DROWSINESS DETECTION WHILE DRIVING USING EYE TRACKING

Rashi Bhargava[1], Ravina Panchal[2], Preeti Verma[3], Shivam Sharma[4]

[1,2,3,4](Students B.Tech (CSE)Krishna Engineering College, Ghaziabad, Uttar Pradesh)

Abstract - ***Drowsiness*** *describes the state of being drowsy or sleepy. A person experiencing drowsiness may feel tired or sluggish and have difficulty staying awake. Individuals are usually less alert when drowsy and may fall asleep but are able to be roused.*

Nowadays, more and more professions require long-term concentration. Drivers must keep a close eye on the road, so they can react to sudden events immediately. Driver fatigue often becomes a direct cause of many traffic accidents. Therefore, there is a need to develop the systems that will detect and notify a driver of her/him bad psychophysical condition, which could significantly reduce the number of fatigue-related car accidents. However, the development of such systems encounters many difficulties related to fast and proper recognition of a driver's fatigue symptoms. One of the technical possibilities to implement driver drowsiness detection systems is to use the vision-based approach. This article presents the currently used driver drowsiness detection systems. Here we are detecting the driver drowsiness by estimating vision system of him.

This paper presents an automatic drowsy driver monitoring and

accident prevention system that is based on monitoring the changes in the eye blink duration. Our proposed method detects visual changes in eye locations using the proposed horizontal symmetry feature of the eyes. Our new method detects eye blinks via a standard webcam fitted accurately in front of the driver seat. It will detect the eyes according to a particular EAR (Eye Aspect Ratio).

Key Words**: Face detection, eye tracking, heart rate monitoring, alarm generation, score generation, eye aspect ratio.**

1.INTRODUCTION

Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy. Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads, driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue related crashes. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. related, up to 50% on certain roads. Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue related crashes. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its effect. Drowsiness detection is one of those common problem needed to be solved to prevent road accidents. In recent time's automobile fatigue connected crashes have very enlarged.

2. PROBLEM STATEMENT

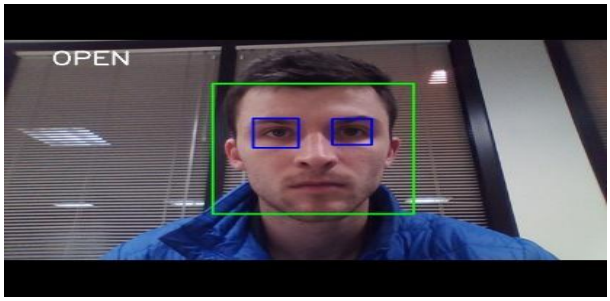
Driver's inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task. Unlike driver distraction, driver drowsiness involves no triggering event but, instead, is characterized by a progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction, however, might have the same effects, that is decreased driving performance, longer reaction time, and an increased risk of crash involvement.

3. APPROACH

Based on acquisition of video from the camera that is in front of driver perform real-time processing of an incoming video stream in order to infer the driver's level of fatigue if the drowsiness is estimated then it will give the alert by sensing the eyes. A new approach towards automobile safety and security with autonomous region primarily based automatic automotive system is projected during this conception. A drowsy driver detection system and a traffic detection system with external vehicle intrusion dodging primarily based conception. So as to attenuate these problems, we've incorporated driver alert system by watching each the driver's eyes.

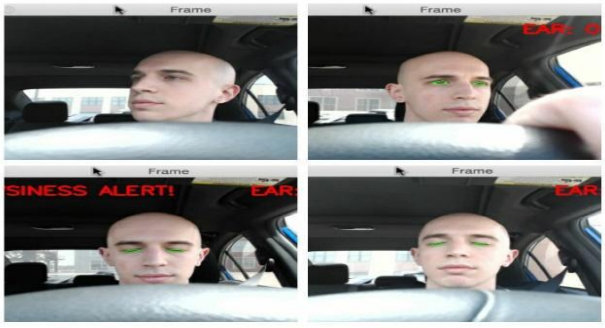
Once its detected that the driver is drowsy then the particular score is generated and the alarm rings to make the driver aware.

