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Driver Drowsiness Detection System

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Abstract- Several traffic accidents occur every hour around the world, some of which are caused by drunk driving, lack of sleep, lack of attention behind the wheel and many other reasons that can be dangerous for both passengers and road users. The most common situation is insomnia, which can make the driver careless at the wheel, these things cannot be ignored. To avoid such situations, the driver's drowsiness detection system is very effective in detecting drowsiness by calculating and estimating the driver's blinking and eye size using a camera and corresponding software. The driver drowsiness detection system is based on the CNN machine learning algorithm, which is implemented completely offline and can alert with an alarm when the driver feels sleepy.

Keywords- driver drowsiness detection, convolutional neural network, real-time tracking, machine learning.

I. INTRODUCTION

Driver drowsiness is one of the biggest factors in traffic accidents worldwide. According to NHTSA, driver fatigue causes approximately 100,000 crashes in the United States each year, resulting in more than 1.5,000 deaths and 71,000 injuries (National Highway Traffic Safety Administration, 2021). Sleepiness is not limited to the United States; this is a global problem that needs to be addressed. Detecting driver drowsiness is an important research topic aimed at preventing accidents caused by driver fatigue. Over the years, interest in this technology has grown and various techniques have been developed to detect driver drowsiness. These methods include physiological and behavioral methods. Physiological methods measure the driver's physical responses to fatigue, such as heart rate, blood pressure, and brain activity, while behavioral methods measure changes in driver behavior, such as steering wheel movements and driving speed [2]. Recently, ML algorithms have been used in driver drowsiness detection systems. These algorithms can identify patterns in physiological and behavioral data collected from drivers and accurately predict their sleepiness. Algorithms use various features such as eye movements, facial expressions and head movements to detect driver drowsiness [3] [4]. The development of driver drowsiness detection systems is necessary to improve road safety and reduce accidents caused by driver fatigue. These systems warn drivers when they are too tired to take breaks, which reduces the risk of an accident. In addition, they can also provide feedback to fleet managers, who can use the data to develop policies that encourage drivers to take a break when they are too tired [5]. In conclusion, the detection of driver drowsiness is an important area of research that can significantly improve road safety. Advances in effective and reliable detection technologies can reduce the frequency of crashes caused by driver drowsiness. This technology can save many lives and should receive more attention from researchers and policy makers.

II. LITERATURE REVIEW

The procurement process used several strategies to improve the efficiency and speed of the drowsiness detection procedure. The methods and strategies used in the past to detect drowsiness are the main topic of this section. The first method is based on a driving model, which also takes into account the characteristics of the vehicle, road conditions and driving techniques. Calculating steering wheel

movement or road deviation helps you determine your driving style [6][7]. Driving requires constant control of the steering wheel to keep the car in its lane. Based on the correlation between fatigue and micro regulation, Krajewski et al [6] had an accuracy of 86%in detecting driver drowsiness. In addition, it is possible to determine the fatigue of a driver by lane deviation. In this case, the position of the car on the lane is monitored and signs of drowsiness are investigated [8]. However, methods based on driving style depend on the character of the vehicle, driver and road conditions.The alternative method category uses data from physiological indicators such aselectrocardiogram(ECG),\electroencephal ogram (EEG) and electrooculography (EOG) data. Information about brain activity is obtained through EEG signals. Delta, theta, and birth signals are the three main signals used to measure driver fatigue. When the driver sleeps, the the taja delta signals increase, while the birth signals barely change. According to Mardi etal [9], this mod is the most accurate system with a taste percentage above 90. However, the main disadvantage of this system is its intrusiveness.

Figure 1: eyes closed

Figure 2: eyes opened

The driver must have multiple sensors connected, which can be cumbersome. In contrast, non-intrusive bio signaling styles are significantly less accurate.A final solution is to detect facial features, including yawning, facial posture, and eye blinking [11]. In the blindfold method, the driver's state is measured by counting the driver's blinks. A typical average blink is between 0.1 and 0.4 seconds. This means that the eye blinks at least 2-3 times per second. This is observed within a few seconds.If the driver is tired, the reading will be lower than in normal conditions. This way we can detect if the driver is tired or not. In our project, the camera is placed in front of the face, which helps to recognize the correct facial position and eye blinks.

