International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 05 | May 2023 www.irjet.net p-ISSN: 2395-0072

DRIVER DROWSINESS DETECTION USING RASPBERRY PI

Chirag Patil[1], Omkar Thopate[2], Soham Patil[3], Prof. A.A. Trikolikar[4]

[1,2,3]Engineering Student, Dept. Electronics and Telecommunication Engineering, JSPM Imperial College of Engineering and Research, Wagholi, Pune, Maharashtra, India.
[4]Professor, Dept. Electronics and Telecommunication Engineering, JSPM Imperial College of Engineering and Research, Wagholi, Pune, Maharashtra, India.

Abstract - *This abstract describes a Raspberry Pi-based system for detecting intoxication and sleepiness. To track vital signs and alcohol levels, it makes use of sensors such a camera, heart-rate sensor, and alcohol sensor. The gathered data is processed by machine learning algorithms, which identify intoxication from alcohol and tiredness. Real-time alerts are produced by the Raspberry Pi, the system's central processing unit, and take the form of auditory notifications or cautions. By offering prompt detection and alarms for tiredness and alcohol impairment, this portable, cost-effective technology seeks to improve safety in workplace and transit situations.*

***Key Words*: Drowsiness Detection, Image Processing, Facial Detection, Yawning, Alcohol Detection**

1.INTRODUCTION

The goal of this project is to come up with a method for waking up sleepy drivers while they are on the road. The tiredness of the driver is one of the factors that contribute to auto accidents. As is well known, there were 1,89,400 road accidents in India in 2018 and 2,01,205 in 2020. According to the research of 2020 traffic accident statistics, 400 fatalities and 1374 accidents occur daily on Indian roadways.

Major causes of accidents and fatalities across a variety of industries, including transportation and the workplace, include drowsiness and alcohol impairment. To ensure public safety, it is crucial to identify and treat these disorders immediately. This introduction introduces a cutting-edge method for detecting intoxication and sleepiness using the Raspberry Pi, a flexible and reasonably priced single-board computer.

To record facial images and extract relevant data for drowsiness analysis, the system uses a camera module. An alcohol sensor that detects the quantity of alcohol molecules in the breath is used to detect alcohol.

The Raspberry Pi serves as the system's central processing unit, managing the machine learning algorithms and producing immediate notifications whenever alcohol or drowsiness is discovered. These cautions may come in the nature of audio warnings.

The major goal of this system is to deliver a cheap, transportable, and trustworthy solution for identifying and dealing with intoxication and drowsiness. By doing this, it seeks to improve security and avoid catastrophes in a variety of settings, including as driving, using public transportation and the workplace.

2. LITERATURE SURVEY

1.Bappaditya Mandal, Liyuan Li, Gang Sam Wang, and Jie Lin "Towards Detection of Bus Driver Fatigue Based on Robust Visual Analysis of Eye State" Driver's fatigue is one of the major causes of traffic accidents, particularly for drivers of large vehicles due to prolonged driving periods and boredom in working conditions. In this paper, we propose a vision-based fatigue detection system for bus driver monitoring, which is easy and flexible for deployment in buses and large vehicles. The system consists of modules of head-shoulder detection, face detection, eye detection, eye openness estimation, fusion, drowsiness measure percentage of eyelid closure estimation, and fatigue level classification.

2.Zuojin Li, Liukui Chen, Jun Peng and Ying Wu "Automatic Detection of Driver Fatigue Using Driving Operation Information for Transportation Safety" Fatigued driving is a major cause of road accidents. For this reason, the method in this paper is based on the steering wheel angles (SWA) and yaw angles (YA) information under real driving conditions to detect drivers' fatigue levels.

3. S. Cotter revealed the methodology for the system that records eye movements using the corneal reflection approach in 2011. However, there were significant drawbacks, including the requirement for a headset, which made the method inappropriate and very intrusive.

3. BLOCK DIAGRAM

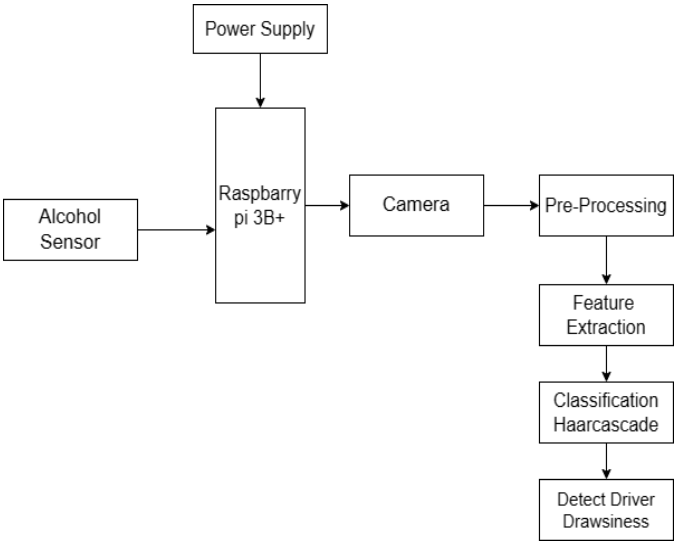

Fig.1 Block Diagram.

