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Proposed System for Driver Drowsiness Detection using IoT

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Abstract— **Every year, many people die in road accidents around the world, and driver fatigue is a major cause of it. Short sleep and fatigue while driving are often the main causes of accidents. However, detecting and alarming the driver is an ongoing research work because it can only detect early signs of drowsiness before a serious mishap. Most traditional methods of detecting drowsiness are based on behavioral aspects. Some are disturbing and distracting to the driver, while others require various algorithms to be followed.**

Therefore, in this article, we analyze various systems developed to detect a driver's drowsiness and their drawbacks and suggest a feasible system that would help detect the driver's drowsiness. The system, accordingly, uses various facial images, analyses them using sensors, and helps alert the driver with good accuracy.

Keywords- Drowsiness Detection, Eye Aspect Ratio, Python, Raspberry pi

I. INTRODUCTION

The driver's sleep system is a technology that helps the driver and prevents the car from crashing. This program aims to reduce risks through the use of various sensors and technologies.

The driver may feel drowsy if he is taking medication, has health problems, or has been driving for long hours. Even if you drink alcohol and drive you can feel sleepy and lose control of the vehicle. Lack of sleep lowers the level of vigilance that produces dangerous situations and enhances risk [1]. 1% of all fatalities are caused by driving during sleep. Many elderly drivers felt tired while driving. An estimated 11 million drivers admit they have been in or near an accident because they are too tired to drive. Fatigue syndrome is most common in teens between the ages of 18 and 30. The National Highway Traffic Safety Administration estimates that some 100,000 accidents directly result from driver fatigue each year. A car crash caused an estimated 1,550 deaths, 71,000 injuries, and 12.5 billion financial losses a year. Drowsy driving is dangerous even if a person doesn't fall asleep [2].

This is why there was an emergence of a driver alert system. There are various methods to detect the drowsiness of a driver which are as follows [1]:

- Eye Aspect Ratio
- Eye Closure Ratio
- Yawn Detection
- Face Expression
- Eye blinking
- Eye gazing

Now taking this as our parameters we can use Artificial Intelligence, Machine Learning, and Computer Vision algorithms to detect driver drowsiness in the system. Some researchers also say that we can use various signals like an electrocardiogram (ECG), electromyogram(EMG), electroencephalogram (EEG), and electrooculogram (EOG) to detect drowsiness [3].

II. LITERATURE REVIEW

Countless approaches have been suggested to detect drivers' drowsiness. This section condenses various approaches related to driver's drowsiness identification. Feroz Ahmed [7] used Virtual Network Computing (VNC) viewer software to observe the real-time Physiognomy of the driver and flickering of the eyes. Maryam Hashemi [8] proposed a system to find heads and detect eyes using Viola and Jones's algorithm. Maninder Kahlon [9] used an IR-led camera to capture the eyes and then process it through MATLAB to identify whether the eyes are open or closed Juve Korompis[10] developed an application in android which scans the face of the driver using OpenCV and it issues an alert for detection of drowsiness using the Google voice engine. Boon Giin Lee [11] proposed a system that uses Arduino to analyze the input signal from fingers sensing the steering wheel and eyes detection through the web camera of the driver and if the input extents the preset threshold, then the system raises alerts and vibrations on the driver's wearables. Ines Tevab [12] developed a driver drowsiness system based on the head tilt angle of the driver, which analyses the spinal inclination of the driver and transmits a sound alarm to the driver's ears if he is feeling drowsy. Vandna Zuojin [13] proposed a driver drowsiness system based on steering- wheel angle sensor data, an unconventional neural network with a variety of self-organizing, flexible learning strategies for organizing a competitive network and detecting fatigue issues of the driver. It takes steering movements and brake force as input sends it to the VBOX data acquisition system and provides the drivers' operational behavior as output. Nishant Kumar [14] developed another system using eye-blink sensors with three main components, an eye blink sensor frame, an IR sensor, and a relay, that analyses the driver's blinking pattern and gives vibrations to alert the driver. Sukrit Mehta [15] proposed a system using eye aspect ratio and eye closure ratio, using python lib library, that checks facial landmarks, and if the ratios are below a certain threshold, the driver would be alerted by the alarm. Eddie E. Galaraza [16] developed a system based on drivers' face image behavior like the behavior of the eyes, the lateral and frontal assent of the head, and yawn through a Human-Computer Interaction System and sends an alert with help of a mobile application. Boon Giin Lee [17] developed a Smartphone-Based Driver Safety Monitoring System Using Data Fusion that focuses on several features such as heart rate, blood pressure, temperature and evaluates the behavior of the driver and if the evaluation index is more than 75%, that means the driver is feeling sleepy and system and an alert call get initiated for the driver.

