VEHICLE ACCIDENT ALARMING SYSTEM USING IMAGE PROCESSING

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ABSTRACT

In every day by day rate of accidents by vehicles upsurges. For year 2014 along there were 384,029 road accidents according to the Ministry of Internal Transport. More than 10% of accidents happened due to falling in sleep while driving. To reduce this there should be an alarming system in vehicles. Some luxury vehicles have some systems to avoid accidents. But there are no systems available which can be separately attached to the vehicle. The system developed in this study is easily attachable to any vehicle. This system detects the rate of eye blinking and gesture of the head. The two signals captured from a camera send to an onboard computer for processing of real-time images. The camera attached to the system is equipped with night vision technique, because much of these kinds of accidents happen at night time. If the driver falls asleep, the onboard computer detects and sends a signal to the speaker to make a warning alarm.

Keywords: *Real-time image processing, automobile accident alarming*

1. INTRODUCTION

With the rapid increase in the number of accidents seems to be increasing day to day. Therefore a need arises to design a system that keeps the driver focused on the roads. Driver in-alertness is an important cause for most accident related to the vehicles crashes. Driver tiredness resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of the accidents on today's roads. Tired driver warning system can form the basis of the system to possibly reduce the accidents related to driver's sleepiness. Volvo escape route[1] is one of the many accidents avoiding system used in modern vehicles.

The purpose of such a system is to perform detection of driver tiredness. Accidents alarming system is developed for automobile safety. This system uses a night vision camera to detect eye blink rate and head gesture to identify whether the driver falls asleep or not. The pcDuino V2[2] is a small computer with a high processing power act as an onboard computer to process

image sent from the camera. If the above two parameters (eye blink rate and head gesture rate) fall down the threshold value, the pcDuino module will send a signal to alarming system. The warning sound can be user defined and both threshold values can be changed according to user. Volvo[1] escape route is one of the most sophisticated accidents avoiding system. The flow chart of the design is shown in the Figure 1.
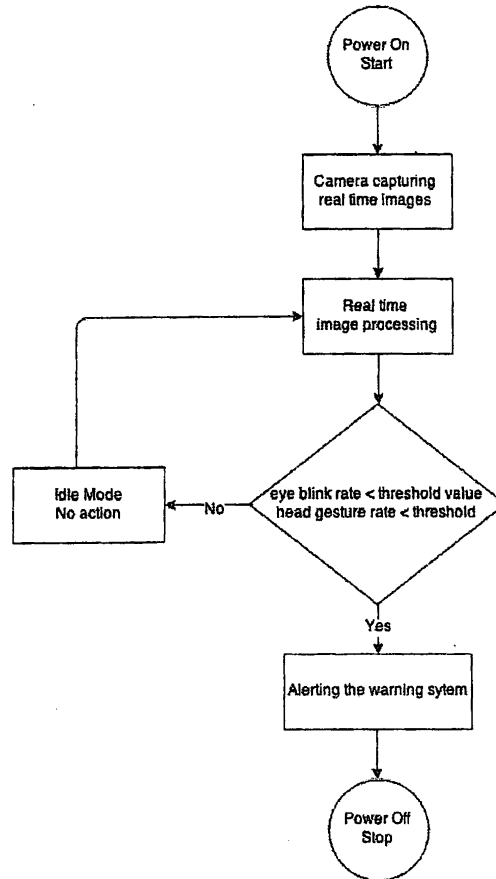

Figure 1: Flow Chart of the Accident Alarming System

2. EXPERIMENTAL

pcDuinov2 supported USB camera used to obtain real time images. pcduino v2 is an open source language with high powered small computer module. System implementing begins with PcDuino v2 development board and Toshiba CNFA1B night vision camera module. First attempt was to detect the camera module by the pcDuino and convert images to gray scale. Gray scale is used because it uses less processing power than with colors. The gray scale image then uses to detect both face and eyes. The detected face and eyes are marked with a red square. If either no face or no eyes are detected, the system makes an alarm signal. The pcDuino model is powered by the vehicles cigarette's lighter. It needed 5V, 2A supply through a mini USB connector. The programming was done using python[3, 4]. The image processing library used was OpenCV[5]. For the debugging prepossess, HDMI connecter

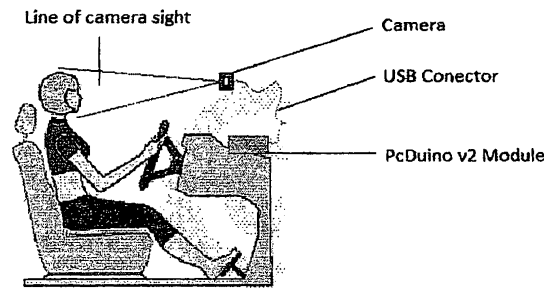connected between pcDuino and Laptop computer was used. For remote desk-toping VNC software was used.

Figure 2: Assembly Schematics Diagram of the System inside a Vehicle

3. RESULTS AND DISCUSSION

Implemented system is processing images according to the programmed code in python. The camera images size is not a problem because the device stores the images and deletes them after processing according to the code. Some algorithms should updated or written to improve the accuracy of the system. The difference between two real time images is one millisecond. The threshold value of eye blinking rate defined is 25 per minute and head gesture rate is adjusted to low range, because if it's high RAM will overloads and reduces the processing power of the pcDuino.

For testing purposes the camera was mounted on the sun wiser of a vehicle and minicomputer module was held on the dash board. The laptop computer that connected to the pcDuino held in the front passenger's seat. The system was tested while car's ignition ON in the neutral gear for safety. Both eyes open, both eyes closed and no driver cases were tested and got expected outputs.

The camera images are very clear in both day and night. The access speed of the data card directly causes to the starting of the device. For debugging purposes HDMI cable was connected to between Laptop computer and pcDuino. Cost of the pcDuino V2 is Rs.9000.00 and camera module is Rs.2500.00.

4. CONCLUSION

This system can attach to any vehicle regardless of their type. The techniques used are real time image processing using python and OpenCV libraries. The performance of this device

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works fine regardless of situation (if ignition is ON and no driver the system gives the warning).

This accidentalarming system wasdesignedusing the state of the arttechniques. The camera module can be changed to get better quality images because higher the quality of the image will require less the processing power. Also pcDuino can be replaced with Raspberry Pi development module[6]. But the Raspberry Pi module is less speed when compared to pcDuino.

The percent system is not self-starting, the programme should run through an external computer via HDMI cable. However as the further development, this can be improved by artificial intelligence to detect driver's gesture and make more accurate decisions.

ACKNOWLEDGEMENTS

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