iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** III **Month of publication:** March 2020

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

Distraction System Driver

R. Naresh[1], Dhruvil Patel[2]
[1]*Associate Professor, Department of Computer Science and Engineering,*
[2]*B.E student, Department of Computer Science and Engineering, SRM Institute Science and Technology, chennai,India*

Abstract: ***Secure car driving is an important entity for safety and is the first priority for any automobile driver and is the main reason for designing a system which captures the state of the drivers eyes and his/her facial variations combined with pulse fluctuations, altogether they gives us parameters to decide whether the driver should be notified or not. Eye detection - more precisely it analyses the eyes and check if they're closed or open using camera module the amount of frames during which eyes are closed is decided. When this number of frames is above a specific threshold, the driving force will get a alert. Camera module periodically takes snaps so as to confirm safety..A true time system which captures the state of the driver which will benefit many of us round the globe.***

Keywords: Camera Module, drowsiness, Viola-Jones Human Machine Interface, Face Detection, Distraction Detection, Alert Sound, Haar Cascade , Arduino , pulse sensor.

I. INTRODUCTION

Driver Distraction relates to unsatisfactory or no attention given to activities critical for driving. Inattentiveness can either be an intentional or an unintentional distraction of attention by the driving force. Driving distraction causes traffic accidents. The increasing use of navigation systems and infotainment systems has led to a rise in driver distraction such as talking on phone, listening to loud music,or even traditional distractions such as drowsiness and yawning are indications That needs motivating the drivers transfer attention removed from the mundane driving task by weakening the drivers auditory, biomechanical, cognitive or visual faculties or combinations thereof. it's important to notice that driver distractions are normally thanks to a competing trigger activity that will cause driver inattention, which successively decrease driving performance. So in order to maintain the driving feasibility some parameters must be looked after which comprises of mainly facial and retina variations of driver and his/her heartbeat or pulse because it is shown by some studies that a drivers heartbeat or pulse is higher while driving and is lowered in a fluctuating manner while sleep or distracted and this all parameters help us to formulate that whether the driver is feeling fatigue or not. By recognizing a number of the explanation for driver distraction, it's possible to isolate scenarios when the reason for distraction will be controlled. the bulk of road accidents nowadays are happening simply because of driver behavior and therefore the fault which may cause death and injuries, and also reasons for financial losses and low productivity. The incautious traits of the driving force they moreover put other drivers in danger. one amongst the explanations for accidents on the road are fatigues of a driver. So there's needed to observe driver behaviors in real time that may reduce fatalities and injuries and road accidents. The given system can help for alerting the driving force when it's distracted. The system detects the face from captured images. If some distraction can happen then the constant sound is played. Driver status notification is distributed to the admin.

II. LITERATURE SURVEY

A. Portable Prevention and Monitoring of Driver's Drowsiness Focuses to Eyelid Movement Using Internet of Things

Authors: Menchie Miranda; Alonica Villanueva; Mark Jomar Buo ; Reynald Merabite; Sergio Paulo Perez ; John Michael Rodriguez, 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology,Communication and Control, Environment and Management (HNICEM) This paper includes a drowsiness prevention device since recently automobile count of accidents grow yearly in the Philippines. Present safety measures are followed to grow the driver's awareness which includes the use of standard rumble strips on roads reference, installation of GPS, speed limiters, sensors and other learning uses signal processing embedded of an costly vehicle. The technology uses IOT so that the automobile holder can monitor the driver's drowsiness everywhere during work hours. The study focuses at the eyelid movement that is not yet mentioned to the previous study. This proposed system continuously scans the eyelid movements of the driver and once drowsiness is detected the device automatically alerts him using a random-typed alarm. It automatically forwards the report to the vehicle owner from the web application through internet access. The project received consistent results through evaluation and testing as it is 95% successfully detects and alerts a drowsy driver.

B. A Fuzzy Based Method for Driver Drowsiness Detection

Authors: Omar Rigane ; Karim Abbes; Chokri Abdelmoula; Mohamed Masmoudi, 2017 IEEE/ACS 14th International Conference on Computer Systems and Applications (AICCSA)

This paper explains a fresh approach for an intelligent driver drowsiness detection system using optical behavior of the driver. The estimation of driver's surveillance is successfully made by adding facial and eye symptoms using a fuzzy logic controller. The investigational results using fuzzy-logic simulation in Matlab show the performance of the developed approach in term of potent and reliability.

