

Driver Drowsiness Detection

Sensor Lab Mini Project Report submitted in partial fulfillment.
of the requirement for the degree of
T. E. (Information Technology)

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CERTIFICATE OF APPROVAL

For
Mini Project Report
On
Sensor Lab Mini Project

This is to Certify that

Tisha Chaurasiya

Have successfully carried out Mini Project entitled

“Driver Drowsiness Detection”

In partial fulfillment of degree course in

Information Technology

As laid down by University of Mumbai during the academic year 2023-24

Under the Guidance of
Prof. Neha Kudu

Signature of Guide

Head of Department

Examiner 1

Examiner 2

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1. Tisha Chaurasiya

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Introduction

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.

Drowsy driving is one of the major causes of deaths occurring in road accidents. The truck drivers who drive for continuous long hours (especially at night), bus drivers of long distance route or overnight buses are more susceptible to this problem. Driver drowsiness is an overcast nightmare to passengers in every country. Every year, a large number of injuries and deaths occur due to fatigue related road accidents. Hence, detection of drivers fatigue and its indication is an active area of research due to its immense practical applicability. The basic drowsiness detection system has three blocks/modules; acquisition system, processing system and warning system. Here, the video of the drivers frontal face is captured in acquisition system and transferred to the processing block where it is processed online to detect drowsiness. If drowsiness is detected, a warning or alarm is send to the driver from the warning system.

Aim & Objective

Aim:

The aim of this project is to contribute to the study of driver behaviour while driving, through the development and evaluation of a drowsiness driver model system. Non-intrusive is chosen as a method due to comfort to the drivers. The result from the project will be integrated to produce the systems that can be efficient in detecting the drowsiness level at an early stage by giving a warning to them about their lack of attention due to drowsiness or other factors. In other words, they can correct the behavior or stop driving when they in the drowsiness state. This system will need to be robust against model mismatch and disturbances and comfort constraints.

Objective:

The objective of this project is to identify the current drowsiness detection by investigating flexible methods for studying the relationships between driver's manoeuvre performances whiles the vehicle on the move and the physiological driver drowsiness states.

Monitoring the driver behaviour by observing the vehicle manoeuvre stability and performance. Validate and measure the progress by using Specific algorithm. Updating the current performance by comparing with the last action stored in system database. Warning the drivers if the behaviour beyond the thresholds.

Problem Definition

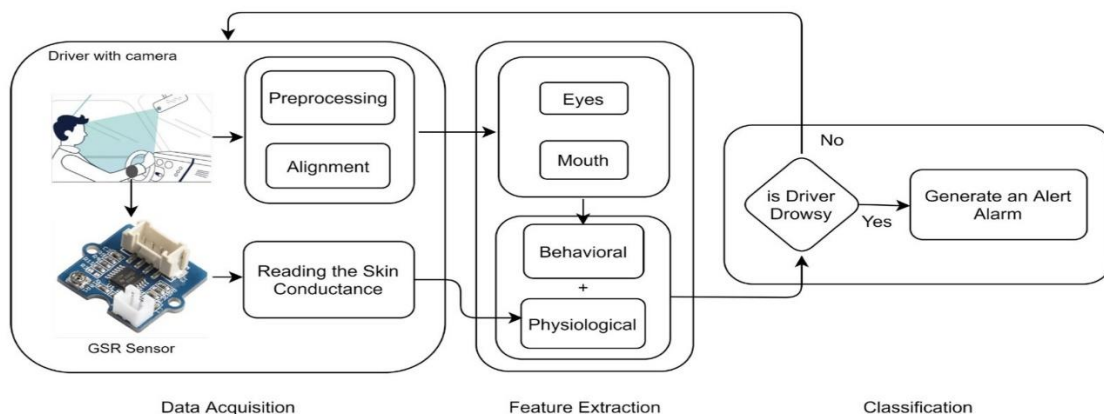
Driver drowsiness is a significant factor in the increasing number of accidents on today's roads and has been extensively accepted. This proof has been verified by many researchers that have demonstrated ties between driver drowsiness and road accidents. Although it is hard to decide the exact number of accidents due to drowsiness, it is much likely to be underestimated. The above statement shows the significance of a research with the objective of reducing the dangers of accidents anticipated to drowsiness. So far, researchers have tried to model the behavior by creating links between drowsiness and certain indications related to the vehicle and to the driver.

Previous approaches to drowsiness detection primarily make pre-assumptions about the relevant behavior, focusing on blink rate, eye closure, and yawning. The automobile business also has tried to build several systems to predict driver drowsiness but there are only a few commercial products available today. The systems do not look at driver performance and overlook driver ability and characteristics. Naturally, most people would agree that different people drive differently. The system that being develop able to adapt to the changes of the driver's behaviour.

