**Drowsy Guard: Vigilance Enhancement System**

Final Year Project Proposal

(BSCS)

By

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**Abstract**

The "Drowsy Guard" project is a machine learning-driven vigilance enhancement system designed to mitigate the risks associated with drowsiness and reduced alertness in various critical scenarios. Drowsiness-related accidents and errors are prevalent in transportation often leading to severe consequences. In response to this challenge, our system employs cutting-edge machine learning algorithms, computer vision techniques to monitor and detect signs of drowsiness in real-time. By analyzing facial expressions, eye movements, and vital signs of individuals, the system generates timely alerts and interventions to prevent accidents and enhance vigilance. The Drowsy Guard project represents a significant advancement in safety technology, offering a proactive approach to safeguarding lives, productivity, and critical operations in diverse domains. This vigilance enhancement system is adaptable and scalable, making it suitable for integration into vehicles, industrial environments, and workplaces where attentiveness and alertness are paramount. By leveraging the power of machine learning and real-time data analysis, Drowsy Guard aims to revolutionize safety standards, reduce human error, and provide an effective solution to the pervasive issue of drowsiness-related incidents.

**Introduction**

In today's fast-paced world, where human activities often extend beyond traditional working hours, the risks associated with drowsiness and reduced alertness have become a matter of significant concern, especially in critical scenarios such as transportation. Drowsy driving, for instance, is a pervasive issue that plagues the roadways, leading to a substantial number of accidents and fatalities each year. The consequences of drowsiness-related incidents extend far beyond vehicular accidents, affecting industries and workplaces where attentiveness and vigilance are essential for safety and productivity. Recognizing the urgency of addressing this challenge, we introduce the "Drowsy Guard" project a revolutionary vigilance enhancement system driven by state-of-the-art machine learning technologies. The "Drowsy Guard" project is engineered to tackle the persistent problem of drowsiness and diminished alertness head-on. By harnessing the capabilities of advanced machine learning algorithms, computer vision techniques, and physiological sensors, this system aims to detect and mitigate the risks associated with drowsiness in real-time. Through the analysis of critical indicators such as facial expressions, eye movements, and vital signs, "Drowsy Guard" identifies individuals at risk of reduced alertness and promptly issues alerts and interventions. With a primary focus on transportation safety, this project seeks to transform the way we approach vigilance enhancement, offering a proactive solution to mitigate the dire consequences of drowsiness-related accidents and errors.

**Problem statement**

In today's world, drowsiness and reduced alertness pose significant challenges, particularly in critical scenarios such as transportation, where lives are at stake. Drowsiness-related accidents and errors continue to be a persistent and severe issue, leading to substantial human and economic losses. Develop a drowsiness detection system for drivers to enhance road safety by identifying and alerting drivers who exhibit signs of drowsiness or fatigue while operating a vehicle. The system should utilize real-time data from various sensors and inputs to accurately detect drowsiness-related indicators, such as eyelid closure, head position, and facial expressions, and provide timely warnings to the driver to prevent accidents caused by impaired alertness. Additionally, the system should be designed to work in diverse driving conditions and be user-friendly, ensuring that it does not distract the driver further.

**Literature review**

1. In that articles, [1] Fatigue has costly effects on the safety, health, and quality of life of the American public. Whether fatigue is caused by sleep restriction due to a new baby waking every couple of hours, a late or long shift at work, hanging out late with friends, or a long and monotonous drive for the holidays – the negative outcomes can be the same. These include impaired cognition and performance, motor vehicle crashes, workplace accidents, and health consequences.[2]Although official government statistics suggest that drowsy driving only contributes to approximately 1-3% of motor vehicle crashes each year in the United States, results of in depth studies suggest that the true prevalence is likely much higher. A previous study by the AAA Foundation for Traffic Safety found that 7% of all crashes in which a vehicle was towed from the scene, 13% of crashes in which a person was hospitalized, and 17% of fatal crashes involved a drowsy driver in years 1999–2008. The current study updates that study. [3]Drowsiness refers to feeling more sleepy than normal during the day. People who are drowsy may fall asleep in when they do not want to or at times which can lead to safety concerns. Excessive daytime sleepiness (without a known cause) may be a sign of a sleep disorder. Depression anxiety, stress, and boredom can all contribute to excessive sleepiness. However, these conditions more often cause fatigue and apathy. [4]The National Highway Traffic Safety Administration (NHTSA) estimated that drowsy driving accounted for 91,000 traffic accidents, which caused approximately 50,000 injuries and 800 deaths, as reported by the police in 2017. However, individuals in the fields of traffic safety, sleep science, and public health have unanimously agreed that these figures underestimate the impact of drowsy driving. The National Sleep Foundation reports that 54% of adult drivers feel drowsy while driving, and 28% have attested that they fall asleep while driving. In addition, more than 40% admit falling asleep at the wheel at least once while driving.[5]According to the Centers for Disease Control and Prevention, about 1 in 25 adult drivers report having fallen asleep while driving in the previous 30 days and many more admit to driving when they were sleep-deprived. These startling figures show how prevalent drowsy driving is. What drivers may not realize is how much drowsy driving puts themselves – and others – at risk. In fact, an estimated 6,400 people died annually in crashes involving drowsy driving, according to the National Sleep Foundation. [6] Measures S based P. Behavioral and Sensor-Based Physiological Measures in which the measure the behaverioul expression detect and then the detecting system working and video recording you eyelid and have fallen asleep.