C. Driver Drowsiness Detection Based on Time Series Analysis of Steering Wheel Angular Velocity

Authors: Gao Zhenhai ; Le DinhDat; Hu Hongyu; Yu Ziwen; Wu Xinyu, 2017 9th International Conference on Measuring Technology and Mechatronics Automation(ICMTMA)

A narrative driver drowsiness detection method based on pattern series analysis of the steering wheel angular velocity is shown in this paper. At first, the direct behavior under the weariness state is analyzed, followed by the resolution of the temporal detection window, and then, the data series of the steering-wheel angular velocity in the temporal detection window is selected as the observation feature.

IF the detection feature satisfies the extent constraint and the variability bounds in the temporal window, a drowsiness state is detected correspondingly. At last, experiment tests give proof of our method has good performance and could be well-used in the working world.

D. Driver Drowsiness Detection System Based on Binary Eyes Image Data

Authors: Maninder Kahlon; Subramaniam Ganesan, 2018 IEEE International Conference on Electro/Information Technology(EIT)

In this paper, the driver drowsiness detection method based on the state of eyes of the driver which is determined by his iris visibility has been implemented.

If eyes remain in one state either open or closed longer than anticipated time as well as if the driver is not looking straight front, it is a symptom that driver is drowsy and then the system notify the driver. The system is capable of perceiving the state of eyes with or without the regular glasses. Matlab with image processing tools has been used to operate the input provided by a camera. Matlab creates System Object using the Viola_Jones(VJ) algorithm to detect objects such as the nose, mouth or upper body.

E. Real-Time Drowsiness Detection Algorithmfor Driver State Monitoring Systems

Authors: Jang Woon Baek ; Byung-Gil Han ; Kwang-Ju Kim ; Yun-Su Chung ; Soo-In Lee, 2018 TenthInternational Conference on Ubiquitous and FutureNetworks(ICUFN)

In this paper, we proposes a novel drowsiness detection algorithm using a camera near the dashboard. The proposed algorithm detects the driver's face in the image and estimates the landmarks in the face region. In order to detect the face, the proposed algorithm uses an AdaBoost classifier based on the Modified Census Transform features. And the proposed algorithm uses regressing Local Binary Features for face landmark detection.

Eye states (closed, open) is determined by the value of Eye Aspect Ratio which is easily calculated by the landmarks in eye region. The proposed algorithm provides realtime performance that can be run on the embedded device. We obtained the dataset using video records from the infrared camera which is used the real-field. The proposed algorithm tested in the target board (i.mx6q). The result shows that the proposed algorithm out performed in the speed and accuracy

F. Driver Drowsiness Detection Based on Respiratory Signal Analysis

Authors: Federico Guede-Fernández; Mireya Fernández-Chimeno; Juan Ramos-Castro ; Miguel A. García-González, 2019 IEEEAccess

Drowsy driving is a prevalent and serious public health issue that deserves attention. Recent studies estimate that around 20% of car crashes have been caused by drowsy drivers. Nowadays, one of the main goals in the development of new advanced driver assistance systems is trustworthy drowsiness detection. In this paper, a drowsiness detection method based on changes in the respiratory signal is proposed. The respiratory signal, which has been obtained using an inductive plethysmography belt, has been processed in real time in order to classify the driver's state of alertness as drowsy or awake. The proposed algorithm is based on the analysis of the respiratory rate variability (RRV) in order to detect the fight against to fall asleep.