III. IDENTIFIED ISSUES

This section identifies the drawbacks of other implemented driver drowsiness detection systems. One of the systems had sensors attached to the driver's body which might affect the driver as the sensor aged while using many sensors will increase the cost of the system. Also, it has only focused on eye movements and flickering to detect drowsiness. Other systems have attached themselves to apps that were specific to a particular platform of Android users and these apps had location detection due to which the driver had to carry the cell phone all the time to receive alerts. Some systems had issues in detecting face and eye movements due to a lack of light and brightness on the face, and the position of the driver. While some systems could not indicate the frequency of yawning which is one of the signs of drowsiness other systems used wristwatches to detect pulse and issue an alert, if these wristwatches were worn by a sick person the system will give unnecessary alerts. One of the systems had the drawback of detecting normal head movements as a sign of drowsiness, giving the driver a false alarm. Another system took twelve successive images of the driver to detect whether their eyes are closed when an accident occurs while the system should lessen the capturing of images.

IV. PROPOSED SYSTEM

The main aim of this project is to estimate the fatigue of a driver that records the face and detects drowsiness.

The drowsiness detection system developed in this work is done with the help of the Internet of Things which helps in the early detection and minimization of false alarms.

When recording the driver, the main idea is to frame the face so that the eyes are clearly visible and drowsiness can be detected as early as possible. For the detection of the face, we will use facial landmarks. Face predictions are used to detect important features of the face. This can be done with the help of OpenCV. The landmarks are trained and Dlib Library is used. To analyze the different behavioral and psychological activities of the driver, eye movement and facial expressions are monitored continuously. This can be done with the help of Eye Aspect Ratio (EAR) which is used to calculate the distance between the vertical and horizontal eye landmarks. The threshold value of EAR lies above 0.25. If the driver closes their eyes for more than 2 seconds, the threshold value falls and the buzzer starts beeping.

The buzzer beeps and plays different sounds which will help the driver to stay awake, and not meet with an accident. This described model works properly with Raspberry Pi programmed in Python language.

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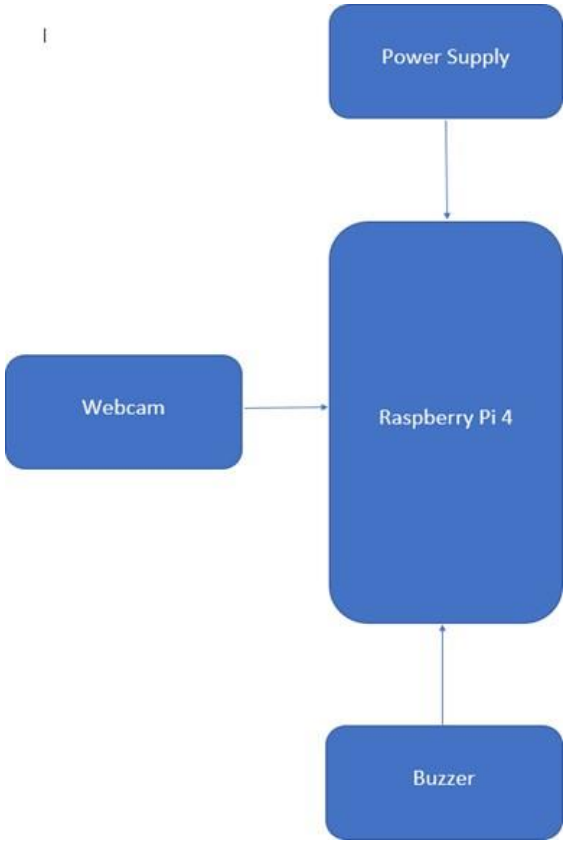

Figure 1. Block diagram of the proposed system

In Fig 1. Raspberry Pi gets the power supply from a power source, webcam, and the buzzer is directly attached to the raspberry pi. On switching on the power, the data is detected, and accordingly, the buzzer is buzzed.

