IoT based Driver Fatigue Detection and Alert System

M.Ramakrishna[1], Pothana Sagar[2], Karri Krishna kalyan[3], Nunna Aravinda Sai[4], Jujjavarapu Sandeep[5]
[1]*Assistant Professor*, [2,3,4,5]*B.Tech Students*
Department of ECE, Andhra Loyola Institute of Engineering and Technology, Vijayawada, A.P.,India.

Abstract **-** In recent years driver fatigue is one of the major causes of vehicle accidents in the world. A direct way of measuring driver fatigue is measuring the state of the driver i.e. drowsiness. So it is very important to detect the drowsiness of the driver to save life and property. This project is aimed towards developing a prototype of drowsiness detection system. To complete this task image processing technique can be more useful. The camera is supported by embedded system in which Raspbian OS is used. This embedded system is serially interfaced with another micro controller with RS232 protocol via serial communication, which will detect the real time situation of the driver and switch on the alarm when drowsiness is detected the system, switches off the car ignition power source by microcontroller based signal. A mobile application is used in this system, which sends sms to the person whose contact is saved in the system.

Keywords **-** Microcontroller, Camera, Alcoholic sensor, Tiltsensor, Raspberry-pi, Pythan programming language, Image processing , Haar.

I. INTRODUCTION

Drowsiness is intermediate stage between wakefulness and sleep that has been defined as the state of progressive impaired awareness associate with the desire or inclination to sleep. Survey results show that thousands of road accidents are occurring due to driver's drowsiness. While developing accident avoidance systems, it is big task to detect drowsiness of the driver and to take further necessary action to avoid the accidents. The main objective for the researchers working on this problem is to develop the system which can detect drowsiness on real time basis. When there is drowsiness, opening and closing of eyes is different than the normal condition. Detection of frequency of opening and closing rate of eye is fundamental objective kept for developing the system. The design based on computer vision and embedded systems have been prepared by scientists. Drowsiness is considered as significant risk factor which contributes to increasing number road accidents all over the world. Many traffic surveys shows that driver drowsiness contributes upto 22% and due to alcoholic drinking is upto 33% in all road accidents. Present work focuses on real time detection of drowsiness, it measures the opening and closing rate of eye. Haar cascade transform is used to detect the eye region of the driver. As the speed of Raspberry-pi board is very high in real time application, it is used in the system. A digital camera is used which is capable to capturing real images. This digital camera is loaded by a system which uses a Raspbrian operating system.. A captured image is to be processed by Raspberry-pi. Haar cascade classifier technique is used to detect the eye location and perform several comparisons from dataset of matching and unmatching images and returns rectangle over detected area of matching.

The database of 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 I2C serial bus. On receiving warning massage, controller takes a necessary action like issuing buzzer or turning off a relay to stop a car. The controller is also interfaced with alcohol sensor, buzzer and relay.

II. BLOCK DIAGRAM

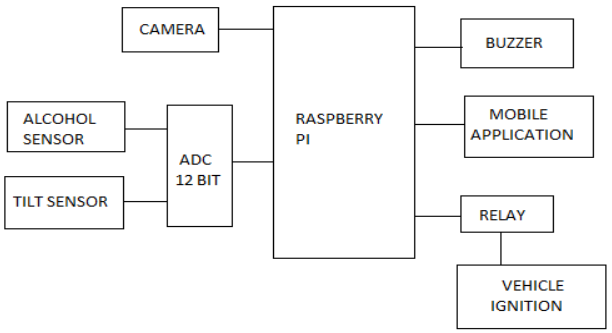

Figure 1:.Basic block diagram

A. Camera - A digital camera of 5 MP was used to capture real time images. It acquires a real time image periodically to detect the drowsiness of the person. The capturing images are then given to the Raspberry pi for further processing for eye and pupil detection.

Figure 2: webcam

B. Raspberry-pi - In Raspberry pi, board image processing based eye and pupil detection algorithm has been implemented. Speed of Raspberry pi board was very high in real time system as compared to other**.**

Figure 3: Raspberry pi3

C. Micro controller - The Raspberry pi sends output to micro controller. Based on the detected opening and closing rate of eye, drowsiness level has been calculated. And if drowsiness detected, respective signal to PIC microcontroller will be sent.

D. Relay - 5V Relay was used to operate a large device like buzzer and ignition of the vehicle. When relay was turned on ignition will be turned on and then vehicle can be started.

E. Buzzer - It was used for indication. As soon as system detects the drowsiness or alcoholic state, the alarm starts ringing and ignition of vehicle was kept in OFF state by keeping relays OFF.

Figure 4: Buzzer

F. Power Supply - DC Power Supply for system depends on selection of micro controller. We have used pic16F877a which runs on 5V supply and this supply can be derived from raspberry pi board.

G. Mobile application - In this system, we are using the mobile application. which sends sms to the person whose contact is saved in the system.

H. Alcoholic sensor - The sensor is connected with a variable resistor to form a voltage divider circuit and the variable resistor is used to change sensitivity. The change in the resistance changes voltage across the sensor and this voltage can be read by microcontroller. The sensor output voltage that is proportional to the concentration of smoke /gas.

Figure 5:.Alcoholic sensor

I. Tilt sensor - Tilt sensor measure the tilting position with reference to gravity and are used in numerous applications. They enable the easy detection of orientation or inclination.

Figure 6: Tilt sensor

III. RESULTS

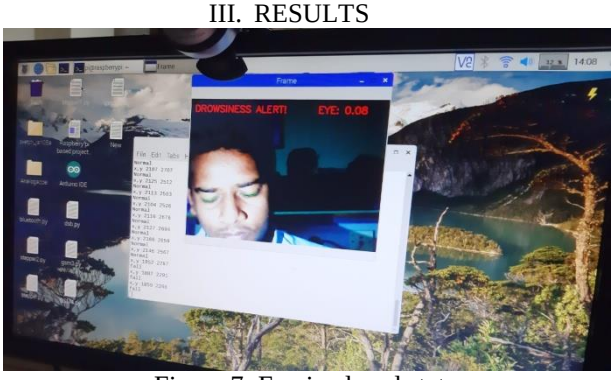

Figure 7: Eye in closed state

IV. CONCLUSION

The system performs well for drivers' drowsiness detection. Implementation of the image processing and adaptive boost along with the Haar cascade makes the system fast enough to work on real time basis.

V. FUTURE SCOPE

Our model is designed for detection of drowsy state of eye and give and alert signal or warning may be in the form of audio or any other means. But the response of driver after being warned may not be sufficient enough to stop causing the accident meaning that if the driver is slow in responding towards the warning signal then accident may occur. Hence to avoid this we can design and fit a motor driven system and synchronize it with the warning signal so that the vehicle will slow down after getting the warning signal automatically.

VI. REFERENCES

[1]. Dwipjoy Sarkar and Atanu Choudhary, "A Real Time Embedded System Application For Driver Drowsiness and Alcoholic Intoxication Detection", International Journal Of Engineering Trends and Technology (IJETT), vol 10, Apr 2014.

[2]. Prateek Verma, Maheedhar Dubey, Somak Basu and Praveen Verma "Hough Transform Method for Iris Recognition-A Biometric Approach" International Journal Of Engineering and Iinnovative Technology (IJEIT) vol 1, June 2012.

[3]. Retno Supriyanti, Budi Setiawan, Haris B. Widodo and Eko Murdyantoro, "Detecting Pupil and Iris under Uncontrolled Illumination using Fixed-Hough Circle Transform",International

Journal of Signal Processing, Image Processing and Pattern Recognition vol. 5, No. 4, December, 2012.

[4]. Minoru Sakairi "Water-Cluster-Detecting Breath Sensor and Applications in Cars for Detecting Drunk or Drowsy Driving" IEEE sensors journal,vol.12, may 2012.

[5]. Kohji Murata, Etsunori Fujita, Shigeyuki Kojima, Shinitirou Maeda, Yumi Ogura, Tsutom Kamei,Toshio Tsuji, Member, IEEE, Shigehiko Kaneko, Masao Yoshizumi, and Nobutak Suzuki "Noninvasive Biological Sensor System for Detection of Drunk Driving", IEEE transactions on information technology in biomedicine,vol.15, january 2011".

[6]. Rami N. Khushaba, Sarath Kodagoda, Sara Lal, and Gamini Dissanayake "Driver Drowsiness Classification Using Fuzzy Wavelet-Packet-Based Feature-Extraction Algorithm IEEE transactions on biomedical engineering, vol. 58, no. 1, january 2011.

[7]. Parris j, "Face and eye detection on hard datasets," Biometrics (IJCB), 2011 International Joint Conference on , vol., no., pp.1,10, 11-13 Oct. 2011.