



VEHICLE SAFETY SPEED CONTROLLER UNDER DRIVER FATIGUE BY USING EYE BLINK SENSOR

¹C. Nagarajan, ²*R. Gayathri, ³M. Kalpana and ⁴M. Kavitha

¹Professor, EEE Department, Muthayammal College of Engineering, Rasipuram.

^{2,3,4}UG Students, EEE Department, Muthayammal College of Engineering, Rasipuram.

Article Received on 06/02/2019

Article Revised on 25/02/2019

Article Accepted on 17/03/2019

*Corresponding Author

R. Gayathri

UG Students, EEE

Department, Muthayammal

College of Engineering,

Rasipuram.

ABSTRACT

Accidents due to driver drowsiness can be prevented using eye blink sensors. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the

vibration sensor can be varied and accordingly action can be taken. The outcome is that the vibrator attached to eye blink sensor's frame vibrates if the driver falls asleep and also the LCD displays the warning messages. The wheel is slowed or stopped depending on the condition. This is accompanied by the owner being notified through the GSM module, so the owner can retrieve the driver's location, photograph and police station list near to driver's location. This is how the driver can be alerted during drowsiness and the owner can be notified simultaneously.

KEYWORDS: Eye Blink Sensor, GSM module, LCD.

1. INTRODUCTION

For any vehicle accidents driver's faults are the most accountable aspect to cause dangerous problem to the society. Many drivers cannot control the vehicles due to different reasons it may cause severe accidents and sometime death. For vehicle accidents various factors involved such as drunk driving, over speeding, many distractions like texting while driving, talking with others, playing with children etc. one of the important factor is sleeping on the wheel. People know the dangerous of alcohol consumption and run the vehicles but they not

understand the seriousness of fatigue driving. In India, Ministry of Road Transport and Highway released a report in 2015, every day around 1,374 accidents may happen and almost 400 people deaths occur. Every hour because of vehicle accidents approximately 57 road accidents and 17 people dies. In that 54.1 percent of people are in the age group of 15 to 34 years are killed in vehicle accident. The Government of India, Ministry of Road Transport and Highway Government of India prepare a strategy to diminish the amount of motorway accidents and losses by 50 % by 2020.

Globally vehicle accidents have seemed one of the major community health problems. In India almost 5 lakh road accidents happened in the year 2015. A fatigue Driver those who falls asleep at the move fails to control the vehicle, not possible to take immediate action and results in a crash so it is necessary to monitor the drowsiness of the driver to prevent accidents.

2. Literature Survey

Automatic driver drowsiness can be detected using artificial intelligence and visual information. System is to detect, track and examine face and eyes of drivers for this different real vehicle image of drivers are taken to validate the algorithms. It is a real time system work in different light conditions. The numbers of accidents are increased due to several factor, one of the main factor is that driver fatigue. Driver's sleepiness is also implemented using video based approach. This system is noninvasive and human related elements are used. Band power and Empirical Mode Decomposition methods are used to investigate and extract the signal, SVM (Support Vector Machine) used to confirm the analysis and to categorize the state of vigilance of the driver .The system designs to find the drivers drowsiness using the hypothesis of Bayesian networks. The interaction between driver and vehicle features are extracted to get reliable symptoms of driver drowsiness. It presents more suitable and accurate strategies to design drowsy driver detection system .Brain and visual activity is used in drowsiness detection system. Electroencephalographic (EEG) channel used to monitor the brain activity. Diagnostic techniques and fuzzy logic are used in EEG-based drowsiness detector. Using blinking detection and characterization for visual activity monitored. Electro oculo graphic (EOG) channel are used to extract the Blinking features

3. Methodology

The concept of drowsy driver detection system focuses on the functioning of all sensor modules used in the project. This helps explain the inputs received by modules and the outputs they produce.

3.1 Eye Blink Sensor

This sensor module consists of the eye blink sensor frame, the IR sensor and a relay. The vibrator device is connected to the eye blink sensor frame which is to be worn by the driver. This vibrator vibrates whenever an accident occurs or the driver falls asleep. The frame consists of the IR transmitter which transmits the IR rays towards the driver's eyes and an IR receiver which receives the reflected rays when the eyes are closed. The relay provides the extra current required by this module and hence is also connected to the SST microcontroller board.