**Project scope**

The scope of the "Drowsy Guard" project encompasses the development and implementation of a comprehensive vigilance enhancement system designed to address the challenges posed by drowsiness and reduced alertness in critical scenarios, with a primary focus on the transportation sector. The project involves the integration of cutting-edge machine learning algorithms, computer vision technologies, and physiological sensors into a unified system capable of real-time detection and mitigation of drowsiness-related risks.

1. **System Development:**

The core component of the project involves the development of the "Drowsy Guard" system. This system will include the design and implementation of machine learning models capable of analyzing data from various sources, such as facial expressions, eye movements, and physiological sensors. These models will be trained to recognize early signs of drowsiness in individuals.

1. **Real-Time Monitoring:** The project will emphasize real-time monitoring and detection capabilities. The system will continuously collect and analyze data, providing instantaneous feedback to users and relevant stakeholders. In the context of transportation, this means timely alerts to drowsy drivers, allowing them to take corrective actions or pull over safely. In industrial settings and workplaces, it means preventing accidents and errors by ensuring that individuals remain alert during critical tasks. The system will also maintain a log of detected events, enabling post-incident analysis and reporting.
2. **Validation and Integration:** The final phase of the project involves rigorous testing, validation, and integration of the "Drowsy Guard" system in real-world scenarios. This will include pilot implementations in various transportation modes (e.g., automobiles, trucks, and public transit), as well as industrial and workplace settings. Comprehensive validation and user feedback will be essential to refine the system's algorithms and enhance its accuracy. The project team will collaborate closely with regulatory bodies, industry partners, and stakeholders to ensure that the "Drowsy Guard" system complies with safety standards and regulations.

The "DrowsyGuard" project's scope is ambitious, aiming to address a critical and pervasive problem through technological innovation. By developing a proactive vigilance enhancement system, the project aims to significantly reduce the incidence of drowsiness-related accidents and errors, thereby enhancing safety and productivity across a range of domains.

**Project development methodology**

The development of the "Drowsy Guard" system requires a systematic and well-structured approach to ensure its successful creation, validation, and implementation. To achieve this, the project will follow an iterative and adaptive development methodology that incorporates the following phases:

1. **Requirements Analysis:** Define the specific requirements of the "Drowsy Guard" system by collaborating closely with stakeholders, including transportation authorities, industry partners, and potential end-users. Identify key use cases, scenarios, and performance metrics, such as detection accuracy, response time, and false-positive rates, to establish clear project goals.Document the functional and non-functional requirements of the system to provide a comprehensive roadmap for development.
2. **Design and Architecture:** Develop a detailed system architecture that outlines the components, modules, and data flows within the "Drowsy Guard" system. Design the user interface elements, alerting mechanisms, and intervention strategies to ensure user-friendliness and effectiveness. Create specifications for the machine learning models, computer vision algorithms, and sensor integration, defining how they will work together to detect drowsiness.
3. **Development and Prototyping:** Begin the development phase by implementing and testing individual system components in parallel. Prototype and iteratively refine machine learning models and algorithms using representative datasets. Integrate the various components to create a functional prototype of the "Drowsy Guard" system, allowing for early testing and feedback.
4. **Testing and Validation:** Conduct comprehensive testing to evaluate the accuracy and reliability of the drowsiness detection algorithms, as well as the responsiveness of alerting mechanisms. Collaborate with domain experts and end-users to validate the system's performance in real-world scenarios. Continuously refine and optimize the system based on feedback and testing results.
5. **Integration and Deployment:** Ensure seamless integration of the "Drowsy Guard" system into various environments. Develop deployment plans and strategies for widespread adoption of the system, considering scalability and maintenance requirements.
6. **Monitoring and Maintenance:** Implement continuous monitoring and maintenance procedures to ensure the system's ongoing effectiveness and reliability. This development methodology emphasizes iterative development, close collaboration with stakeholders, and a strong focus on real-world testing and validation to ensure the "Drowsy Guard" system effectively addresses the problem of drowsiness-related incidents in critical scenarios. It aims to deliver a robust and reliable solution that enhances safety and vigilance in various domains.

Video Input

Face Detection

Eye Detection

Eye State

Eye closure and blinking rate

No

Drowsy

Yes

Alarm

**Project working Flow chart of Drowsiness**

**Project milestones and deliverables**

The project milestones and deliverables for the "Drowsy Guard" system involve a multi-phased approach. Key milestones include the completion of requirements analysis and documentation, followed by the design and architecture phase, culminating in the development and prototyping of the system. Subsequently, rigorous testing and validation phases will lead to the integration and deployment of the system in various environments.

**GANTT CHART**

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| **Activity** | **Weeks** | | | | | | | | | | | | | |
| **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** | **12** | **13** | **14** |
| **Data collection** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Data analysis and interpretation of Project** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Project write up and Project submission** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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