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Proactive integrated detection to identify sleepy driver and RFID based auto zone detection for speed control

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ABSTRACT

In this paper a complete accident avoidance system is proposed by determining the driver's behavior. As the main causes of vehicle accident were related to human factors, it could be labeled in one of the two main driver's distraction categories (Alcohol Consumption and/or Drowsiness). The aim of the proposed system is to help in analyzing the factors associated with driver's behavior for the development of accident avoidance systems. The major causes of the traffic accidents will be discovered by analysing driver behavior with the help of the proposed system, will be used for the development of assistant devices and alarm systems that could help the driver to avoid risky situations. In this paper we are implementing two image processing tool to get the facial geometry based eye region detection for eye closure identification and also the combined tracking and detection of vehicles. Frequencies of eye blinking and eye closure are used as the indication of sleepy and warning sign is then generated for recommendation; outside an ego vehicle, road traffic is also analyzed. Alcohol sensor which is used to identify the drunk drivers to stop the car, Ultrasonic sensor is used to measure distance in front of cars. Break failure also detected.

Keywords: Ultrasonic sensors,

INTRODUCTION

The increasing number of road side accidents with increasing number of cars on the road is becoming a major issue. Statistics shows that, Malaysia lies in one of the top countries in which the rate of road side accidents is high. The reasons behind these accidents are different mistakes of driver, out of which most mistakes occurred due to drowsiness. In Europe, statistics show that between10% to 20% of all traffic accidents are due to drowsy drivers. NCSDR expert panel on fatigue has estimated that there are 56,000 crashes each year in US and the major cause of most of these crashes is drowsiness. For these reasons, it is essential to develop a driver monitoring system that can detect the fatigue level of driver and alert him/her in case of fatigue detection.

In this paper, we propose a fatigue detection system based on driving behavior which detects the drowsiness level of driver from his/her face and facial features and alert the driver in case of fatigue detection. The algorithm used hybrid method for face and facial feature detection, which not only increases the accuracy of drowsiness detection but also reduces the processing time. The other advantage of the system is that it is not intrusive and do not disturb the driving of driver while monitoring the vigilance level.

PROPOSED SYSTEM

The block diagram of the proposed system is shown in Figure 1 which consists of a microcontroller, an alcohol sensor, ultrasonic sensor, PC, LCD and a buzzer.

