiness Alert" and beep buzzer.
7) If less than 0.3 calculate EAR.
8) Wait.

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9) If "Q " is pressed then close the video window and clear the memory.
10) End.

Working Principle: -

In Haar Cascade Classifiers, a lot of similar and dissimilar images are trained in order to detect fatigue of the driver. OpenCV is a learning-based method, packed with a detector as well as a trainer. For training, a separate database is maintained for face and eye with several positive and negative images having eye closed and opened conditions and different set facial images.

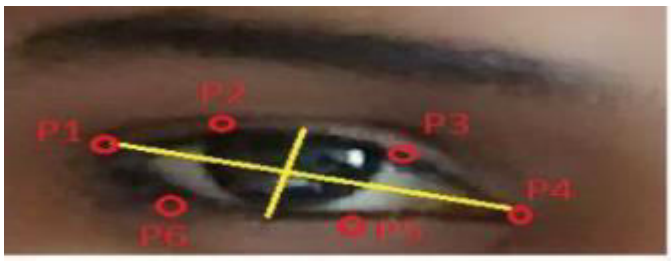

Fig.6.4.1 (a) Eye Aspect Ratio

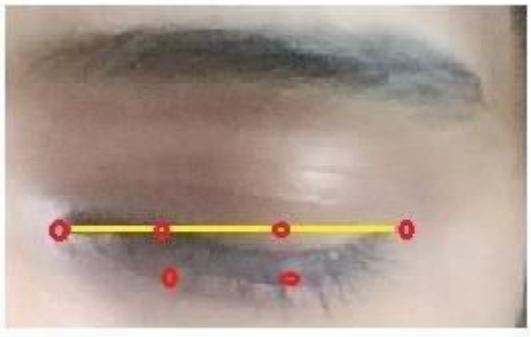

Fig.6.4.1(b) Shape predictor Facial Landmark detection and Eye Aspect Ratio (EAR)

In order to predict the face and eye region in the live video stream, shape predictor is used. Fig. shows the sleepiness which is measured by calculating the eye aspect ratio (Euclidean distance between the eyes are calculated), the arguments are passed to the predefined dataset and facial landmark detection is carried out. For every video sequence, the eye landmarks are located. The aspect ratio between width and height of the eye is calibrated.
Fig.6.4.1 (a): Close and open eyes with landmark detected automatically by. The EAR is calculated for several frames of a video. A single blink is represented.

$$EAR = \frac{\|p3 - p6\| + \|p3 - p5\|}{2\|p1 - p4\|} \quad (1)$$

Where p1, p6 are the two-dimensional landmark location, represented in

Fig6.4.1 (b): The EAR is mostly stable when an eye is open and is getting close to zero while the eye is not in open state. If the person viewing the camera continuously, the Eye Aspect Ratio (EAR) is found to be normal and it reaches low value when he/she closing the eye for a longer time. When the lower value is reached, then drowsiness is detected.

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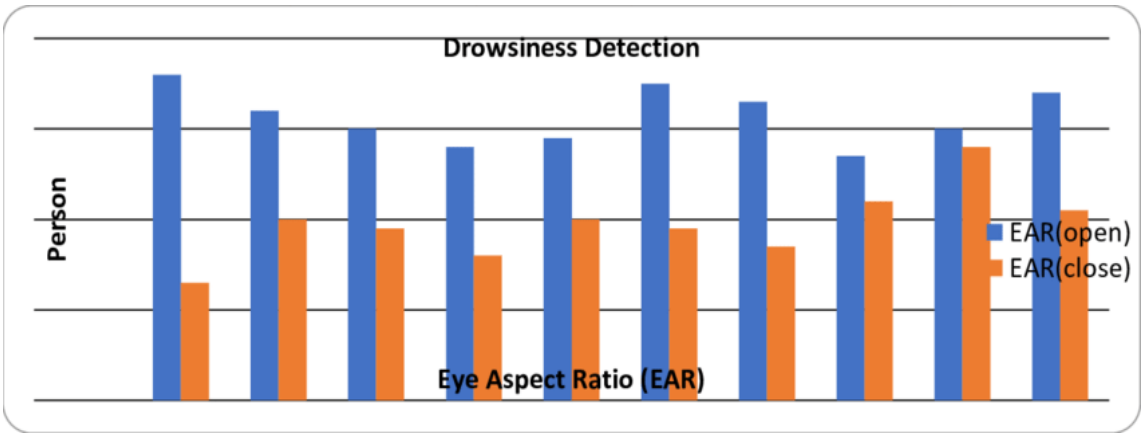

Fig.6.4.2 Graph-EAR

The above graph shows the Eye Aspect Ratio (EAR) in which we can observer eye closeness and eye openness of a person while driving.