3.2 LCD

LCD is a device which displays the messages in case the driver falls asleep or accident occurs. The messages displayed are —SLEEPING|| and —ACCIDENT OCCURRED|| as per the situation. All the modules are connected to it so that the particular signals can be received and hence message could be displayed. It uses the power supply from the SST microcontroller board displays a —WELCOME|| message. It also provides 5V power to other modules.

3.3 LM317PSU Board

This board is connected to the relay chip which in further connected to the eye blink sensor system module. This board's main purpose is to fulfill the power requirements of the eye blink sensor module.

3.4 DC Motor

The motor acts as the wheel of the vehicle and it rotates when the power is supplied to it through L298 chip. The speed of rotation is slowed down when the driver falls asleep as detected by the eye blink sensor, in the other case the wheel is stopped when the accident occurs.

3.5 Vibration Sensor

The purpose of this sensor is to sense any jerk given to the vehicle which is the emulation of the accident occurrence in real time. This receives power from the 5V port of the LCD. The output produces and sends signals to dc motor driver and stops the rotation of the wheel, that is, the motor.

4. Implementation

4.1 Hardware Requirements

The various sensors form the hardware part of the project and power supply is AC DC 12V adapter. Other hardware modules are specified as follows:

4.2 Software Requirements

For the implementation of the modules, the coding language is specified in this part and also the platforms used for coding and the android application development:

- 1) Keil C compiler
- 2) Embedded system

There shall be no element of doubt regarding the correctness of the distance measured. The system must have the android app for location detection since phone's processor is faster than that used by GSM module. The system should be robust.

4.3 Development Methods

The development methods decide a large section of how the final system functions, and thus care is taken to ensure that the best practices, tools and equipments are used. The system will be developed using Keil IDE. The programming language embedded C will also be used. Certain sections of the system will be ported android application development for performance enhancement. The main modules would be microcontroller, IR sensor, LM358 comparator, accelerometer, LCD and android phone.

4.4 System Architecture

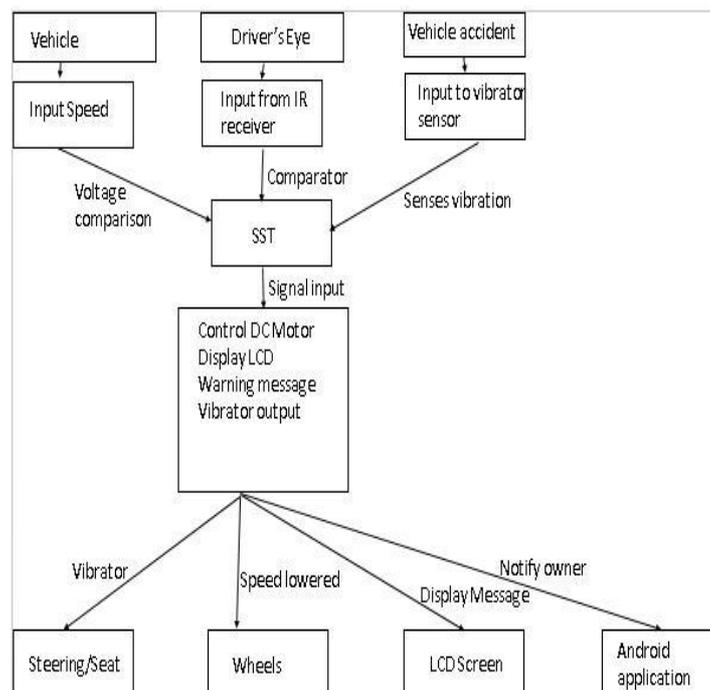


Fig. 1: Block diagram.

Drowsy driver detection system is divided into subsystems and these sub systems gives some interconnected services. Architecture design can be defined as proving a framework for sub-system control, in the first stage of the design process all subsystems of the drowsy driver detection system are identified and hence, the design process output is a output of this a explanation of the software architecture. A basic structural framework for a system can be established through architectural design process. The identification of the major components of the system and communications between these components is considered under this.

The system architecture below portrays the blocks required for the implemented system. Figure 1 outlines the system architecture. The sensors need to detect respective parameters and pass the signals to microcontroller. The outputs from SST are used as inputs by various output devices to control the speed and display the message.