4. METHODOLOGY

The Raspberry Pi, camera module, alcohol sensor, buzzer, and speaker drowsiness detection methodology uses a methodical manner to assure accurate and real-time detection. The first step in the hardware setup is to connect the Raspberry Pi's GPIO pins for the camera module, alcohol sensor, buzzer, and speaker. This guarantees effective component integration and communication.

The next step in data collecting is to use the camera module to periodically take pictures of the individual's face. The camera is placed carefully to get crisp, well-lit photographs of the face that allow for accurate analysis. The alcohol sensor is simultaneously put close to the person to determine the amount of alcohol in their breath.

Image processing techniques are used to extract relevant components that signify drowsiness from the collected face pictures. To assess the degree of exhaustion or drowsiness facial movements, head posture, and eye closure patterns are analysed. These characteristics offer insightful information on the individual's level of awareness.

In addition, the alcohol sensor detects the amount of alcohol present in the subject's breath. The conversion of the sensor signals into measurable alcohol levels facilitates the evaluation of alcohol impairment.

Machine learning techniques may be used to classify alcohol and fatigue. The retrieved characteristics from the human face images and alcohol levels may be processed by trained algorithms to provide a thorough analysis of the individual's state. The technology triggers the buzzer and speaker to produce audio warnings or alerts whenever drowsiness or excessive alcohol levels are detected, informing the person and maybe necessary authorities of their impaired status.

This method uses the Raspberry Pi, camera module, alcohol sensor, buzzer, and speaker to guarantee a thorough approach to detecting intoxication and drowsiness. The solution improves safety and enables prompt response to reduce possible dangers by combining these elements and using machine learning techniques.

5. CIRCUIT DIAGRAM

Fig. 2 Circuit Diagram.

6. ALGORITHM

1. Initialize the system.
2. Start the data collection process.
3. Capture a facial image using the camera module.
4. Apply image processing techniques to extract relevant features from the facial image.
5. Check the alcohol detection.
6. Analyze the extracted facial features.
7. Classify the individual's state as either drowsy or alert based on the analysis of drowsiness features.
8. If drowsiness or high alcohol levels are detected: Activate the buzzer and speaker to generate audio warnings or alerts.
9. Repeat the process by capturing new facial images and continuously monitoring the individual's state.
10. Terminate the system.

