International Journal for Modern Trends in Science and Technology
Volume 10, Issue 09, pages 76-80.
ISSN: 2455-3778 online
Available online at: http://www.ijmtst.com/vol10issue09.html
DOI: https://doi.org/10.46501/IJMTST1009013

Driver Drowsiness Detection System Using Machine Learning

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To Cite this Article
Y Nagendra Kumar, Shaik Adhil, A. Karthikeya, G. Jyothi Sai, M V V D S S Phaneendra, Driver Drowsiness Detection System Using Machine Learning, International Journal for Modern Trends in Science and Technology, 2024, 10(09), pages. 76-80. https://doi.org/10.46501/IJMTST1009013

Article Info
Received: 13 August 2024; Accepted: 28 August 2024; Published: 05 September 2024.

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ABSTRACT

Today the main problem faced due to accidents are driver state analysis and condition of driver. Drowsy Driving can be extremely dangerous, a lot of road accidents are related to the driver falling asleep while driving and subsequently losing control of the vehicle. However, initial signs of fatigue and drowsiness can be detected before a critical situation arises. Driver drowsiness detection is a car safety technology that helps to prevent accidents caused by driver getting drowsy. In this project, we aim to design and develop driver drowsiness detection and use image processing for detecting whether the driver is feeling fatigued and sleepy, using image processing we detect the eyes of the person and detect for how much time the eyes are closed of the driver if the eyes are closed the system will sound an alert thus alerting the driver and waking him up, preventing an accident. This proposed system implemented using Raspberry pi4 model.

If driver getting drowsy feel automatically alerts through vibration motor to awake sleep. This tracking system is composed of a GPS receiver, Microcontroller and a GSM Module. The Microcontroller processes this information and this processed information is sent to the user/owner using GSM modem. The presented application is a low-cost solution for accident prevention using Alcohol detection for monitoring adolescent drivers by their parents as well as in car tracking system applications.

KEYWORDS- research, accident prevention, potential, road safety, education, institutions

1. INTRODUCTION

Driver drowsiness is a primary cause of several highway calamities leads to severe physical injuries, loss of money, and loss of human life. The implementation of driver drowsiness detection in realtime will aid in avoiding major accidents. The system is designed for four wheelers wherein the driver's fatigue or drowsiness is detected and alerts the person. The proposed method will use 5megapixel Raspbian camera that captures driver's face and eyes and processes the images to detect driver's fatigue. On the detection of drowsiness, the programmed system cautions the driver through an alarm to ensure vigilance. The proposed method constitutes of various stages to determine wakefulness of the driver. According to this output, the warning message is generated. Haar Cascade Classifiers is used to detect the blink duration of the driver and Eye Aspect Ratio (EAR) is calculated. Finally, the alert message

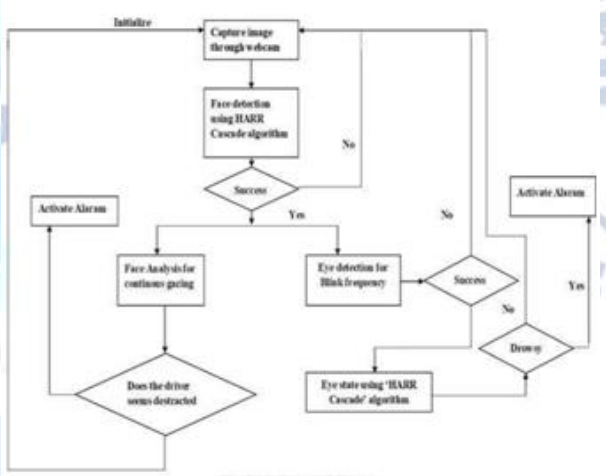
along with car plate number is sent to the concerned person mobile with help of Ubidots cloud service and Twilio API. For this Raspberry Pi 3 with Raspbian (Linux Based) Operating System is used. A realtime driver drowsiness detection system for driving safety. Based on computer vision techniques the driver's face is located from a color video captured in a car. Then, face detection is employed to locate the regions of the driver's eyes, which are used as the templates for eye tracking in subsequent frames. Finally, the tracked eye's images are used for drowsiness detection in order to generate warning alarms. The proposed approach has three phases: Face, Eye detection and drowsiness detection. The role of image processing is to recognize the face of the driver and then extracts the image of the eyes of the driver for detection of drowsiness. The Haar face detection algorithm takes captured frames of image as input and then the detected face as output. Drowsy driving is one of the major causes behind fatal road accidents. One of the recent study shows that one out of five road accidents are caused by drowsy driving which is roughly around 21% of road accidents, and this percentage is increasing every year as per global status report on road safety 2015, based on the data from 180 different countries. This certainly highlights the fact that across the world the total numbers of road traffic deaths are.

