

A PROPOSED MODEL ON HUMAN SLEEP DETECTION SYSTEM IN AUTOMOBILES

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ABSTRACT

Driver fatigue and consumption of alcohol is one of the most common reasons for fatal road accidents around the India. This shows that in the transportation industry especially, where a driver of a heavy vehicle is often exposed to hours of monotonous driving which causes fatigue without frequent rest period. Due to the frequent incidence of driver fatigue this has become an area of great socio economic concern. Consequently, road accidents prevention systems by detecting driver's drowsiness, which measure the level of driver inattention and provide a warning when a potential hazard exists, have received a great deal of attention a same as sure to prevent accidents caused by driver inattention. In this paper incorporates in it literature survey carried out on several researchers conducted on sleep detection system in four wheelers and some additional features related to the safety and rules for the drivers. It also gives its readers to easily understand the whole system because the paper has a complete block diagram of the system.

KEYWORDS: Image Processing, MATLAB, Alcohol Detector, Microcontroller etc.

I. INTRODUCTION

With the ever increasing population and usage of automobiles, there is an increase in the number of fatalities as well. India, unfortunately, boasts of a very high number of 142,485 traffic related fatalities. There are a number of reasons that can be attributed to this astonishing statistic, a few of primary concern being Fatigue, Alcohol Consumption and Sleep Deprivation. This project entitled "Human Sleep Detection in Automobile" developed a method to test for the closing of eyes of a person driving an automobile and provide an alarm indication if the eyes are detected to be closed for more than a specified amount of time. MATLAB Image processing techniques are adopted to detect the closure of the eye by sectioning only that portion of the driver's face from alive video relay obtain educing a front camera or web cam attached with the laptop.

II. LITERATURE SURVEY

Prof P. R. Sonawane etal [5]: In this page author describes the drowsiness in drivers can be generally divided into the following categories:

- Sensing of driver operation
- Sensing of vehicle response.
- Monitoring the response of driver.
- Sensing of physiological characteristics.

Among these methods, the techniques based on human physiological phenomena are the most accurate. This technique is implemented in two ways:

- Measuring changes in physiological signals, such as brain waves, heart rate, and eye blinking.
- And measuring physical changes such as sagging posture, leaning of the driver's head and the open/closed states of the eyes.

The first technique, while most accurate, is not realistic, since sensing electrodes would have to be attached directly onto the driver's body, and hence be annoying and distracting to the driver. In addition, long time driving would result in perspiration on the sensors, diminishing their ability to monitor accurately. The second technique is well suited for real world driving conditions since it can be non intrusive by using video cameras to detect changes. Driver operation and vehicle behavior can be implemented by monitoring the steering wheel movement, accelerator or brake patterns, vehicle speed, lateral acceleration, and lateral displacement. These too are nonintrusive ways of detecting drowsiness, but are limited to vehicle type and driver condition. The final technique for detecting drowsiness is by monitoring the response of the driver. This involves periodically requesting the driver to send a response to the system to indicate alertness.

K. Subhashini Spurjeon etal [6]: In this paper author describes a real time system for analyzing video sequences of a driver and determining the level of attention. For this purpose, author uses the computation of percent of eyelid closure. The eye closure acts as an indicator to detect drowsiness. Driver's fatigue and drowsiness are the major causes of traffic accidents on road. It is very necessary to monitor the driver's vigilance level and to issuing an alert when he/she is not paying enough attention to the road is a promising way to reduce the accidents caused by driver factors. The fatigue monitoring can be starts with extracting visual parameters. This can be done via a computer vision system. In the purposed work, author purpose a real time robust methods for eye tracking under variable lighting conditions and facial orientations. In this paper the latest technologies in pattern classification recognition and in object tracking are employed for eye detection. The tracking is based on the eye appearance. Visual information is acquired using a specially designed solution combining a CCD video camera with an IR illumination system. The system is fully automatic and detects eye position and eye closure and recovers the gaze of eyes. Experimental results using real images demonstrate the accuracy and robustness of the proposed solution. This could become an important part in the development of the advanced safety vehicle.