G. Real-Time Driver's Drowsiness Monitoring Based on Dynamically Varying Threshold

Authors: Isha Gupta ; Novesh Garg ; Apoorva Aggarwal ; Nitin Nepalia ; Bindu Verma, 2018 Eleventh International Conference on Contemporary Computing (IC3) One of the most prevailing problems across the globe nowadays is the booming number of road accidents. Improper and inattentive driving is one of the major cause of road accidents. Driver's drowsiness or lack of concentration is considered as a dominant reason for such mishaps. Research in the field of driver drowsiness monitoring may help to reduce the accidents. This paper therefore proposes a non-intrusive approach for implementing a driver's drowsiness alert system which would detect and monitor the yawning and sleepiness of the driver. The system uses Histogram Oriented Gradient (HOG) feature descriptor for face detection and facial points recognition. Then SVM is used to check whether detected object is face or non-face. It further monitors the Eye Aspect Ratio (EAR) and Mouth Aspect Ratio (MAR) of the driver up to a fixed number of frames to check the sleepiness and yawning. Since the drowsiness or tiredness of the driver is also based on the number of hours he or she has been driving, an additional feature of varying the threshold frames for eyes and mouth is included.

H. Designofa Vehicle Driver Drowsiness DetectionSystemThroughImage ProcessingusingMatlab

Authors: Melissa Yauri-Machaca; Brian Meneses-Claudio ; Natalia Vargas-Cuentas ; Avid Roman-Gonzalez, 2018 IEEE 38th Central America and Panama Convention (CONCAPAN XXXVIII)

A person when he or she does not have a proper rest especially a driver, tends to fall asleep causing a traffic accident. It is why the present work wants to realize a system that can detect the drowsiness of the driver, in order to reduce traffic accidents. For that system, it will take the processing of images through a camera which will focus on the driver. In that, it is going to analyze the changes that happen in the face and then will be processed through a program in order to detect drowsiness to send an alert to the driver.

I. Driver Drowsiness Detection Using Visual Information On Android Device

Authors: Aldila Riztiane ; David Habsara Hareva ; Dina Stefani ; Samuel Lukas, 2017 International Conference on Soft Computing, Intelligent System and Information Technology (ICSIIT)

The number of casualties from road accidents keep arising each year. While there are many causes to road accidents, most are surprisingly caused by human errors, such as drowsiness. Therefore, this issue raises an idea for an application which will be able to track a person's eye movement while driving. The application, called “Driver Drowsiness Detection”, runs on an Android hand held and wearable. The purpose of this application is to alert drivers so that they can be cautioned to pull over and stop driving in a drowsy state. The application “Driver Drowsiness Detection” utilizes Haar-cascade Detection as well as template matchingin OpenCVto detect and track the eyes using the front camera of an Android device.

J. Driver Drowsiness Detection System Basedon Binary Eyes Image Data

Authors: Maninder Kahlon ; Subramaniam Ganesan, 2018 IEEE International Conference on Electro/InformationTechnology(EIT)

In this paper, driver drowsiness detection algorithm based on the state of eyes of the driver which is determined by his iris visibility has been implemented. If eyes remain in one state eitheropen or closed longer than expected time as well as if the driver is not looking straight front, it is an indication that driver is drowsy and then the system warns the driver. System is capable of detecting the state of eyes with or without the regular glasses. Matlab with image processing tools has been used to process the image provided by a camera. Matlab creates System Object using Viola_Jones algorithm to detect the objectssuchas nose,mouthorupperbody.

III. PRPOSED WORK

Many traffic accidents are caused by drivers falling asleep while driving. So it'd be beneficial to develop how to detect the drowsiness before it occurs and to be able to warn the driving force in time. Many systems have already been developed which are supported the vehicle behavior like wheel movements, that specialize in the driving force physical behavior i.e. supported recording taken of head movements, pulse alteration or grasp strength. System uses a video camera for the tracking of eye movements have also been developed. Till now no system has proved to be sufficiently reliable. Existing system used the attention closure ratio as input parameter to detect the drowsiness of the driving force. If the attention closing down ratio decreases from the conventional ratio, the driving force is notified with the assistance of a alarm. For our system, a Pi camera module is employed to require the pictures of the driver’s eye.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

A. Abbreviations and Acronyms

Img-image
Hmi-human machine interface
Vj-viola jones
Ar-arduino IDE

B. Equations

1) Haar algorithm features can easily be scaled by expanding or the dimensions of the pixel group being inspected. this enables features to detect features on particular gestures. The variances of contrasts within the pixel groups are accustomed be told relative light & dark areas. The feature value f of any single Haar feature with k rectangles will be elected by because the following equation

$X\leq$ *((number of Pos.Img-number of Neg.Img)/*
(1+number ofstages-1))(1-min hit rate) …{1}*

2) Haar-like feature-based classifier gives both high precision & speed. It needs fewer microprocessor instructions & has much less false detections. the employment of integral images causes the high speed of evaluation while rectangular property of the haar like features characterize non-symmetrical properties of Gesture appearance , so it's perfect for Gesture detection procedure.

