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Driver Drowsiness Detection System Using Raspberry Pi

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Abstract- *Driver fatigue is one of the major causes of accidents in the world. In recent years driver fatigue is one of the major causes of vehicle accidents in the world. A direct way of measuring driver fatigue is measuring the state of the driver i.e. drowsiness. So it is very important to detect the drowsiness of the driver to save life and property. This project is aimed towards developing a prototype of drowsiness detection system.*

This system is a real time system which captures image continuously and measures the state of the eye according to the specified algorithm and gives warning if required. Many of the accidents occur due to drowsiness of drivers. It is one of the critical causes of roadways accidents now-a-days. Latest statistics say that many of the accidents were caused because of drowsiness of drivers. Vehicle accidents due to drowsiness in drivers are causing death to thousands of lives. More than 30per accidents occur due to drowsiness. For the prevention of this, a system is required which detects the drowsiness and alerts the driver which saves the life. In this project, we present a scheme for driver drowsiness detection. In this, the driver is continuously monitored through webcam. This model uses image processing techniques which mainly focus on face and eyes of the driver. Raspberry-pi processor is used for image processing.

Keywords *– Python, Webcam, Haar-cascade frontal face, Drowsiness detection, Distraction, Eye detection, Eye Tracking, Face Detection*

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

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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. The Real-time Driver Drowsiness Detection for Android Application Using Deep Neu- ral Networks Techniques, 2018, Procedia Computer Science, Elsevier In this publication, an advanced approach is devised for real-time drowsiness detection. It is based on de- ploying a deep neural network to an Android application that achieves high accuracy[1].
2. Real-timeline driver drowsiness detection using a logistic regression-based machine learning algorithm, 2016, IEEE Explore:An approach that detects the driver's drowsiness by making use of heart rate variation is proposed. An advanced logistic regression-based Machine Learning algorithm is used. The model requires minimal time for predictions and achieves an accuracy above 90 [2].
3. Driver drowsy detection using representation learning, 2014, IEEE: A vision- based driver drowsiness detection system which uses Convolutional Neural Network to learn hidden and complex facial representations. The work is based on both qualitative and quantitative results [3].
4. Ovidiu Stan et.al. Says in the paper "Eye-Gaze Tracking Method Driven by Raspberry PI Applicable in Automotive Traffic Safety" that This paper comes as a re- sponse to the fact that, lately, more and more accidents are caused by people who fall asleep at the wheel. Eye tracking is one of the most important aspects in driver assis- tance systems since human eyes hold much in-formation regarding the driver's state, like attention level, gaze and fatigue level. The number of times the subject blinks will be taken into account for identification of the subject's drowsiness. Also the direction of where the user is looking will be estimated according to the location of the user's eye gaze. The developed algorithm was implemented on a Raspberry Pi board in order to create a portable system. The main determination of this project is to conceive an active eye tracking based system, which focuses on the drowsiness detection amongst fatigue related deficiencies in driving [4].
5. In Real-Time Driver-Drowsiness Detection System Using Facial Features, 21 Au- gust 2019, IEEE Access In this work, a system DriCare is introduced, which is responsible for detecting the drivers' weariness status, such as yawning, blinking, and duration of eye closure, using video images, without equipping their bodies with devices. Basically, in DriCare, features of both eyes and mouth are captured and accordingly the device could alert the driver by generating a fatigue alarm. It achieved an accuracy of 92percentage [5].

1. B. Warwick proposed a system that is based on physiological approach in which the driver wears a wireless biosensor called BioHarness, a wearable device capable of collecting the physiological data and then transmitting to a smartphone. This data is then analysed through Fast Fourier Transform (FFT) and Power Spectral Density (PSD) [6].

3. METHODOLOGY

3.1 System Hardware

The system architecture of the proposed system is represented in Fig 5.1 showcases the various important blocks in the proposed system and their interaction. It can be seen that the system consists of 5 distinct modules namely,(a) Video acquisition, (b) Dividing into frames, (c) detection. In addition to these there are two external Camera for video acquisition and an audio alarm.

system can be described as follows:

Video Acquisition: Video acquisition mainly involves obtaining the live video feed of the automobile driver. Video acquisition is achieved, by making use of a camera. Divid- ing into frames: This module is used to take live video as its input and convert it into a series of frames/ images, which are then processed.

Face Detection: The face detection function takes one frame at a time from the frames provided by the frame grabber, and in each and every frame it tries to detect the face of the automobile driver. This is achieved by making use of a set of pre-defined Haarcascade samples.

Eyes Detection: Once the face detection function has detected the face of the au- tomobile driver, the eyes

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detection function tries to detect the automobile driver's eyes. This is achieved by making use of a set of pre-defined Haarcascade samples

Drowsiness Detection: After detecting the eyes of the automobile driver , the drowsi- ness detection function detects if the automobile driver is drowsy or not , by taking into consideration the state of the eyes , that is , open or closed and the blink rate.

