



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 6, June 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 7.512**



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com

# Accident Prevention for Night Drivers using Eye Drooping Sensor

Aswathi Rajendran<sup>1</sup>, Nithin Gnanam R<sup>2</sup>

Master's Student, University of Stuttgart, Baden Württemberg, Germany<sup>1</sup>

Former Student, Department of Mechanical Engineering, SNS college of Technology, Tamil Nadu, India<sup>2</sup>

**ABSTRACT:** The objective of the present study is to understand the importance of developing a system to prevent accidents due to the driver's drowsiness. This system involves monitoring the consciousness of the driver regularly with the help of eye drooping sensor. Due to the continuous stress factor, any driver is at risk of losing consciousness. This eventually leads to the closure of eyelids causing a drop-in vehicle control. Therefore, it has led to unavoidable accidents. This problem can be prevented by providing intermittent signals to the driver. These signals are used to bring back consciousness. The frequency of eye closure is monitored by the eye drooping sensor. If in case of detecting drowsiness, the system produces signals to the driver. The first level signals are produced in the form of warning sounds by using a buzzer. Secondly, vibration is produced by using the seat vibrator. Rapid motions are effective in bringing back consciousness. The obstacle sensor is also used to detect the objects under risk. The frequency of the warning sounds and vibrations is directly proportional to the eye drooping movements. Thirdly, the system glows the hazard warning lights in the vehicle in order to alert the other drivers in the lane. The obstacle sensor is also coupled with this system. This will drastically avoid multiple accidents at impact. Altogether, the study focuses on preventing the accidents and ensuring safety for the night time drives.

**KEYWORDS:** Driver's drowsiness detection, Affirming consciousness, IR sensor, Vibrator, Hazard warning lights, Obstacle sensor.

## I. INTRODUCTION

The night drive accidents due to drowsiness and eye drooping in highways constitutes around 20% among all other accidents. Continuous stress followed by a silent night increases drowsiness [1]. Specifically, night time drivers fall into this difficulty to maintain the normal state of consciousness. The stress factor is an unavoidable term for the drivers. It develops with the duration. This stress forces the eyelids to close. The closure can be avoided and controlled till a level of breaking point. Once it exceeds the limit the eyelids are uncontrollably forced to droop at least for a few seconds until being interrupted.

Public engagement into night time drives are considerably more in all countries [2]. This also increases the casualties. When a driver loses consciousness, he/she ends up causing an accident. Unfortunately, the drivers following in the lane also collide with them, committing a multiple incident [3]. Thereby, a system has to be developed not only to maintain the consciousness of the drowsy driver but also to prevent other drivers following and leading the track. The development factor aiming to avoid these incidents is producing an interruption [4],[5]. This study involves producing interruption through smart systems. The types of interruptions proposed to produce are vibration, alarm and warning lights to the drivers. These are produced using the IR sensor, LCD screen, Vibrator electric motor and hazard warning lights. These are intermittently used to maintain the consciousness of the driver. It is also used to operate spontaneously in case of requirement, due to high frequency drooping.

## II. SCOPE

Spontaneous interruptions that are required to maintain consciousness are aimed to produce accurately with consideration to the frequency level of drowsiness. Therefore, preventing accidents and unfortunate collisions, and focusing on a safe and controlled night drive.

### III. Components of the System

The basic model of the system involving components is depicted in the below block diagram. There are few sensors utilized to monitor and generate signals for the interruption. The sensors and their specific uses are listed below.

Hardware:

- Eye drooping sensor  
This sensor is used to detect the frequency of eyelid closures using the Infrared zone of electromagnetic spectrum. This data is used to establish the frequency of eye drooping to calculate the drowsiness level of the driver.
- Vibrator Electric motor  
This motor is used to produce vibration which is effectively used to bring back consciousness to the driver.
- Buzzer  
Buzzer is used to produce warning sounds to reduce and remind about the conscious level.
- Hazard lights  
Hazard warning lights are engaged to alert the other lane drivers.
- Obstacle sensor  
It is used to detect the distance between the objects to reduce colliding.
- PIC16F877A Microcontroller  
It is used to govern and produce signals in this system.
- Arduino UNO  
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board has a set of digital and analog input/output pins that can be interfaced to other circuits.
- Jumper Wires  
It is a conducting wire used to connect two points in a circuit.
- Bread Board  
A breadboard is a rectangular board with many mounting holes on it. It is used for creating electrical connections between electronic components.
- LCD Display  
It is used to display the warning signs.

