**A Project Report**

**On**

**FACE MONITORING SYSTEM FOR SAFETY MEASURES**

*Submitted for the partial fulfilment of the requirement for the award of the Degree*

*Of*

**BACHELOR OF TECHNOLOGY**

*In*

**Computer Science & Engineering**

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**Dr. APJ Abdul Kalam Technical University, Lucknow**

**(Batch: 2016 - 2020)**

**DECLARATION**

We hereby declare that this project entitled “FACE MONITORING SYSTEM FOR SAFETY MEASURES” is our own work which includes TUSHIT AGARWAL, TAVISHI GUPTA, SPARSH GUPTA & SIDHARTH JAIN and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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**CERTIFICATE**

This is to certify that Project Report entitled “FACE MONITORING SYSTEM FOR SAFETY MEASURES” which is submitted by TUSHIT AGARWAL, TAVISHI GUPTA, SPARSH GUPTA, SIDHARTH JAIN in partial fulfilment of the requirement for the award of degree B. Tech. in Department of Computer Science and Engineering of Dr. APJ Abdul Kalam Technical University, is a record of the candidates own work carried out by them under our supervision. The matter embodied in this project is original and has not been submitted for the award of any other degree.

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We also do not like to miss the opportunity to acknowledge the contribution of the project committee members of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our parents and friends for their contribution in the completion of this project.

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**ABSTRACT**

Road safety is the biggest concern around the globe. Most of these accidents occur due to driver’s drowsiness and fatigue-ness. Driver’s drowsiness or short sleep can lead to many mishaps on roads like failing to apply break when needed, losing control of vehicle on highways at high speed, disbalancing the vehicle while overtaking etc. Almost all drivers may face this condition due to reasons like long driving, weather effects etc. Ensuring safety at this point becomes very essential as one mistake of any driver can put many lives to threat. Though human error can’t be removed completely but it can be reduced to a significant number. This project mainly used in detecting if the driver is in fatigue or drowsy state or not.

In this the driver will be under computer-vision that will examine him by reading his face and detecting with the help of OpenCV - the image processing technique. An alarm will be raised if the driver is found to be present in any of the above conditions or is going in that condition. This will alert the driver and thus can prevent road accidents to a much larger extent.

**CHAPTER – 1**

**INTRODUCTION & BACKGROUND**

**Drowsiness:**

Drowsy means sleepy and having low energy. Drowsiness is position of near to sleep, a strong desire to sleep. Drowsiness is defined as a decreased level of awareness portrayed by sleepiness and trouble in staying alarm but the person awakes with simple excitement by stimuli. Drowsiness is also called excess sleepiness. It might be caused by an absence of rest, medicine, substance misuse, or a cerebral issue. It is mostly the result of fatigue which can be both mental and physical. Physical fatigue, or muscle weariness, is the temporary physical failure of a muscle to perform ideally. Mental fatigue is a temporary failure to keep up ideal psychological execution. The onset of mental exhaustion amid any intellectual action is progressive, and relies on an individual's psychological capacity, furthermore upon different elements, for example, lack of sleep and general well-being. Mental exhaustion has additionally been appeared to diminish physical performance. It can show as sleepiness, dormancy, or coordinated consideration weakness. Drowsiness may lead to forgetfulness or falling asleep at inappropriate times.

In the past years according to available data driver sleepiness has gotten to be one of the real reasons for street mishaps prompting demise and extreme physical injuries and loss of economy. A driver who falls asleep is in an edge of losing control over the vehicle prompting crash with other vehicle or stationary bodies. Keeping in mind to stop or reduce the number of accidents to a great extent the condition of sleepiness of the driver should be observed continuously.

**Driver Fatigue and Road Accidents:**

Driver fatigue sometimes results in road accidents every year. It is not easy to estimate the exact amount of sleep related accidents but research presents that driver fatigue may be a contributing reason in up to 20% in road accidents. These types of accidents are about 50% more expected to result in death or serious hurt. They happen mainly at higher speed impacts and the driver who has fallen asleep cannot brake. Drowsiness reduces response time which is a serious element of secure driving. It also reduces alertness, vigilance, and concentration so that the capacity to perform attention-based activities i.e. driving is impaired. The speed at which information is processed is also reduced by drowsiness. The quality of decision-making may also be affected. It is clear that drivers are awake when they are feeling sleepy, and so make a conscious decision about whether to continue driving or to stop for a rest. It may be that those who persist in driving underestimate the risk of actually falling asleep while driving or it may be that some likely to happen on long journeys on monotonous roads, such as motorways, between 2pm and 4pm especially after eating or taking an alcoholic drink, between 2am and 6am, after having less sleep than normal, after drinking alcohol, driver takes medicines that cause drowsiness and after long working hours or on journeys home after long shifts, especially night shifts.