V. RESULTS

In order to reduce the number of road accidents resulting from a driver drowsiness, it is of great importance to introduce to the automotive industry a system that would effectively detect the first signs of a drowsiness and notify the driver. A system based on real-time face analysis can be one of the most effective approaches for detecting drowsiness symptoms. There are many problems associated with its design such as uneven illumination of a driver's face or the selection of effective real-time data processing algorithms to name a few. Current technological advances in video recording and processing help reduce and even eliminate such problems. It is envisaged that by integrating such a system with other on-board car driving system would increase road safety definitely. The block diagram of the hypothetical system, and principle of its operation is presented. The investigations of the proposed drowsiness detection vision system will be continued and the results of the research will be delivered. The following are the results

- Raspberry pi as a main controller used which controls all the operations.
- Pi camera for detection of eye blinking of the driver.
- If camera detects 50% of eye in close condition then buzzer beep for '5' seconds and send the signal to the user in the form of text message.
- Alcohol sensor for detection of alcohol drunk by the driver or not.
- If alcohol is detected then buzzer will beep for 5 seconds and send a text message with bus number.
- All the information will be displayed on LCD.
- Automotive and transport vehicles.
- Security, remote monitoring, transportation and logistics.

VI. CONCLUSION

In proposed system we have monitored different drivers drowsiness detection system, with alcohol detection. This system contains set of eye images. Capturing real time images of the eye, gets compared with the eye images in the database. Real time image shows that eye remains closed beyond threshold value, then Raspberry-pi sends a warning signal to the micro controller over which can be displayed on LCD and the buzzer is on. On receiving warning message, controller takes a necessary action like issuing buzzer or send text message to the user. The controller is also interfaced with buzzer.

REFERENCES

1. Rahman, M. Sirshar and A. Khan, "Realtime drowsiness detection using eye blink monitoring," Proc. of National Software Engineering Conference, 2015.
2. T. Danisman, I. Bilasco, C. Djeraba and N. Ihaddadene, "Drowsy driver detection system using eye blink patterns," Proc. Of International Conference on Machine and Web Intelligence, 2016.

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3. Tianyi Hong, Huabiao Qin, "Drivers drowsiness detection in embedded system" IEEE International Conference on Vehicular Electronics and Safety, 2007
4. Jang Woon Baek, Byung-Gil Han, Kwang-Ju Kim, Yun-Su Chung, Soo-In Lee, "Real-time Drowsiness Detection Algorithm for Driver State Monitoring Systems," National Software Engineering Conference (NSEC), 2015.
5. Dr. S. Deepa, S. Priyalakshmi, M. Lavanya, V. Anitha, G. Swetha," Advanced Driver Assistant System with AI Control Machine", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, 2016
6. [6]A. Sahayadhas, K. Sundaraj, and M. Murugappan, "Detecting driver drowsiness based on sensors: A review," Sensors, vol. 12, pp. 16 937–16 953, 2012.
7. S. Ren, K. He, R. Girshick, and J. Sun, "Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks," IEEE Transaction on Pattern Analysis and Machine Intelligence, Vol. 39, pp. 1137-1149, 2016.
8. S. Kee, S. Tamrin, and Y. Goh, "Driving fatigue and performance among occupational drivers in simulated prolonged driving," Global J. Health Sci., vol. 2, no. 1, pp. 167–177, 2010.
9. D. Blome, J. Beveridge, B. Draper, and Y. Lui, "Visual Object Tracking using Adaptive Correlation Filters," Proc. of Computer Vision and Pattern Recognition 2010, pp.2544-2550, Jun. 2010
10. S. Lal and A. Craig, "A critical review of the psychophysiology of driver fatigue," Biol. Psychol., vol. 55, no. 3, pp. 173–194, 2001.
11. E. Hitchcock and G. Matthews, "Multidimensional assessment of fatigue: A review and recommendations," in Proc. Int. Conf. Fatigue Manage. Transp. Oper., Seattle, WA, USA, Sep. 2005.
12. Williamson, A. Feyer, and R. Friswell, "The impact of work practices on fatigue in long distance truck drivers," Accident Anal. Prevent., vol. 28, no. 6, pp. 709–719, 1996.
13. W. Dement and M. Carskadon, "Current perspectives on daytime sleepiness: The issues," Sleep, vol. 5, no. S2, pp. S56–S66, 1982.
14. L. Hartley, T. Horberry, N. Mabbott, and G. Krueger, "Review of fatigue detection and prediction technologies," Nat. Road Transp. Commiss., Melbourne, Vic., Australia, Tech. Rep., 2000.
15. J. May and C. Baldwin, "Driver fatigue: The importance of identifying causal factors of fatigue when considering detection and countermeasure technologies," Transp. Res. F, Traffic Psychol. Behav., vol. 12, no. 3, pp. 218–224, 2009.

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