International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 2 ǁ 2022 ǁ PP. 11-14

Driver Distraction Monitering Alert System By Using Opencv Algorithm

Dhanya G Naik [1]
Suha [2]
Subramanya G. Bhagwath [3]
[1,2] *UG Student, Dept. of Computer Science Engineering, Anjuman Institute of Technology and Management, Bhatkal, Karnataka, India*
[3]*Assistant Professor, Dept. of Computer Science Engineering, Anjuman Institute of Technology and Management, Bhatkal, Karnataka, India*

Abstract
Every year many people lose their lives due to fatal road accidents around the world and drowsy driving is one of the primary causes of road accidents and death. Fatigue and micro sleep at the driving controls are often the root cause of serious accidents. However, initial signs of fatigue can be detected before a critical situation arises and therefore, detection of driver's fatigue and its indication is ongoing research topic. Most of the traditional methods to detect drowsiness are based on behavioural aspects while some are intrusive and may distract drivers, while some require expensive sensors. Therefore, in this paper, a light-weight, real time driver's drowsiness detection system is developed and implemented on Android application. The system records the videos and detects driver's face in every frame by employing image processing techniques. The system is capable of detecting facial landmarks, computes Eye Aspect Ratio (EAR) and Eye Closure Ratio (ECR) to detect driver's drowsiness based on adaptive thresholding. Machine learning algorithms have been employed to test the efficacy of the proposed approach. Empirical results demonstrate that the proposed model is able to achieve accuracy of 84% using random forest classifier.

Date of Submission: 02-02-2022 Date of acceptance: 16-02-2022

I. INTRODUCTION

One of the major causes behind the casualties of people in road accidents is driver's drowsiness. After continuous driving for long time, drivers easily get tired resulting into driver fatigue and drowsiness. Research studies have stated that majority of accidents occur due to driver fatigue. Different countries have different statistics for accidents that occurred due to driver fatigue. Developing technology for detecting driver fatigue to reduce accident is the main challenge. According to the report by "Ministry of Road Transport & Highways" there were 4,552 accidents reported every year in India, that took lives of thousands of people because of sleepy drivers(Road Accidents in India 2016). For instance, many vehicles are driven mostly at night such as loaded trucks. The drivers of such vehicles who drive for such continuous long period become more susceptible to these kinds of situations. Detecting drowsiness of drivers is still an ongoing research in order to reduce the number of such miss-happenings and accidents. Typical methods used to identify drowsy drivers are physiological based, vehicle based, and behavioural based(S. Sangle, B. Rathore, R. Rathod, A. Yadav, and A. Yadav,2018)–(A. Kumar and R. Patra,2018). Physiological methods such as heartbeat, pulse rate, and Electrocardiogram(T. Hwang, M. Kim, S. Hong, and K. S. Park,2016), (S. Junawane, S. Jagtap, P. Deshpande, and L. Soni,2017) etc. are used to detect fatigue level. Vehicle based methods include accelerator pattern, acceleration and steering movements. Behavioural methods(S. Sangle, B. Rathore, R. Rathod, A. Yadav, and A. Yadav,2018)–(A. Kumar and R. Patra,2018) include yawn, Eye Closure, Eye Blinking, etc. To encounter this worldwide problem, a solution that captures images in a succession, transmits real-time driver's data to the server, and determines drowsiness using EAR (Eye Aspect Ratio) and ECR (Eye Closure Ratio) has been proposed and implemented using Android application. The computed value via the system prompts the driver to take a break or rest for some time. The methods used are non-intrusive in nature; hence, no additional costs would be incurred during the course of the drowsiness detection method. The rest of the paper is organised as follows. In section 2, the literature review is presented. Section 3 presents the proposed approach to detect driver's drowsiness. It also details the components which are developed as a part of application to compute EAR and ECR. Section 4 describes comparison of the proposed approach with existing approach. Section 5 describes the performance evaluation with discussion of experimental results. The paper is concluded in Section 6.

1.1 Problem Definition

According to a survey 32% of the road Accidents are caused by drowsiness driver. This is just a big problem not only the driver but also other people who use that road. A lot is over when things go wrong the worst that could be a crowded place or a school location. So, this is Driver Drowsiness the detection system is a secure alarm system notify the driver whenever he or she hears of it drowsiness. Driver eye movement are monitored live and whenever the driver hears sleep or close your eyes for more than 2 seconds at a time with the help of a loud alarm alert**.**

1.2 Existing System

Drowsiness can be detected by real-time photo or video help i.e. taken from a camera installed in front of driver's face. This video is being converted to Number of frames. The OpenCV-classifier is uploaded. Each framework compares with the previously defined features of OpenCV-classifiers. When features are matched to the face it is find and draw a rectangle around it face. By using the output feature, we adjust eye shape. In comparison with OpenCV is a classifier, eyes are on and rectangles are drawn around the left and righteye. Manu B.N in 2016, made a suggestion that a face detection method using OpenCV features based on cascade-classifiers. Initially, the algorithm needs a lot of good graphics too negative images of separator training to do see something. And OpenCV feature-based separators, Ada boost cascade a separator is used to detect faces region, and then the compensated image divided by the number of rectangular areas, in any position and scale within the original picture

