ISSN: 2321-2152

IJMECE

International Journal of modern electronics and communication engineering

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editor.ijmece@gmail.com
editor@ijmece.com

www.ijmece.com

ISSN 2321-2152
www.ijmece.com
Vol 12, Issue 4, 2024

DRIVER DROWSINESS DETECTION SYSTEM USING RASPBERRY PI

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ABSTRACT

This proposed system is aimed at driver and road safety systems. The use of computer vision techniques allows for the extraction of the driver's face from a color video captured inside the car. After that, we need to locate the driver's eyes using face detection. Future eye tracking frames will be based on these. With the goal of setting off alerts, the tracking eye takes pictures for the purpose of detecting drowsiness. The proposed approach consists of three steps: recognizing faces, detecting eyes, and determining drowsiness. Image processing has to recognize the driver's face and then capture a picture of their eyes before it can determine whether they are fatigued. The Haar face identification method takes the image frames as input and outputs the detected face. This approach is cost-effective and has the potential to increase transportation safety by reducing the frequency of incidents caused by sleepy drivers.

Keywords: Raspberry Pi, Eye Tracking, Fatigue Detection, Alert System

I.INTRODUCTION:

One of the main objectives is to create a system that can detect whether a motorist is becoming drowsy by continuously monitoring their eye movements, namely their retina. The system is programmed to sound an alarm if the motorist yawns excessively or keeps their eyes closed for more than a few seconds. The functioning of the device will not be impeded by a driver's spectacles. The system remains operational under low-light conditions.

Drowsy driving is a major contributor to fatal vehicle accidents. One in

ISSN 2321-2152
www.ijmece.com
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five traffic incidents, or about 21% of all traffic accidents, are caused by drowsy driving, according to the 2015 global status report on road safety, which is based on data from 180 nations. Plus, this number is going up every year. This conclusively demonstrates that drowsy driving is a key factor in the high number of fatalities caused by traffic accidents worldwide. The most common factors that contribute to these incidents are drivers who are too tired, too drunk, or too careless to pay attention on the road. This is greatly affecting people's lives and families in many countries. A real-time drowsiness detector is one of the best ways to let drivers know when they're becoming too sleepy to drive safely. By helping to detect signs of driver sleepiness early on, a device like this might reduce the likelihood of accidents. It details our approach of identifying drowsy drivers by using image processing, OpenCV, and Raspberry Pi. Numerous studies have shown various techniques that may detect driver drowsiness. A number of techniques exist for identifying drowsy drivers, including physiological, ocular, and performance-based approaches. Ocular and physiological measurements may provide more preciseresults.

II. LITERATURE REVIEW

They have put in a lot of time and effort learning how to apply Haar Cascade Classifier and Eye Aspect Ratio in their project. One example is the use of the author's own face and eyes in training Haar Cascade Classifier detectors; this allowed them to be integrated into the hierarchical system and provide more efficient detections [19].

By using this method on a set of test images, it was able to locate the eye area. Additional research on the eyes-to-monitor-system ratio has, however, been conducted [20].

In this particular experiment, a video camera was used to capture frames of the driver's face. The objective was to monitor the driver's level of attentiveness by means of face recognition and facial characteristics. With the use of multi-eyelid movement data and the information-fusion methodology partial-last-square regression (PLSR), we

ISSN 2321-2152
www.ijmece.com
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provide a method for identifying driver drowsiness, which can be used to predict the probability of somnolence. There is a strong collinear connection between these variables, but our approach gets around it. Based on its prediction accuracy and resilience, this model provides a new way to identify and anticipate sleepiness by using multi-features [21]. Researchers looked at drivers' eye health and head posture (HP) to determine how attentive they were while behind the wheel. Several current methods for visual detection of non-alert driving behaviors depend on the angles at which the driver's head shakes or shuts its eyes to determine whether the driver is sleepy or preoccupied. When a warning or non-alert driving event occurs, the video segments are sorted into sets using the support vector machine (SVM) [22].

One such new approach checks for drowsiness in drivers using a dynamic simulation using a Hidden Markov Model (HMM). A virtual driving simulator was important in the method's development. The experimental findings demonstrated the practicability of the proposed method [23].