3) The rotated integral image is calculated by calculating the sum of the pixels' intensity values which are located at forty-five-degree angle to the left & above for the x value & below for the y values.

IV. IMPLEMENTATION

The Distraction system initially takes input using camera module and identify the driving force then it implies certain parameters to test the drowsiness of the driving force, system use the attention closure ratio as input parameter to detect the drowsiness of the driving force. If the attention closure ratio deteriorates from the quality ratio, the driving force is alerted with the assistance of a buzzer. Haar Cascade may be a machine learning algorithm accustomed identify objects in a very img or video when compared to viola- jones algorithm it is more compact and captures facial and retina movements, altogether the distraction system software harnesses haar cascade to differentiate between drowsy and normal features of driver and open CV platform provides a feasible way to harness the graphical input.

A. Open CV as a Raspberry pi- alternative

Even though Raspberry Pi can perform different tasks, there are some limitations thanks to its hardware. thanks to its processor, it cannot run X86 operating systems. Some common ones like Windows and Linux distros don't seem to be compatible. additionally, some applications which require high demands on CPU processing are off-limits. "Model B took 107 ms to complete one calculation of the purely synthetic prime test; a mid-range desktop Core 2 Duo E8400 took only 0.85ms." (Collins, 2012) Users must not use normal computer standards to guage Raspberry Pi.

B. Haar Cascade Classifier

Haar Cascade could be a classifier which is employed for detecting a face from a picture.
For training the classifier positive images which contain the wanted object i.e. face within the image and negative images which don't contain the face are needed. The classifier scans the features on the positive images and creates specific target values by using the sum values of the black area and also the white areas within the features
Classifier tries to make the foremost optimized target values for detecting and tracking the item by changing the sizes of the features. Features are the weak classifiers. Because they can't be an accurate classifier with alone.
In an object, there are many features and an area where they're collected contains the wanted object within the image. employing a lot of positive and negative images facilitates the detection of the item within the image.
Classifier runs as mentioned above basically. Its speed of finding the objects within the image depends on the training method of the classifier and also the number of positive and negative images. Training the Classifier for training the classifier positive and negative images are used. We train the classifier by giving positive images separately in keeping with their type. The positive images are resized to 24*24 pixels and converted to a vector file with a script. After them, the amount of positive images that may be utilized in training is set. For determining this number (x) Equation (1) is employed.

C. Pusle Monitering Using Arduino

There is a significant fluctuation variation in drivers pulse while driving and while sleepy and this is a observed fact during study conducted [12] and the most effective and affordable option to moniter heartbeat is using Arduino and pulse sensor the simple combination computes the drivers heartbeat while finger is placed and notifies if the pulse value is abnormal or out of bounds

D. Figures and Tables

TABLE I. TABLE TYPE STYLES

S.NO	Distraction system
	TOOL
1	CAMERA MODULE
2	OPEN CV
3	ANACONDA
4	NAVIGATOR
5	ALARM
	PULSE SENSOR
6	JUMPER WIRES
	ARDUINO UNO BOARD
7	DETECTION SYSTEM

E. System Tools Requirement

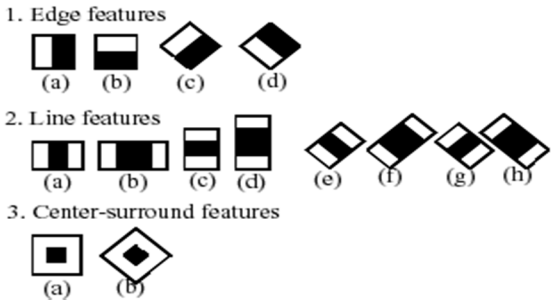


Fig. 1. Haar cascade features.

