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DROWSINESS DETECTION SYSTEM FOR DRIVERS

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ABSTRACT
Driver drowsiness is one of the major causes of accidents in the world. Detecting the drowsiness of the driver is one of the surest ways of measuring driver fatigue. The drowsiness detection system works by monitoring the eyes of the driver and then sounding an alarm when he/she is drowsy. This document is a review report on the research conducted and the project made in the field of computer engineering to develop a system for driver drowsiness detection to prevent accidents from happening because of driver fatigue and sleepiness. The report proposed the results and solutions on the limited implementation of the various techniques that are introduced in the project. Whereas the implementation of the project give the real world idea of how the system works and what changes can be done in order to improve the utility of the overall system. Drowsiness detection approach based on the combination of several different detection methods, with robustness to the input signal loss. Car accident is the major cause of death in which around 1.3 million people die every year. Majority of these accidents are caused because of distraction or the drowsiness of driver. To prevent such accidents we proposed this system which alerts the driver if he gets distracted or feels drowsy. Since it alerts the driver the chances of accident occurrence is greatly reduced which is quite helpful for avoiding crashes caused by drowsiness related cases.

KEYWORDS—*Driver drowsiness; eye detection; yawn detection; blink pattern; fatigue*

INTRODUCTION

"1 in 25 adult drivers report that they have fallen asleep at the wheel in the past 30 days"

If you have driven before, you've been drowsy at the wheel at some point. It's not something we like to admit but it's an important problem with serious consequences that needs to be addressed. 1 in 4 vehicle accidents are caused by drowsy driving and 1 in 25 adult drivers report that they have fallen asleep at the wheel in the past 30 days. The scariest part is that drowsy driving isn't just falling asleep while driving. Drowsy driving can be as small as a brief state of unconsciousness when the driver is not paying full attention to the road. Drowsy driving results in over 71,000 injuries, 1,500 deaths, and $12.5 billion in monetary losses per year. Due to the relevance of this problem, we believe it is important to develop a solution for drowsiness detection, especially in the early stages to prevent accidents.

Additionally, we believe that drowsiness can negatively impact people in working and classroom environments as well. Although sleep deprivation and college go hand in hand, drowsiness in the workplace especially while working with heavy machinery may result in serious injuries similar to those that occur while driving drowsily. Few research papers have published on determining the drowsiness of a driver using electroencephalogram (EEG) sensor technology that detects the brain waves and determines if the person drowsy based on the obtained data. EEG is an optimum way of measuring the active state of a person in real time. In this work, we are adopting this technology along with an eye blink detection to detect the drowsiness and alert the driver.

Our solution to this problem is to build a detection system that identifies key attributes of drowsiness and triggers an alert when someone is drowsy before it is too late.

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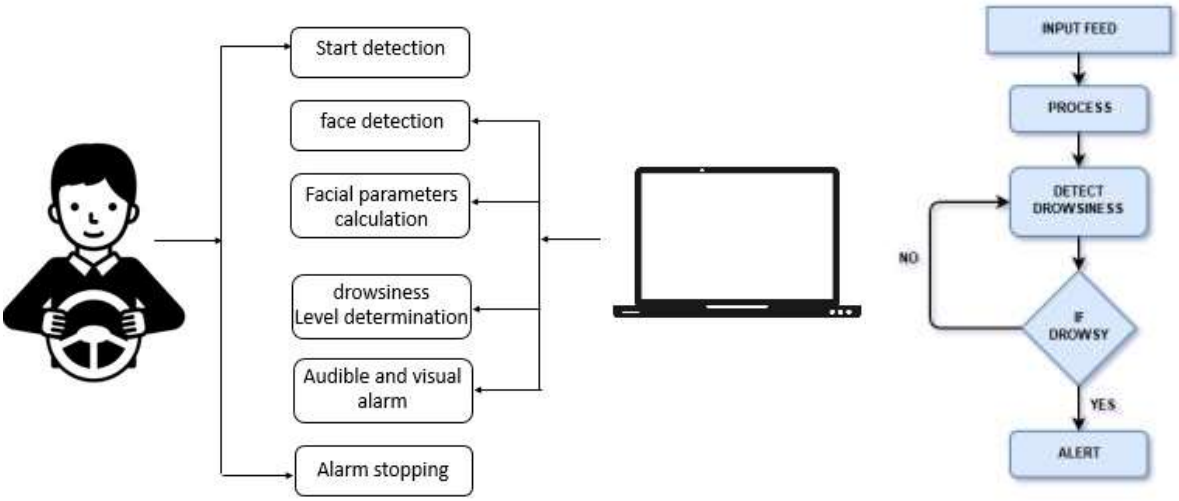

When a blink lasts for a little longer than usual the driver is judged to be drowsy and an alarm is sounded. The intended audience for this document are the development team, the project evaluation jury, and other tech-savvy enthusiasts who wish to further work on the project.

