Drowsy Driver Detection System

Abstract

Driver drowsiness is one of the major causes of serious traffic accidents, which makes this an area of great socioeconomic concern. Continuous monitoring of drivers' drowsiness thus is of great importance to reduce drowsiness-caused accidents. This requirement gives idea for concept of a real-time, nonintrusive driver's drowsiness detection system. A Drowsy Driver Detection System can be developed, using a non-intrusive machine vision based concepts.

The system uses a small monochrome security camera that points directly towards the driver's face and monitors the driver's eyes and head movements in order to detect drowsiness & fatigue. In such a case when drowsiness is detected, a warning signal is issued to alert the driver. This seminar report describes brief idea for driver drowsiness detection system. Again how to find the eyes, and also how to determine if the eyes are open or closed and head movement. The system deals with using information obtained for the binary version of the image to find the edges of the face , which narrows the area of where the eyes may exist. Once the face area is found, the eyes are found by computing the horizontal averages in the area .Taking into account the knowledge that eye regions in the face present great intensity changes, the eyes are located by finding the significant intensity changes in the face. Once the eyes are located, measuring the distances between the intensity changes in the eye area determine whether the eyes are open or closed and comparing calculated blinking rate with standard assume rate. Again head movements are also noted. On the basis of eye blinking rate and head movement , device gives result that driver is drowsy or not. Also supportive system of pressure sensor system is used .

INTRODUCTION

1.1 History

Drowsy driving causes many traffic accidents. Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to drowsiness & fatigue related crashes. The U.S. National Highway Traffic Safety Administration (NHTSA) attributes more than 100,000 crashes, including 1,357 fatal crashes and approximately 71,000 injury crashes annually, to driver drowsiness. FARS indicates an annual average of 1,544 fatalities. In addition, drowsy driving is the reason for 22% to 30% of severe traffic accidents resulting in death, and permanent disability ranking it as the top of the cause list. So drowsy driving is undoubtedly very dangerous for traffic .Drowsiness due to fatigue has been estimated to be involved in 10-40% of crashes on highways (rural Interstate).15% of single vehicle fatal truck crashes. Drowsiness is the most frequent contributor to crashes in which a truck driver was fatally injured. So there is need to control accidents due to driver drowsiness.

Fig1. Accident due to drowsiness

1.2 Need of System

The development of technologies for detecting or preventing drowsiness at the wheel , is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. The aim of this system is to develop a prototype drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes in and head movements in real time. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a vehicle accidents. Detection of drowsiness due to fatigue involves a sequence of images of a face, and the observation of eye movements and blink patterns. The analysis of face images is a popular research area with applications such as face recognition, virtual tools, and human identification security systems. This system is focused on the localization of the eyes, which involves looking at the entire image

of the face, and determining the position of the eyes by a self developed image-processing algorithm. Once the position of the eyes is located, the system is designed to determine whether the eyes are opened or closed.Then by detecting drowsiness alert driver by alarm which indirectly tell driver to take rest for sometime that is stop driving.

