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Fatigue Monitoring Detection System

B. Vineela Rani[1], B. Rishi Ganesh[2], B. Jayani[3], B. Jyothi[4], D. Pavan[5]
Assistant Professor, Department of Computer Science and Engineering[1]
Students, Department of Computer Science and Engineering[2,3,4,5]
Raghu Institute of Technology, Visakhapatnam, AP, India

Abstract: *The main idea behind this project is to develop a unobtrusive system which can detect fatigue of any human and can issue a timely warning. Drivers who do not take regular breaks when driving long distances run a high risk of becoming drowsy a state which they often fail to recognize early enough. According to the expert's studies show that around one quarter of all serious motorway accidents are attributable to sleepy drivers in need of a rest, meaning that drowsiness causes more road accidents than drnk-driving. This system will monitor the driver eyes using a camera and by developing an algorithm we can detect symptoms of driver fatigue early enough to avoid the person from sleeping. So, this project will be helpful in detecting driver fatigue in advance and will give warning output in form of alarm and pop-ups. Moreover, the warning will be deactivated manually rather than automatically. For this purpose, a de-activation dialog will be generated which will contain some simple mathematical operation which when answered correctly will dismiss the warning. Moresssover, if driver feels drowsy there is possibility of incorrect response to the dialog. We can judge this by plotting a graph in time domain. If all the three input variables show a possibility off fatigue at one moment, then a Warning signal is given in form of sound. This will directly give an indication of drowsiness/fatigue which can be further used as record of driver performance.*

Keywords: Driver drowsiness, Eye detection, Blink pattern, Driver position angle

I. INTRODUCTION

Nowadays drowsiness of drivers is one of the main reasons behind road accidents. It is natural for the drivers who take long drives to doze off behind the steering wheel. In this article, we will build a drowsiness detection system that will alert the driver as soon as he fell asleep.

Drowsiness is identified by using vision-based techniques like eyes detection and nodding. When it comes to nodding some people can sleep without nodding. One more method is by using physiological sensors like biosensors.

Here the disadvantages are like the driver may hesitate to wear them or he may forget to wear them. Detecting drowsiness through eye detection is best compared to the remaining techniques.

1.1 Background

After a Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads. Data shows that 2.4 percent of all fatal car accidents involve drowsy drivers.

Most crashes occur between 4 to 6 a.m, midnight to 2 a.m. and 2 to 4 p.m. Nearly 23 percent of adults admit that they know someone personally who has crashed due to falling asleep at the wheel. 21 percent of all fatal accidents are due to drowsy driving. To over come this problem we are introducing the fatigue monitoring system.

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1.2 Trust Based Recommendation System

A trust-based recommendation system for fatigue monitoring system could involve the development of a system that provides personalized recommendations for individuals based on their past behavior and the behavior of others in similar situations. The system could use a trust-based approach, where the reliability and credibility of the recommendations are based on the level of trust between the individuals involved.

For example, in a transportation industry setting, the system could provide recommendations to drivers based on their past driving behavior, such as the duration of their shifts, frequency of breaks, and compliance with safety regulations. The system could also consider the behavior of other drivers in similar situations and provide recommendations based on their experiences.

To establish trust in the system, the recommendations could be validated using feedback from the individuals and stakeholders involved. The system could also incorporate mechanisms for individuals to report false or inaccurate recommendations, which can improve the system's accuracy and reliability over time.

Overall, a trust-based recommendation system for fatigue monitoring can help individuals make informed decisions and prevent potential risks associated with fatigue. By providing personalized recommendations based on past behavior and the behavior of others, the system can improve safety and productivity in various industries and environments.

1.3 Motivation of the Project

The motivation behind a fatigue monitoring system is to improve safety and productivity in industries where fatigue can pose a risk to individuals and others around them. Fatigue is a significant problem that can lead to accidents, injuries, and even fatalities, particularly in safety-critical environments such as transportation and healthcare.

A reliable and accurate fatigue monitoring system can help mitigate these risks by detecting signs of fatigue in real-time and providing timely alerts to individuals and relevant stakeholders. This can enable individuals to take appropriate action, such as taking a break, changing tasks, or seeking medical attention, to prevent potential risks.

In addition to improving safety, a fatigue monitoring system can also enhance productivity by ensuring that individuals are alert and focused on their tasks. By identifying and addressing fatigue-related issues in real-time, the system can help prevent errors, delays, and rework, which can result in improved efficiency and reduced costs for organizations.

