



An Innovative Approach for Drowsiness Detection Warning & Accident Prevention using Image Processing

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ABSTRACT: The goal of this project is to design an Accident Prevention System which helps in preventing or avoiding accidents. The driver is more prone to accidents due to drowsiness and the disturbing intruders. This project describes a real-time online prototype driver-fatigue monitor.

Driver fatigue is one of the most common reasons for fatal road accidents around the world. 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 as a measure to prevent accidents caused by driver inattention. In this project an efficient driver's drowsiness detection system is designed using eyelid movement & yawn detection by taking eye detection and mouth detection into consideration simultaneously so that road accidents can be avoided successfully. This is found to be reasonably robust, reliable and accurate in fatigue characterization.

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. Hence, we 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 a live video relay obtained using a front camera or webcam attached with the laptop or desktop.

II. LITERATURE SURVEY

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

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

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attached directly on to 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. .

III. METHODOLOGY

The main aspect of the project is totally depend 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 weather driver is drowsy or not.

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

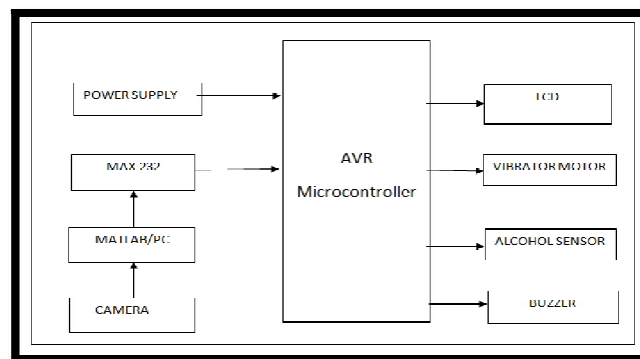


Fig.Block diagram of system

IV.BLOCK DIAGRAM EXPLANATION

1. Microcontroller(AVR Atmega16A):-

Microcontroller is the heart of this circuit. The microcontroller used is AVR, Atmega16A from Atmel company. Here we have used one AVR microcontroller IC on the detection side of the driver drowsiness. The ATmega16A 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 ATmega16A achieves throughputs approaching 1 mips per MHz allowing the system designer 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 4mm is body diameter and 8mm is body length.

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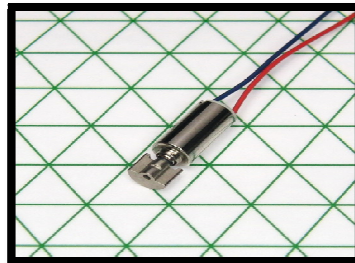


Fig. vibrator motor

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.

Output	Level of drunkness		
	130 ppm- 260 ppm	261 ppm - 390 ppm	391 ppm - 650 ppm
LCD Disply	"Alcohol not detected"	"Alcohol detected & display concentration"	"Alcohol detected & display concentration"
Buzzer	OFF	ON	ON

level of drunkness in ppm

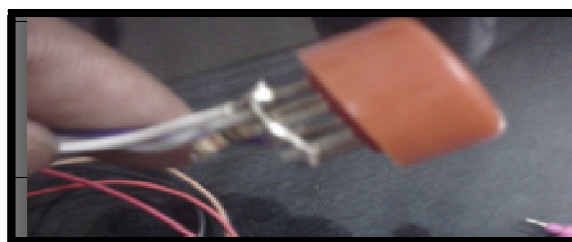


Fig. Alcohol sensor

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:-

- Meet or Exceed TIA/EIA-232-F and ITU Recommendation V.28
- Operate With Single 5-V Power Supply
- Operate Up to 120 kbit/s
- – 2000-V Human-Body Model (A114-A)



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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.SD1209T3-A1, SD1209T5-A1(Applicable to automobile) / ϕ 12mm TYPE

Features:-

- These high reliability electromagnetic buzzers are applicable to automobile equipment.
- Compact, pin terminal type electromagnetic buzzer with 2048Hz output.
- Pin type terminal construction enables direct mounting onto printed circuit boards.

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 used the camera as the input device which locate remotely in front of the driver for capturing the current movements of the drivers eyelid movement. The Images taken by camera are transfer to the PC/MATLAB unit for processing in the MATLAB. By analysing the images the system will know the Driver is Drowsy or not by analysing the close eye condition in the images.

8.USB to serial converter:-

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

V. WORKING OF SYSTEM

The working of system is basical divided in three parts:

1) Alcohol detection unit:-

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

2) Drowsiness detection unit:Drowsiness detection unit consisst 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 analysing 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 him from sleepy mode. Buzzer is activated upon when alcohol consumption is detected and also when driver drowsiness is detected