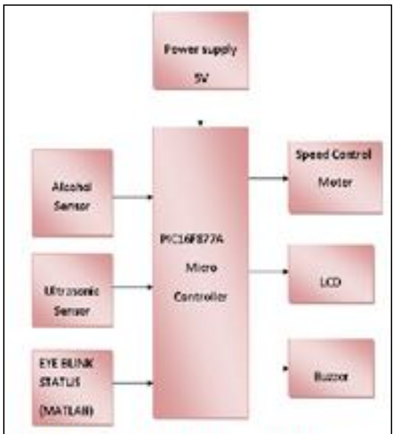

Figure 1: Block diagram of proposed system

Figure 2: Alcohol Sensor

Figure 3: Ultrasonic sensor

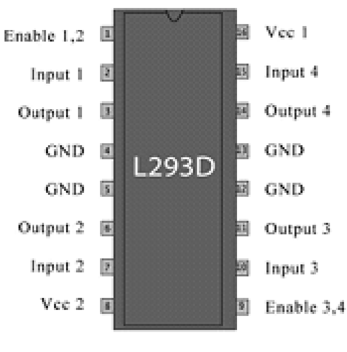

Figure 4: L293D Motor Driver

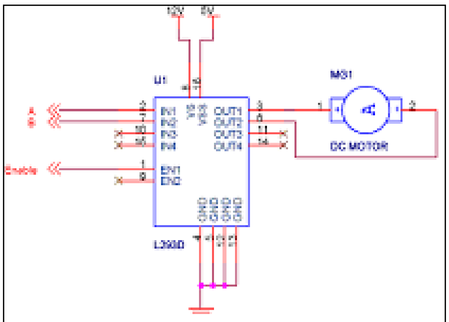

Figure 5: Interfacing a DC motor using L293D motor driver

The alcohol sensors shown in Figure 2 contain two or three electrodes, rarely four, in contact with an electrolyte. The electrodes are fabricated by fixing a high surface area precious metal on to the porous hydrophobic membrane. The gas diffuses into the sensor, through the back side of the porous membrane to the working electrode where it is oxidized. This electrochemical reaction results in an electric current that passes through the external circuit. Changing the diffusion barrier allows the sensor manufacturer to tailor the sensor to a particular target gas concentration range. Since the diffusion barrier is basically mechanical, the calibration of electrochemical sensors tends to be more stable over time and so electrochemical sensor based instruments require much less maintenance than some other detection technologies.

Ultrasonic sensors shown in Figure 3 are based on measuring the properties of sound waves with frequency above the human audible range. They are based on: the Doppler effect, time of flight and the attenuation of sound waves. They are non-intrusive in that they do not require physical contact with the target, and can able to detect certain clear or shiny targets else obscured to some vision-based sensors. Ultrasonic sensors can offer a number of advantages over optical methods. Most notably, they can be used for measuring distance to any surface, including glass and liquids. Ranges vary from a few millimeters to around ten metres, without increasing the size of the device.

The DC Motor or Direct Current Motor is the most commonly used actuator for producing continuous movement and whose speed of rotation can be easily controlled, making them ideal for use in applications such as speed control, servo type control and positioning is required. L293D is a dual H-Bridge motor driver (Figure 4). So with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if we have motor with fix direction of motion then we can make use of all the four I/Os to connect up to four Direct Current motors. L293D has peak output current of 1.2A per channel and output current of 600mA. For protection of circuit from back EMF output diodes are included within the IC. The output supply (VCC_2) has a wide range from 4.5V - 36V. A simple schematic for interfacing a DC motor using L293D is shown in Figure 5. As seen in Figure 5, three pins are needed for interfacing a DC motor (A, B, Enable). If we want the o/p to be enabled completely then we can connect Enable to VCC and only 2 pins needed from controller to make the motor work.

HARDWARE IMPLEMENTATION OF PROPOSED SYSTEM

Figure 6 shows the hardware layout of the proposed system. (i)The alcohol sensor, Webcam for eye blink are connected to the port A pins of the PIC microcontroller. (ii) Ultrasonic sensor and Brake detect are connected to the port B pins of pic controller. (iii)Yawn detection is identified with a set of MATLAB coding which is connected to PIC through RS 232 and MAX 232. (iv) The LCD used in this project is a 2*16 display.

Alcohol sensor which is fixed at the steering section detects the alcoholic consumption of the driver. In MATLAB, image processing tool algorithm is developed to detect the driver drowsiness and to alert the driver and also to intimate to hardware to stop the car. Frequencies of eye blinking and eye closure are used as the indication of sleepy and warning sign is then generated for recommendation; outside an ego vehicle, road traffic is also analyzed. Ultrasonic sensor also employed to detect the distance between the front and the rear vehicles. If the distance seems to be very less, then an alert will be given to the driver to slow down the vehicle. If the speed is not reduced by the driver then an automatic braking will be activated to stop the vehicle. The flowchart shown in Figure 7 represents the signal flow from sensor and webcam to the microcontroller and the action taken to reduce the speed of the motor.

