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# Driver Alert System Using Image Processing

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**ABSTRACT:** Drowsiness of the drivers is the important reason of accidents in the world as nicely as Sri Lanka. Due to lack of sleep and tiredness, drowsiness can appear whilst driving. The exceptional way to keep away from accidents triggered via drivers' drowsiness is to observe drowsiness of the driver and warn him earlier than fall into sleep. To observe drowsiness many strategies like eye retina detection, facial characteristic awareness has been used. Here in this paper, we advise a technique of detecting driver drowsiness the usage of eye retina detection and pulse fee detection of the driver. In this report, we recommend a greater correct drowsiness detection approach which is a hybrid method of eye retina detection and pulse sample detection.

**KEYWORDS:** Drowsy, system, fatigue, template matching.

## I. INTRODUCTION

The improvements in the car enterprise over the final hundred years have made our automobiles greater powerful, simpler to drive and manage safer greater electricity efficient, and extra environmentally friendly. Majority of the accidents prompted these days via motors are mainly due to the driver fatigue. Driving for a lengthy duration of time motives immoderate fatigue and tiredness which in flip makes the driver sleepy or free awareness. With the fast enlarge in the wide variety of accidents looks to be growing day to day. Therefore a need arises to graph a gadget that continues the driver targeted on the road. Data on avenue accidents in India are accumulated by means of Transport Research Wing of Ministry of Road Transport &amp; Highways. The goal of this paper is to enhance a prototype of drowsy driver warning system. Our total focal point and awareness will be placed on designing the machine that will precisely reveal the open and closed country of the driver's eye in actual time. By constantly monitoring the eyes, it can be viewed that the signs and symptoms of driver fatigue can be detected early sufficient to keep away from an accident. This detection can be achieved the usage of a sequence of pix of eyes as nicely as face and head movement. The remark of eye movements and its edges for the detection will be used. Devices to become aware of when drivers are falling asleep and to furnish warnings to alert them of the risk, or even manage the vehicle's movement, have been the situation to tons lookup and development. Driver fatigue is a

serious trouble ensuing in many heaps of avenue accidents every year. It is no longer presently viable to calculate the specific number of sleep associated accidents due to the fact of the difficulties in detecting whether or not fatigue used to be a component and in assessing the stage of fatigue. However lookup suggests that up to 25% of accidents on monotonous roads in India are fatigue related. Research in other countries additionally shows that driver fatigue is a serious problem. Young male drivers, truck drivers, organization automobile drivers and shift employees are the most at threat of falling asleep whilst driving. However any driver traveling lengthy distances or when they are tired, it is at the danger of a sleep associated accidents. The early hours of the morning and the center of the afternoon are the height instances for fatigue accidents and lengthy journeys on monotonous roads, particularly motor-ways, are the most in all likelihood to end result in a driver falling asleep. In this paper the algorithms for face detection and eye monitoring have been developed on frontal faces with no restrictions on the heritage .The proposed technique for eye monitoring is built into 5 stages. Using frontal pix got from a database, the likelihood maps for the eyes vicinity are constructed etc.

## II. RELATED STUDY

Although the range of researches have be done previously in order to distinguish the stage of fatigue as well as drowsiness country of driver based totally on physiological, behavioral and automobile characteristics. Among these techniques, Forsman et al. [2], designed a framework which employed the quite a number automobile motion like