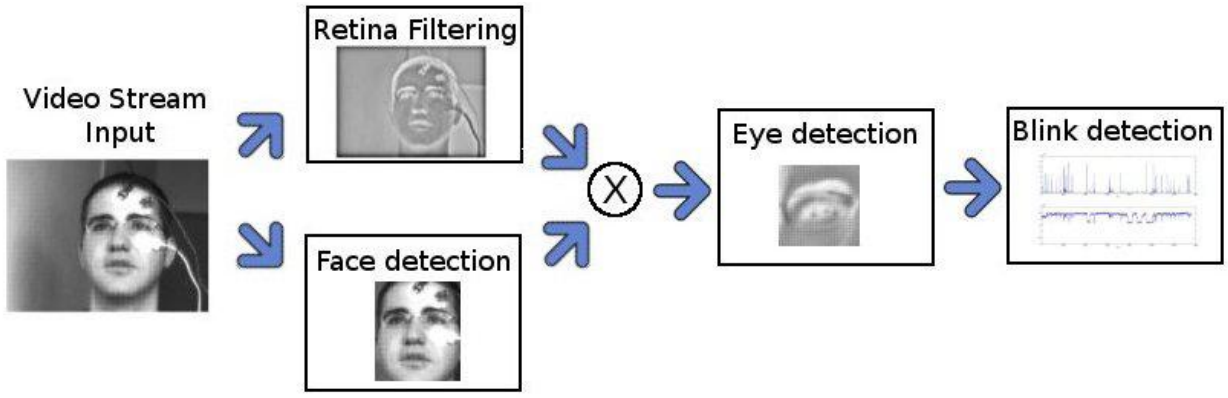

Fig.2.Eye blinking rate detecion

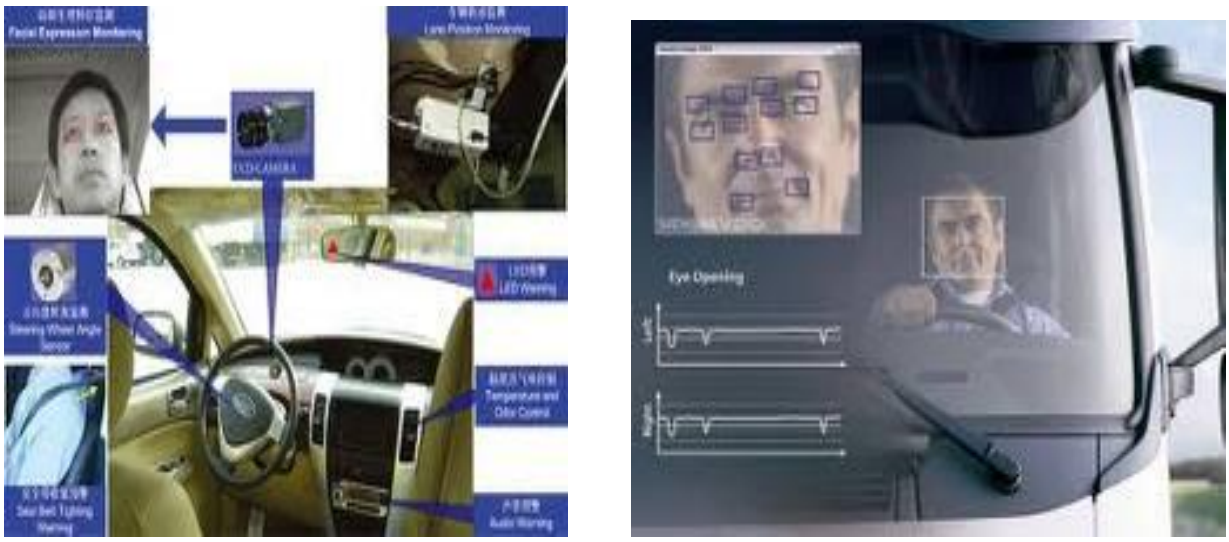

Fig3.Drowsy driver detection system

Block Diagram For the System

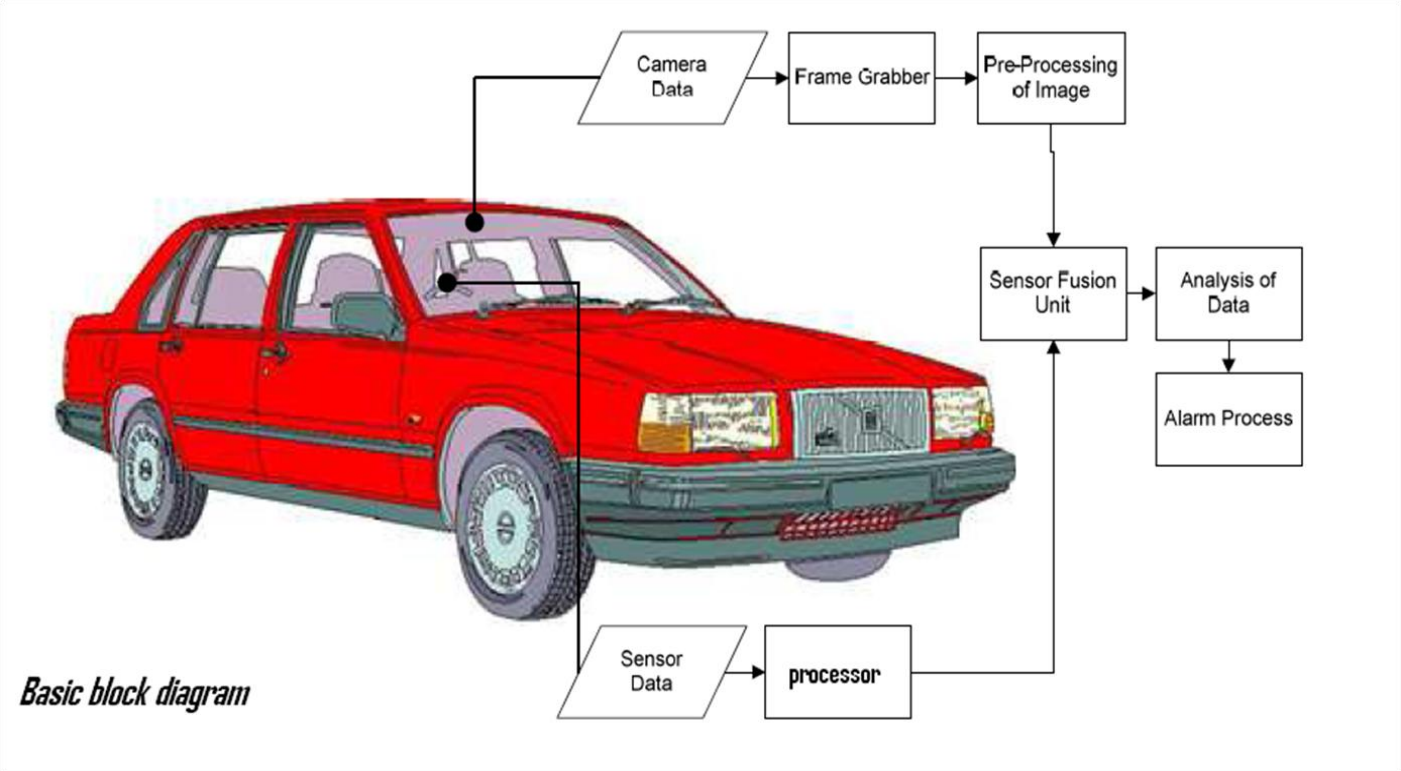

Fig6.Basic block diagram

FUNCTIONALITY:

The functionality of the system is illustrated in above figure: In above block diagram the various block used they are as follow

CAMERA:-A number of cameras were used in the development of this system. Each had different advantages over each other. The camera to be test with the system was a high-resolution is CMOS web cam with a manually variable focus lens. This camera used but had the higher resolution of 1028 x 840. This camera also implemented a face tracking system which could be run in parallel with the drowsiness detection system. This involved a digital zoom to the region of the face and output this frame to the fatigue detection system which allowed for the redundancy of much of the pre-cropping of the image. This solved the issue of initial face detection as the camera software would always deliver the facial

image to the system provided the subject stayed within the range of the high-resolution image. We used two camera ,first camera takes continues video i.e. monitoring driver face and then send output to the frame grabber. We use second camera for road detection in condition that when no traffic on road driver may drive in relax mode ,so pressure on steering wheel reduced in this case also.

FRAME GRABBER:-There are different types of grabber.Homemade Frame Grabbers Using the Parallel Port , Commercial Frame Grabbers: Euresys Picolo I.The frame grabber receives the camera feed from which it takes in the current image data in digital form and allows access to the data for processing. This procedure repeats itself at the start of every cycle once the previous frame is processed. The image is captured and taken into the system where it is pre-processed before the Hough Transform is applied.

PREPROCESSOR:-The image is reduced in size to the region surrounding the eyes, using cropping tools. Then the cropped image is converted from RGB (Red Green Blue) colour to a greyscale image with 255 levels of intensity. This reduces the amount of data in the image while retaining much of the critical information needed. Here data analysis is done,all the things such as ee blinking rate calculation then its comparision with standard rate or calculation of head movements.Then preprocessor send its result to the sensor fusion unit where result of pressure sensor by processor used in project is also coming.