3.1GENERATE THE PREVIEW WITH THE WEB CAMERA

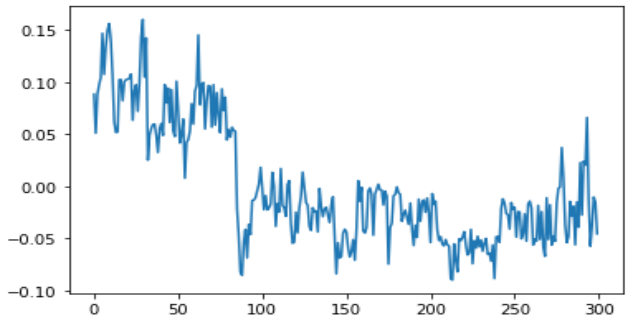


3.2 RECORD THE VIDEO THROUGH THE WEB CAMERA AND CAPTURE IT.

3.3 GENERATE THE PICTURES THROUGH THE VIDEO.



3.4 TRACK THE EYES AND GENERATE THE PLOT.



3.5 SOUND THE ALARM IF THE EYES GET CLOSE AND THE PERSON FEELS DROWSY.

The mentioned steps are used by us to test the drowsiness through eye tracking.

4. EYE TRACKING

Eye tracking is the process of measuring either the point of gaze (where one is looking) or the motion of an eye relative to the head. An **eye tracker** is a device for measuring eye positions and eye movement. Eye trackers are used in research on the visual system, in psychology, in psycholinguistics, marketing, as an input device for human-computer interaction, and in product design. Eye trackers are also being increasingly used for rehabilitative and assistive applications (related for instance to control of wheel chairs, robotic arms and prostheses). There are a number of methods for measuring eye movement. The most popular variant uses video images from which the eye position is extracted. Other methods use search coils or are based on the electrooculogram. We here are using eye tracking in detecting the drowsiness of the driver. Eye tracking is helping us to detect and sense the sleep of the driver, whether he is sleeping, wanting to sleep, getting exhausted while driving etc.

5. TECHNIQUE INVOLVED

5.1 EYE TRACKING AND DETECTION OF FACE THROUGH VIDEOS

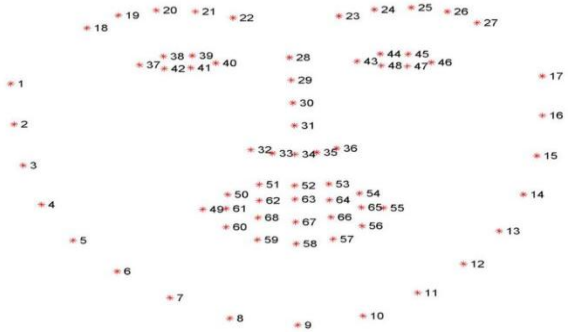
We are first trying to generate a preview of the driver through the web camera of the laptop. The driver's preview image is being captured simultaneously by the web camera and the camera forms to give us a preview image. The camera now starts to record the video and automatically saves it in the backend so that it can be analyzed. The recorded video is in grey, HSV color and original form. These different types of recording is because it helps to give us data in all the frames- grey scale or black and white, colored frame and original frame. After the images, videos, frames are being recorded and saved, the eyes are detected from them and then tracked.

5.2 SOUNDING THE ALARM

If the eyes are drowsy the alarm gets sound and the driver is given an alert through that sound.

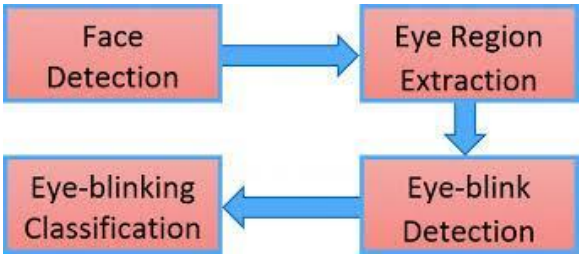
5.3 EYE TRACKING AND PLOT GENERATION

The eye tracking involves to calculate the value for the eye aspect ratio and gives the figures and plots to detect the data being recorded.