Overall, the motivation behind a fatigue monitoring system is to create a safer and more productive environment for individuals and organizations, while also reducing the potential risks and costs associated with fatigue-related incidents.

1.4 Problem statement

Fatigue is a significant issue in many industries, including transportation, healthcare, and manufacturing. Fatigued individuals can experience reduced cognitive function, decreased reaction times, and impaired decision-making abilities, all of which can increase the risk of accidents, errors, and injuries. Current methods of detecting fatigue, such as self- reporting or observation, are often subjective and unreliable, and may not provide timely alerts to prevent potential risks.

Therefore, there is a need for a reliable and accurate fatigue monitoring system that can detect signs of fatigue in real-time and alert individuals and stakeholders to take appropriate action to prevent accidents and ensure safety."

1.5 Scope of the Project

The scope of a fatigue monitoring system project typically involves designing, developing, and implementing a system that can detect signs of fatigue in individuals, such as drowsiness, reduced alertness, or impaired cognitive function.

The project scope may include identifying the specific needs and requirements of the system, such as the type of environment in which it will be used, the target population (e.g., drivers, pilots, healthcare workers), and the desired level of accuracy and reliability. The project may also involve selecting and integrating various components of the system, such as sensors, algorithms, and user interfaces, as well as conducting rigorous testing and validation to ensure that the system meets its intended objectives.

Other important aspects of the project scope may include defining the project timeline, budget, and resources required, as well as identifying potential risks and challenges that may arise during the development and implementation process.

Overall, the scope of a fatigue monitoring system project is to create a reliable and effective system that can help

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prevent accidents, improve productivity, and enhance safety in a variety of settings where fatigue can pose a risk to individuals and others around them.

II. SYSTEM ANALYSIS

2.1 Existing System:

- Security of vehicle.
- Record driving data, collision data and position data.
- Analyze the accidents detail.
- Send location of car and its maintenance to base station through GPS & GSM technique.
- Sense gas & fuel leakage and display its status on car monitoring system.
- Detect if the driver is drunk or not.
- Detect if the driver is feeling sleepy.

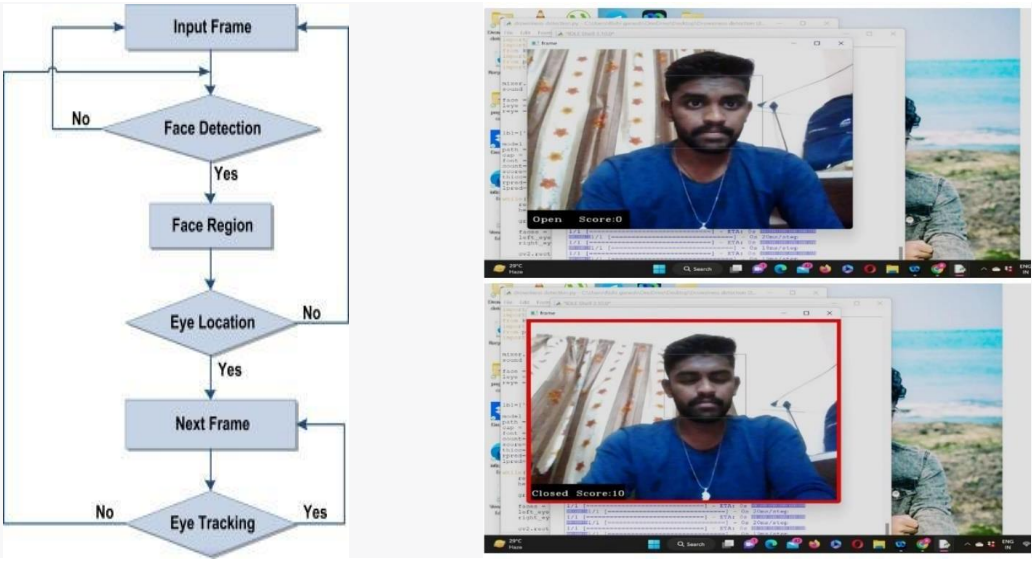
2.2 Disadvantages:

- Not Reliable
- May damage retina.
- Highly expensive.
- Intrusive.
- Not portable.
- Aging of sensors.
- This program is highly sensitive to environment.