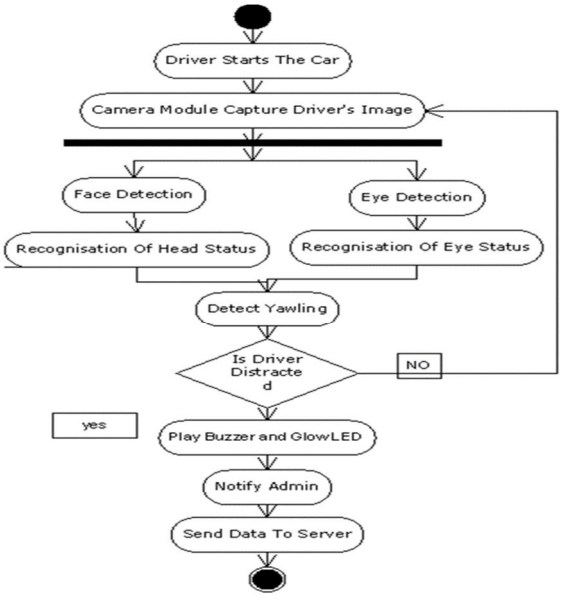


Figure 2: System Flow

Fig. 2. Distraction system flow

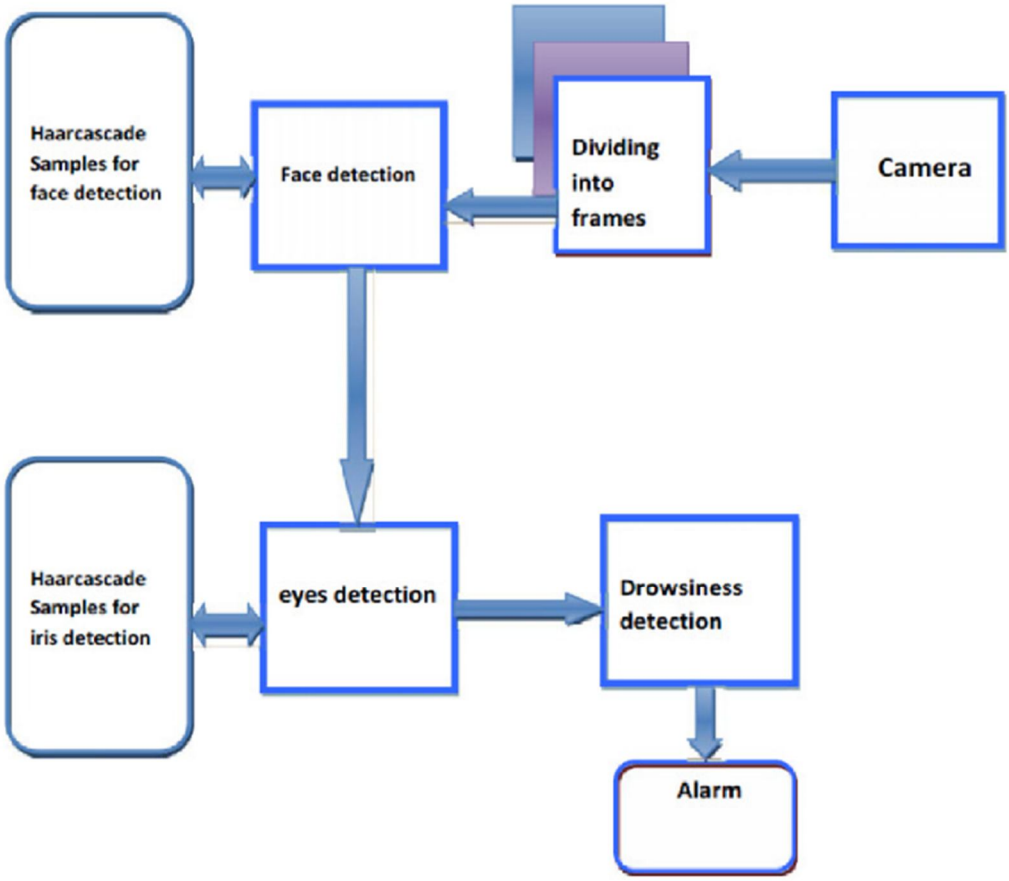
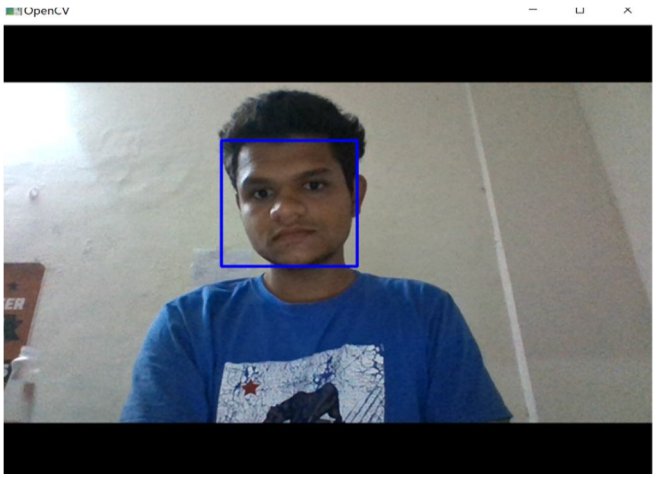