The above figure marks all the regions on the face and gives the proper outlining of the face to be focused on.

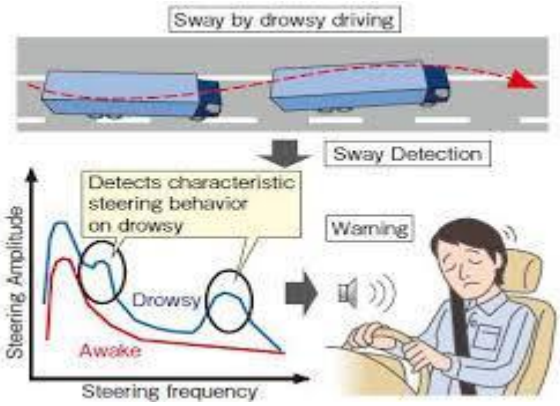
The numbers marked 37,38,39,40,41,42,43,44,45,46,47,48 are the main region of interest for us in this project.



Face detection, Eye region being focused, Detecting the blinking of the eye, Eye blinking being detected.

6. NEED FOR DROWSINESS DETECTION

1. Drowsiness Detection System is necessary.
2. It will protect the driver while driving and will ask him to drive safely.
3. No risk of death or any accident will be there.
4. The driver will feel safe in the night too while driving.
5. Driver will get alert with it.



DRIVERS WHEN DROWSY SWAY WHILE DRIVING THE CAR.

7. EYE TRACKING REQUIREMENTS

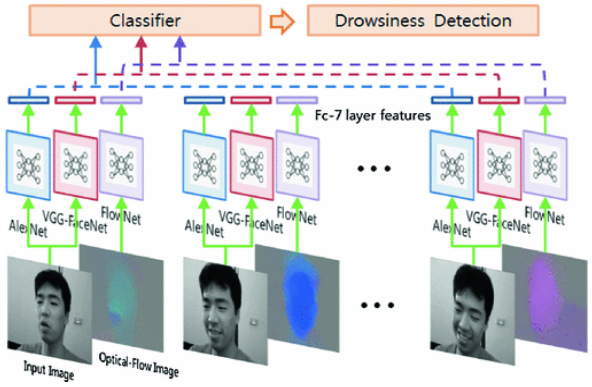
WEB CAMERA

THE CAMERA QUALITY SHOULD BE GOOD ENOUGH TO RECORD THE VIDEO AND CAPTURE IMAGES.

THE LAPTOP BEING USED SHOULD BE UPDATED TO SAVE THE VIDEO AND IMAGES.

THE LAPTOP SHOULD BE ABLE TO GIVE PREVIEW OF IMAGES, PLOTS AND VIDEOS.

7.1 EYE DETECTION USING MULTIPLE PRROCESSED IMAGES-



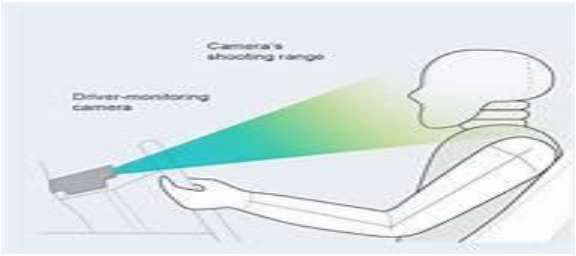
Multiple images help to sense the drowsiness detection smoothly. All the images give us an accurate measure of drowsiness to be sensed and detected.

7.2 CAMERA CONNECTIVITY

The front camera or web cam giving the perfect view from each direction.

- The perfect view of the driver can only be taken if the camera is connected properly.
- Hence the camera should be clear and connected properly.

CAMERA FOCUSSING ON THE FACE OF THE DRIVER.