4.5 Input Module

This section is responsible for taking in crisp values of the vehicle, eye blink movements any vibration caused to vehicle due to accident.

- **Purpose**

The purpose of this module is obtaining values from each sensor and comparing them with reference values.

- **Functionality**

The functionality of this module is to obtain the raw values and pass signals to SST.

- **Input**

The input to this module are the crisp values of vehicle speed, IR from eye blink sensor and values from shock due to accident.

- **Output**

The output of this module is fed into SST80C51 microcontroller.

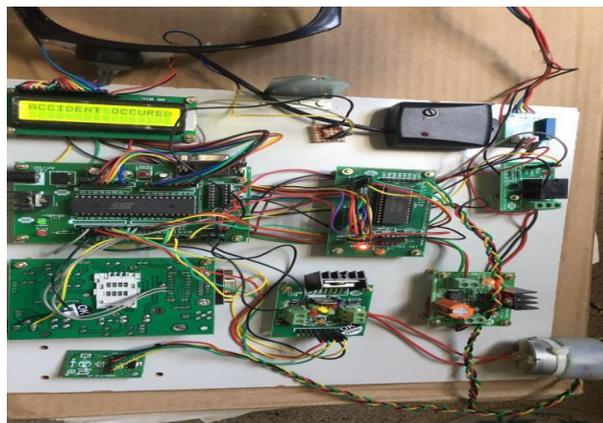


Fig. 2: Hardware setup 1.

4.6 SST Microcontroller

This section contains three inputs and outputs to various output devices. It receives the signals from the previous modules

- **Purpose** The purpose of this module is to pass the received values as input to output devices.
- **Functionality** This module provides inputs to the output devices.
- **Input** The inputs would be outputs received by input devices.
- **Output** The output of SST would be passed to other output devices so various functionalities could be carried out as demanded by project.

4.7 Output Devices

This section contains DC motor, LCD, vibrator, GSM module which perform their respective function. The purpose of this module is to carry out respective functionalities such as slowing down the vehicle speed, alerting the driver, notifying the owner and displaying message on the LCD.

4.8 Eye Blink Sensor

To observe the solidness of the traffic, we will be placing a few sets of IR transmitter & receiver sensors on the side of the roads. On side IR transmitter device will be installed & right opposite to the IR transmitter, an IR receiver will be positioned. This set of IR transmitter & receiver will be placed at interim distance on the road.^[19] The IR transmitters are attached to supply, so that they will transmit high signal all the time. The IR receivers are attached to the comparator circuit, to get digital signals. A low power operational amplifier LM324 IC has been used to build a comparator circuit. Two set of LM324 IC has been used in this project.^[20]

5. RESULTS

5.1 The Drowsy Driver Detection System

The results obtained by running the module are as follows:

- The owner's phone receives an audio warning message.
- The owner can retrieve the location of the driver by choosing the —location‖ option.
- The owner can also get a list of driver's nearby police stations. With this, the photograph of the driver can be sent to owner's email address as specified in the clamped phone.
- The wheel/motor is stopped as soon as an accident occurs, the vibrator in the eye blink sensor frame vibrates and displays a message on the LCD.
- When the driver falls asleep, the vibrator vibrates and the LCD displays the message. Along with this, the vehicle speed is automatically reduced.
- When the accelerometer is tilted randomly, that acts as the steering, a message is displayed on the LCD the speed of the vehicle is reduced.
- With all of the above mentioned, the android applications send and receives details simultaneously.

5.3 Eye is shut



Fig. 3: Hardware setup 2.

7. CONCLUSION

The proposed system helpful to avoid vehicle accidents because of driver's sleepiness using eye and design the system for driver fatigue detection. If the driver becomes drowsy the eye blink sensor's frame vibrates attached to the vehicle and also the LCD displays the warning messages and it alerts the driver's through alarm sound to avoid the road accidents. The wheel is slowed or stopped depending on the condition. This is accompanied by the owner being notified through the GSM module, so the owner can retrieve the driver's location, photograph and a list of nearby police stations.