Fig. 3. System design

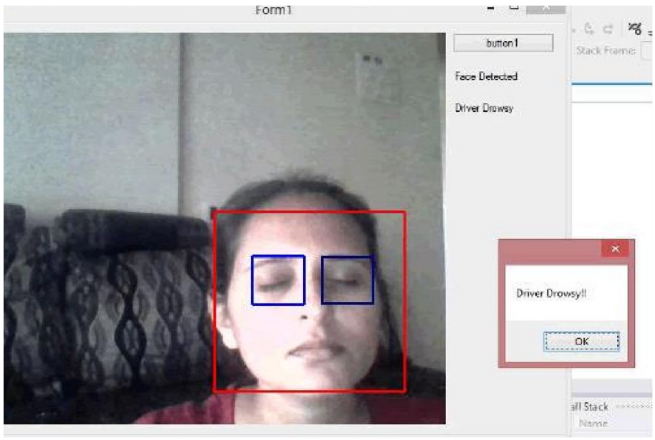
V. RESULTS DISCUSSION

The model feasibly detects the face and eyes through camera module and using haar cascade repository it determines whether the driver is distracted or not and notifies the admin about the same and moniters pulse rate through pulse sensor connected to Arduino uno board and report any irregularities.

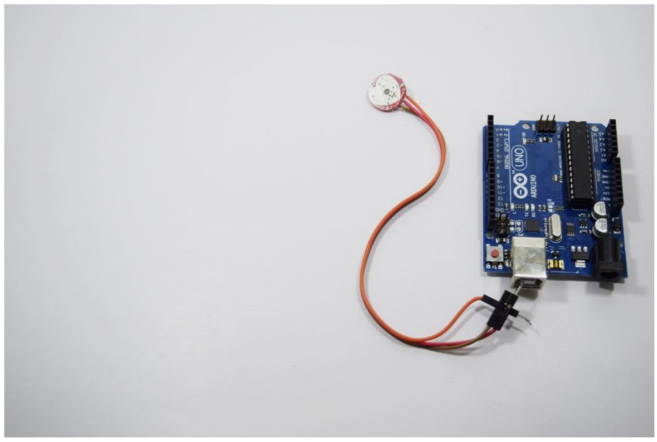
A. Screenshots of the Facial Detection



B. Screenshots of the Drowsiness Detection



C. Arduino uno and Pulse Sensor



VI. CONCLUSION

The main goal of this project is to develop a real-time drowsiness monitoring system in vehicles. We developed a straightforward system consisting of steps namely video acquisition, dividing into frames, face detection, eye detection, pulse detection and drowsiness detection. Each of those steps are often presented separately hence providing some way to stack them supported the wants. Four things that produces our system different from the present driver detection system are
concentrate on the driving force, which may be a direct way of detecting the drowsiness, A real-time system that detects face,iris, blink, and driver drowsiness , a totally non-intrusive system, Cost effective as no hardware cost is required because of open CV compared to raspberry pi and use of Haar cascade algorithm makes our model different with collaboration of pulse monitering.
Our model gives the knowledge about the driving force's behavior while driving and detect if the driver is yawning, sleeping or not concentrating on the road while driving. The proposed system can estimate the gaze which is employed to warn the driving force. The system could warn the driving force to concentrate whenever the driver's gaze gets distracted on an edge apart from the road. The Haar cascade method is employed to detect Face, eye Jones algorithm which only detects frontal faces. Haar cascade has better performance as compared to viola Jones performance i.e. viola Jones performance cannot easily be estimated. Haar cascade includes a good solution as compared Adaboost algorithm may be a suboptimal solution. In future the warning mechanism are going to be given within the kind of visual, audio or some quite regeneration are often incorporated which will influence driving behavior in a very positive manner.