1.3 **Proposed System**

1.3.1 Face and Eye Detection by OpenCV Algorithms:

In this paper, the approach is novel important parts of face detection are provided based on the analog network of the cellular neural network (OpenCV) algorithms. Proposed OpenCV algorithms detect and help to make a person normal face, effectively while the cause of the greatest danger related to car crashes. Driver fatigue their required time is part of previously used methods. The algorithm starts with the acquisition of heads in colored images using color deviation and structure of human face and back. Usually once the distance reference point position, all faceit should be converted into the same size again position. To be normal, the eyes act appoint indicator. Other findings of the OpenCalgorithm eyes on any gray image by searching features of the eye and eye feature sockets. Test performed on standard website show that the algorithm works very fast and is real reliable. Driver photos taken from the installed camera. It will be transferred to preprocessing which prepares an image for further processing by system. If no face is found then another frame found. If a face is found, then a your favorite place is marked on the face. This region of interest consists of eyes. Describe the region you are interested in greatly reduces counting system requirements. After that, the eyes are found in the area of interest. If eye is detected, then no blink again the blink counter is set to "20". If the eyes are present closed in a certain frame, then blink counter is decremented and blink is found. When the eyes are closed for more there are 4 or 5 frames, so it turns out that the driver feels drowsy. So, drowsiness is received and the alarm sounds. After this, the the whole process is repeated as long as the driver he is driving a car.

1.4 Objectives

- Our proposed method is to design and develop a low cost system, which is based on embedded platform.
- The main objective is to prepare prototype of a driver drowsiness system that alerts the driver when he/she is drowsy and sleepy.
- Most existing approaches for the drowsiness detection rely either on eye closure or head nodding angles to determine the driver distraction level
- This method combine the both eye state to detect the drowsiness of the driver.
- Achieved by the use of computer vision model to detect the face of the driver and analyzing the state of the driver.
- Detection system analyze the movie frame by frame and determines the driver's eyes are open and shut, depending upon this system beeps to alert takes place.

II. LITERATURE SURVEY

A. Driver Drowsiness Detection System and Techniques: According to the experts it has been observed that when the drivers do not take break they tend to run a high risk of becoming drowsy. Study shows that accidents occur due to sleepy drivers in need of a rest, which means that road accidents occurs more due to drowsiness rather than drink-driving. Attention assist can warn of inattentiveness and drowsiness in an extended speed range and notify drivers of their current state of fatigue and the driving time since the last break, offers adjustable sensitivity and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system.

B. Implementation of the Driver Drowsiness Detection System This paper is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue. To advance a system to detect fatigue propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver. If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off.

C. Detecting Driver Drowsiness Based on Sensors: Researchers have attempted to determine driver drowsiness using the following measures: (1) vehicle-based measures; (2) behavioural measures and (3) physiological measures. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system. This paper reviews the three measures as to the sensors used and discuss the advantages and limitations of each. The various ways through which drowsiness has been experimentally manipulated is also discussed. It is concluded that by designing a hybrid drowsiness detection system that combines non-intrusive physiological measures with other measures one would accurately determine the drowsiness level of a driver. A number of road 8 accidents might then be avoided if an alert is sent to a driver that is deemed drowsy.

D. Eye Tracking Based Driver Drowsiness Monitoring And Warning System: This project represents a way of developing an interface to detect driver drowsiness based on continuously monitoring eyes and DIP algorithms. Micro sleeps are the short period of sleeps lasting 2 to 3 seconds, are good indicator of fatigue state. Thus by monitoring continuously the eyes of the driver by using camera one can detect the sleepy state of driver and timely warning is issued. Aim of the project is to develop the hardware which is very advanced product related to driver safety on the roads using controller and image processing. This product detects driver drowsiness and gives warning in form of alarm and it also decreases the speed of vehicle. Along with the drowsiness detection process there is continuous monitoring of the distance done by the Ultrasonic sensor. The ultrasonic sensor detects the obstacle and accordingly warns the driver as well as decreases speed of vehicle.

E. Driver Drowsiness Detection System: One of the major cause of traffic accident is Drivers drowsiness. It is a serious highway safety problem. If drivers could be warned before they became too drowsy to drive safely, some of these crashes could be prevented. In order to reliably detect the drowsiness, it depends on the presentation of timely warnings of drowsiness. To date, the effectiveness of drowsiness detection methods has been limited by their failure to consider individual differences. Based on the type of data used, drowsiness detection can be conveniently separated into the two categories of intrusive and non-intrusive methods. During the survey, non-intrusive methods detect drowsiness by measuring driving behaviour and sometimes eye features, through which camera based detection system is the best method and so are useful for real world driving situations. This paper presents the review of existed drowsiness detection techniques that will be used in this system like Circular Hough Transform, FCM, Lab Color Space etc

III. TOOLS AND TECHNOLOGY USED

3.1 Tools and image processing libraries

Following optimized tools and image processing libraries are used for implementation of presented algorithm

OpenCV(Open- source Computer Vision):

It has a wide range of modules that can help us with lot of computer vision problems. But perhaps the most useful part of OpenCV is its architecture and memory management. It provides with a framework in which we can work with images and videos, using OpenCV‟s algorithms, without worrying about allocating and reallocating memory for images. OpenCV libraries and functions are highly optimized and can be used for real-time image and video processing.