III. METHODOLOGY

There are some methodological issues in this paper, such as sample size estimation, data classification and eyelid detection. This paper will also do future research such as yawn detection and eye detection, which is more useful for detecting driver drowsiness.

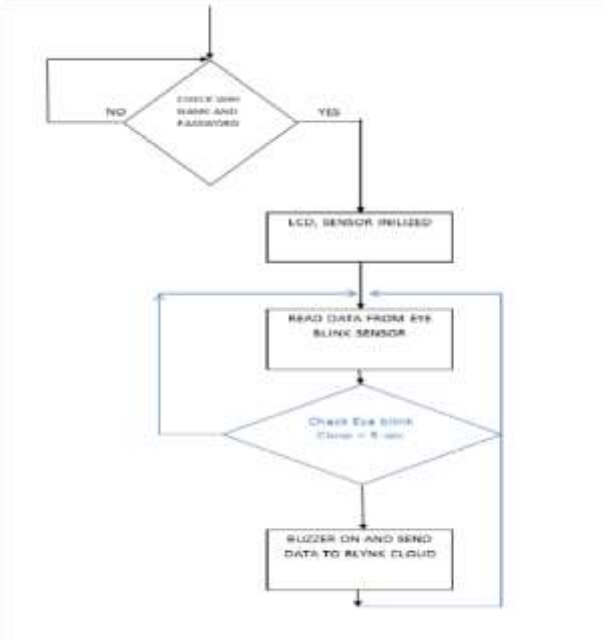

Figure 3: circuit diagram

Figure 4: detecting eye glass

To detect drowsiness. This article uses Python. The system treats the face only as a specific body part. Wearing eye glass to record the driver's eye blinks. Whether the eye is open or closed can be determined by the aspect ratio of the IR Sensor [38] [39]. The system examines the driver's eyes. Then we will know if the eye is open or closed. If the specified interval is shorter than the time during which the eyes are closed, an alarm will sound to warn the driver. If the driver is looking ave, the device will continue to track their eyes.

IV. OUTCOME SCREENSHOT

Figure 5: detection system

Result Outcome

The most approach to recognizing any picture highlights extracti on from eye movements of interest. If the eye is open or closed.

Figure 6: eyes opened

Figure 7: eyes closed for a minute

V. CONCLUSION

Over the past decade, advances in blindness detection technology, the Internet of Things, sensor miniaturization, and artificial intelligence have led to significant advances in driver drowsiness detection (DDD) systems. This paper reviews four main approaches to DDD systems: imaging, biological, vehicular and hybrid systems and their characteristics, artificial intelligence algorithms, data and performance metrics.

The review addresses current challenges in the field, practical applications and future trends, emphasizing the role of 5G networks in improving DDD systems. With 5G connectivity, DDD systems can be based on real driving scenarios with data from different drivers, taking into account different factors. The use of 5G can improve deep learning capabilities to make accurate decisions in real time so that connected cars can warn tired drivers, take control of the vehicle when necessary, and communicate with neighboring vehicles. The market potential for DDD technology is significant as automakers adopt driver assistance systems and advances in artificial intelligence and deep learning fuel the development of smart cities.

REFERENCES

1. T. Vesselenyi et al 2017 IOP Conf. Ser.: Mater. Sci. Eng. 252 012097
2. Driver drowsiness detection and alert system research gate https://www.researchgate.net/publication/352116070_Driver_Drowsiness_Detection_and_Alert_System_using_Python_and_OpenCV4) Drowsy drivingstatistics(https://www.thezebra.com/resources/research/drowsy-driving-statistics/)
3. NHTSA driving data(https://www.nhtsa.gov/riskydriving/drowsy-driving)
4. Driver Alert Control (DAC). (2018, January 08). Retrieved from http://support.volvocars.com/uk/cars/Pages/ownersmanual.aspx?mc=Y555&my=2015&sw=14w20&article=2e82f6fc0d1139c2c0a801e800329d4e
5. Mardi Z, Ashtiani SN, Mikaili M. EEG- based drowsiness detection for safe driving using chaotic features and statistical tests. Journal of medical signals and sensors 2011;1:130–137.
6. Danisman T, Bilasco IM, Djeraba C, Ihaddadene N. Drowsy driver detection system using eye blink patterns. Machine and Web Intelligence (ICMWI) IEEE 2010;230-233