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# Advanced Alert System for Driver's Drowsiness Detection System

***Sarode Shashikala R*** [a], ***Prof. J. R. Mahajan*** [b]

[a] *Student Computer Engineering, ATC, Ahmednagar, Maharashtra, India*

[b] *Asst. Prof. ATC,Ahmednagar, Maharashtra, India*

**ABSTRACT**

The number of traffic accidents caused by drowsy drivers is increasing at an alarming rate. If you've ever driven, you've got been drowsy at the back of the wheel in some unspecified time in the future. it is no longer something we like to admit, however it is an crucial issue with critical outcomes that wishes to be addressed. The scariest element is that drowsy using would not just imply falling asleep even as driving. Drowsy driving can be as minor as a brief state of inattention where the driver does not pay full attention to the road. Automatic contactless machine that he can apprehend the drowsiness of the driver in time is needed for hours. Our project describes a system learning approach for sleepiness detection. Face detection is used to find the driving force's eye areas, which are used as templates for eye monitoring in next images. Subsequently, pictures of the tracked eye are used for sleepiness detection to generate warning alarms. This proposed approach has 3 levels: face detection, eye detection and sleepiness detection. Our task describes a system getting to know approach for sleepiness detection. Face detection is used to find the motive force's eye areas, which might be used as templates for eye monitoring in subsequent images. Finally, they're images of the tracked eye used to stumble on sleepiness to generate caution alarms.

**Keywords:** ***Image Processing, Eye Detection, Driver drowsiness, Alarm System, Real time, Drowsiness, Health Monitoring, Alcohol detection.***

## I.INTRODUCTION

According to the National Highway Traffic Safety Administration and the World Health Organization, at least 1.35 million people die each year as a result of traffic accidents. Injuries and deaths worldwide. Inappropriate driving is the most common cause of accidents. Certain circumstances occur when the driver is under the influence of alcohol or fatigue. One of the most common causes of driver fatigue is an accident. Stolen vehicle checks occur when drivers fall asleep at the wheel. In order to create a smart or intelligent car, advanced technologies must be used. As part of these works, an alarm system for drivers is being developed. One is to stay alert and active while driving. Neglecting our responsibility towards safer travel has allowed hundreds of thousands of tragedies each year associated with this amazing invention. It may seem like a trivial matter to most people, but following the rules and regulations of the road is of the utmost importance. Although the car has the greatest performance on the road and in irresponsible hands, it can be destructive and sometimes carelessness can damage the lives of people on the road. One type of carelessness is not admitting when we are too tired to drive. In order to monitor and prevent the destructive consequences of such carelessness, many researchers have written research papers on driver drowsiness detection systems.

## II. METHODOLOGY

Drowsiness that occurs as a result of long driving is one of the most common and dangerous problems related to road safety. According to a study by the Central Road Research Institute (CRRI) , about 40% of traffic accidents occur as a result of drivers who are exhausted, falling asleep at the wheel. Many technologies and systems have been proposed to deal with this issue, but not many of them have been very successful, some of the reasons being that the system developed has a subjective nature detection method where the driver is forced to participate in activities such as filling out questionnaires to determine his sleepiness. The more successful detection was the objective detection method. This method evaluates driver behavior and fatigue in real time. The objective method is further classified according to whether it is a contact or non-contact system.

A contact system would detect driver fatigue by monitoring physiological characteristics such as their heart rate, brain waves and eye movements, or changes in physical characteristics such as lowered head, slumped posture, etc. to use would be a requirement to attach some form of hardware, such as electrodes, to the controller that would prevent the driver from operating. In such a system, the driver's face is the most important focus area because it conveys the most information through the driver's facial expressions, so it is very important for the face detection part to be highly accurate. Previous such contactless systems used cascaded classifiers based on Haar features for face detection purposes. Feature-based cascade classifiers are very good at detecting lines and edges, making them very efficient at detecting faces and very fast in the disadvantage of using a system based on features are that the results may not be very accurate. In the case of a driver with glasses of any kind, this system would fall short in the face detection task. So to overcome this problem of inaccuracy and driver face detection we use a Histogram of Oriented Gradient (HOG) feature descriptor in which distributions (histograms) of gradient directions (oriented gradients) are used as a function. This descriptor is more accurate than the previously discussed system because it is generated on a dense grid of uniformly spaced cells and uses local contrast normalization, which is overlapping in nature.