2.3 Proposed System

A. Eye detection algorithm:

The physiological properties and appearances of the eyes will be investigated and the method of capturing these properties of the eyes using infrared lighting will be explored. Kalman trackers will be used to determine eyes and head dynamics between successive images and a probabilistic model will be used to calculate the driver's vigilance.



2.4 Advantages

Prevent Accidents:

Drowsiness is one of the leading causes of road accidents. By detecting drowsiness and alerting the driver in time, drowsiness detection systems can prevent accidents and save lives.

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Improve Driver Safety:

Drowsiness can affect a driver's ability to make decisions, react quickly, and stay focused on the road. Drowsiness detection systems can help drivers stay alert and improve their safety on the roads

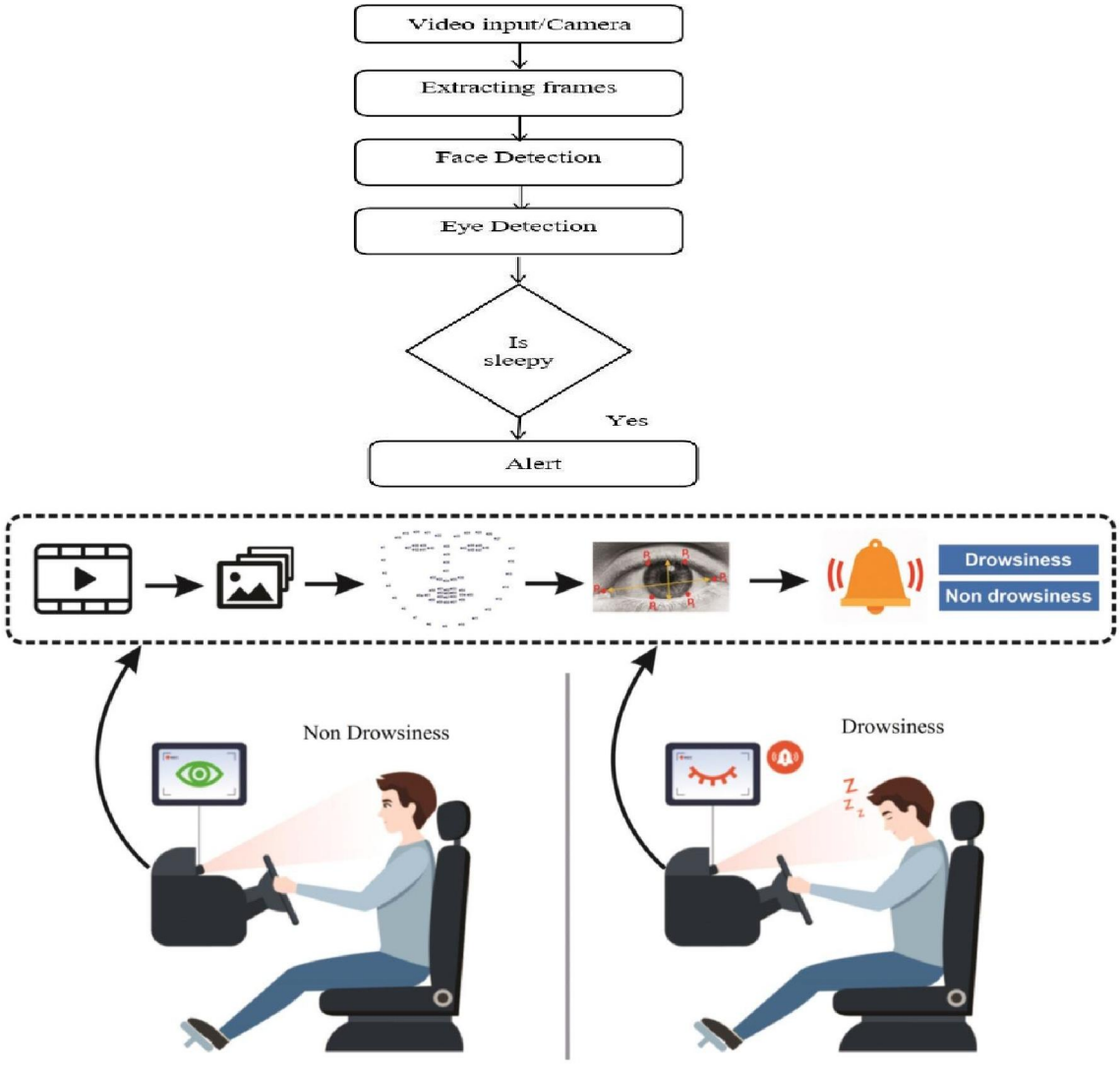
Reduce Driver Fatigue:

Long hours of driving can be tiring, and drowsiness can result in decreased productivity and an increased risk of accidents. Drowsiness detection systems can help reduce driver fatigue by alerting drivers when they need to take a break.