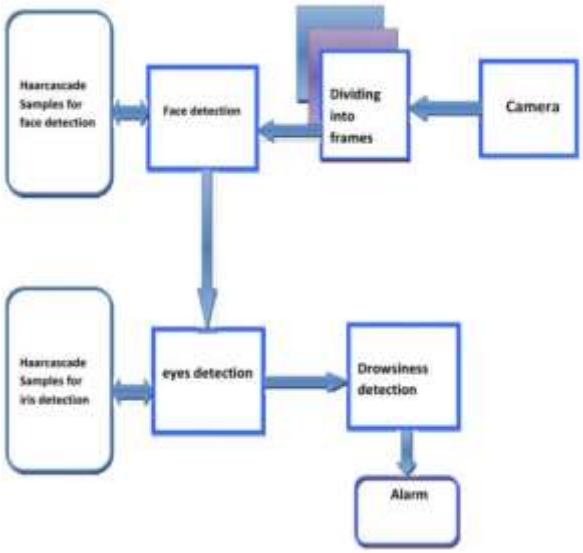

Figure 3.1 System Architecture

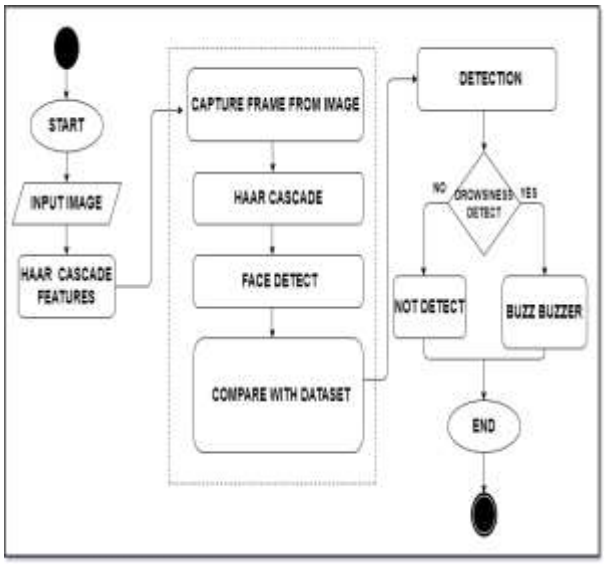

Figure 3.2 Activity Diagram of Driver Drowsiness Detection

4. Implemented system:

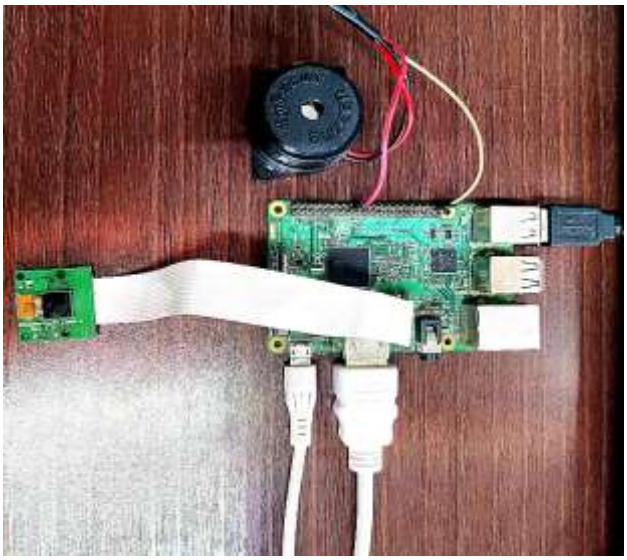

Figure 4.1 Circuit diagram

5. 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. Analyze the extracted facial features.
6. Classify the individual's state as either drowsy or alert based on the analysis of drowsiness features.
7. If drowsiness or high alcohol levels are detected: Activate the buzzer and speaker to generate audio warnings or alerts.
8. Repeat the process by capturing new facial images and continuously monitoring the individual's state. Terminate the system

6. EXPRIMENT AND RESULT

In this Experimental Result the drowsiness and Yawn is not detected as the individual is not sleeping. In this the alert is

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not generated. In this the score is calculated which is 0 in this result and the eyes are open.

.Figure 6.1 Driver Face with open Eyes

Figure 6.2 Driver Face with Closed Eyes

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.

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.

4.

7. CONCLUSION

we have successfully interface Raspberry-Pi camera with the processor. Raspber- ry-Pi camera is properly initialize, images are captured. Image is further used for Haar feature extractions. Haar cascade Face region, Eye region and Open eye region is calcu- lated. Drowsy driving can be as deadly as drunk driving. Drivers drowsiness not only putting themselves in danger, but they are a risk to everyone else on the road. Drivers who are tiredand sleepy have delayed reactions and make bad decisions.In this paper, we presented the conception and implementation of a system for detecting driver drowsiness based on vision that aims to warn the driver if he is in drowsy state. detection system with a self--driving car colud ensure that the car can take appropriate action if the driver become drowsy or falls asleep

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