DLib:

It is a modern C++ toolkit containing machine learning algorithms and tools for creating complex software in C++ to solve real-world problems. It is used in both industry and academia in a wide range of domains including robotics, embedded devices, mobile phones, and large high performance computing environments. Open Source Dlib library is used for implementation of CNN(neural networks).

Python:

Python is an object-oriented programming language created by Guido Rossum in 1989. It is ideally designed for rapid prototyping of complex applications. It has interfaces to many OS system calls and libraries and is extensible to C or C++. Many large companies use the Python programming language included NASA, Google, YouTube, etc. Python is widely used in Artificial Intelligence, Natural Language Generation, Neural Networks and other advanced fields. Python had deep focus on code readability.

1.5 **Hardware Requirements**

¬ Personal PC or Laptop

¬ Wireless Connection or connecting cable ¬

Processor of Intel or high leve

1.6 **Software Requirements**

¬ Windows 7 or more

¬ Internet connection

¬ OpenCV

¬ Python 2.7 or 3.9 version

IV. DESIGN

Drivers face is continuously monitored using a camera. In order to detect the drowsiness, the first step is to detect the face using the series of frame shots taken by the cameras. Then the location of the eyes is detected and retina of the eye is continuously monitored. The captured image is sent to the Rasberry Pi board for image processing. The raspberry Pi converts the received image to digital signal using OpenCV. The digital signal is transmitted from transmitter to the receiver. Both the transmitter and the receiver are paired up. The signal is then passed to the LPC2148, the microcontroller. If the signal crosses the threshold of 2 seconds, then the alarm beeps and the speed of the vehicle is automatically reduced. The drowsiness detection and correction system developed is capable of detecting drowsiness in a rapid manner. During the monitoring, the system is able to decide whether the eyes are open or closed. Using drowsiness detection system, driver safety can be implemented in normal cars also.

This projected is designed to achieve certain goals which are:

¬ Driver drowsiness detection is a car safety technology which helps to save the life of the driver by preventing accidents when the driver is getting drowsy.

¬ The main objective is to design a system to detect drivers drowsiness by continuously monitoring retina of the eye.

¬ The system works to alert the driver on the detection of drowsiness by using buzzer or alarm.

¬ Speed of the vehicle can be reduced.

¬ Traffic management can be maintained by reduce accident.

V. CONCLUSION AND FUTURE WORK

In this work, a real time system that monitors and detects the loss of attention of drivers of vehicles is proposed. The face of the driver has been detected by capturing facial landmarks and warning is given to the driver to avoid real time crashes. Non-intrusive methods have been preferred over intrusive methods to prevent the driver from being distracted due to the sensors attached on his body. The proposed approach uses Eye Aspect Ratio and Eye Closure Ratio with adaptive thresholding to detect driver's drowsiness in real-time. This is useful in situations when the drivers are used to strenuous workload and drive continuously for long distances. The proposed system works with the collected data sets under different conditions. The facial landmarks captured by the system are stored and machine learning algorithms have been employed for classification. The system gives best case accuracy of 84% for random forest classifier. The future work can include integration of the proposed system with globally used applications like Uber and Ola. The system, if integrated, can reduce the number of casualties and injuries that happen regularly due to these drowsy states of the drivers. This experiment can run as a part of pilot plan i.e. for a few days/months in different regions of the world where such incidents occur regularly. Thus, our proposed approach also gives the same accuracy for the people wearing spectacles. Accuracy of our proposed system improves with the increase in brightness of the surrounding environment. The work can be extended for different types users such as bike riders or in different domains like railways, airlines etc.

REFERENCES

[1]. Feng You, Xiaolong Li, Yunbo Gong, Haiwei Wang, and Hongyi Li, "Real-Time Driving Drowsiness Algorithm for Individual Differences Consideration", Proc of IEEE, 2019, pp December 10,2019.

[2]. Jasper S. Wijnands, Jason Thompson, Kerry A. Nice, Gideon D. P. A. Aschwanden, Mark Stevenson, "Real-time monitoring of driver drowsiness on mobile platforms using 3D neural networks", Proc of IEEE, December 2018, pp October 13, 2019.

[3]. Ralph Oyini Mbouna and Seong G. Kong, "Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring", Proc of IEEE, Vol 14, pp 2013.

BIOGRAPHICS

Dhanya G Naik

Final Year B.E Student Dept. of Computer Science Engineering AITM, Bhatkal Karnataka