# DESIGN AND DEVELOPMENT OF INTELLIGENT EYE BLINK MONITORING SYSTEM

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## ABSTRACT

The driver and road safety system makes use of this suggested method. The driver's face is identified from a color video taken inside a vehicle using computer vision algorithms. The areas of the driver's eyes are then located using face recognition, and these areas serve as templates for eye tracking in later frames. Images from the monitored eye are used to detect tiredness and provide warning alerts. Face, eye, and sleepiness detection are the three stages of the suggested method. In order to identify tiredness, image processing first recognizes the driver's face before extracting an image of the driver's eyes. The Haar face identification technique uses the image's collected frames as input and the identified face as output. This strategy is a low-cost and efficient way to promote transportation safety by lowering the frequency of incidents caused by sleepy drivers.

**Keywords: Raspberry Pi, USB Camera, OpenCV**

## I.INTRODUCTION

One of the main reasons for deadly traffic accidents is sleepy driving. [1] A recent research found that sleepy driving is responsible for one out of every five traffic incidents, or around 21% of all traffic accidents. According to the 2015 Global Status Report on Road Safety, which analyzed data from 180 nations, this figure is rising each. This undoubtedly emphasizes the fact that driver fatigue is a major contributing factor in the high number of traffic fatalities worldwide. Carelessness, intoxication, and driver [2] drowsiness are emerging as the main causes of these traffic incidents. This is affecting a lot of lives and families in different places. One of the greatest tools available to help drivers recognize when they are driving too sleepy is real-time drowsy driving detection. By identifying driver drowsiness early on, such a driver behavioral state monitoring system may help prevent accidents. In this research, we offer a method for detecting driver drowsiness that uses image analysis, OpenCV, [3] and a Raspberry Pi. Numerous research have shown a range of potential methods for identifying driver fatigue. It is possible to identify driver tiredness by physiological, visual, and performance indicators. Of these, visual and physiological measurements may provide more precise findings. Brain waves, heart rate, and pulse rate readings are examples of physiological measures that call for a physical connection of some kind, such as attaching an electrode to the driver's body. However, this results in uncomfortable driving circumstances. It is possible to take an ocular measure without a physical connection. Because it uses a camera [4] to determine whether the eyes are open or closed, this ocular measure to assess a driver's eye health and potential vision based on eye closure is ideally suited for real-world driving situations. By analyzing the eye closure interval and creating an algorithm to identify the driver's drowsiness beforehand and alert the driver via the vehicle's alarm, the Real Time Driver Drowsiness System using Image Processing captures the driver's eye state using computer vision-based drowsiness detection systems. This section explains how to identify faces and eyes for automotive applications, since determining a driver's level of tiredness requires their detection. The proposed method and the paper as organized as I. Introduction Section II as literature survey section III as existing method and its operation section IV Proposed method block diagram and its operation and section V conclusion and its future scope

## II.LITERATURE SURVEY

There have been a number of previous attempts to include the Eye Aspect Ratio and the Haar Cascade Classifier into their project. To create effective eyes and face Haar Cascade Classifier detectors before they were integrated into the hierarchical system, for instance, the Haar Cascade Classifier was tested for training on the author's face and eyes [5]. Using a series of test photos, our system was able to identify and pinpoint the eye region. However, the Eyes Aspect Ratio for the driving monitoring system has been the subject of further study [6]. A video camera was used for the experiment, taking pictures of the driver's face to feed into the system. The goal was to employ facial features and face recognition to track driver alertness. The problem of close collinear relationship between eyelid movement variables is addressed by driver drowsiness detection using multi-eyelid movement features based on the information fusion approach partial least square regression (PLSR), which predicts the likelihood of somnolence. Validation of the model's prediction accuracy and robustness demonstrates that it offers a unique method of integrating many characteristics to improve our capacity to identify and forecast sleepiness [7].

The study was based on a visual assessment of the driver's eye health and head posture (HP) to track their level of awareness. Numerous existing techniques for visualizing non-alert driving behaviors rely on angles of head shaking or eye shutting to assess the degree of distraction or drowsiness of the driver. A sequence of video segments is either classified as warning or non-alert driving occurrences using the help vector machine (SVM) [8]. Additionally, a novel method of assessing the driver's facial expressions to detect drowsiness utilizing dynamic modeling of the Hidden Markov Model (HMM). A simulated driving rig was used to apply the algorithm. The results of the trial verified that the suggested process was feasible [9]. It is evident from the types of literature discussed above that the majority of the early attempts to identify driver drowsiness were based on driving performance metrics rather than the driver's behavioral responses when the somnolence and drowsiness occurred. These attempts were limited to a particular brand of automobile. There was also little discussion of the kinds of feedback that drivers should get in response to potentially hazardous driving performance indicators.