7. EXPERIMENT AND RESULTS

7.1 RESULT 1

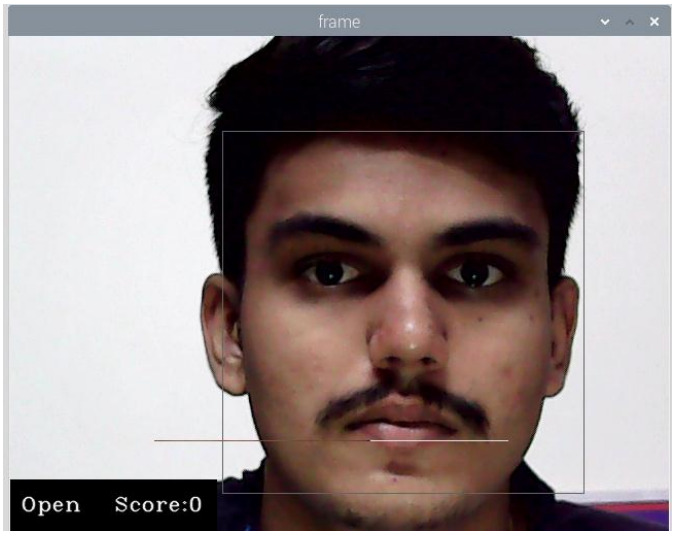

Fig.3 Result 1

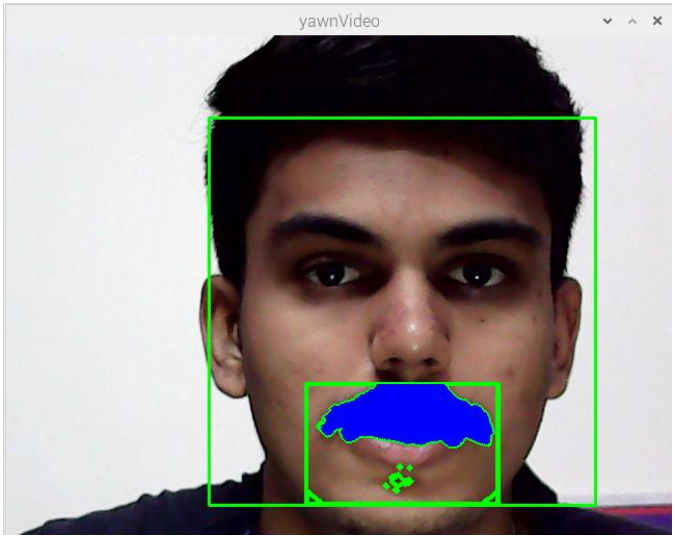

Fig.4 Yawn Result 1

In this Experimental Result the drowsiness and Yawn is not detected as the individual is not sleeping. In this the alert is not generated. In this the score is calculated which is 0 in this result and the eyes are open.

7.2 RESULT 2

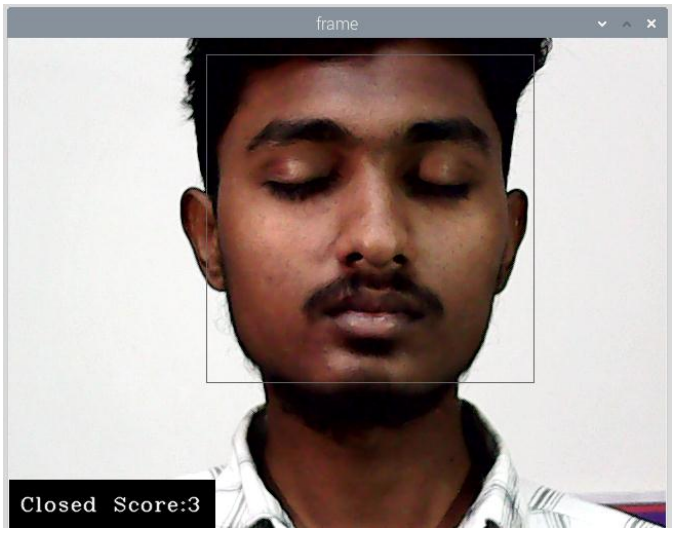

Fig.5 Result 2

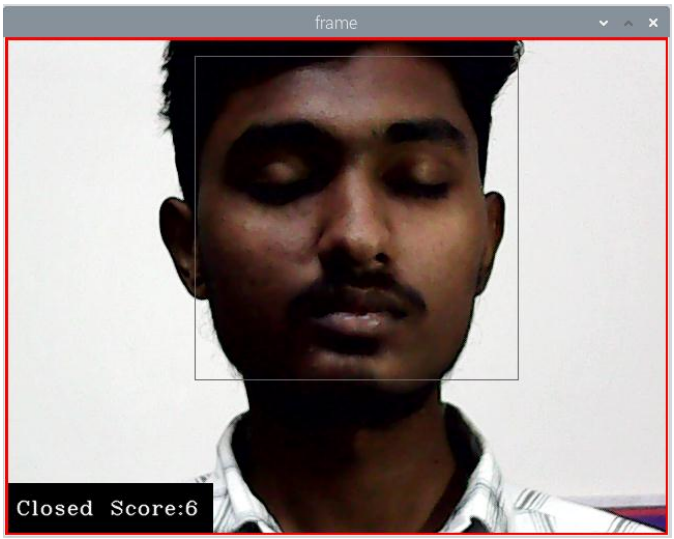

Fig.6 Result 2

In this Experimental Result the drowsiness is detected as the eyes of the individuals are closed. In this the alert is generated. In this the score is calculated which is 3 in this result and the eyes are closed.

7.3 RESULT 3

In this Experimental Result the Yawn is detected. In this the alert is generated. The audio alert is generated as the yawn is detected.