2.5 Applications:

- Transportation business where almost daily accidents occur due to driver fatigue.
- Security guard cabins.
- Operators at nuclear power plants where continuous monitoring is necessary
- Military applications where high intensity monitoring ofsoldier is needed
- In classrooms where students feel drowsy and inattentive during the class

III. SYSTEM ARCHITECTURE



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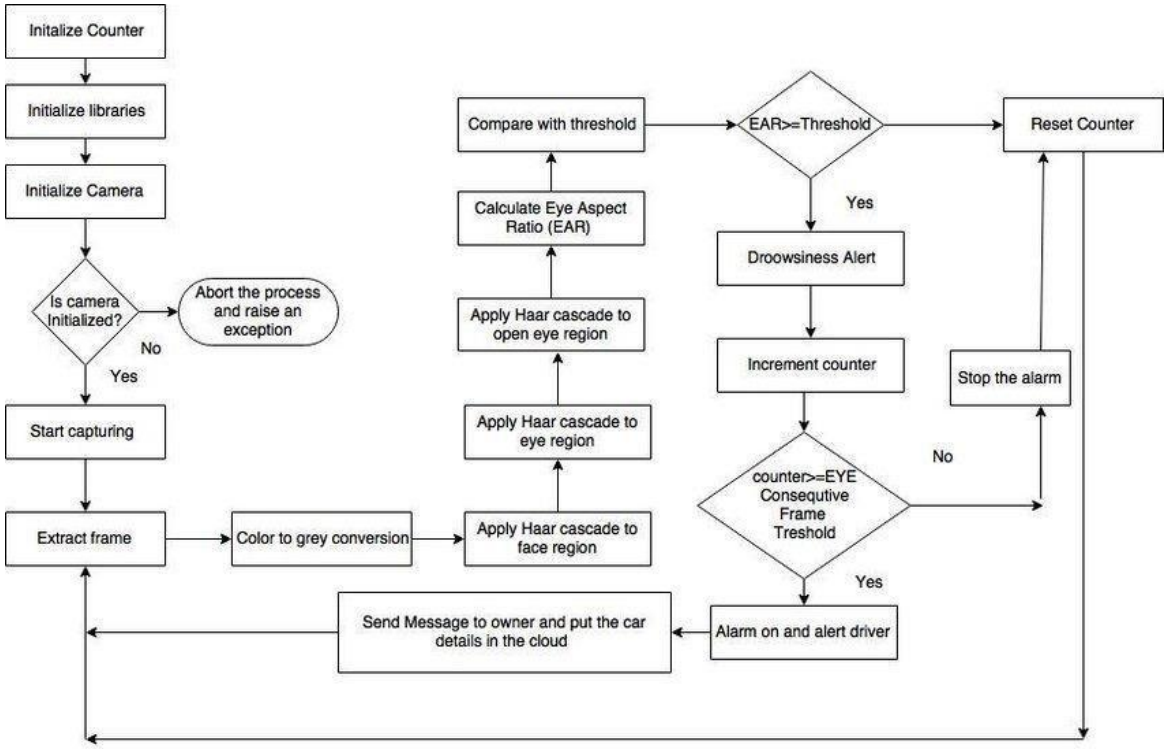
IV. DATA FLOW DIAGRAM



V. CONCLUSION

- A non-invasive system to localize the eyes and monitor fatigue was developed. Information about the eyes position is obtained through self-developed image processing algorithm. During the monitoring, the system is able to decide if the eyes are opened or closed. When the eyes have been closed for too long, a warning signal is issued. In addition, during monitoring, the system is able to automatically detect any eye localizing error that might have occurred. In case of this type of error, the system is able to recover and properly localize the eyes.
  The following conclusions were made:
  Image processing achieves highly accurate and reliable detection of drowsiness.
  Image processing offers a non-invasive approach to detecting drowsiness without the annoyance and interference.
- A drowsiness detection system developed around the principle of image processing judges the drivers alertness level on the basis of continuous eye closures. With 80% accuracy, it is obvious that there are limitation to the system

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