REFERENCES

[1] Marco Javier Flores, J. A. (n.d.). Driver Drowsiness Warning System Using Visual Information for Both Diurnal and Nocturnal Illumination Conditions. *EURASIP Journal on Advances in Signal Processing*.

[2] 40 Of Highway Accidents Occur Due To Drivers Dozing Off. (2019, July 30). Retrieved from Financial express.

[3] Arun Sahayadhas, K. S. (n.d.). Detecting Driver Drowsiness Based on Sensors: A Review

[4] Dr. Sunita Chowdhary, L. M. (2018, March 15). *Drowsy Driving - Facts, Causes, and Effects.* Retrieved from medindia.net.

[5] *Basics About Sleep.* (2017, March 21). Retrieved from cdc.gov..

[6] Cues of Fatigue: Effects of Sleep Deprivation on Facial Appearance

[7] FEROZ AHMED, Y. S. (n.d.). IOT BASED DRIVER DROWSINESS DETECTION AND HEALTH. *Journal of Xi'an University of Architecture & Technology*.

[8] Hashemi, M., Mirrashid, A. & Beheshti Shirazi, A. Driver Safety Development: Real-Time Driver Drowsiness Detection System Based on Convolutional Neural Network. *SN COMPUT. SCI.* **1,** 289 (2020).

[9] M. Kahlon and S. Ganesan, "Driver Drowsiness Detection System Based on Binary Eyes Image Data," *2018 IEEE International Conference on Electro/Information Technology (EIT)*, 2018, pp. 0209-0215, DOI: 10.1109/EIT.2018.8500272.

[10] M. T. Tombeng, H. Kandow, S. I. Adam, A. Silitonga and J. Korompis, "Android-Based Application To Detect Drowsiness When DrivingVehicle," *2019 1st International Conference on Cybernetics and Intelligent System (ICORIS)*, 2019, pp. 100-104, DOI: 10.1109/ICORIS.2019.8874905.

[11] Lee, Boon Giin & Lee, Boon-Leng & Chung, Wan-Young. (2015). Wristband- Type Driver Vigilance Monitoring System Using Smartwatch. Sensors Journal, IEEE. 15. 5624-5633. 10.1109/JSEN.2015.2447012

[12] Teyeb, Ines & Jemai, Olfa & Zaied, Mourad & Ben Amar, Chokri. (2014). A Drowsy Driver Detection System Based on a New Method of Head Posture Estimation. 362-369. 10.1007/978-3-319-10840-7_44.

[13] Zuojin Li, Q. Y. (n.d.). A fuzzy recurrent neural network for driver fatigue detection based on steering-wheel angle sensor data. *International Journal of Distributed Sensor Networks*.

[14] Kusuma Kumari B.M, S. S. (n.d.). Detection of Driver Drowsiness Using Eye Blink Sensor. *International Journal of Engineering & Technology*.

[15] Mehta, Sukrit & Dadhich, Sharad & Gumber, Sahil & Bhatt, Arpita. (2019). Real-Time Driver Drowsiness Detection System Using Eye Aspect Ratio and Eye Closure Ratio. SSRN Electronic Journal. 10.2139/ssrn.3356401

[16] Galarza, Eddie & Egas, Fabricio & Silva, Franklin & Velasco, Paola & Galarza, Eddie. (2018). Real-Time Driver Drowsiness Detection Based on Driver's Face Image Behavior Using a System of Human-Computer Interaction Implemented in a Smartphone. 10.1007/978-3-319- 73450-7_53.

[17] Lee, Boon Giin & Chung, Wan- Young. (2012). A Smartphone- Based Driver Safety Monitoring System Using Data Fusion. Sensors (Basel, Switzerland). 12. 17536-52. 10.3390/s121217536.