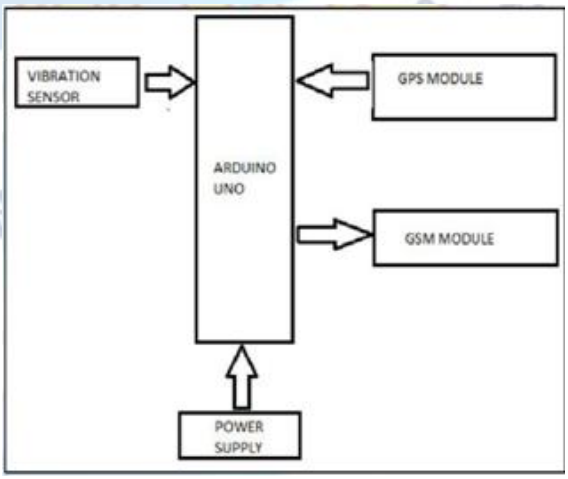
2. DISCUSSION

The development of the driver drowsiness detection system enhances teaching and learning by providing a real-world application of technology in road safety. This research offers a practical example of integrating advanced technologies such as computer vision and machine learning into a system designed to improve safety. Students studying in fields related to automotive technology, computer science, and engineering can gain hands-on experience through involvement in developing and testing the system. Additionally, the system serves as an educational tool to demonstrate the impact of technology on everyday life, fostering a deeper understanding of how theoretical knowledge can be applied to solve real-world problems. The research's focus on user interface design and compliance with regulatory standards also teaches the importance of user-centered design and adherence to legal and safety requirements in technology development.

The research on driver drowsiness detection is a significant research endeavor, contributing to advancements in both algorithm development and sensor integration. By implementing robust algorithms to analyze facial features and behavioral patterns indicative of drowsiness, the research pushes the boundaries of computer vision and machine learning. The integration of sensors for monitoring vehicle dynamics and detecting accidents opens new avenues for research in sensor technology and data fusion. This research also explores the application of real-time location tracking to enhance emergency response, contributing to research in geospatial technologies and telecommunications. The interdisciplinary nature of the research—combining computer science, automotive technology, and safety engineering—demonstrates the research's potential to drive innovation across multiple fields.

This research exemplifies synthesis and creativity by merging diverse technologies into a cohesive system aimed at enhancing road safety.





The system's ability to notify emergency contacts or authorities in case of accidents facilitates prompt response and assistance, improving emergency services and potentially saving lives. The research's scalable design allows it to be implemented in various contexts, from personal vehicles to commercial fleets and public transportation, making its benefits accessible to a broad audience. By addressing market demand for innovative road safety solutions, the research also contributes to the global effort to reduce road accidents and fatalities, aligning with broader public safety and health objectives.

3. RESULTS

The aim of this project is to significantly enhance road safety by developing an advanced system that detects driver drowsiness and provides timely notifications to prevent accidents resulting from fatigue. This initiative addresses the critical issue of driver fatigue, a major factor in road accidents. The system will incorporate sophisticated algorithms to analyze facial features and behavioral patterns indicative of drowsiness. These algorithms will track eye movements, yawning frequency, and head tilting to gauge the driver's alertness level accurately. By identifying signs of drowsiness early, the system can intervene promptly, advising drivers to take necessary breaks or corrective actions before their fatigue leads to dangerous situations.