Nidhi Sharma etal [7]: In this paper author discuss about the various artificial intelligence methods for detecting the drowsiness of system. Driver's drowsiness is an important factor in motoring of vehicle from accidents. The driving performance deteriorates with increased drowsiness with resulting crashes constituting morel vehicle accidents. In recent years, there has been growing interest in intelligent vehicles. The ongoing intelligent vehicle research will revolutionize the way vehicles and drivers interact in the future. The detection mechanism into vehicles may help prevent many accidents. There are various techniques used for analyzing driver exhaustion. Most of the published research on computer vision approaches to detection of fatigue has focused on the analysis of blinks and head movements. After long hours of driving or in absence of mental alert state, the attention of driver starts to loose and that creates risks of accidents. These are the typical reactions of fatigue, which are very dangerous. In image fatigue detection, correct and real time decision is very important. In this paper, author discusses the various artificial detection.

Behnoosh Hariri etal [8]: Describe that the drowsy is the major issue behind the road accidents. The use of assistive systems that monitor a driver's level of vigilance and alert the driver in case of drowsiness can be significant in the prevention of accidents. In this paper author purposed a new approach towards detection of drives drowsiness based on yawning measurement. This involves several steps including the real time detection and tracking of driver's face, detection and tracking of the mouth contour and the detection of yawning based on measuring both the rate and the amount of changes in the mouth contour area. In this paper several techniques are used, that are applied several techniques to ensure the robust detection of yawning expression in the presence of variable lighting conditions and facial occlusions. Test results demonstrate that the proposed system can efficiently measure the aforementioned parameters and detect the yawning state as a sign of driver's drowsiness.

Prof. V. K. Banga etal [9]: In this paper author discuss about the safety warning systems. This system is active warning systems for preventing traffic accidents have been attracting much public attention. Safe driving is a major concern of today's societies. There are thousands of accidents are happen in a day. Due to which many people get injured and many out of them got die. The aim of this paper is to develop a prototype drowsiness detection system. The main focus is on designing a system that are used for l accurately monitor the open or closed state of the driver's eyes in real time. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. The author purposed a vehicle driver drowsiness warning system using image

processing technique with neural network. It is based on facial images analysis for warning the driver of drowsiness or inattention to prevent traffic accidents. The facial images of driver are taken by the video camera that is installed on the dashboard in front of the driver. A Neural network based algorithm is proposed to determine the level of fatigue. It measures by the eye opening and closing, and warns the driver accordingly.

III. METHODOLOGY

The main aspect of the project is totally depends on monitoring the physiological condition of the driver using image processing. In this monitoring we are going to monitor closed and open eye condition of the driver and also eye blink count of the driver eyes by monitoring this two condition then we are going to decide whether driver is drowsy or not.

For this purpose the actual propose system of our project is shown below:-

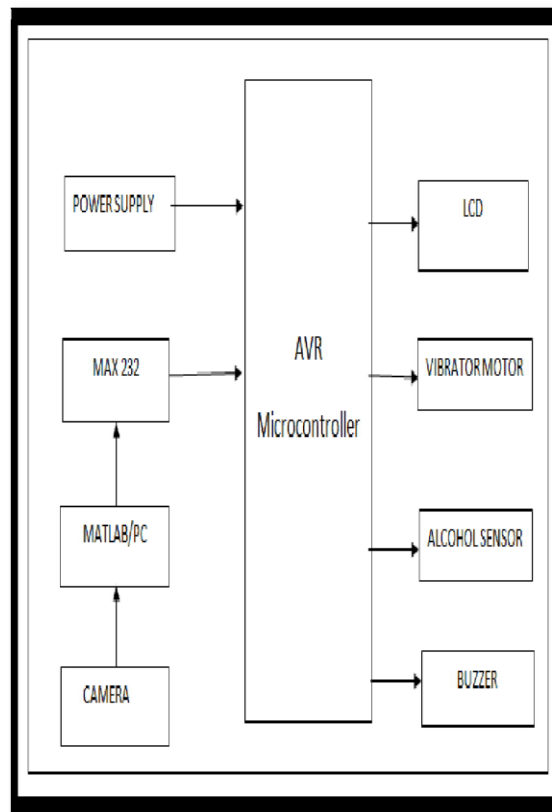


Fig.1 Block diagram of system.

