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Driver Drowsiness Detection and Alcohol Detection using Image Processing

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

[1234]Student, Computer Engineering, MES College of Engineering, Pune, Maharashtra, India,
[5]Professor, Dept. Of Compter Engineering, MES College of Engineering, Pune, Maharashtra, India

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Abstract - *In recent years, driver's drowsiness is the main cause of accidents causing severe physical injuries, death and economic loss. The purpose of this paper is to develop a drowsiness detection system. In this work, images are processed using image processing techniques for identifying driver's current state. Driver's drowsiness is analyzed by his/her facial expression and head movement. This system manages utilizing data gained for the image which is in binary form to locate the face. Detection of alcohol consumption is done with the help of sensors. The number of road accidents might then be avoided if an alert is sent to a driver that is deemed drowsy. The drowsiness measure based on camera give an appreciated contribution.*

Key Words: **Driver drowsiness, Image processing, Driver behavior monitoring, Accident prevention, Head movement**

1. INTRODUCTION

Drowsiness is a state resulting in reduction of consciousness caused due to lack of sleep or fatigue. Due to drowsiness, drive loses control of the vehicle which may deviate him/her from the road and results in severe accidents. According to NHTSA organization statistics, the major factor causing accidents is sleepiness of driver. India is a signatory to Brasilia Declaration and is committed to reduce the number of road accidents and fatalities by 50 per cent by 2020. However, over the years, with the increasing growth rate of motorization accompanied by road network expansion and urbanization, India is facing serious impacts on road safety levels.

In India the total number of road accidents is increased by 2.5 per cent from 4,89,400 in 2014 to 5,01,423 in 2015. The road accident data analysis of 2015 reveals that about 1374 accidents and 400 deaths take place every day on Indian roads. Few of the major causes for this huge loss are alcohol consumption while driving and drowsiness of driver.

In order to minimize this huge number of accidents, advanced driver assistance techniques can be used. For this the driver is monitored using two ways: direct and indirect. Direct monitoring technique consists of head movement, facial expressions captured using sensors like camera. Driver activities and his/her response to specific situation are included in indirect techniques for monitoring drowsiness. A series of actions performed by driver while driving involves eye activities, frequency and the amount of time for which eyes were closed, head displacement with respect to the centre of gravity assists in detecting the driver's current state.

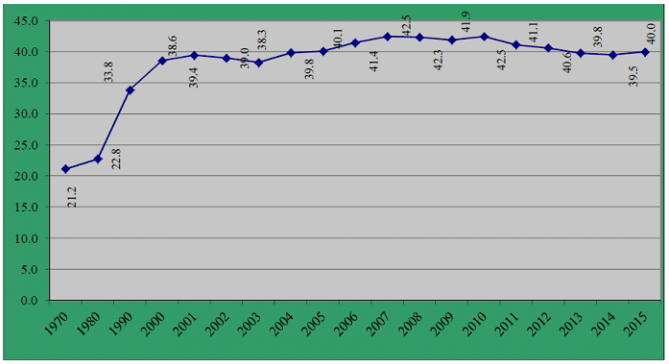

Fig -1: Number of road accidents per lakh population(1970-2015)

Considering the available statistics, importance of drowsiness detection systems is unavoidable. The main objective of this paper is to design and implement a combination of hardware and software system which will detect driver's drowsiness, especially those diagnosed at the right time to alert which will result in preventing many accidents and save countless lives.

1.1 Literature Survey

Yuichi Saito, Makoto Itoh, Toshiyuki Inagaki [1] have described a multilayered assistance with a dual control scheme, which could assist in reducing sleep related accidents. The system judges the driver's state in multilayered way through the interaction between the driver and the assistance system in addition to executing the first and second stage controls to maintain the safety.

Duy Tran, Eyosiyas Tadesse, Weihua Sheng , Yuge Sun, Meiqin Liu and Senlin Zhang [2] Proposed the designing of a driver assistance framework which allowed switching between manual and autonomous driving on a simulated testbed. This testbed is driving simulator which can create realistic environment and driving experience while enabling both autonomous and manual driving capabilities. This framework demonstrated that intermittent autonomous driving can be adopted as a mechanism to prevent accidents in certain abnormal situations.

Ajay Mittal, Kanika Kumar, Sarina Dhamija, Manvjeet Kaur[3] have 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.

Aleksandar Colic, Oge Marques and Borko Furtht[4] have described the steps involved in designing and implementing driver's drowsiness detection system based on visual input (driver's face and head). It combines off-the-shelf software components for the face detection human skin color detection, and eye state (open vs. closed) classification in a novel way.