REFERENCES

1. MarcoJavier Flores, JoséMaría Armingol and Arturo de la Escalera, "Driver Drowsiness Warning System Using Visual Information for Both Diurnal and Nocturnal Illumination Conditions", *Springer, EURASIP Journal on Advances in Signal Processing*, 2010.
2. C.Nagarajan and M.Madheswaran, 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter with fuzzy controller' - *Journal of Electrical Engineering*, 2012; 63(6): 365-372.
3. R.Raja and C.Nagarajan, "Performance Analysis of LCL-T Filter Based 2 Stage Single Phase Grid Connected Module with ANN Controller using PV Panel," *Current Signal Transduction Therapy*, 2018; 13(2): 159-167.
4. C.Nagarajan and M.Madheswaran, "Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis" *Springer, Electrical Engineering*, 2011; 93(3): 167-178.

5. E.Geetha, C. Nagarajan, "Stochastic Rule Control Algorithm Based Enlistment of Induction Motor Parameters Monitoring in IoT Applications," *Wireless Personal Communications*, 2018; 102(4): 3629–3645.
6. M.Madheswaran, C.Nagarajan, "DSP Based Fuzzy Controller for Series Parallel Resonant converter", *Frontiers of Electrical and Electronic Engineering*, 2012; 7(4): 438-446.
7. C.Nagarajan, "Single-Stage High-Frequency Resonantac/AC Converter Using Fuzzy Logic and Artificial Neural networks', *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 30-37.
8. E Geetha, C Nagarajan, "Induction Motor Fault Detection and Classification Using Current Signature Analysis Technique", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 48-52.
9. GS SatheshKumar, C Nagarajan, ST Selvi, "A Virtual Impedance Based Analysis of Dynamic Stability in a Micro-Grid System", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 38-41.
10. CS Lakshmi, C Nagarajan, "Neural Controlled Multi-Level Inverter Based DVR for Power Quality Improvement", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 42-47.
11. S Thirunavukkarasu, C Nagarajan, "Performance Analysis of BLDC Motor Drive for Feed Drives", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 67-70.
12. JP Daniel, C Nagarajan, "Hybrid Filter for Distorted Voltage Source in Microgrids", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 11-15.
13. K Umadevi, C Nagarajan, "High Gain Ratio Boost-Fly Back DC-DC Converter using Capacitor Coupling", *Conference on Emerging Devices and Smart Systems (ICEDSS)*, 2nd and 3rd March, organized by mahendra Engineering College, Mallasamudram, 2018; 64-66.
14. C.Nagarajan and M.Madheswaran, "Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State

- Space Analysis”, *Iranian Journal of Electrical and Electronic Engineering*, 2012; 8(3): 259-267.
15. C. Santhana Lakshmi and C. Nagarajan, “Multiconverter Technology Based Voltage Compensation for Photovoltaic System” *Ecology, Environment and Conservation*, 2017; 23: 226-229.
 16. C.Nagarajan and M.Madheswaran, ”Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques”, *Electric Power Components and Systems*, 2011; 39(8): 780-793.
 17. C.Nagarajan, M.Muruganandam and D.Ramasubramanian – ‘Analysis and Design of CLL Resonant Converter for Solar Panel - Battery systems- *International Journal of Intelligent systems and Applications*, 2013; 5(1): 52-58.
 18. C.Nagarajan and M.Madheswaran, “Experimental Study and Comparative Analysis of CLL-T and LCL-T Series Parallel Resonant Converter with Fuzzy/ PID Controller”, *Journal of Electrical Engineering*, 2011; 11(3): 122-129.
 19. C.Nagarajan and M.Madheswaran, “Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation” has been presented in ICTES’08, a IEEE / IET International Conference organized by M.G.R.University, Chennai, 2007; 1: 190-195.
 20. C. Nagarajan, M.Madheswaran and D.Ramasubramanian, “Development of DSP based Robust Control Method for General Resonant Converter Topologies using Transfer Function Model,” *Acta Electrotechnica et Informatica Journal* , 2013; 13(2): 18-31.
 21. S.Sathish Kumar and C.Nagarajan, “Performance - Economic and Energy Loss analysis of 80 KWp Grid Connected Roof Top Transformer less Photovoltaic power Plant,” *Circuits and Systems*, 2016; 7(6): 662-679.