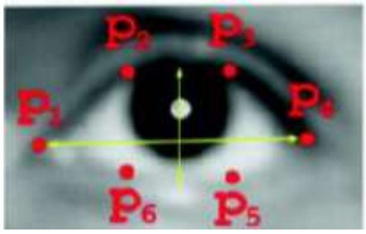
## III. PROPOSED SYSTEM

The basic purpose of this system is to monitor the driver's facial condition and eye movements, if the driver feels sleepy, then the system will trigger a warning message. When drowsiness is detected, the driver is alerted by a buzzer. Measuring various driver parameters like heart rate, alcohol status and eye blink using sensors like heart rate sensor, alcohol sensor and eye blink sensor. There are many products that provide measurements of driver fatigue levels that are implemented in many vehicles. The Drowsiness Detection and Driver Health Monitoring System provides a similar function, but with better results and additional **benefits. It also notifies the user when a certain saturation point of the sleepiness rate is reached.**

### A. Sensing Phase

Eye Camera is used to capture the driver's eyes. The alcohol sensor is used to detect the presence of alcohol in the driver's breath. An accelerometer located on the vehicle's suspension unit senses the vehicle's acceleration down bumps and potholes. Eye aspect ratio is the ratio of height to width of the eye. If you notice, each eye is represented using 6 landmarks points. The EAR for a single eye is calculated using this formula.

$$EAR = \frac{||p2 - p6|| + ||p3 - p5||}{2||p1 - p4||}$$



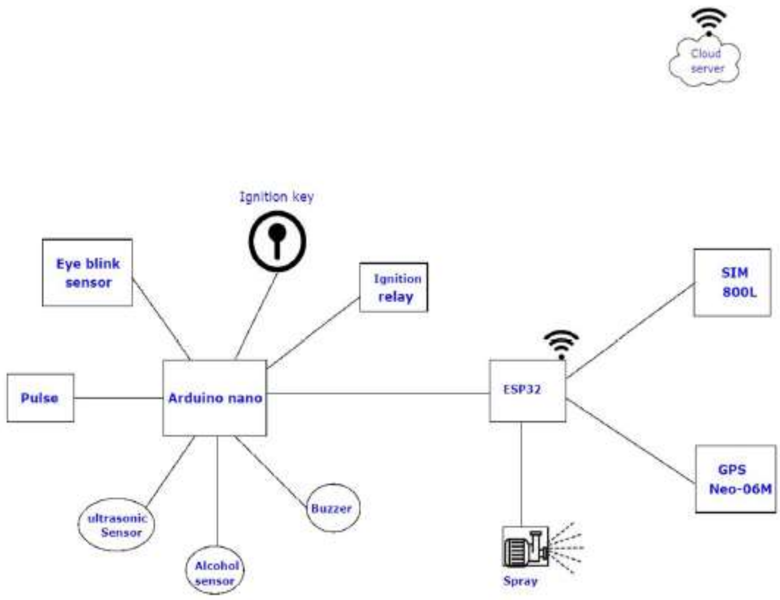




**Fig.1: Block Diagram**

### B. Detection Phase

The analysis of the information from the sensors and the camera is carried out in order to derive the current driving style of the driver. Eye open/closed state is derived using computer vision image processing techniques. Image processing techniques are performed in a PC.

### C. Correction Phase

This phase is responsible for taking the corrective actions required for that particular detected abnormal behavior. Corrective measures include in-vehicle alarms, engine revving and GSM communication with authorities. Corrective actions vary based on the behavior identified. Drowsiness corrections include in-vehicle alarms and its repetition turns off the engine.

### D. Finding Intensity Changes

The next step in eye localization is to find changes in intensity face. This is done using the original image, not the binary image. The first step is to calculate the average intensity for each y coordinate. This is called the horizontal average because the averages are taken between the horizontal values.

The valleys (dips) in the graph of horizontal values indicate the intensity Changes. When the horizontal values were originally plotted, it was found that there were many small valleys which did not represent changes in intensity but resulted from small differences in diameters. A smoothing algorithm was implemented to remedy this. The smoothing algorithm eliminated small variations, resulting in a smoother and cleaner graph. After obtaining horizontal average data, the next step is to find the most significant valleys that will be mark the eye area.

## IV. RESULTS AND DISCUSSION

**1. Drowsiness Detection**

The state of the eyes (open or closed) is determined by the distance between the first two intensity changes detected in the above step. When the eyes are closed, the distance between the y-coordinates of intensity changes is greater than when the eyes are open. The limitation is if the driver moves his face closer or further away from the camera. If this happens, distances will vary depending on the number of pixels face takes vary as seen below. Because constraints, the developed system assumes that the driver's face remains almost the same distance from camera at all times.

2. Judging Drowsiness

When there are 5 consecutive frames, find the closed eye, the alarm is activated and the driver is notified to wake up. Consecutive closed frames are required to avoid cases of eye closure due to blinking.

## V. CONCLUSION

Our current project develops a system for detecting drowsiness of the driver. This project is built using Python, OpenCV, ML model, Dlib and other open-source libraries. The system uses eye aspect ratio and mouth aspect ratio to detect blinks and yawning respectively and also a ML model is trained to draw the result based on them to achieve the main objective of project i.e., Driver's Drowsiness. The framework has reached a stable state in which all bugs have been eliminated. The results are discussed in testing section and are found satisfactory. Drowsiness detection system developed based on the closed eyes of the driver can distinguish between normal blinking and drowsiness and detect drowsiness when management. The designed system can prevent accidents caused by drowsy driving. The system works well even when drivers are wearing glasses and even in low light conditions as long as the camera provides better output. Head and eye position information is obtained using various self-developed image processing algorithms. During monitoring, the system is able to decide whether the eyes are open or closed.

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