ISSN (Print): 2957-9325, ISSN (Online): 2957-9333

INTERNATIONAL JOURNAL OF APPLIED ENGINEERING RESEARCH TRANSACTION

(Open Access-Referred-Peer-Reviewed Journal)

Journal homepage:https://ijaer-transaction.com/

Research Article

SMART GOGGLES TO DETECT SLEEP OF CAR DRIVER AND ALARM

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Article History:	Received: 20.01.2025	Accepted: 24.02.2025	Published: 04.03.2025

Abstract

This project aims to develop and implement a system of Anti-Sleep Glasses for drivers to detect drowsiness and issue alerts, thereby preventing accidents due to fatigue. The system leverages an Arduino Nano, Eye Blink Sensor, and a buzzer to track the driver's eye movements in real-time. If the system detects that the driver's eyes remain closed for over 3 seconds, it activates a buzzer to alert the driver, helping them stay awake and focused. The goal of this project is to enhance road safety by reducing fatigue-related accidents, offering a straightforward, affordable, and reliable solution for monitoring driver alertness.

Keywords: Arduino Nano, Eye blink Sensor, Buzzer alert System, Road safety.

INTRODUCTION

Drowsy driving is a significant contributor to road accidents, particularly during long-distance travel or nighttime driving. Fatigue impairs a driver's ability to make quick decisions, delays reaction times, and raises the likelihood of accidents. This project aims to solve this problem by creating Anti-Sleep Glasses for drivers, an innovative approach to detect and prevent drowsiness. The system utilizes an Arduino Nano, Eye Blink Sensor, and a buzzer to monitor the driver's eye movements. If the system detects that the driver's eyes remain closed for more than 3 seconds, it triggers a loud buzzer to alert the driver, helping them stay awake and focused. The main objective is to reduce accidents caused by fatigue by providing immediate feedback, boosting driver awareness, and enhancing overall road safety. This wearable solution offers an efficient and affordable method to combat driver fatigue without requiring manual intervention.

BLOCK DIAGRAM

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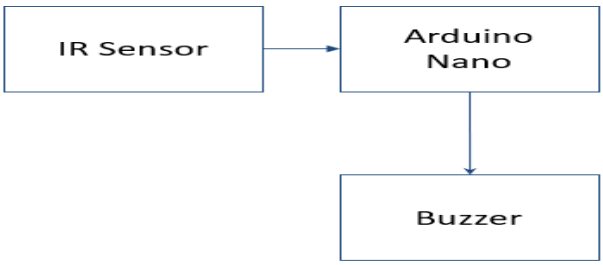

Fig.1 Block Diagram for Smart Goggles to Detect Sleep of Car Driver and Alarm

SYSTEM DESIGN AND ARCHITECTURE:

Block Diagram: Provide a block diagram illustrating the components of the system, including:

IR Sensor: This component detects objects or motion using infrared signals. When an object is detected, it sends a signal to the Arduino Nano.

Arduino Nano: This microcontroller processes the input from the IR sensor. If the IR sensor detects an object, the Arduino will send a signal to activate the buzzer.

Buzzer: The buzzer receives a signal from the Arduino and produces a sound (beep) to indicate the detection of an object.

Components:

Arduino: Microcontroller that processes the signal from the IR sensor and controls the buzzer accordingly.

IR Sensor: Detects objects or motion using infrared signals.

Buzzer: Produces a sound when activated by the Arduino to indicate detection.

Power Supply: The system can be powered using a 5V USB supply or an external battery.

METHODOLOGY:

Eye Blink Detection: An Eye Blink Sensor (infrared-based) is used to monitor the driver's eye movements. The sensor detects whether the eyes are open or closed by measuring the reflection of infrared light from the eye. When the eyes are open, the infrared reflection is low, and when the eyes are closed, the reflection increases.

Data Processing: The Eye Blink Sensor continuously transmits data to the Arduino Nano microcontroller. The Arduino Nano processes the received data in real time and compares it with a predefined threshold. If the eyes remain closed for more than 3 seconds, it indicates possible drowsiness or sleepiness.

Alert Mechanism: If prolonged eye closure (more than 3 seconds) is detected, the Arduino triggers a buzzer to produce an alert sound. This alarm warns the driver to stay awake and focused.

Continuous Monitoring: The system continuously monitors the driver's eye status throughout the journey. If the eyes open, the system resets the countdown. If the eyes remain closed again for another 3 seconds, the buzzer will sound again to ensure continuous alertness.

Power Supply: The system is powered by the vehicle's power supply or an external battery, making it reliable for long trips.

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ADVANTAGES

Enhanced Road Safety: The system minimizes accidents caused by driver fatigue, helping drivers stay attentive and focused while driving.
Instant Alerts: By sounding a buzzer when signs of drowsiness are detected, the system provides real-time warnings, allowing drivers to take preventive action before fatigue leads to potential hazards.
Affordable Solution: Utilizing cost-effective components like the Arduino Nano and Eye Blink Sensor, this system offers an economical way to improve driver safety.
User-Friendly Design: Easy to implement, the system seamlessly integrates into existing driving environments without requiring major modifications or complex setup.
Lightweight and Wearable: Designed as comfortable, lightweight glasses, the system ensures continuous monitoring of the driver's alertness without causing discomfort.
Health and Safety Benefits: By promoting wakefulness and reducing fatigue-related accidents, the system supports long-term driver well-being and road safety.
Energy-Efficient Operation: Built with low-power components, the system is designed for extended use without significantly impacting the vehicle's battery life, making it ideal for long journeys.

CONCLUSION

This real-time drowsiness detection system enhances driver safety by detecting fatigue-induced sleepiness at an early stage. The integration of the Arduino Nano, Eye Blink Sensor, and buzzer provides a cost-efficient and effective solution to reduce the risks of fatigue-related accidents

AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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SOURCES OF FUNDING

The authors received no financial aid to support for the research.

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