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HARDWARE UNIT

4.FLOWCHART :-

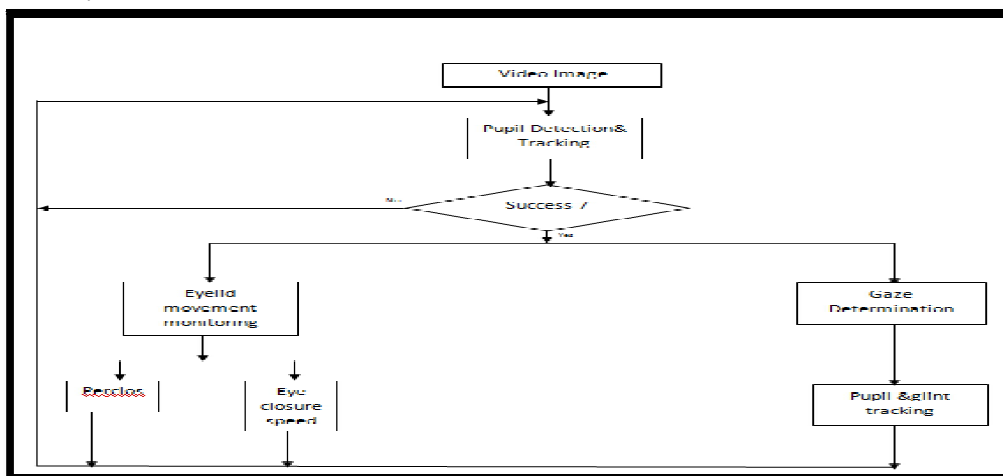
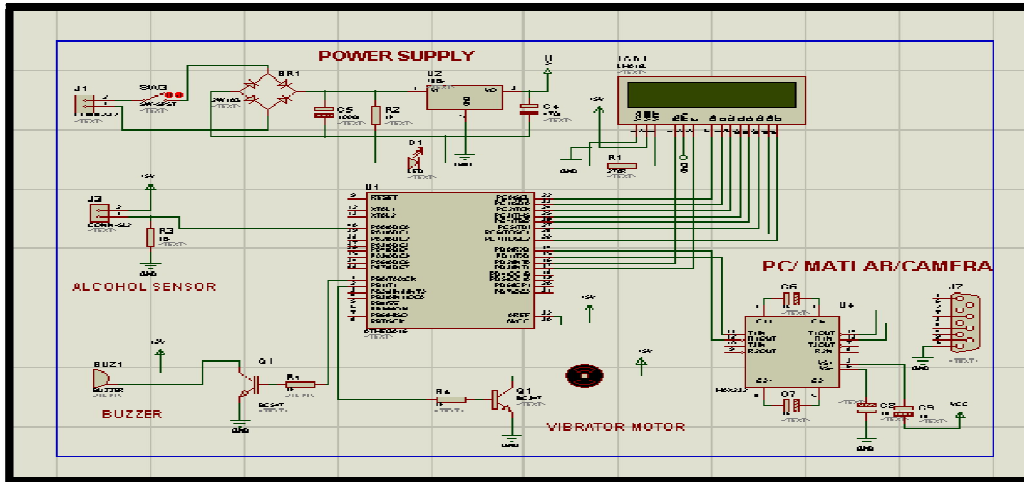


Fig.flowchart

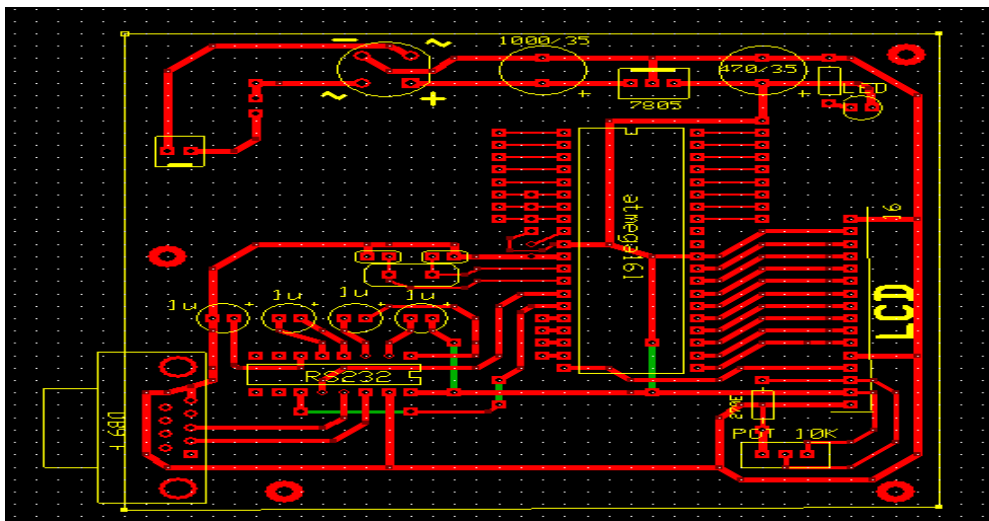
6. Software Used with Circuit Diagram:-

1) Proteus:-

Proteus 6.9 is a Virtual System Modeling (VSM) that combines circuit simulation, animated components and microprocessor models to co-simulate the complete microcontroller based designs. This program allows users to interact with the design using on-screen indicators and/or LED and LCD displays and, if attached to the PC, switches and buttons.



Circuit Schematic On Proteus



PCB final layout

VI.RESULTS

The result of our system is shown below :-

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 .



Fig. When alcohol is detected

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2.Drowsiness detection unit:-

Drowsiness detection unit is 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 analysing closed or open eye condition

When driver drowsiness detected:-



Fig.Driver drowsiness detected display

1) Alerting system:-

Alerting system is nothing but hardware part used for alerting the driver or other passenger in vehicle after drowsiness condition is detected. This hardware part consist of buzzer,vibrator motor which is used bellowed driver seat for wake up him from sleepy mode. Buzzer is activated upon when alcohol consumption is detected and also when driver drowsiness is detected. Vibrator motor activation:-

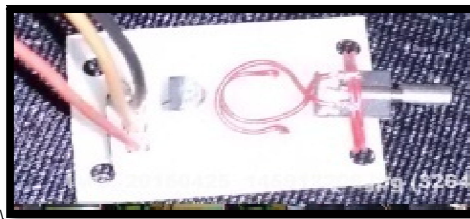


Fig.Vibrator motor activation

VII .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 worthful and important human lives that people may have to loss after accidents occure most of the time
2. We can also save the individual from facing economical losses that occure after accidents.

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