This is how the web camera is helping us to record, save, preview and capture videos and images

8. ALGORITHM USED

- Step 1- Look for faces in the input video being recorded.
- Step 2 - Test the input faces and capture them as images for processing them.
- Step 3 - If the eyes get little drowsy sound an alarm.
- Step 4 - Keep the eyes tracked through the video being saved at the backend.
- Step 5 - Generate the graphs and plots showing the score of drowsiness.

The above algorithm is applied in our project.

9. ADVANTAGES:

- Efficiency while driving and safe driving.
- Decreased death rates.
- Reduced manual work.
- As the system is automated it doesn't require more resources like hand written record of driver's safety, but the record is maintained in the database.
- The system has less hardware requirements in comparison to the other biometric system.
- As the system uses fewer resources therefore the cost of the system is less.
- The system also reduces the human effort.
- No fatigue while driving.

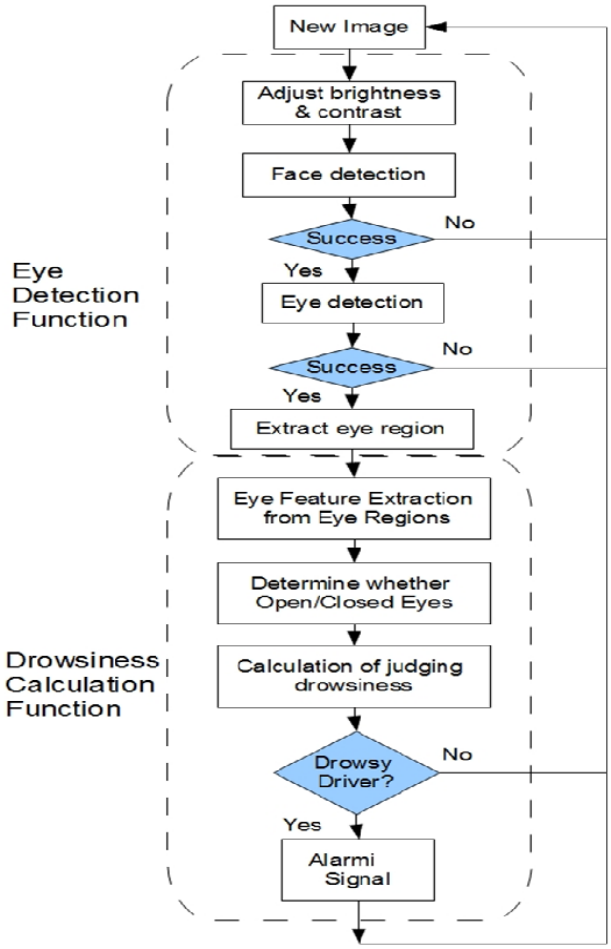
- This system uses the facial recognition technology and can be further used in various applications like for surveillance, checking the concentration of person while driving.

- This system is efficient and works perfectly in the ideal conditions.

- The system also works in real time.

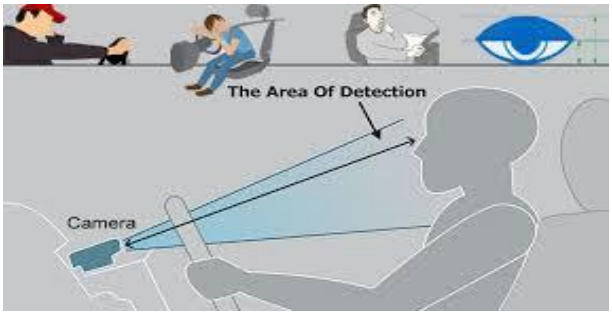
10. DROWSINESS DETECTION FLOW CHART.

- The chart depicts how the full function of the drowsiness detection is carried out.
- It describes the importance of each step that is required to complete the detection of drowsiness.
- We can see how first the brightness and contrast level of the camera is adjusted.
- Then the face is detected.
- If it is successfully previewed then only the further step is taken.
- The eye detection takes place.
- The decision for proper eye detection is taken and then the eye region is focused and extracted.
- The eyes are determined whether they are closed or opened.
- The drowsiness is calculated through the data being stored and saved.
- The drowsiness is judged now.
- If the drowsiness is drowsy then alarm rings loud and alert is given to him.
- This is how it works.