Proposed System

Driver drowsiness detection is a crucial field within automotive safety technology, aiming to mitigate the risks associated with driver fatigue, a leading cause of road accidents worldwide. By monitoring various physiological and behavioral indicators, such as eye movements, heart rate, and head position, these systems can effectively alert drivers when they exhibit signs of drowsiness, allowing them to take necessary rest breaks or corrective actions, thus preventing potential accidents and saving lives.

System Architecture:



1.1 System Architecture

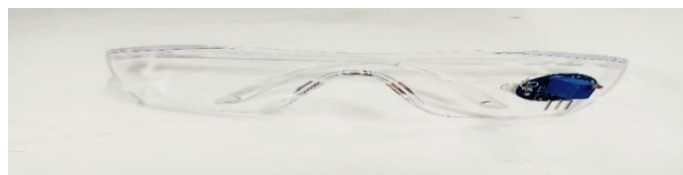
Hardware & Software Used:

The hardware components of a driver drowsiness detection system are meticulously chosen and integrated to ensure seamless functionality and user experience. High-quality sensors, carefully calibrated to capture subtle physiological changes, are embedded within the vehicle's interior, minimizing

interference and maximizing accuracy. The microcontroller, typically Arduino or a similar platform, orchestrates the sensor data acquisition and processing tasks, leveraging its computational power and versatility. On the software front, custom-written code governs the system's operation, orchestrating data acquisition, feature extraction, classification, and user feedback. Graphical user interfaces (GUIs) may also be developed to visualize the collected data in real-time and provide intuitive alerts or recommendations to the driver.

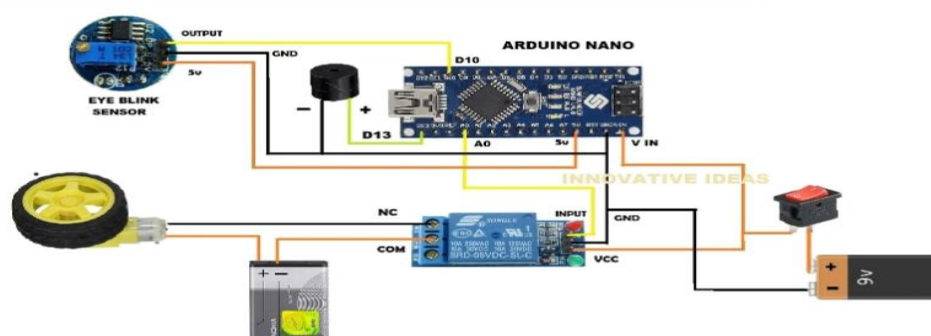


2.1 Arduino



2.2 Eye Blink Sensor

Circuit Diagram:

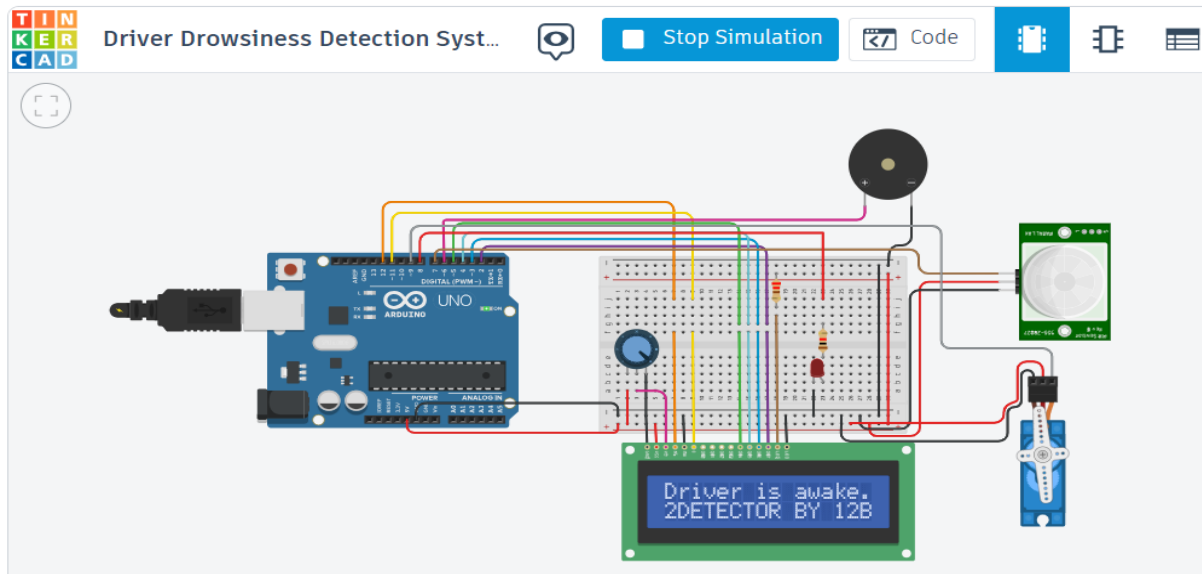


3.1 Circuit Diagram

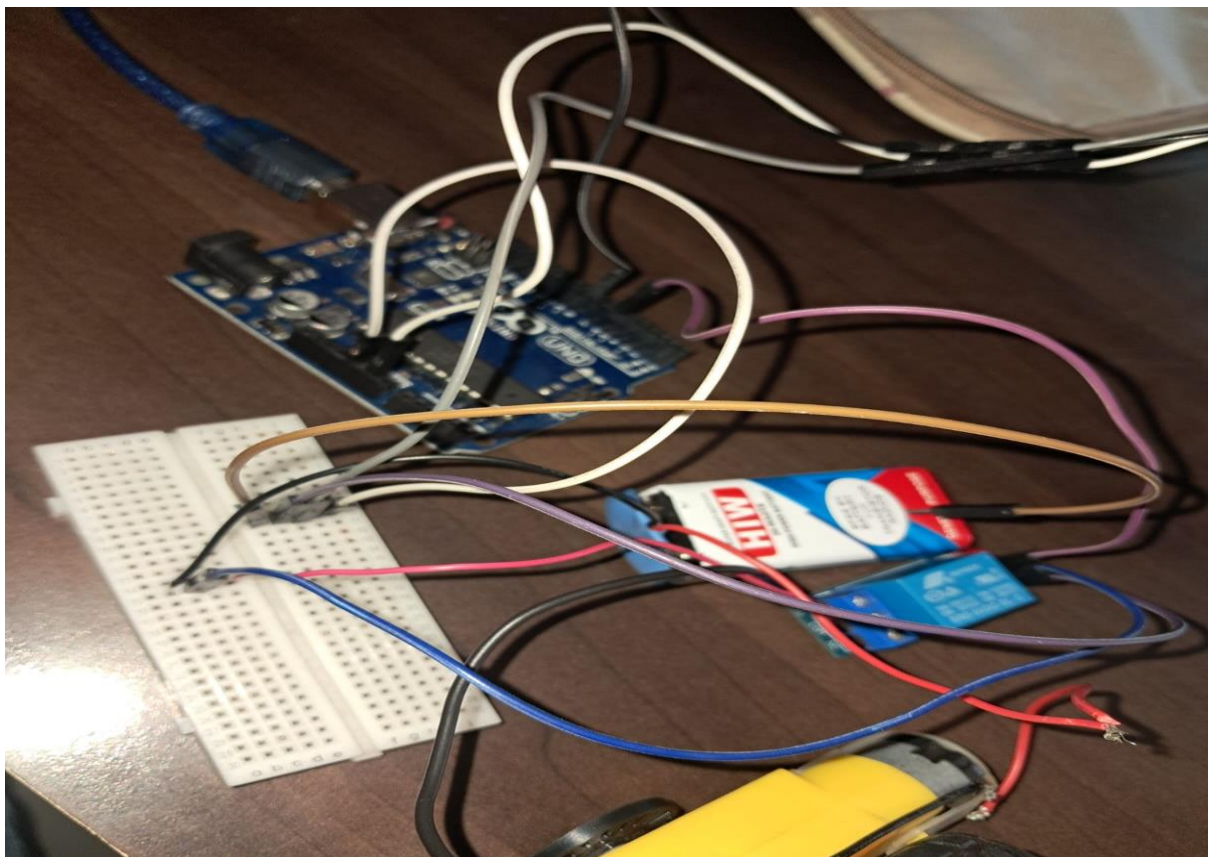
Implementation Screenshots

Tinkercad Simulation:

Driver Drowsiness Detection System



4.1 Tinkercad Simulation



4.2 Connections

Conclusion & Future Scope

In conclusion, driver drowsiness detection systems represent a groundbreaking advancement in automotive safety technology, offering a proactive approach to mitigating the risks associated with driver fatigue. However, continued research and development are necessary to further enhance their capabilities and address emerging challenges.

Future work may encompass refining the algorithmic models to achieve higher accuracy and reliability across diverse populations and driving conditions. Additionally, efforts to miniaturize and integrate sensors seamlessly into vehicles, as well as exploring novel modalities such as brainwave monitoring, hold promise for advancing the field and ultimately saving more lives on the road.

References

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2. https://youtu.be/NDIBw1kXwes?si=KZynW7gEPju_mqs0
3. https://www.researchgate.net/publication/326699270_Detection_of_Driver_Drowsiness_using_Eye_Blink_Sensor

GitHub Link

<https://github.com/tishaa26/Driver-Drowsiness-Detection.git>