Anjali K U, Athiramol K Thampi, Athira Vijayraman, Franiya Francis M, Jeffy James N, Bindhu K Rajan[5] have implemented a system by analyzing the eye movement of the driver and alerting the driver by activating the buzzer when he /she is drowsy. The system implemented is a nonintrusive real time monitoring system for eye detection. They obtained visual cues by observing eye blink rate using camera which characterize the alertness level of a driver.

Javed Ahmed, Jain -Ping-Li, Saeed Ahmed Khan, Riaz Ahmed Shaikh[6] have developed the system to concentrate the eyes of driver and check the drowsiness. The system manages utilizing data gained for the image to locate the face edges. At the point when the eyes of driver are closed for really long time, a warning sign is issued to driver.

Amna Rahman, Mehreen Sirshar, Aliya Khan[7] have presented new eye blink monitoring algorithm that uses eye feature points to determine the open and closed state of the eye and activate the alarm ti determine if the driver is drowsy in real time. This technique highly accurate results when used under good illumination conditions and executed using high resolution camera.

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.

2. System Architecture

The architecture of the system consists of various phases. The architecture diagram is shown in fig-2.

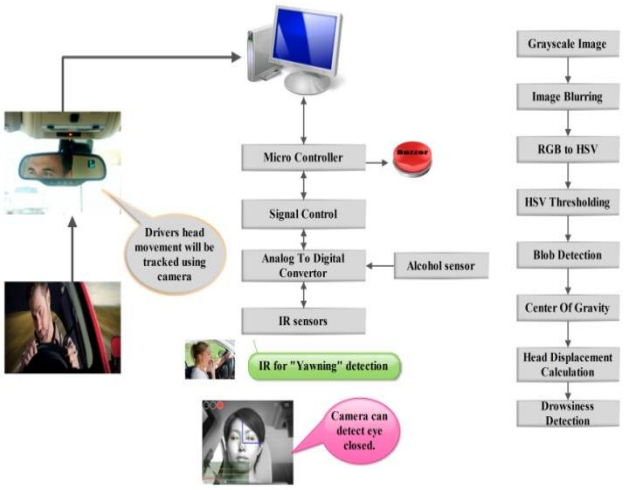

Fig -2: Architecture of the system

The system follows a specific way of execution. The dataflow diagram shown in fig-3 depicts this execution flow. The various phases of detection of drowsiness are given below.

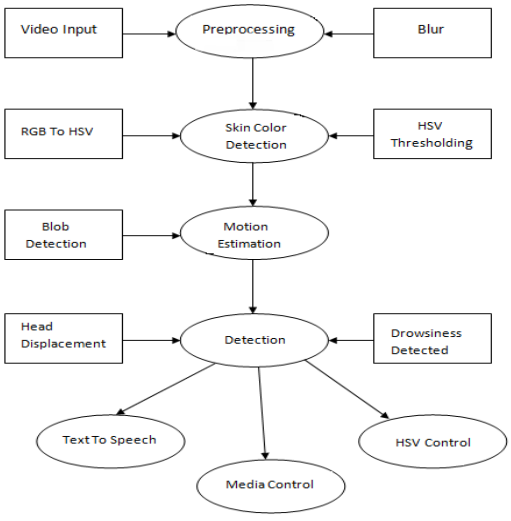

Fig -3: Dataflow diagram

A. Image capturing:

This is the initial stage of the system. A setup is made and optimized for current user. Successful head location of the driver is the key stage. If the driver's head is successfully located, it becomes easy to process the image and helps in identifying the current state of the driver.

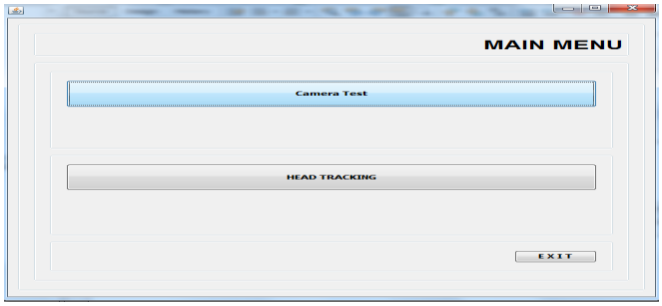

Fig -4: Camera Interface for Image Capturing

The setup of our system includes: (i) extracting the driver's facial expressions and detection head movement and (ii) collecting samples of eyes open/closed. This information is further processed to analyze the state of the driver.