III.EXISTING SYSTEM:

There is one that uses Raspberry Pi to track the user's eye movement and then operates the wheel chair accordingly. System Proposed :In order to capture photographs of the driver in real-time, our suggested system uses an open-source web camera. We need to transfer the picture to the Raspberry-pi board so that it may be processed further. Open CV (Computer Vision) Python packages and the Raspbian operating system are preinstalled on the Raspberry-pi system. To determine the necessary eye component (pupil and iris), Haar-Cascade characteristics are used. Additionally, edge detection of the iris and pupil is accomplished using the Hough transform. A comparison is made between the computed pupil and iris areas and a threshold value. A buzzer will sound to alert the driver of a potential situation of sleepiness if it rises beyond a certain level.

IV. PROPOSED SYSTEM:

One method of physically connecting with the driver to assess physiological parameters including heart rate, brain waves, and pulse rate is by connecting an electrode

ISSN 2321-2152
www.ijmece.com
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to their body. Nevertheless, it is not comfortable to drive in such conditions. For ocular measurement, physical touch is unnecessary. In real-world driving situations, ocular measurements that can detect the open/closed state of the eyes without using a camera are ideal, because they can infer the driver's eye health and possible vision from eye closure. The Real Time Driver Drowsiness System utilizing Image Processing evaluates the drivers' eye closure intervals and creates an algorithm to anticipate when they may get sleepy. This system uses computer vision to identify when drivers are drowsy. After then, the system will sound an alarm to alert the driver.

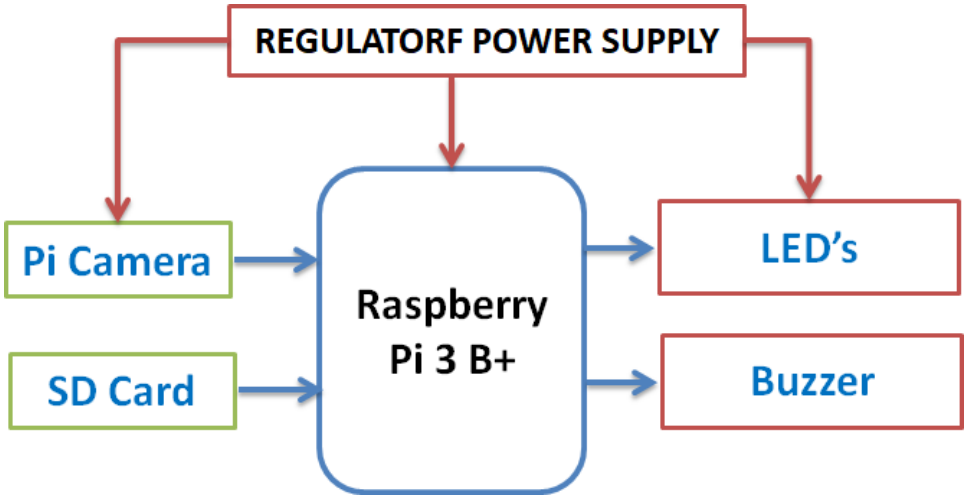

Fig.1: Block Diagram

V. WORKING METHODOLOGY

A. Face detection:

Open CV makes use of the Viola-Jones method for facial recognition, which was developed in 2001 by Paul Viola and Michael Jones. Object identification rates in real-time are competitive using this method. The major use of this method is face detection, although it may also be used to

ISSN 2321-2152
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identify other objects. At its core, the Viola-Jones architecture for face identification is made up of four main components.

1. Features that are called Haar features and have a rectangular form.

2. A Multi-Segment Feature Image for Fast Feature Identification.

Adobos feature selection, step three.Quick detection is achieved by using a cascaded classifier.

Banalization is the first step in locating the gaze in a picture. One way to convert a photograph to binary format is by using the "banalization" method. One kind of image is the binary image, in which each pixel is converted into a binary integer, such "0" or "1". A lit pixel will be denoted by one and a dark pixel by zero. Reducing it to its barest essentials makes it easier to alter the detected image. To convert the grayscale image to a binary image, thresholding is being used. Two typical variables used to establish thresholds are the driver's skin tone and the lighting conditions.