Figure 6: Hardware Layout of the Proposed System

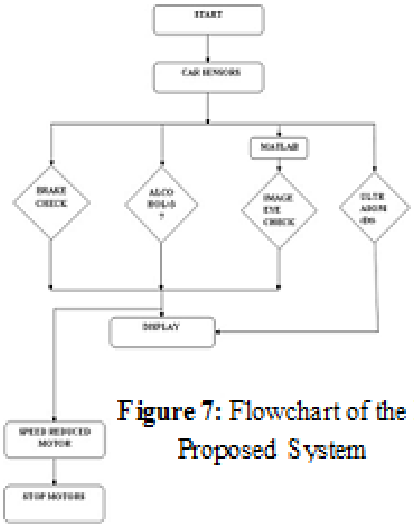

Figure 7: Flowchart of the Proposed System

RESULTS AND DISCUSSION

All the algorithms are implemented in MATLAB 7 and are these programs are tested in Windows XP 32bit operating system and 2 GB of RAM. This algorithm is tested with video images of the type shown in Figure 8-10. The Videos are converted in to sequence of frames for the purpose of testing. Table.1 shows the percentage error of the images and the average accuracy of the system is 96 %.

Figure 8: Normal Eye Position of the Driver

Figure 9: Closed Eye Detection of Sleepy Driver

Figure 10: Lip Detection of Driver

Table.1.Percentage error of the images

Video	Number of frames	Eye detection	Closed eyes detection	Lip detection
Video A	1050	0.56 %	1.08 %	0.076 %

CONCLUSION

This paper describes the implementation of automatic speed reduction of the motor based on the drowsiness of the driver. In detail it describes a fatigue detection system based on driving behavior. The proposed system uses skin color pixels detection and VJ method for face detection. Facial feature detection is achieved by dividing the image into three parts and applying VJ method on each part of the image. For accurate detection of yawning and eyes status a threshold value is calculated dynamically and each coming frame is compared to the threshold value for drowsiness detection. The processing time for drowsiness detection decreases due to fast detection rate of face and facial features. The accuracy level of face and facial feature detection is increased due to application of hybrid method, which in turn increases the accuracy level of the whole system. The system is designed on software bases only and Matlab software is used for simulation. Since VGA camera is used for image acquisition, hence the system works in daylight only. Using of night vision camera in future might make the system able to detect drowsiness level of driver in nighttime as well.

REFERENCES

B. G. S. Hyun Jae, Chung Ko Keun, Kim ,KwangSuk, Park, A Smart Health Monitoring Chair for Nonintrusive Measurement of Biological Signals, Information Technology in Biomedicine, IEEE Transactions on, vol. 16, pp. 150-158, 2012.

J. Z. Zutao Zhang, A new real-time eye tracking based on nonlinear unscented Kalman filter for monitoring driver fatigue, Journal of Control Theory and Applications, 8, 2010, 181-188.

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L. M. N. Bergasa, J. Sotelo, M. A. Barea, R. Lopez, M. E, Real-time system for monitoring driver.
L. P. Danghui, Sun YanQing, Xiao Yunxia, Yin, Drowsiness Detection Based on Eyelid Movement, in Education Technology and Computer Science (ETCS), 2010 Second International Workshop on, 2010, 49-52.
S. Abtahi, Hariri, B , Shirmohammadi, S, Driver drowsiness monitoring based on yawning detection, in Instrumentation and Measurement Technology Conference (I2MTC), 2011 IEEE, 2011, 1-4.
S. B. M. T. SzeSeen Kee, YongMeng Goh, Driving Fatigue and Performance among Occupational Drivers in Simulated Prolonged Driving, Global Journal of Health Science, 2, 2010.
S. G. H. Charles C. Liua, Michael G. Lennéa, Predicting driver drowsiness using vehicle measures: Recent insights and future challenges, Journal of Safety Research, 40, 2009, 239-245.
T. H. Laurence Hartley, Nick Mabbott, Review of Fatigue Detection and Prediction Technologies, Institute for Research in Safety & Transport Murdoch University Western Australia and Gerald P Krueger Krueger Ergonomics Consultants, 2000.
T.-W. L. Yu-Shan Wu, Quen-Zong Wu,Heng-Sung Liu, An Eye State Recognition Method for Drowsiness Detection, IEEE international Conference, 978-1-4244-25, 2010.
W. Z. U. Yufeng, Detection driver yawning in successive images, in proc first International Cont. on Bioinformatics and Biomedical Engineering, 581-583, 2007.