The positive or negative abrupt fluctuations in heartbeat also indicates the drivers drowsiness and can be monitered easily using Arduino ide and pulse sensor and as this components are available at a cheap market cost the system is quite affordable and adaptable.

REFERENCES

[1] Portable Prevention and Monitoring of Driver's Drowsiness Focuses to Eyelid Movement Using Internet of Things Authors: Menchie Miranda ; Alonica Villanueva ; Mark Jomar Buo ; Reynald Merabite ; Sergio Paulo Perez ; John Michael Rodriguez, 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology,CommunicationandControl,EnvironmentandManagement(HNICEM)

[2] A Fuzzy Based Algorithm for Driver Drowsiness Detection Authors: Omar Rigane ; Karim Abbes ; Chokri Abdelmoula ; Mohamed Masmoudi, 2017 IEEE/ACS 14th International Conference on Computer Systems and Applications(AICCSA)

[3] Driver Drowsiness Based on Time Series Analysis of Steering Wheel Angular Velocity Authors: Gao Zhenhai ; Le DinhDat ; Hu Hongyu ; Yu Ziwen ; Wu Xinyu, 2017 9th International Conference on Measuring Technologyand MechatronicsAutomation(ICMTMA)

[4] Driver Drowsiness Detection Based on Time Series Analysis of Steering Wheel Angular Velocity Authors: Gao Zhenhai ; Le DinhDat ; Hu Hongyu ; Yu Ziwen ; Wu Xinyu, 2017 9th International Conference on Measuring Technologyand MechatronicsAutomation(ICMTMA)

[5] Real-Time Drowsiness Detection Algorithm for Driver State Monitoring Systems Authors: Jang Woon Baek ; Byung-Gil Han ; Kwang-Ju Kim ; Yun-Su Chung ; Soo-In Lee, 2018 Tenth International Conferenceon Ubiquitous andFutureNetworks(ICUFN)

[6] Ruian Liu,et.a;, "Design of face detection and tracking system," Image and Signal Processing (CISP), 2010 3rd International Congress on , vol.4, no., pp.1840,1844, 16-18 Oct. 2010

[7] Xianghua Fan, et.al, "The system of face detection based on OpenCV," Control and Decision Conference (CCDC), 2012 24th Chinese , vol., no., pp.648,651, 23-25 May 2012