B. Analysis:

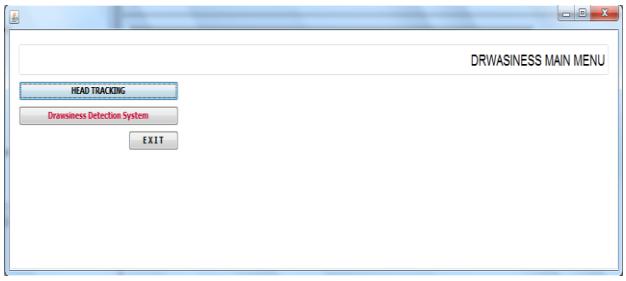

Fig -5: Drowsiness Menu

The system enters into analysis stage after locating the driver's head and eyes properly in image captured through camera. This image is then preprocessed using various Image Processing techniques for drowsiness detection. Various techniques involved in Image Processing are Blurring, RGB to HSV Conversion, HSV Thresholding Blob Detection. In blurring stage, the previously captured image is decomposed into pixels which spreads out and gets mixed into surrounding pixels. This obtained image consists of some unique features which can be best expressed and described using using HSV format. So the RGB image format is converted using HSV format. When the pixel color range is diversed, thresholding in HSV is very useful for isolating image features that cannot be achieved by RGB thresholding. So HSV thresholding is carried out. After image thresholding blob detection method is implemented which aims at detecting regions of image that differ in properties like brightness or color as compared to surrounding regions.

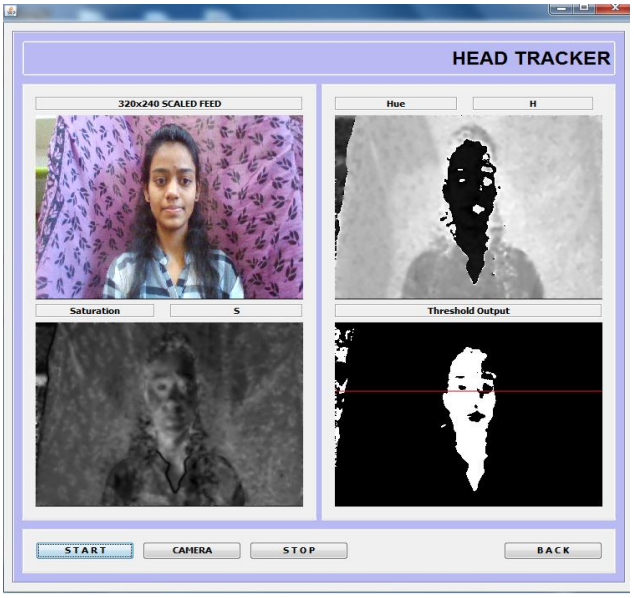

Fig -6: Head tracking

Driver's head movement is monitored using camera which is then analyzed using Centre of Gravity to detect the driver's state. For detecting if the driver has consumed alcohol, a sensor is used which is placed right in front of the driver's face. A sensor named as MQ6 has been used in our system.

C. Alert stage:

The system activates the alarm and alerts the driver if he/she is found in abnormal driving state i.e. being drowsy or if the driver has consumed alcohol. The alarm can be a buzzer, a vibrator or a previously saved audio.

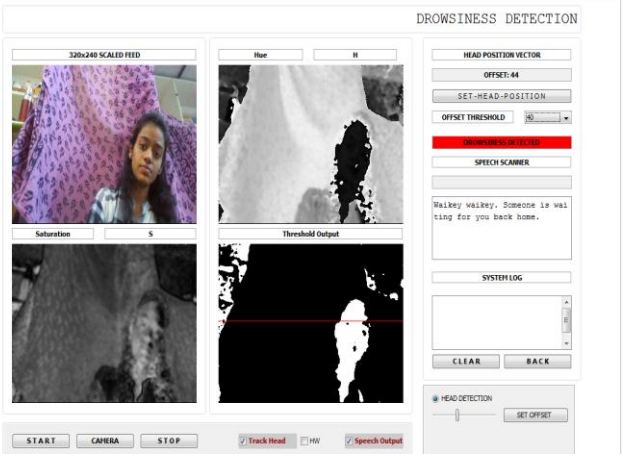

Fig -7: Alerting the driver

3. Future Scope

The Advanced Driver Assistance System is used to detect the drowsiness of driver. It can also be used to check if the driver is drunk or not. This system can be implemented in vehicles in real world to give provision to take live video feed of driver It can be used to send an alarm to the owner of the vehicle after detecting drowsiness Research can be done to implement the model in two-wheelers.

4. Conclusion

This paper has proposed a system for assisting driver to avoid major accidents caused due to drowsiness of driver and alcohol consumption by assisting his/her state. State of driver is identified using algorithms related to image processing. 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. The movement of head is captured using a camera of appropriate resolution. 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. To inspire the driver to reach destination safely the alarm is generated which can be in the form of audio or vibration. 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] Aleksandar, 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]. (2002) The IEEE website. [Online]. Available: http://www.ieee.org/

[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.