Software:

- MPLAB

#### IV. METHODOLOGY

The essential part of the system is to identify the drowsiness level of the driver prior to the breaking point of stress. The closure of eyelids is the main source of detection. Eye blinking frequency is recorded. The standard time interval taken to a blink is calculated. If the time taken increases, the drowsiness level is high, and vice versa. When the drowsiness is detected, the system develops interruption through warning sounds and vibrations. The buzzer is used to produce the warning sounds and the vibrator is used to produce vibrating motions to the driver's seat. The frequency of the interruptions is directly proportional to the level of drowsiness or the frequency of eye drooping. This system is also connected to the hazard warning lights of the vehicle. This glows the lights to alert the following and leading drivers of the lane. This will avoid further collision with the ongoing vehicles. Thereby avoiding multiple accidents. The time taken to detect and analyze the frequency of interruptions is very less comparatively. The reaction time plays a major impact in this incident. The time taken to produce timely interruptions is a deciding factor. Therefore, possible warning sounds and vibrations are developed in order to provide spontaneous reactions. The obstacle sensor is also connected to this system. This detects the distance between objects to develop warnings [7]. Unfortunate accidents are also predicted with this combined system. The LCD screen is also used to provide warning signs. Different levels of interruptions are stored in this system. Hence the interruptions are developed according to the drooping values to maintain the consciousness of the driver.

#### V. EXPERIMENTAL RESULTS

The value of the eye drooping is calculated and the level of interruption to be provided to the driver is also detected. The spontaneous warning sounds and motions are transferred to the driver. The reaction time is less and durability is high. Eventually providing an effective solution for a safe night drive.

#### VI. CONCLUSION

In this project we have developed a model which helps in reducing the accidents especially during night drivings. The model typically works based on the eye drooping sensor when this sensor is activated it automatically turns on the buzzer, vibrator and gives notification via LCD display. Thus, by fitting this model in the vehicle system we can reduce accidents and safeguard lives. Its durability is high. Production and maintenance cost is low.

#### REFERENCES

- [1] Stutts, J., Feaganes, J., Rodgman, E., Hamlett, C., Reinfurt, D., Gish, K., Mercadante, M. and Staplin, L., 2003. The causes and consequences of distraction in everyday driving. In *Annual Proceedings/Association for the Advancement of Automotive Medicine* (Vol. 47, p. 235). Association for the Advancement of Automotive Medicine.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217550/>
- [2] Zhang, G., Yau, K.K., Zhang, X. and Li, Y., 2016. Traffic accidents involving fatigue driving and their extent of casualties. *Accident Analysis & Prevention*, 87, pp.34-42.  
<https://www.sciencedirect.com/science/article/abs/pii/S0001457515301159>
- [3] erstedt, T., Kecklund, G. and Hörte, L.G., 2001. Night driving, season, and the risk of highway accidents. *Sleep*, 24(4), pp.401-406.  
<https://academic.oup.com/sleep/article/24/4/401/2750016?login=true>
- [4] Chellappa, Y., Joshi, N.N. and Bharadwaj, V., 2016, August. Driver fatigue detection system. In *2016 IEEE International Conference on Signal and Image Processing (ICSIP)* (pp. 655-660). IEEE.  
<https://ieeexplore.ieee.org/abstract/document/7888344>
- [5] Bergasa, L.M., Nuevo, J., Sotelo, M.A., Barea, R. and Lopez, M.E., 2006. Real-time system for monitoring driver vigilance. *IEEE Transactions on Intelligent Transportation Systems*, 7(1), pp.63-77.  
<https://ieeexplore.ieee.org/abstract/document/1603553>
- [6] Verwey, W.B. and Zaidel, D.M., 1999. Preventing drowsiness accidents by an alertness maintenance device. *Accident Analysis & Prevention*, 31(3), pp.199-211.  
<https://www.sciencedirect.com/science/article/abs/pii/S0001457598000621>
- [7] Borenstein, J. and Koren, Y., 1988. Obstacle avoidance with ultrasonic sensors. *IEEE Journal on Robotics and Automation*, 4(2), pp.213-218.  
<https://ieeexplore.ieee.org/abstract/document/2085>





**Impact Factor:  
7.512**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details