PRESSURE SENSOR SYSTEM:-By making use of additional sensing devices and combining all of the information in a "sensor fusion" environment. Pressure sensor is fixed to the steering wheel of vehicle . Sensors in the steering wheel are analysed the amount of grip the driver is applying to the wheel. Pressure sensors could be located in the steering wheel to indicate how "tightly" the wheel is being gripped; if the pressure suddenly drops, this may indicate that the driver is relaxing his/her hands because of fatigue. This send report to sensor data On the other hand, the pressure may drop simply because the driver is relaxing, so visual information may be required to "confirm" the hypothesis that the driver is falling asleep.

SENSOR FUSION UNIT:- Once the pressure is processed and image data pre-processed the sensor fusion aspect of this project uses the information given to it to vary the sensitivity of the analysis of the image data. Should the steering wheel pressure be marginal the eye detection function will increase its scrutiny for signs of fatigue. Once sensor data has been considered the Hough Transform is applied to the

cropped greyscale image and circular object data is referenced to a minimum threshold to remove spurious detections and interferences. The data is analysed further for the detection of eyes in the image. This involves the application of the geometric features of the eye to the data, resulting in a more accurate detection. Resulting data is then further analysed to check if the points selected resemble eyes, using the colour data from the original image. Combining the resulting image information and the sensor data

ALARM:- After the analysis of data in data analyser the drowsiness detection system is able to decide whether the alarm procedure is activated or returns to the start where it re-initialises and the process starts over again. The functionality of this system should be unobservable to the driver during normal conditions and the driver should only be aware of the system, should the alarm procedure be activated.