1. Microcontroller:-

Microcontroller is the heart of this circuit. The microcontroller used is AVR Atmega328 from Atmel company. Here we have used one AVR microcontroller IC on the detection side of the driver drowsiness. The ATmega328A is a low power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

2. Vibrator motor:-

Vibrator motor is used for alerting the driver from drowsiness condition after drowsiness condition is detected. Here we are using Pico Vibe™ 4mm Vibration Motor-8mm Type vibrator. In this 4 mm is body diameter and 8 mm is body length.

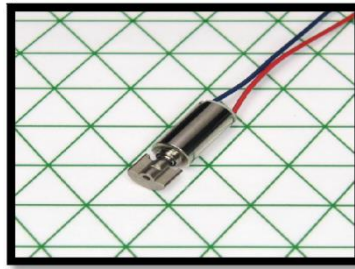


Fig.2 Vibrator motor

3. Alcohol Sensor:-

MQ-3 Semiconductor Sensor for Alcohol detection is used in this project. Sensitive material of MQ-3 gas sensor is SnO₂, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is more higher along with the gas concentration rising. MQ-3 gas sensor has high sensitive to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor.

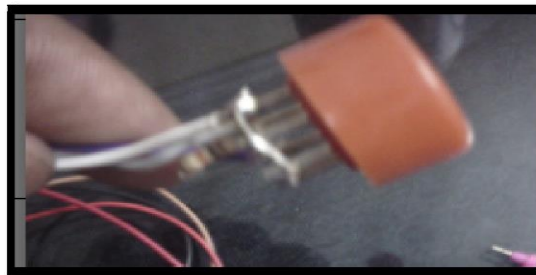


Fig.3 Alcohol sensor

4. MAX 232:-

MAX 232 is used for connecting the PC to the microcontroller unit for sending alertness signal from PC to the microcontroller.

Features:-

- Operate With Single 5-V Power Supply
- Operate Upto 120 Kbit/s

5. Buzzer:-

Buzzer is used for indication purpose, it indicates that the drivers drowsiness condition is detected. We are going to use the SD series pin terminal electromagnetic buzzer.

6. PC/MATLAB:-

PC is used to for processing the images of the Vehicle Driver that we are obtained from the camera which is located in front of the Driver. In PC we are using the MATLAB software tool for processing the close eye condition of the Driver means for Detecting the Drowsiness Condition of the driver. In this we are using the windows operating system.

7. Camera:-

In this project we are going to use the camera as the input device which locates remotely in front of the driver for capturing the current movements of the driver's eyelid movement. The Images taken by camera are transfer to the PC/MATLAB unit for processing in the MATLAB. By analyzing the images the system will know the Driver is Drowsy or not by analyzing the close eye condition in the images.

8. USB to serial converter:-

The USB processors ends the processed USB signals to a serial driver chip which applies the correct voltages and sends the processed data signals to the serial output.

IV. WORKING OF SYSTEM

The working of system is basically divided in three parts:

1) Alcohol detection unit:-

This is the important unit of our system in this unit first alcohol consumption test is done using alcohol detection sensor if alcohol consumption is detected then vehicle is not started.

2) Drowsiness detection unit:

Drowsiness detection unit consist of camera and MATLAB/PC for analysis of driver closed & open eye condition. This unit is totally software unit in this high quality camera is use for capturing the drivers face image. After capturing images the images are send to MATLAB for performing operations on it and analyzing closed or open eye condition.

3) Alerting system:-

Alerting system is a hardware part consist of buzzer vibrator motor which is used bellowed driver seat for wake up them from sleepy mode. Buzzer is activated upon when alcohol consumption is detected and also when driver drowsiness is detected.

V. CONCLUSION

In this project we have designed a system and method that provides an innovative and practically implementable drowsiness detection system for avoiding the everyday occurring road accidents due to drowsiness of the driver.

Due to this system we can save the two important things for the people:-

1. The most worth full and important human lives that people may have to loss after accidents occur most of the time.
2. We can also save the individual from facing economical losses that occur after accidents.

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