VI. HARDWARE DESCRIPTION

RASPBERRY PI POWER SUPPLY:

The B+'s power supply has been rethought from the ground up to increase reliability while also decreasing current usage. Even though the 1A circuit is now a 2A intertwine, the left side still contains a tiny USB connector. Moreover, a DMG2305UX P-Channel MOSFET is included. This is an extreme assurance switch, even if it is more "out of date" than diodes. Since its protection is just 52mW, a voltage loss of around 0.1V will occur at 2A. 0.5V is the minimum voltage required for a diode. Take a look at this amazing system video: On the right side of the screen, you can see the TVS diode projector (component D5 # SMBJ5) that serves as a shield from the obstacles. Very little has changed in this regard other than the inclusion of a FET guarantee. It is now three in the morning, so I am unsure, but I believe a mixed coordinated PNP surrounds the FET terminal. Before doing any kind of examination, make sure you stand up straight. Perhaps we could begin by examining the 3.3V and 1.8V power supplies:

SD CARD:

ISSN 2321-2152
www.ijmece.com
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An industry standard for non-volatile memory cards used in portable devices, Secure Digital (SD) was developed by the SD Card Association (SDA). The industry standard has been in place since August 1999, when SanDisk, Panasonic (Matsushita Electric), and Toshiba launched it as an update from Multimedia Cards (MMC). The three companies merged to form SD-3C, LLC, which licencing and enforces IP rights pertaining to SD memory cards, SD hosts, and associated products.

RASPBERRY PI CAMERA MODULE

Connecting straight to your Raspberry Pi, this 5 megapixel camera module can capture still photographs and 1080p video. Get the most recent version of Raspbian installed on your Raspberry Pi, connect the ribbon cable that came with it to the camera's serial interface (CSI) port, and you're ready to go.

VII. SOFTWARE DESCRIPTION

SETUP RASPBERRY PI:

An SD card must include the required operating system prior to the start of Raspberry Pi. Before we can save data on the SD card, we need to install the operating system. Those interested in learning more about installing or storing an operating system may go to Installing Operating System Image on SD card.At this point, an SD card was used to install Raspbian.Afterwards, log in using the following credentials: raspberrypi piRaspberry is the password.Password and user ID are set to default. Password changes are available after the first login. Raspberry Pi may be controlled via the command window that is seen above. Use the following command to obtain a graphical user interface (GUI) environment on a Raspberry Pi: startx

• After that, locate the option to change your password and click on it. At this point, we have a solid grasp of the Raspberry Pi OS. Writing C programs on Raspbian • Alright, let's get started by writing some basic C code on Raspbian and running it. Make a new file with no contents and append the extension.c to it. Create a simple software that prints "Hello World" now.

ISSN 2321-2152
www.ijmece.com
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Program

```
#include<stdio.h>
int main(){
    print f("Hello World");
    return 0;
}
```

To run the code, open the terminal by pressing Ctrl+alt+t once you've written it. After that, input the following instructions to compile and run the program.

VIII. PROJECT RESULT

Raspberry Pi and Pi Camera will be dancing together. After inserting an SD card, the Raspberry Pi will boot into the Raspbian operating system, and you may open cv on it. In the first instance, the Pi Camera will take a picture. Using the openCV code, center the pupil and focus on the eye in the picture. Using the pupil's precise location as a starting point, we can next specify distinct values for the X and Y coordinates to ensure precise command. Transistor circuit receives signals from Raspberry Pi using GPIO. Improving the quality of life and giving crippled people a chance at independence are two of the primary goals of the Eye Movement controlled wheelchair. The screen's center coordinate is used as a starting point for controlling the pupil's position relative to the mouse pointer (cursor). With the mouse cursor initially placed in the screen's center, this location serves as the foundation for tracing. The cursor's current location is relative to its starting point. Pupil movement causes the screen's mouse pointer coordinates to vary in response to the pupil's movement. The pointer will stop moving once the pupils are back in their original location.