modern-day position of automobile on lane, steerage wheel motion and movement involve in brake as nicely as acceleration pedal and so on, in Investigation of drowsiness stage of driver's. These characteristics are normally associated with automobile model, driving proficiency as properly as intimacy of driver. These procedures are now not performing nicely in case of micro-sleeps (driver fall asleep on wheel for a moment) due to the fact it require bulk amount of statistics as nicely as time and effort for measuring these parameters. Including this problem, these strategies are sometimes intrusive in nature capacity exterior equipments are mounted on the physique of driver to seize these parameters which deviates the driver from their everyday driving. Few in the past lookup works have additionally evaluated the physiological attribute such as talent signal, coronary heart rate and nerve impulses etc. in order to apprehend the drowsiness state of driver. Simon et al. [3], discover the truth that kingdom of drowsiness in driver recognized via the quite a number electric signal such as electromyography (EMG) for muscle tone, electroencephalogram (EEG) [4] for talent activity, electrocardiography (ECG) for coronary heart rate, electrooculogram (EOG) [5] for ocular activity. Here, the evaluation entails in deciding the stage of drowsiness based totally on the physiological characteristics is intrusive in nature. Due to this intrusive nature, quantity of equipments which having the many sensors, have connected on the exceptional element of driver's body that are succesful of getting to know the talent indicators as well nerve impulses and so on. Thus, these equipments produce the greater burden to driver which hindered them from their smooth driving. Therefore, it is quintessential that there should not bodily attachment between identification machine and driver. So, after giving extra special result, these techniques are no longer commercially feasible. In order to get to the bottom of the hassle proven by means of physiological a well as automobile characteristics based totally drowsiness detection techniques as mentioned in above paragraphs, the computer vision methods got here into the existence. In current era, this technique has end up extra famous due to low value of execution and convenient to configure with the car as nicely as its non intrusive nature. From the survey of literatures, we found that pc imaginative and prescient approach on the whole employed the facial expression in willpower of nation of drowsiness due to the fact it becomes convenient to become aware of the driver is sleepy or alert through the facial expression [16, 18]. According to Bergasa et al. [6], reveal that the frequency, amplitude, length associated to opening and closing of mouth as properly as eye play a significant function in identification of driver's drowsiness state. The framework primarily based on this technique, frequently look at the surrounding vicinity and situation of iris in a precise time slotto compute these variables i.e. frequency, amplitude, duration etc..

### III. SYSTEM METHODOLOGIES

#### A. EXISTING SYSTEM

In this Existing System the lookup performed and the challenge made in the area of pc engineering to increase a gadget for driver drowsiness detection to stop accidents from taking place due to the fact of driver fatigue and sleepiness. The record proposed the effects and options on the restrained implementation of the a number of methods that are delivered in the project. Whereas the implementation of the assignment supply the actual world notion of how the machine works and what modifications can be achieved in order to enhance the utility of the average system.

#### B. PROPOSED SYSTEM

Among all these 4 strategies, the most unique method relies upon on human physiological measures. This technique is achieved in two ways: measuring adjustments in physiological signs, for example, intelligence waves, coronary heart rate, and eye flickering; and measuring bodily changes, for example, sagging posture, inclining of the driver's head and the open/shut stipulations of the eyes [1]. In spite of the reality that this process is most precise, it is no longer reasonable, on account that detecting electrodes would want to be put simple onto the driver's body, and consequently be aggravating and diverting to the driver. Also, lengthy time riding would carry about sweat on the sensors, decreasing their potential to display precisely.

*C. FLOW DIAGRAM*
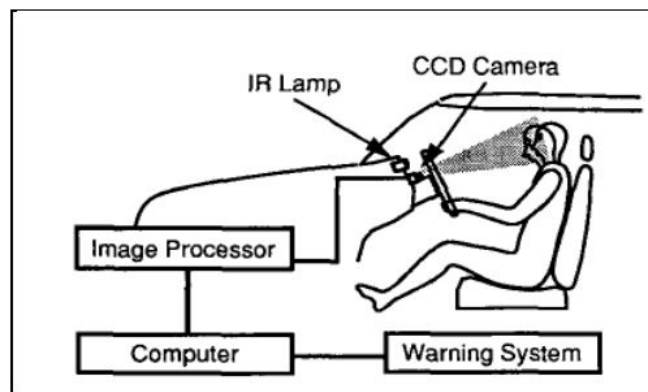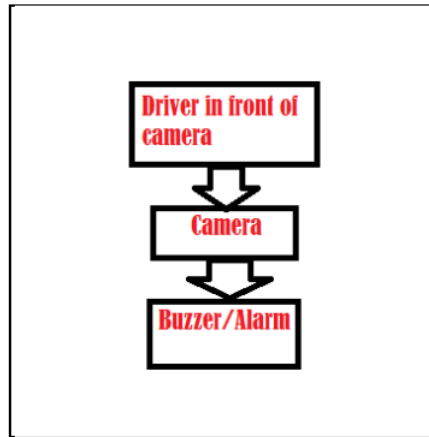




## IV. DESCRIPTION OF MODULES

**Image Capture:**

Utilizing a net digital camera delivered internal the vehicle we can get the photograph of the driver.

Despite the truth that the digicam creates a video clip, we have to follow the developed algorithm on every side of the video stream. This paper is solely targeted on the making use of the proposed mechanism solely on single frame. The used digital camera is a low value net digital camera with a body price of 30 fps in VGA mode. Logitech Camera is used for this technique is proven in parent 2.