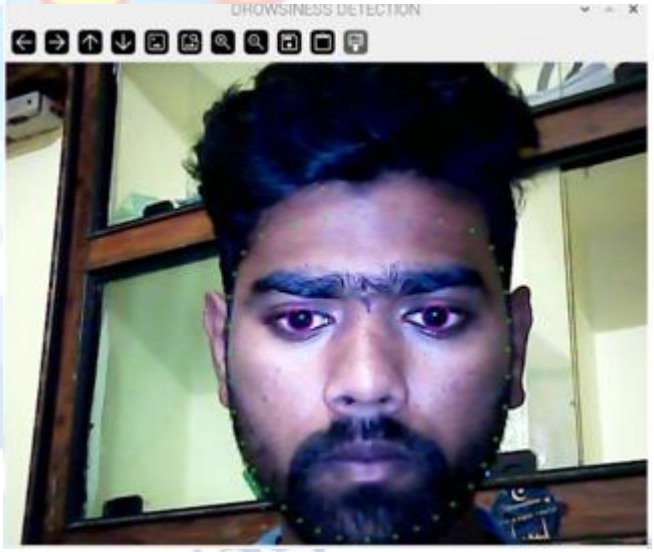
Complementing the drowsiness detection feature, the system will integrate sensors to monitor vehicle dynamics. These sensors will detect sudden changes in speed, direction, or impact, which are indicative of potential accidents. When such changes occur, the system will automatically alert emergency contacts or authorities, thereby facilitating a quicker response to accidents. This dual approach—monitoring both driver condition and vehicle behavior—enhances the overall safety of the driving experience.

Real-time tracking of the vehicle's location is another crucial component of the system. This feature allows for the accurate dissemination of information to emergency responders in the event of an accident, improving response times and the effectiveness of assistance provided. Automated alert mechanisms, including SMS notifications, will be employed to reduce reliance on manual observation and ensure timely communication with drivers and relevant stakeholders about drowsiness or accident events.

To ensure user-friendliness, the project will develop an intuitive user interface that allows easy configuration and system monitoring. This interface will be designed for both drivers and administrators, making the system accessible and straightforward to use. Throughout the development process, strict adherence to regulatory requirements and automotive safety standards will be maintained, ensuring the system's reliability and legality. Designed to be scalable and adaptable, the solution will be suitable for various deployment scenarios, including personal vehicles, commercial fleets, and public transportation systems. This flexibility addresses the diverse needs of different users and maximizes the system's applicability. By implementing this comprehensive solution, the project aims to contribute to the reduction of road accidents and fatalities, meeting the growing market demand for innovative road safety solutions and establishing a new standard in driver safety technology globally.

Screenshots:

Input



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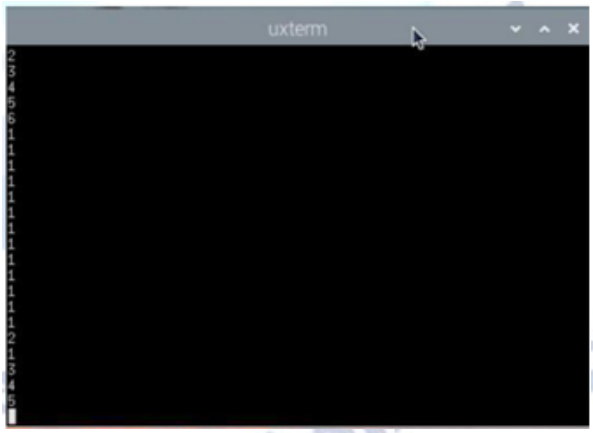