HUMAN PSYCHOLOGY WITH CURRENT TECHNOLOGY

Humans have always invented machines and devised techniques to ease and protect their lives, for mundane activities like traveling to work, or for more interesting purposes like aircraft travel. With the advancement in technology, modes of transportation kept on advancing and our dependency on it started increasing exponentially. It has greatly affected our lives as we know it. Now, we can travel to places at a pace that even our grandparents wouldn't have thought possible. In modern times, almost everyone in this world uses some sort of transportation every day. Some people are rich enough to have their own vehicles while others use public transportation. However, there are some rules and codes of conduct for those who drive irrespective of their social status. One of them is staying alert and active while driving.

Neglecting our duties towards safer travel has enabled hundreds of thousands of tragedies to get associated with this wonderful invention every year. It may seem like a trivial thing to most folks but following rules and regulations on the road is of utmost importance. While on road, an automobile wields the most power and in irresponsible hands, it can be destructive and sometimes, that carelessness can harm lives even of the people on the road. One kind of carelessness is not admitting when we are too tired to drive. In order to monitor and prevent a destructive outcome from such negligence, many researchers have written research papers on driver drowsiness detection systems. But at times, some of the points and observations made by the system are not accurate enough. Hence, to provide data and another perspective on the problem at hand, in order to improve their implementations and to further optimize the solution, this project has been done.

FACTS & STATISTICS

Our current statistics reveal that just in 2015 in India alone, 148,707 people died due to car related accidents. Of these, at least 21 percent were caused due to fatigue causing drivers to make mistakes. This can be a relatively smaller number still, as among the multiple causes that can lead to an accident, the involvement of fatigue as a cause is generally grossly underestimated. Fatigue combined with bad infrastructure in developing countries like India is a recipe for disaster. Fatigue, in general, is very difficult to measure or observe unlike alcohol and drugs, which have clear key indicators and tests that are available easily. Probably, the best solutions to this problem are awareness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very lucrative. When there is an increased need for a job, the wages associated with it increases leading to more and more people adopting it. Such is the case for driving transport vehicles at night. Money motivates drivers to make unwise decisions like driving all night even with fatigue. This is mainly because the drivers are not themselves aware

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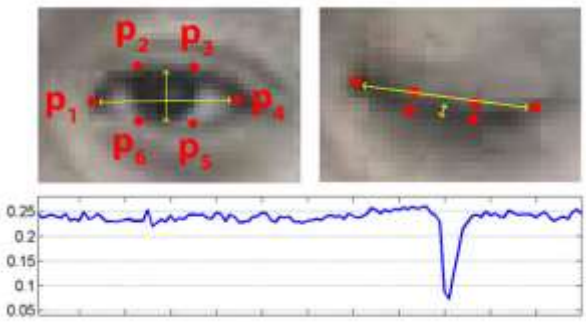
of the huge risk associated with driving when fatigued. Some countries have imposed restrictions on the number of hours a driver can drive at a stretch, but it is still not enough to solve this problem as its implementation is very difficult and costly.

This survey is done to comprehend the need and prerequisite of the general population, and to do as such, we went through different sites and applications and looked for the fundamental data. Based on these data, we made an audit that helped us get new thoughts and make different arrangements for our task. We reached the decision that there is a need of such application and felt that there is a decent extent of progress in this field too.

TEST CASES

Test Case	Test Condition	System Behavior	Expected Result
T01	Straight Face, Good Light, With Glasses	Non Drowsy	Non Drowsy
T02	Eyes Closed, Good Light, No Glasses	Drowsy	Drowsy
T03	Eyes Closed, Good Light, With Glasses	Drowsy	Drowsy

It completely meets the objectives and requirements of the system. The framework has achieved an unfaltering state where all the bugs have been disposed of. The framework comprehend it's focal points and the fact that it takes care of the issue of stressing out for individuals having fatigue-related issues to inform them about the drowsiness level while driving.



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When a blink lasts for a little longer than usual the driver is judged to be drowsy and an alarm is sounded. The system designed is a non-intrusive real-time monitoring system. In our drowsiness detector case, we'll be monitoring the eye aspect ratio to see if the value *falls* but *does not increase again.*

The model can be improved incrementally by using other parameters like blink rate, yawning, state of the car, etc. If all these parameters are used it can improve the accuracy by a lot.

We plan to further work on the project by adding a sensor to track the heart rate in order to prevent accidents caused due to sudden heart attacks to drivers.

Same model and techniques can be used for various other uses like Netflix and other streaming services can detect when the user is asleep and stop the video accordingly. It can also be used in application that prevents user from sleeping.

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