Figure 2: Camera used for enforcing drowsiness detection system

Dividing into Frames: We are dealing with actual time scenario the place video is recorded and has to be processed. But the processing or utility of algorithm can be executed solely on an image. Hence the captured video has to be divided into frames for analyzing.

**Face Detection:**

In this stage we discover the vicinity containing the face of the driver. A distinct algorithm is for detection of face in each and every frame. By face detection we potential that finding the face in a body or in different phrases discovering place of facial characters thru a kind of science with theuse of computer. The body may additionally be any random frame. Only facial associated constructions or points are detected and all others sorts of objects like buildings, tree, our bodies are ignored.
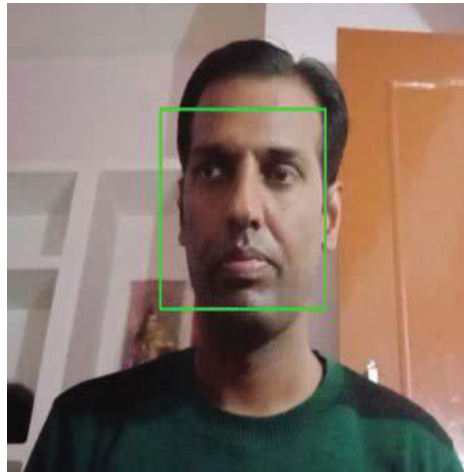
**Eye Detection:**

After profitable detection of face eye wishes to be detected for similarly processing.In our approach eye is the selection parameter for discovering the kingdom of driver. Though detection of eye can also be less difficult to locate, however it's certainly pretty complicated. At this factor it performs the detection of eye in the required specific vicinity with the use of detection of countless features.Generally Eigen strategy is used for this process. It is a time taking process. When eye detection is completed then the end result is matched with the reference or threshold fee for figuring out the kingdom of the driver.
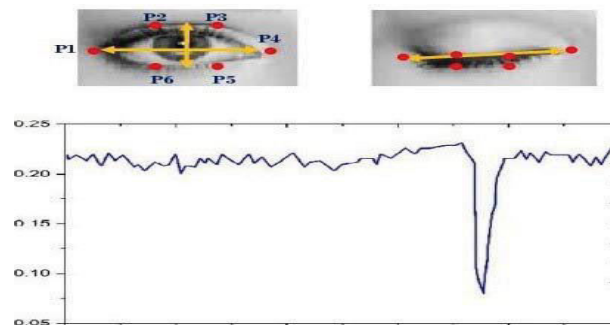


**State of eye:**

In this stage, we discover the genuine nation of the eye that if it is closed or open or semi closed or open. The identification of eyes popularity is most vital requirement. It is finished through an algorithm which will be clarified in the later parts. We channelize a warning message if we attain that the eyes are in open nation or semi open country up to a unique threshold value. If the device detects that the eyes are open then the steps are repeated once more and once more till it finds a closed eye.

The proposed method is built in four stages and it is applied to the colored images with any background.

- Localization of Face
- Localization of the Eyes
- Tracking the eyes in the subsequent frames.
- Detection of failure in tracking.

## V. PROCESSING OF OPERATIONS

a) Preprocessing The preprocessing operations include the binarization of a facial image to increase the processing speed and conserve memory capacity and noise removal. The image processor developed for this drowsiness warning system performs the expansion and contraction operation on the white pixels and processing for noise removal is performed on the small black pixels of the facial images. After the binarization, the noise removal procedure involves

an expansion processing method combined with the use of a median filter. These preprocessing operations are sufficient to support detection of the vertical positions of the eyes. However, following identification of the eye positions, the size of the eyes must be converted back to the original image format at the time the degree of eye openness is output. To facilitate that, data contraction is performed in the latter stage of preprocessing.

b) Face width detection The maximum width of the driver's face must be detected in order to determine the lateral positions of the areas in which the eyes are present. Face width is detected by judging the continuity of white pixels and the pattern of change in pixel number. On that basis, the outer edges of the face are recognized and determined.