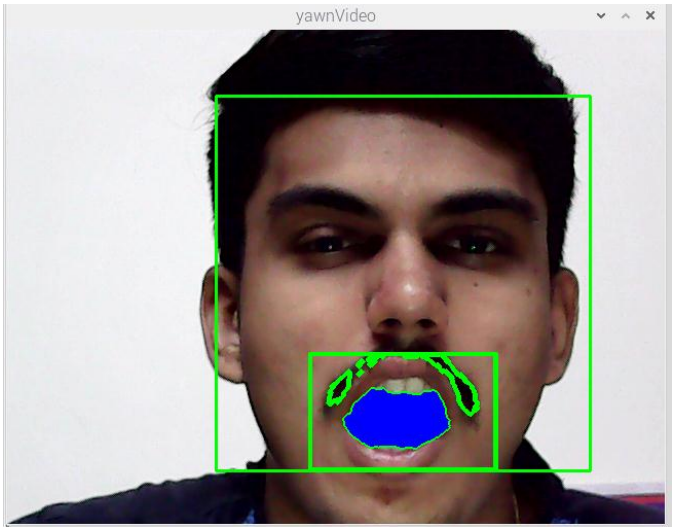

Fig.7 Result 3

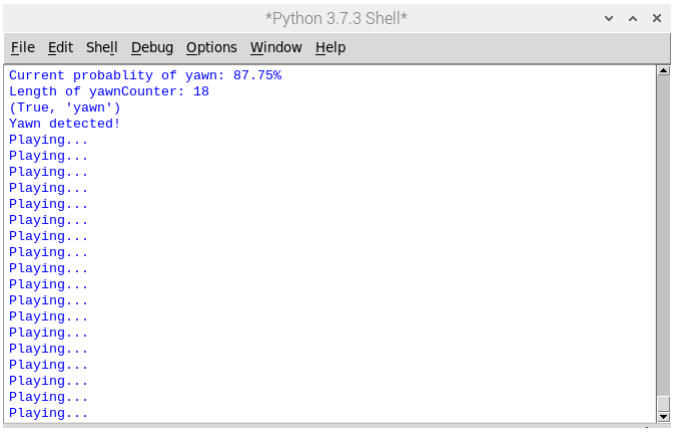

Fig.8 Yawn Result

8. OBSERVATION TABLE

SR. NO	OBSERVATION	EAR AND YAWN SCORE	RESULT
1.	Eyes open and Not Yawning	Eye Score<3 Yawning counter<17	Ideal State
2.	Eyes closed and Not Yawning	Eye Score>3 Yawning counter<17	Drowsiness Detected
3.	Eyes Open and Not Yawning	Eye Score<3 Yawning counter>17	Yawn Detected

9. ADVANTAGES OF PROPOSED SYSTEM

1. Enhanced Safety: The system offers real-time monitoring and alcohol impairment detection, which helps to improve safety in a variety of parameters. It enables quick responses to stop accidents and possible risks by producing alerts and warnings.

2. Real-time Monitoring: The technology makes it possible to keep an eye on vital signs, facial features, and alcohol levels in real-time.

3. Timely Alerts and Warnings: The driver is get alerted on time by using the buzzer and speaker.

10. CONCLUSION

A complete solution for improving safety in various situations is the drowsiness detection system with alcohol detection integrating Raspberry Pi, camera module, alcohol sensor, buzzer, and speaker. The device can efficiently monitor vital signs, analyse facial features and analyse alcohol levels in real-time by fusing sensor technologies, image processing and machine learning algorithms.

A cost-effective and portable solution is provided by utilising Raspberry Pi as the central processing unit, making it appropriate for use in workplaces, transportation systems, and vehicles. The system's capacity to identify intoxication from alcohol and drowsiness enables prompt responses, lowering the chances of accidents involving alcohol and fatigue.

Overall, the Raspberry Pi-based drowsiness and alcohol detection system offers a useful and approachable way to increase safety by treating fatigue and alcohol impairment in real-time. Research and development efforts in this field might considerably improve public safety and reduce accidents across a variety of sectors.

11 REFERENCES

1. Quang N., NguyenLe T. Anh ThoToi Vo VanHui YuNguyen DucThang, “Visual Based Drowsiness Detection Using Facial Features”, 6th International Conference on the Development of Biomedical Engineering in Vietnam (BME6) pp 723-727, BME 2017.

2. Kunika Chhaganbhai Patel, Shafiullah Atiullah Khan, Vijaykumar Nandkumar Patil, “Real-Time Driver Drowsiness Detection System Based on Visual Information”, International Journal of Engineering Science and Computing, March 2018.

3. Rahman, M. Sirshar, A. Khan” Real Time Drowsiness Detection Using Eye Blink Monitoring” 2015

National Software Engineering Conference (NSEC 2015).

4. J. May and C. Baldwin, "Driver fatigue: The importance of identifying causal factors of fatigue when considering detection and countermeasure technologies," *Transp. Res. F, Traffic Psychol. Behav.*, vol. 12, no. 3, pp. 218–224, 2009.

5. Hee-Jong Yoo, "Is a certain acoustic alarm effective for preventing drowsiness driving?", Journal of the Acoustical Society of Korea, 2016.

6. Sang-Hyuk Park, Chang-dong Yoo, "Efficient Real-Time Drowsy Detection Algorithm for Safe Operation", 2011 Summer Conference of Electronics Engineering Society of Korea, pp..947-950, 6. 2011.