11. EXPERIMENTAL RESULT

11.1 Test Result of preview generation on driver's captured data



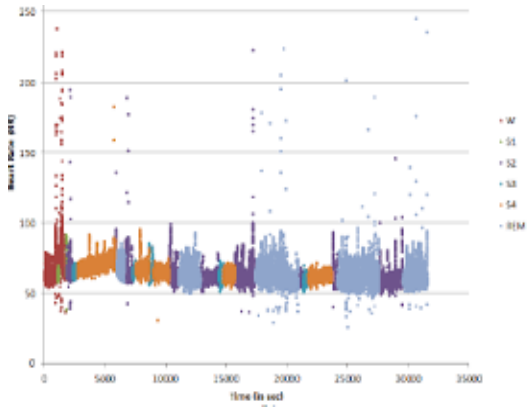
Here the preview generation is done using the web camera. The preview is perfectly taken with no ambiguity and is being saved at the backend.

11.2 Results of video recording through web camera

- Video recording gives live updates of the driver while he is driving.

- No risk in driving as at backend the driver is being observed.
- Less fatigue and drowsiness by the driver.

11.3 Results of alarm generation and plot view.



- The plot is generated with the stored and backup data at the end.
- The alarm rings and sounds loud once the region of drowsiness is detected.

12. SCOPE

- To automatically recognize the sleep and drowsiness of the driver and its detection.
- To analyze the focus of driver while driving.
- To determine concentration of drivers while driving.
- To detect whether the camera is focusing properly and the driver's face.
- To verify the drowsiness.

CONCLUSION

- Hence driver drowsiness detection is a very important part for the driver while he drives the car. So every driver should have a drowsiness detection system in his vehicle so that he can be almost safe and secure from road accidents, deaths from road accidents.
- A sleep of even a second can take the life of the driver. Then why to take any risk? This risk can be prevented when the driver uses the drowsiness detection system.
- The truck drivers, car passengers, taxi drivers, all can be aware about this system. They can manage to get help through it. Also they must be tracked on every route where they are driving to prevent any mishappening.
- There are also sensors that monitor the heart rate of the patient to predict whether the driver is in a condition of driving the car or not.

ACKNOLEDGEMENT

- We are thankful to Prof. Pramod Shetty who is the mentor of our project to guide us for this wonderful and innovative project. We are also thankful to our H.O.D sir Mr. Pramod Kumar who allowed us to complete the project smoothly within the limited time frame.
- We also thank to each of us in our team without whom the project would be impossible to be completed well.
- We thank to our Parents for allowing us and encouraging us daily to complete the project and score well through it.

REFERENCES

- *https://en.wikipedia.org/wiki/Driver_drowsiness_detection*
- *https://www.pyimagesearch.com/2017/04/24/eye-blink-detection-opencv-python-dlib/*
- *https://scholar.google.co.in/scholar?q=driver+drowsiness+detection+system+conclusion&hl=en&as_sdt=0&as_vis=1&oi=scholart*
- *https://www.pyimagesearch.com/2017/05/08/drowsiness-detection-opencv/*
- *Driver Monitoring and Drowsiness Detection by Steering Signal Analysis* ***Originally published:*** *2007*
  - ***Author:*** *Tobias Altmüller*
- *Drowsiness Detection Using Image Processing*
- *Book by Hanojhan Rajahrajasingh*
- *Driver Drowsiness Detection: Systems and Solutions*
- *Book by Aleksandar Čolić, Borko Furht, and Oge Marques*

- *Driver Drowsiness Detection*
- *Systems and Solutions*
- *Authors:* ***Colic****, Aleksandar,* ***Marques****, Oge,* ***Furht****, Borko*
- *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3571819/*

BIOGRAPHIES

RASHI BHARGAVA

Student Krishna Engineering College, Ghaziabad

Batch 2016-20

Computer Science branch

B.Tech

PREETI VERMA

RAVINA PANCHAL

SHIVAM SHARMA