## III.EXISTING METHOD

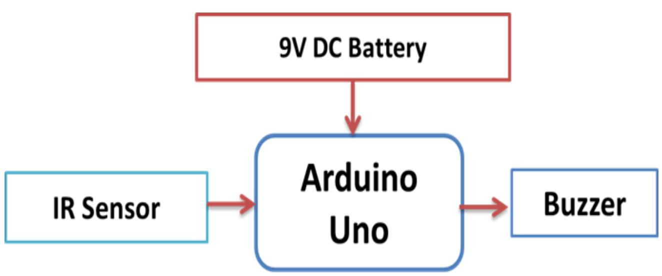


Fig.1.The drowsiness detection system using Arduino

OPERATION

The purpose of the Arduino and infrared sensor drowsiness detection system is to improve driving safety by keeping an eye out for symptoms of sleepiness. To identify the eye-blink pattern, the system mainly employs an infrared (IR) sensor set up close to the driver's eyes. A person's eyes blink regularly and often while they are awake and attentive. However, the blinking slows down or pauses for prolonged periods of time while you're sleepy or drowsy.The IR sensor in this configuration keeps a watch on the driver's eyes. It detects the eye's reflection after releasing infrared light. The reflection is stronger while the eyes are open and weaker when they are closed. The Arduino Uno receives this signal and analyzes the frequency and duration of eye closure. The system takes this as an indication of tiredness if it notices that the eyes stay closed for longer than a certain threshold (for example, two to three seconds). After that, the Arduino alerts the driver by turning on a vibration motor or buzzer. Parts

1. Sensors for electrooculography (EOG): These sensors pick up electrical impulses produced by blinks and other eye movements.

2. Signal Conditioning Circuit: To enhance signal quality, this circuit filters and amplifies the EOG signals.

3. Microcontroller or Processor: To identify eye blinks, this part interprets and processes the conditioned signals.

4. Algorithm Implementation: The system uses algorithms, such as blink frequency, duration, and pattern, to identify and categorize eye blinks.

## WORKING CIRCUIT

1. Acquisition of impulses: EOG sensors record the electrical impulses produced by eye movements.

2. Signal Conditioning: To eliminate noise and enhance signal quality, the signal conditioning circuit filters and amplifies the EOG signals.

3. Signal Processing: To identify eye blinks, the microcontroller or processor uses algorithms to evaluate the conditioned signals.

4. Blink Detection: Using the signals it has examined, the system may identify eye blinks and initiate reactions like notifications or alarms.

## IV.PROPOSED METHOD

The Raspberry Pi and the Pi Camera will be friends. The Raspberry Pi will use an SD card, after which it will install the Rasbian operating system and launch CV. The Pi Camera will take the first picture. Pay attention to the eye in the picture and use the openCV code to determine [10] the pupil's center location. Use the pupil's precise location value as a guide, and then adjust the X and Y coordinates to vary for precise command.

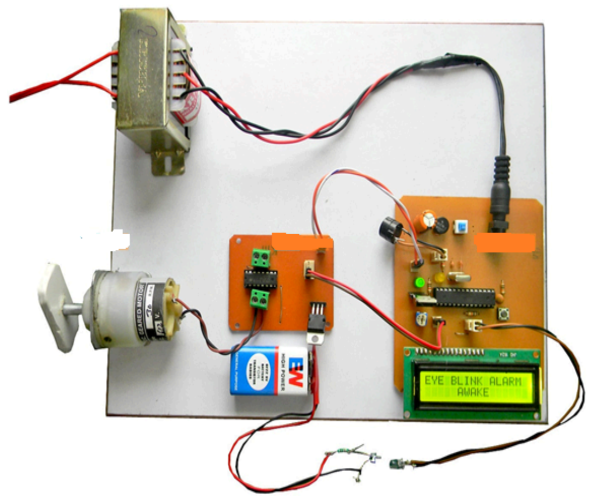


Fig.3.The drowsiness detection system using Arduino

Signals from the Raspberry Pi go via the GPIO to the transistor circuit. Making life easier and giving patients who are totally paralyzed the chance to be independent are two of the primary goals of an eye movement controlled wheelchair. Using the center coordinate of the screen as a starting point allows the pupil to direct the mouse pointer (cursor) on the screen. The mouse pointer's initial location is set to the middle of the screen, and this [11] serves as the foundation for tracing. The starting position serves as the foundation for the cursor's moving position. The mouse pointer's coordinate on the screen changes in accordance [12-15] with the student's movement as they go in one of the directions. The pointer stops moving when the pupils are in their initial position.

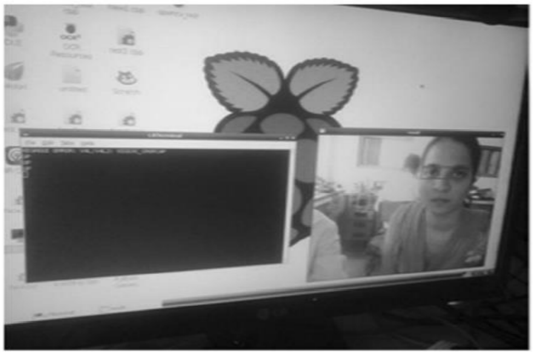

Fig. 2. Simulation results

Eye movements also provide control over the cursor's start and stop. The pointer begins or stops moving when the user shifts his eyes for a brief moment. In other words, if the cursor is moving, it will stop after an eye movement, and vice versa. During the presentation, the eye direction arrows serve as testing tools. There is a green circle visible next to these arrows. Upon detecting an obstruction in front of the eyes, the cursor pauses, a buzzer sounds, and this circle becomes red. Keep in mind that this circle doesn't look red when the pointer stops naturally due to eye movement.

## V.CONCLUSION AND FUTURE SCOPE

This real-time drowsiness detection system can quickly identify tiredness in order to track the eyes of drivers and check for exhaustion. The system can distinguish between tiredness and a typical blink. Which may assist in keeping the driver from being drowsy while operating a motor vehicle? The technology has room for improvement and commercial use in the automobile industry. The information gathered from the different photos taken may assist the system in determining the state of drowsiness. When the real-time system detects a sleepy state, it sounds an alert. Implementing such a system in automobiles may lower the possibility of accidents caused by tiredness.

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