**CHAPTER – 2**

**REQUIREMENT ANALYSIS**

**2.1 Hardware Specifications:**

System: Intel® Core™ i5 – 8250u (8th Gen) CPU @ 1.60GHz 1.80GHz

Hard Disk: 2TB

Display: 1920 x 1080

Ram: DDR4 8.00 GB @5500 RPM

Web Cam: 5 MP 1280 x 720

**2.2 Software Specifications:**

Operating System: Windows 10 Pro, Version – 1909, Built – 18363.836

Python Version: 3.6.3

C++ Version: 17.0

Other software used for the successful development of this project are: Microsoft Visual Studio-2019, PyCharm – 2020.1

**CHAPTER – 3**

**LITERATURE REVIEW**

Few research papers were taken into considerations for our proposed method, all are listed below:

1. **N. Dalal and B. Triggs, “Histograms of oriented gradients for human detection, “Proc. – 2005 IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognition, CVPR 2005, vol I, pp. 886-893, 2005.**

**Abstract** - We study the question of feature sets for robust visual object recognition, adopting linear SVM based human detection as a test case. After reviewing existing edge and gradient based descriptors, we show experimentally that grids of Histograms of Oriented Gradient (HOG) descriptors significantly outperform existing feature sets for human detection. We study the influence of each stage of the computation on performance, concluding that fine-scale gradients, fine orientation binning, relatively coarse spatial binning, and high-quality local contrast normalization in overlapping descriptor blocks are all important for good results. The new approach gives near-perfect separation on the original MIT pedestrian database, so we introduce a more challenging dataset containing over 1800 annotated human images with a large range of pose variations and backgrounds.

1. **T. Ito, S. Mita, K. Kazuhiro, T. Nakano, S. Yamamaoto, “Driver Blink Measurement by the Motion Picture Processing and its Applications to Drowsiness Detectin”, The IEEE 5th International Conference on Intelligent Systems, 2002.**

**Abstract** - The lack of concentration, caused by fatigue, is the most factor of the increasing number of accidents. In the last few years, the development of an automatic system which based on facial expression analysis, to controls the driver fatigue and prevents him in advance from accidents, has received a growing interest in all intelligent vehicle systems. In this paper, we propose and compare two methods to detect the driver drowsiness state. These methods extract geometric features using video to characterize eyes blinking as a nonstationary and nonlinear signal. The first method is based on Cumulative Blink Signal analysis technique “CBS” which locates and analyses the eyes blinking from the obtained nonstationary and nonlinear signal to detect the driver drowsiness state. The second method is based on IFD technic “Intrinsic Functions Decomposition of the nonstationary and nonlinear signal to analyse the nonstationary and nonlinear signal by using the combination between the two methods: Empirical Mode Decomposition (EMD) and Band Power(BP). For both proposed methods, this analysis is confirmed by the Support Vector Machine (SVM) to classify the state of driver fatigue. The synthesis results obtained by both methods CBS and IFD are discussed and compared to those of the literature.

1. **Omkar, Revati Bhor, Pranjal Mahajan, H.V. Kumbhar “Survey on Driver’s drowsiness detection system”, vol. 132,2015.**

**Abstract** - There is much attentional impairment while driving that affect driver’s reaction. Among which driving while drowsy is one of the major causes behind road accidents, and exposes the driver to a much higher crash risk compared to driving while alert. Therefore, the use of an assistive system that monitor a driver’s level of vigilance and alert the driver in case of drowsiness can be significant in the prevention of accidents. This paper introduces a new approach towards detection of driver's drowsiness based on yawning measurement and head movement. This involves several steps including the real time detection and tracking of driver’s face, detection and tracking of the mouth contour, the detection of yawning based on measuring both the rate and the amount of changes in the mouth contour area and head movement tracking. Test results demonstrate that the proposed system can efficiently measure the aforementioned parameters and detect driver’s drowsiness.