c) Detection of vertical eye positions Each vertical eye position is detected independently within an area demarcated by the center line of the face, which is found from the face width, and straight lines running through the right and left outer edges of the face. In a binary image, the eye becomes collection of black pixels, along with the eyebrows, nostrils, mouth and other facial features. These collections of black pixels are recognized on the basis of a labeling operation, and the position of each eye is extracted by judging the area of each label along with its aspect ratio and relative coordinate positions in the facial image. Through this process of detecting each vertical eye position, the central coordinates of each eye are recognized. The coordinates serve as references for defining the areas of eye presence. d) Eye tracking A function for tracking the positions of the eye is an important capability for achieving high-speed processing because it eliminates the need to process every frame in order to detect each eye position from the entire facial image. This function consists of a subordinate for updating the areas of eye presence and recognizing when tracking becomes impossible. The basic concept of eye tracking is to update the area of eye presence, in which an eye search is made in the following frame, according to the central coordinates of the eye in the previous frame. The updating process involves defining an arc of eye presence on the basis of the coordinates $(x_k, y_k)$ at the point of intersection of center lines running through the Feret's diameter of the detected eye. The area thus becomes the area of eye presence in which the system searches for the eye in the image data of the next frame. This process of using information on eye position to define the eye position for obtaining the next facial image data makes it possible to track the position of the eye. As it is clear from this description, the size of the area of eye position changes. If the eyes are tracked correctly, their degree of openness will always vary within certain specified range for each individual driver. Consequently, if the value found by the system falls outside the range, it judges that the eyes are not being tracked correctly. The process of detecting the position of each eye from the entire facial image is then executed once more. e) Judgment whether the eye are open/closed: We constructed a template consisting of two circles, one inside the other. A good match would result in many dark pixels in the area inside the inner circle, and many bright pixels in the area between the two circles. This match occurs when the inner circle is centered on the iris and the outside circle covers the sclera

## VI. RESULTS

In our proposed work we have developed such a system which can effortlessly be deployable on a machine, sturdy and reliable to use. This developed technique is tremendously appropriate in comparison of physiological technique based totally gadget such as EEG, EOG etc. due to the fact it is intrusive capability there is no need to connect any more gear with the physique of driver to detect the kingdom of drowsiness [3]. Here, generally two parameter i.e. EAR, time period (T) is used to make the decision of drowsy country of driver. First, we evaluate the EAR price with pre initialized threshold value. For a moment when fee of EAR is much less than the threshold then state of eye modifications from open to close. Here, a blink counter is used whose cost is extended in this scenario.
Actually, this counter maintains the tune of time elapsed in the drowsy state. If the fee of this counter is upward jab above the certain limits then an alert message will be generated for the driver to make him to be alert.
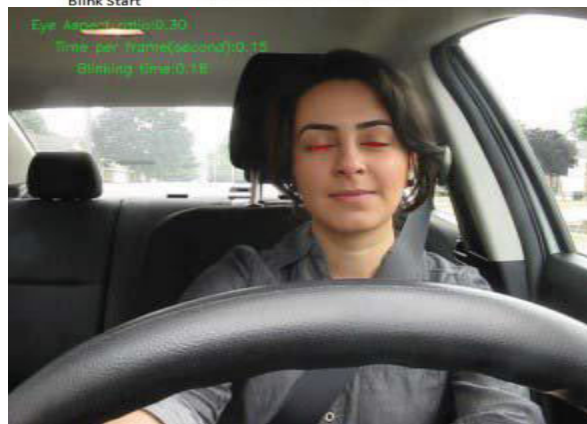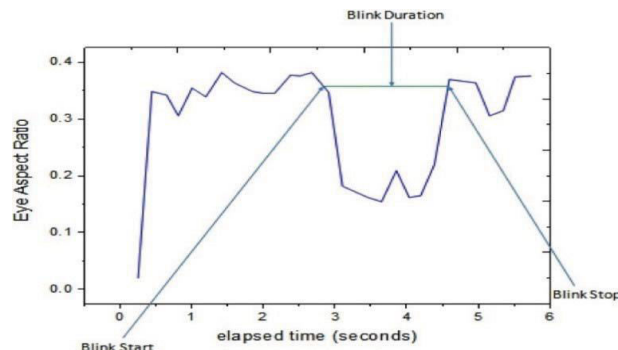
## VII. CONCLUSION

We developed a system that localizes and track the eyes and head movements of the driver in order to detect drowsiness. The system uses a combination of template – based matching and feature based matching in order to localize the eyes. During tracking, system will be able to decide if the eyes are open or closed and whether the driver is looking in front. When the eyes will be closed for too long, a warning signal will be given in the form of buzzer or alarm author-kit message.

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