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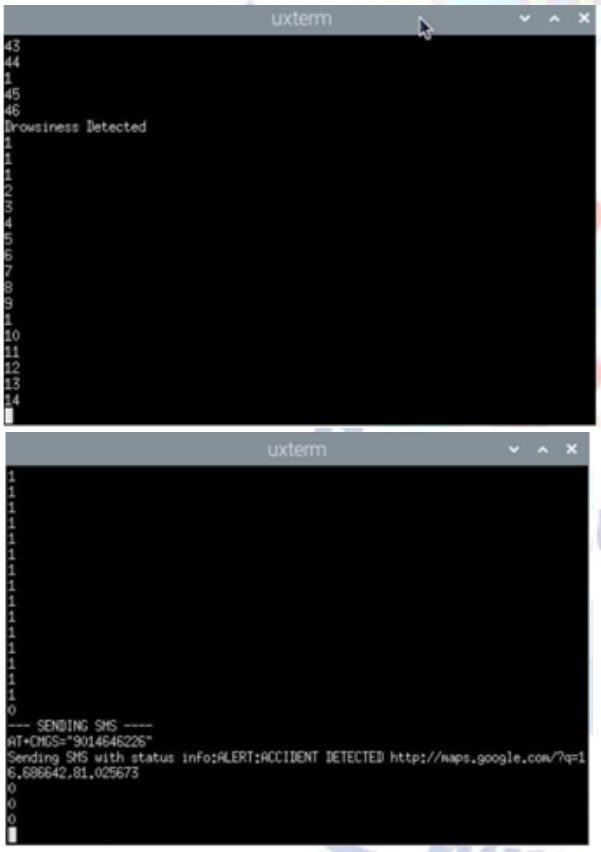

4. CONCLUSION

Development of our driver drowsiness detection system with real-time accident location tracking represents a significant milestone in advancing road safety technology. By leveraging cutting-edge technologies such as OpenCV for computer vision and Haar cascades for object detection, our system can accurately identify signs of driver drowsiness in real-time. This capability plays a crucial role in mitigating the risks associated with fatigue-induced accidents, providing timely alerts that can prevent potential mishaps.

Throughout the development process, we conducted rigorous testing phases to ensure the system's reliability, accuracy, and usability. These phases included unit testing to verify the functionality of individual components, integration testing to ensure that different system modules work together seamlessly, and acceptance testing to confirm that the final product meets the specified requirements and performs effectively in real-world conditions. Each test focused on key aspects such as regulatory compliance, user experience assessment, performance evaluation, and scalability. Ensuring compliance with automotive safety standards and industry regulations was a priority, aligning our system with legal requirements and enhancing its market readiness.

In addition to technical testing, we engaged in extensive user testing by conducting alpha and beta trials with representative user groups. These tests were crucial for gathering practical feedback on the system's performance and user interface, allowing us to refine the design and functionality based on real-world usage scenarios. Feedback from these trials enabled us to make critical adjustments, ensuring the system meets user needs and expectations effectively.

Our system's intuitive user interface facilitates ease of use for drivers, allowing them to configure settings and monitor system performance effortlessly. This design consideration enhances user engagement and satisfaction, making the system more accessible and effective in preventing accidents caused by driver fatigue.

In summary, our driver drowsiness detection system offers a proactive and comprehensive solution to enhance road safety. By integrating advanced technology with thorough testing and user-centered

design, we deliver a reliable and effective tool that addresses the pressing issue of driver fatigue, ultimately contributing to safer roads and reduced accident rates. This project underscores our commitment to leveraging innovation to create practical solutions that save lives and improve driving safety globally.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] J. Treboux, D. Genoud and R. Ingold, "Decision Tree Ensemble Vs. N.N. Deep Learning: Efficiency Comparison For A Small Image Dataset," 2018 International Workshop on Big Data and Information Security (IWBIS), 2018, pp. 2530, doi: 10.1109/IWBIS.2018.8471704. International Conference on Electronic Circuits and Signalling Technologies Journal of Physics: Conference Series 2325 (2022) 012057 IOP Publishing doi:10.1088/17426596/2325/1/012057 12

[2] K. J. Chabathula, C. D. Jaidhar and M. A. Ajay Kumara, "Comparative study of Principal Component Analysis based Intrusion Detection approach using machine learning algorithms," 2015 3rd International Conference on Signal Processing, Communication and Networking (ICSCN), 2015, pp. 16, doi: 10.1109/ICSCN.2015.7219853.

[3] R. Kumaran, R. Deepak Kumar, M. Karthick Kumar, B. Rahul, 2020, Driver Drowsiness Monitoring System using Visual Behaviour and Machine Learning, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) RTICCT – 2020 (Volume 8 – Issue 12)