1. **Swathi Kale, Rashmi Bhadke, Anuja Sali, NanaSaheb Kadu “Drowsiness detection and warning system” IJARCST, Vol2, issue 2, 2014.**

**Abstract** - Drowsiness or a fatigue of a driver is the major reason for road accidents. This paper represents a new way towards safety as well as security of automobiles. We are using the concept of Iris recognition system, Drowsiness detection, Distress signalling system using non-intrusive machine. Nowadays driver fatigue related crashes have increased. The main aim of our project is to develop nonintrusive system which will detect the fatigue or drowsiness of driver and will issue a warning with the help of alarm. As most of the accidents are caused due to drowsiness so this project will help to decrease the crashes or accidents. In this project we will detect the eye blinking with the help of webcam. If the eyes of the person are closed for more interval of time then this will result into the warning in the form of sound.

1. **M. Hemamalini, P. Muhilan “Accident prevention using eye blink sensor”, vol 1, Issue L11, 2017.**

**Abstract** - This project presents an accident prevention using eye blink sensor for preventing accident due to drowsy is prevented and controlled when the vehicle is out of control. And also, the drunken drive also prevented by installing alcohol detector in the vehicle. The term used here for the recognition that the driver is drowsy is by using eye blink of the driver. In recent times drowsiness is one of the major causes for highway accidents. The drowsiness is identified by the eye blink closure and blinking frequency through infra-red sensor worn by driver by means of spectacles frame. If the driver is drunk then the buzzer indicates and the vehicle doesn’t allow the driver to start the vehicle. If the driver is drowsy, then the system will give buzzer signal and the speed of the vehicle is reduced. A marketable design would also shut down power to the vehicle, thus providing maximum probability for avoiding road accidents and extending a crucial window for preventive and mitigation measures to be taken.

1. **Prakash Chaudhary, Rahul Sharma, Gautam Singh, Smarjeet Das “A Survey paper on Drowsiness Detection and Alarm system for Drivers.”, vol 3, Issue 12, 2016.**

**Abstract** - Our safety is the first priority while travelling or driving. One mistake of the driver can lead to severe physical injuries, deaths and significant economic losses. Nowadays there are many systems available in market like navigation systems, various sensors etc. to make driver’s work easy. There are various reasons especially human errors which gives rises to the road accidents. Reports say that there is a huge increment in the road accidents in our country since last few years. The main reason occurring from the highway accidents is the drowsiness and sleepiness of driver while driving. It is a necessary step to come with an efficient technique to detect drowsiness as soon as driver feels sleepy. This could save large number of accidents to occur. We conduct the survey on various designs on drowsiness detection methods to reduce the accidents.

1. **Subbarao, K. Sahithya “Driver Drowsiness Detection System for vehicle Safety”, vol 8, Issue 6S4, ISN 2278-3075, 2019.**

**Abstract** - Detection of drowsiness of driver is a vehicle safety technology, which helps to put off accidents which caused by the driver being dozy. A variety of studies have recommended that around 20% of all road accidents are due to drowsiness of the driver. The developments of technologies for detecting or preventing drowsiness while driving is a major confront in accident evasion systems. Because of the peril of the tiredness while driving, different new methods need to be developed for counteracting the effect. The paper is based on a example for detection of drowsiness system. The intend of this paper is design of an automated system for safety of driver from improper driving. The system is designed such that it will precisely scrutinize the eye blink. In this paper, the eye blink of the driver is detected by using eye blink sensor which is IR based. The disparity across the eye will vary as per eye blink. The output is high, if the eye is closed or else output is low. It indicates closing or opening position of an eye. Their outputs given to circuit to signify the alarm. The controller will send a warning signal so that it is displayed on liquid crystal display screen. The buzzer, which is placed near the driver, will be activated and alters the driver when he falls asleep during driving. The alcohol sensor is also used to detect whether the driver is drunken which avoids accident caused by the drunken drivers. According to the intensity of light, the lights will be ON or OFF inside the vehicle, this saves power consumption. Tilt sensor is also used to detect whether the vehicle met with an accident or not.

1. **Jyotsna Ghabane, Dhanashri Dixit, Pranali Mankar, Ruchika Kamble, Sayantani Gupta, "Drowsiness Detection and Alert System: A Review", International Journal for Research in Applied Science & Engineering Technology, (2018), Pg. 236- 241, ISSN: 2321-9653**

**Abstract** - Truck drivers, company car drivers and shift workers are the most at risk of falling asleep while driving. Majority of the accidents occur due to the drunkenness of the driver. The burden of which lies on the company owner as they are made liable. It can lead to economic loss. In this presentation we present an adaptive driver and company owner alert system and an application that provides driving behaviour to the company owner.