International Journal of Engineering and Techniques - Volume 3 Issue 1, Jan – Feb 2017

RESEARCH ARTICLE OPEN ACCESS

Driver Drowsiness Detection, Alcohol Detection and Accidents Prevention

Tejaswini Jagdale[1], Pradnya Jadhav[2], Prajakta Totre[3], Mayura Zadane[4], Shrilekha Mankhair[5]

[1,2,3,4,5](Department of Computer Engineering, MESCOE, Pune)

Abstract:

Driver's drowsiness is the main reason for vehicular accidents. Drowsy driving is the form of impaired driving that continuously affects a person's ability to drive safely. Continuous restless driving for longer time may result in drowsiness and cause accidents. In this study, a collaborative system is build which assist the user and identifies his/her state while driving in order to improve safety by preventing accidents. Based on grayscale image processing, the position of the driver's face and his/her head movement is analysed. The driver's state identification also includes the detection of alcohol consumption with the help of sensors.

Keywords - **Driver drowsiness detection , Image processing, Head movement estimation, Driver assistance system.**

I. INTRODUCTION

The number of deadly traffic accidents are increasing every year with the increase in number of vehicles, thereby increasing the damage in properties. One of the main cause for these ever increasing accidents is driver drowsiness and alcohol consumption. According to the global status report on road safety given by WHO which reflects information from about 180 countries has indicated that worldwide the total number of road traffic death has plateaued at 1.25 million per year, with India reporting about 1.34 lakh fatalities in road accidents every year, a vast 70 percent of them being due to drunken driving.

A way to minimize this vast number is to use advanced techniques for driver assistance. Driver monitoring can be done by using two ways: direct and indirect driver related measures. Direct driver related measures include head movement; facial expressions obtained using camera sensors. Indirect driver related measures consists of driver activities, response to specific situation. The drowsiness of driver can be encountered by detecting series of actions performed by driver which includes eye activities, the amount of time and frequency of closing eyes, head displacement measured by
considering centre of gravity. While looking for pedal and steering actions to estimate drowsiness of driver, delay in steering, lateral shifting of vehicle and standard deviation of distance to a leading vehicle are more often used.

However, most of these techniques are less reliable. Due to difference in physical properties from person to person, driver cannot be correctly judged by means of physiological measures. Applications based on these methods could be impractical in real world due to difficulty in a driver monitoring system.This study focuses on continuous detection of the driver's current state using image processing. A driver is given an alert as soon as symptoms of drowsiness are detected. This can be done by using an alarm or by fixing a vibrator in driver's seat. Alcohol consumed can be detected using a sensor.

II. LITERATURE SURVEY

Yuichi Saito, Makoto Itoh, Toshiyuki Inagaki [1] have described an assistance system which effectively prevents sleep related accidents. They presented a multilayered assistance with dual control scheme which can help in reducing sleep related accidents. This assistance system interacts with driver to determine driver's state in a multilayered way. They used driving simulator which was equipped with assistance system for investigating the effectiveness of finding out drowsiness of driver and avoiding accidents due to lane departure.

[2] Proposed the designing of a driver assistance framework which allowed switching between manual and autonomous driving on a simulated testbed. They proposed a framework for monitoring driver's state. If a driver is non-drowsy then he/she can manually control the simulated car. Otherwise it is run along the predefined trajectory by switching to autonomous driving.

[3] Presented a survey which includes the techniques for detecting driver drowsiness by monitoring the driving pattern. A number of measures like subjective, physiological, behavioral and vehicular were used in this model. Among various behavioral measures the most precise and effective is head movement measure. Aleksander, Oge and Borko [4] discussed the process of designing and implementing driver drowsiness detection system by combining off-the-shelf the algorithm with some suitable approaches. The system is dynamic, user specific. The models created are totally based on driver's current features.

[5] Proposed a driver alertness detection system depending on fatigue detection at the given instant. They used image processing algorithms to identify the position of eyes. They obtained visual cues by observing eye blink rate using camera which characterize the alertness level of a driver.

[6] Illustrated the process of locating the eyes of a person to decide whether they are open or not. The system utilized the data which is in binary form obtained for the image to locate driver's face and eyes. They developed an unobstructive driver drowsiness detection system to concentrate on eyes of driver.

[7] Proposed an algorithm to monitor eye blink which uses eye feature points to determine the state of driver's eyes and activate an alarm if the driver is drowsy. This technique gives correct results when the camera used is of high resolution. They proposed an algorithm which is less complex than the Flares et al algorithm and gives same accuracy.

Nila Novita Sari and Yo-Ping Huang [8] presented a two-stage intelligent model which combined the wavelet packet transform (WTD) and functional-link-based fuzzy NN (FLFNN) to obtain the level of drowsiness. The proposed model is effective in detection of drowsiness level which can be further by extending the duration of experiments.

III. PROPOSED SYSTEM

In this paper, sensors and microcontrollers are used to develop system and perform different functionalities.

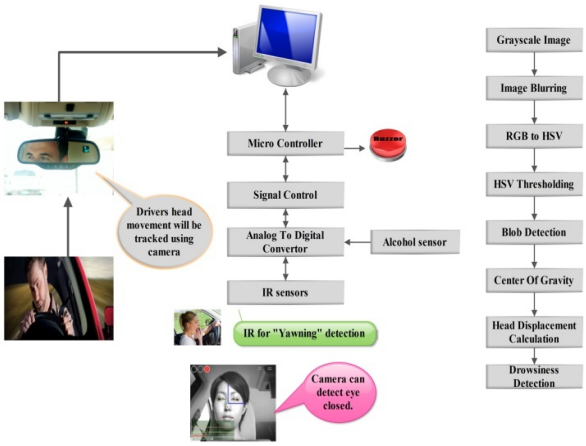

Fig. 1 Drowsiness detection with hardware

The above fig. 1 demonstrates the process of drowsiness detection. Initially, input to the system is provided in the form of an image or video through webcam residing in the vehicle. This image obtained using webcam is preprocessed for drowsiness detection involving various image processing techniques like blurring, RGB to HSV conversion, HSV thresholding, blob detection.

A. Image Capturing

User logs in and gain authentication. Accesses to assistance systems application through webcam. Detects head movement, Detects warning, Controls Hardware. Gains the driver's status through webcam image.

B. Gray Scale Image

Grayscale is a range of shades of gray with the darkest possible black shade, which indicates total absence of transmitted or reflected light. The lightest possible shade is white, where the total transmission or reflection of light is visible at all wavelengths.

C. Image Blurring

Blurring means each pixel in the source image gets spread over and mixed into surrounding pixels.

D. RGB to HSV

The HSV color model is often preferred over the RGB model so it is necessary to convert RGB to HSV.

E. HSV Thresholding

This option is similar to the Threshold RGB process. It selects pixels by either their hue, saturation and luminance (HSL), or hue, saturation and value (HSV).

F. Blob Detection

In computer vision, blob detection methods are detects regions in a digital image that range in properties like brightness or color as compared to surrounding regions.

G. Centre of Gravity

Drivers head movement will be tracked using camera. Then calculate the center of gravity to determine head displacement of driver.

H. Drowsiness Detection

Finally from the Calculated Center of gravity and head displacement we detect the drowsiness of driver.

IV. FUTURE SCOPE :

The model can be implemented in vehicles in real world to give provision to take live video feed of driver remotely. It can be used to send an alarm to the owner of the vehicle. Tracking of vehicle will become less complex for the vehicles equipped with the assistance system. Research can be done to implement the model in two-wheelers.

V. CONCLUSION :

This paper has discussed a system for assisting driver which is very effective for preventing major accidents caused due to driver drowsiness and alcohol consumption. Algorithms related to image processing have been used to identify the state of driver. A buzzer is used to alert the driver if he/she is drowsy. With reference to the center of gravity the position of driver's head is determined and accordingly the current state of driver is identified. A camera of appropriate resolution is used to sense the movement of eyes. A system gives extra feature of yawning detection. If a driver yawns more frequently then also an alarm is generated.

A sensor is used to detect whether the driver is drunken or not. There should be proper distance between the sensor and the driver for accuracy. The alarm generated can be in the form of audio in order to inspire the driver to reach his/her destination safely. Although there is need for more research, the proposed system can contribute effectively in detecting the driver's state and highly decrease the frequency of road accidents.

REFERENCES :

1. Yuichi Saito, Makoto Itoh, Toshiyuki Inagaki, "Driver Assistance System With a Dual Control Scheme: Effectiveness of Identifying Driver Drowsiness and Preventing Lane Departure Accidents" IEEE Transactions on Human-Machine Systems March 21, 2016.

2. D. Tran, E. Tadesse and W. Sheng, Y. Sun, M. Liu and S. Zhang, "A Driver Assistance Framework Based on Driver Drowsiness Detection" The 6th Annual IEEE International Conference on Cyber Technology in Automation, Control and Intelligent Systems June 19-22, 2016.

3. A. Mittal, K. Kumar, S. Dhamija, M. Kaur "Head Movement-Based Driver Drowsiness Detection: A Review of State-of-Art Techniques" 2nd IEEE International Conference on Engineering and Technology(ICETECH) March 17-18, 2016.

4. Alesandar, Oge Marques and Borko Furht "Design and Implementation of a Driver Drowsiness Detection System A Practical Approach".

5. Anjali K U, Athiramol K Thampi, Athira Vijayaraman, Franiya Francis M, Jeffy James N, Bindhu K Rajan " Real-Time Nonintrusive Monitoring and Detection of Eye Blinking in View of Accident Prevention Due to Drowsiness" 2016 International Conference on Circuit ,Power and Computing Technologies[ICCPCT].

6. J. Ahmed, Jain–Ping Li, S. Ahmed Khan, R. Ahmed Shaikh "Eye Behavior Based Drowsiness Detection System".

7. A. Rahman, M. Sirshar, A. Khan "Real Time Drowsiness Detection Using Eye Blink

Monitoring" 2015 National Software Engineering Conference(NSEC 2015).

8. Nila Novita Sari and Yo-Ping Haung "A Two-Stage Intelligent Model To Extract Features From PPG for Drowsiness Detection" 2016 International Conference on System Science and Engineering (ICSSE) National Chi Nan University July 7-9, 2016.

9. Wenqiang GUO, Baorong ZHANG, Lingjun XIA, Shuai SHI, Xiao ZHANG, Jinlong SHE "Driver Drowsiness Detection Model Identification With Bayesian Network Structure Learning Method" 2016 28th Chinese Control and Decision Conference(CCDC).

10. Jua-Juh Yan, Hang-Hong Kuo, Ying-Fan Lin, Teh-Lu Liao "Real-Time Driver Drowsiness Detection System Based on PERCLOS and Grayscale Image Processing" 2016 International Symposium on Computer, Consumer and Control.