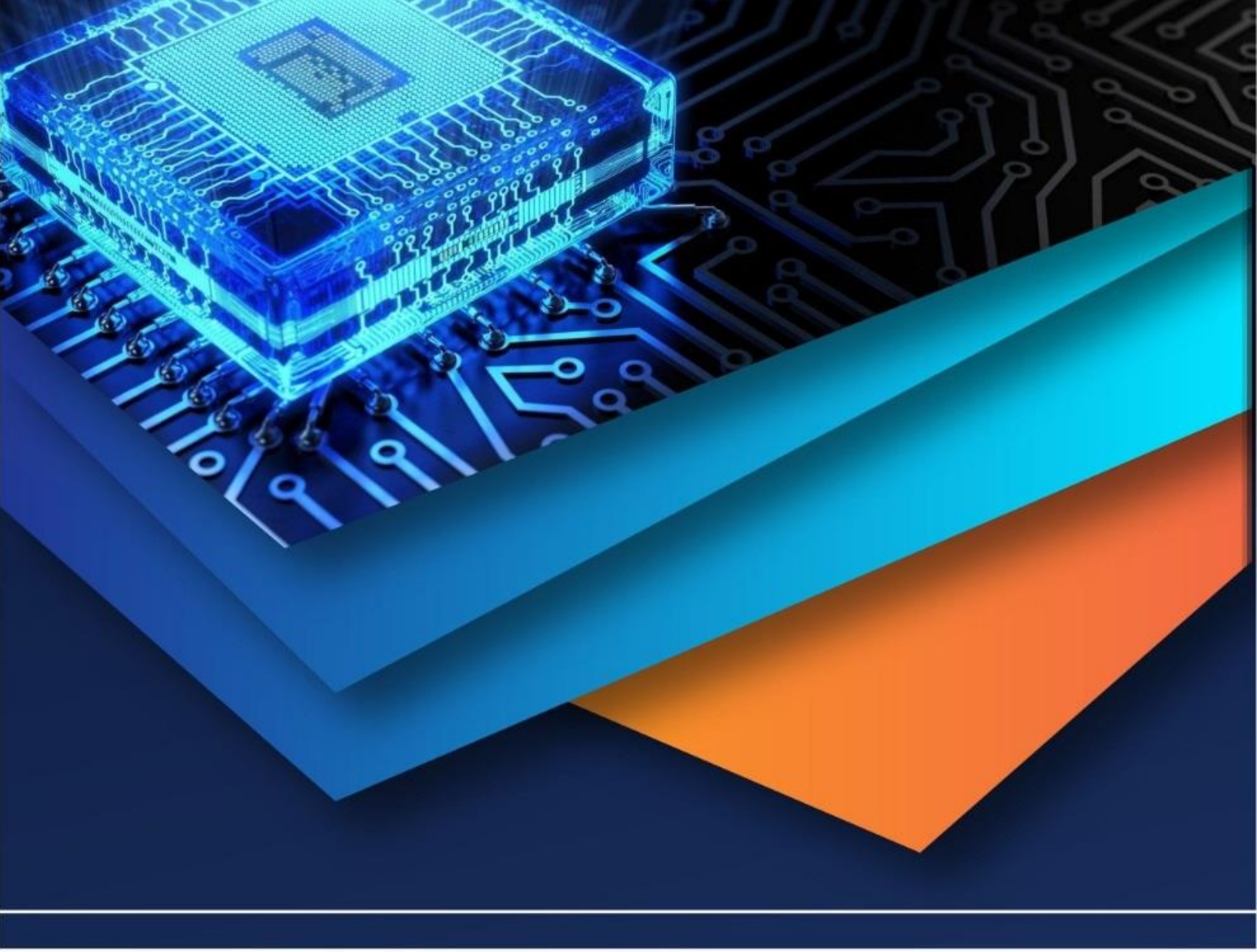
[8] Goel, P, et.al., "Hybrid Approach of Haar Cascade Classifiers and Geometrical Properties of Facial Features Applied to Illumination Invariant Gender Classification System," Computing Sciences (ICCS), 2012 International Conference on , vol., no., pp.132,136, 14-15 Sept. 2012

[9] Parris, J., et.al, "Face and eye detection on hard datasets," Biometrics (IJCB), 2011 International Joint Conference on , vol., no., pp.1,10, 11-13 Oct. 2011 [5] Peng Wang., et.a;., "Automatic Eye Detection and Its Validation," Computer Vision and Pattern Recognition - Workshops, 2005. CVPR Workshops. IEEE Computer Society Conference on , vol., no., pp.164,164, 25-25 June 2005

[10] Picot, A. et.al., "On-Line Detection of Drowsiness Using Brain and Visual Information," Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on , vol.42, no.3, pp.764,775, May 2012

[11] Xia Liu; Fengliang Xu; Fujimura, K., "Real-time eye detection and tracking for driver observation under various light conditions," Intelligent Vehicle Symposium, 2002. IEEE , vol.2, no., pp.344,351 vol.2, 17-21 June 2002.

[12] P. Dewi Purnamasari and A. Zul Hazmi, "Heart Beat Based Drowsiness Detection System for Driver," *2018* International Seminar on Application for Technology of Information and Communication, Semarang, 2018



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY