Human Drowsiness Detection Using Image Processing

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Abstract-*As field of signal processing is widening in various security and surveillance applications, motivated the interest for implementing better application with less complications. The system is consisting of web camera which placed in a way that it records driver's head movements in order to detect drowsiness. As drowsiness is detected, a signal is issued to alert the driver. The system deals with detecting face, eyes and mouth within the specific segment of the image. All the possible actions have been considered and output is generated accordingly. Drowsiness is determined by observing the eye blinking action of the driver. Other than drowsiness, driver's attention while driving is also considered. The system is implemented using cascade object identifier from vision toolbox of Matlab, which detects face, eyes, nose and mouth from the image which is captured from web camera. For this system Region of Interest is location of eyes and mouth which are determined and indicated by rectangle.*

Keywords-Drowsy detection, Facial detection, Viola-Jones.

I. INTRODUCTION

Every year thousands of people in India lose their lives due to traffic accidents. The role of human factor plays a key role in the accidents. In general, the driver fatigue alone accounts for around 25 percent of the road accidents and up to 60 percent of road accidents result in death or serious injury [1]. A main cause of fatigue is sleeplessness or insomnia. So a drivers' drowsiness state is a major factor in severe road accidents that claims thousands of lives every year. In the recent years, use of intelligent algorithms in cars has developed considerably. These systems use WSNs to monitor and transmit the condition of the car and the driver. Smart cars that use software techniques to control engine speed, steering, transmission, brake etc. has improved the quality of driving significantly. Ad hoc networks were the first to develop the automatic navigation systems in cars. A noticeable weakness of these systems is that they don't respond in real time to the environmental changes. It is especially important in driving where time is a critical factor in driver's decision. On the other hand, another method to check the driver fatigue is monitoring the physical condition and facial expressions of the drivers, which wireless sensor networks are unable to process and transmit these information with adequate precision and a good recall. Hence it is very essential to develop an efficient drowsiness detection system.

II. LITERATURE REVIEW

In this paper (1) in order to implement a computer vision based recognition system of driver fatigue. In addition to detecting human face in different light sources and the background tracking conditions and tracking eyes state and combined with fuzzy logic to determine whether the driver of the physiological phenomenon of fatigue from face of detection. Driving fatigue recognition has been valued highly in recent years by many scholars and used extensively in various fields, for example, driver activity tracking, driver visual attention monitoring, and in-car camera systems.

This paper (2) describes a real-time prototype computer vision system for monitoring driver vigilance. The main components of the system consists of a remotely located video CCD camera, a specially designed hardware system for real-time image acquisition and for controlling the illuminator and the alarm system, and various computer vision algorithms for simultaneously, real-time and non-intrusively monitoring various visual bio-behaviors that typically characterize a driver's level of vigilance. The visual behaviors include eyelid movement, face orientation, and gaze movement (pupil movement). The system was tested in a simulating environment with subjects of different ethnic backgrounds, different genders, ages, with/without glasses, and under different illumination conditions, and it was found very robust, reliable and accurate.

In this paper (3) the driver drowsiness detection is measured using three methods i) Image processing ii)EEG based detection iii) Artificial neuron network. The different techniques used for detection of drowsiness, we came to know that according to the condition different techniques are used. Artificial Neural network technique is not very efficient as many neurons have to use for proper results. EEG based technique is also not efficient as driver has to wear electrode helmet. So now a day much attention is given on the image processing based techniques and that also gives proper results. More study is needed in Eye Blinking Frequency Count technique, comes under image processing, which can be cheapest and correct method to detecting the drowsiness of driver.

The aim of this paper (4) is to develop a prototype of drowsy driver warning system. Our whole focus and

concentration will be placed on designing the system that will accurately monitor the open and closed state of the driver's eye in real time. By constantly monitoring the eyes, it can be seen that the symptoms of driver fatigue can be detected early enough to avoid an accident. This detection can be done using a sequence of images of eyes as well as face and head movement. The observation of eye movements and its edges for the detection will be used. Devices to detect when drivers are falling asleep and to provide warnings to alert them of the risk, or even control the vehicle's movement, have been the subject to much research and development. Driver fatigue is a serious problem resulting in many thousands of road accidents each year. It is not currently possible to calculate the exact number of sleep related accidents because of the difficulties in detecting whether fatigue was a factor and in assessing the level of fatigue. However research suggests that up to 25% of accidents on monotonous roads in India are fatigue related. Research in other countries also indicates that driver fatigue is a serious problem.

In this paper (5), we presented the conception and implementation of a system for detecting driver drowsiness based on vision that aims to warn the driver if he is in drowsy state. This system is able to determine the driver state under real day and night conditions using IR camera. Face and eyes detection are implemented based on symmetry. Hough Transform for Circles is used for the decision of the eyes states. The results are satisfactory with an opportunity for improvement in face detection using other techniques concerning the calculation of symmetry. Moreover, we will implement our algorithm on a Digital Signal Processor to create an autonomous system working in real time.

The aim of this paper (6) is to detect the drowsiness for drivers using image processing. We are going to design a system using camera that points directly towards the driver's face and monitors the driver's eyes in order to detect fatigue or drowsiness by self developed image processing algorithm which can give information regarding drowsiness of drivers. So the first step is the face detection. For face detection Viola-Jones method is used.The second step is Feature Extraction like detect the eye portion which has been done by Viola-Jones algorithm. During detection of eyes, system will be able to decide if the eyes are open or closed and whether the driver is looking in front by self developed algorithm and its pixels map. When the eyes will be closed for too long, a warning signal will be given in the form of buzzer or in the form of alarm signal and also send the feedback reply to the driver for the system.

III. BLOCK DIAGRAM

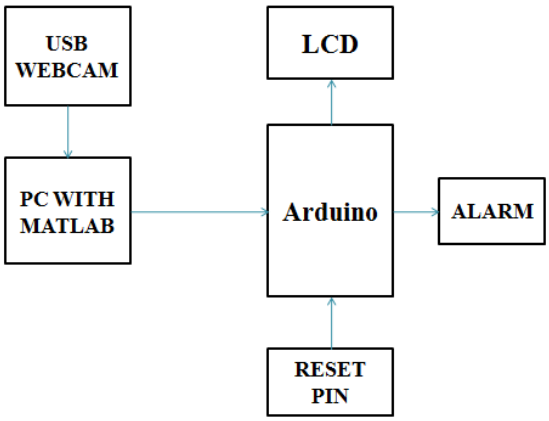


Fig. 1 Block Diagram

IV. HARDWARE AND SOFTWARE

1) WEBCAM: 6 infrared LED on camera will provide enough light to capture images in normal light as well as in low light also.

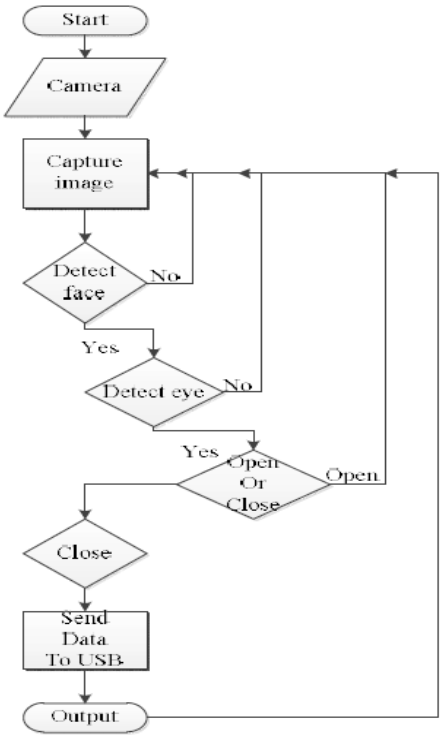
Fig. 2 Webcam

2) ARDUINO: MATLAB output is provided to arduino LCD and alarm system is interfaced with arduino.

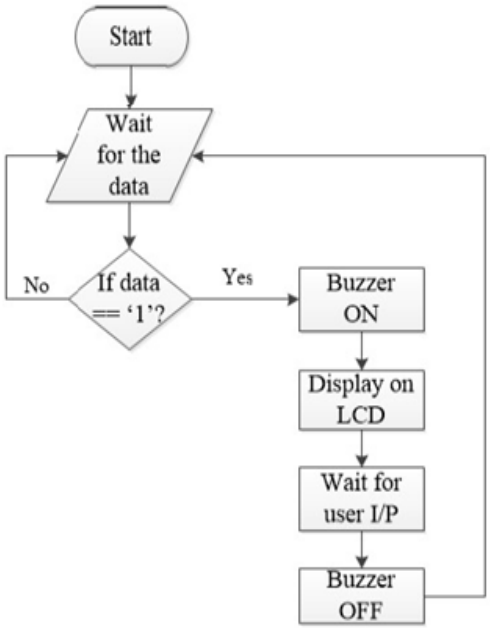
Fig. 3 MATLAB Simulink

V. ALGORITHM

1) PROGRAM ALGORITHM



2) IMPLEMENTATION ALGORITHM



VI. CONCLUSION

This paper consists of different applications combined together to fulfill safety precautions. This application is used to provide the prevention of accident due to drowsiness of the driver and disturbing intruders. We have made the vehicle and driver secure against such severe problems. It tries to look at the emerging technologies and determine the best approaches in trying to prevent the number one cause of fatal vehicle crashes. The primary goal of this topic is to develop a real time drowsiness monitoring system in automobiles.

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