ISSN 2321-2152
www.ijmece.com
Vol 12, Issue 4, 2024

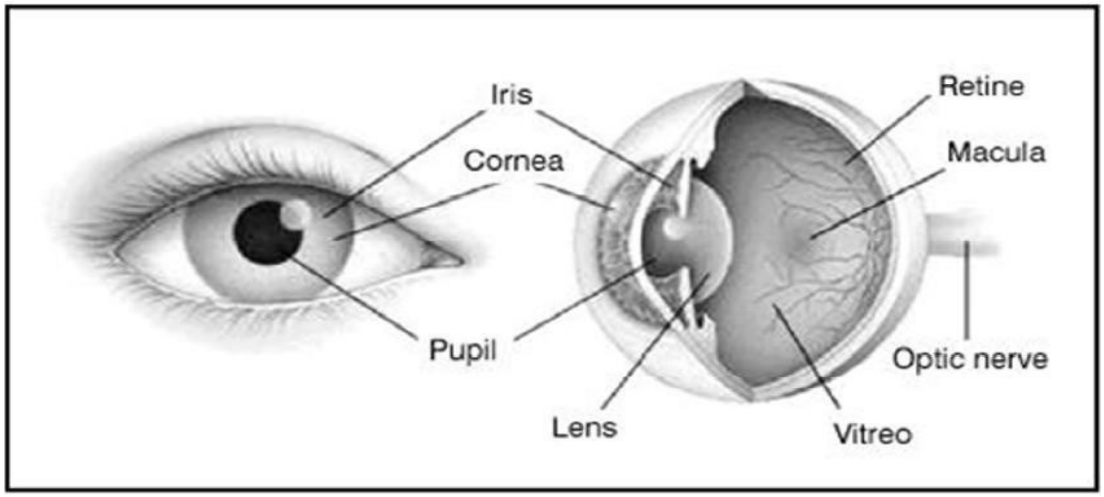

Fig. 2:Pupil anatomy

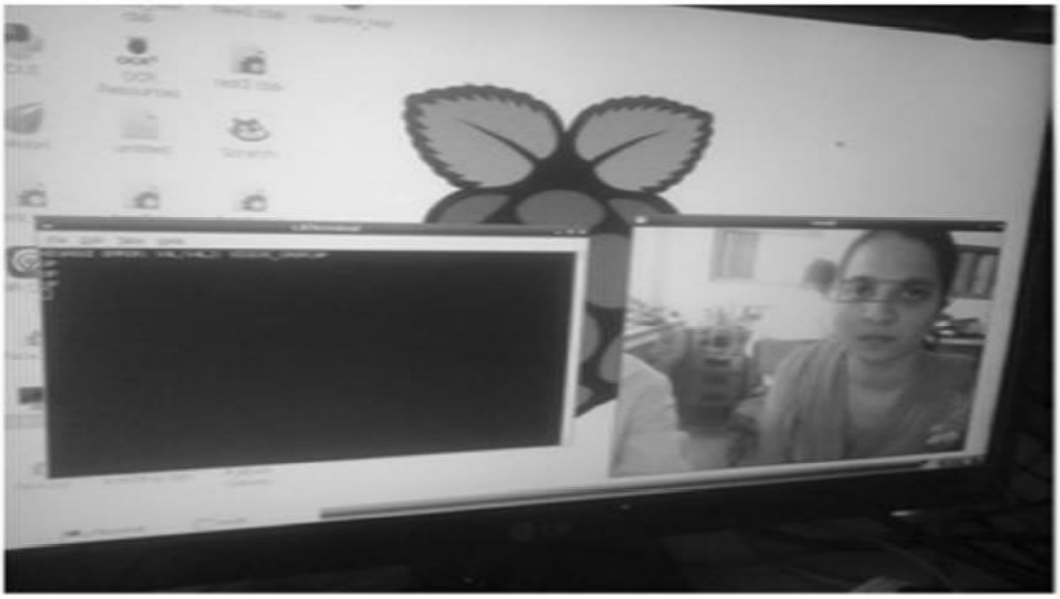

Fig.3: Simulation results

IX. CONCLUSION

Locating the driver's eyes and monitoring them for exhaustion, this real-time drowsiness

detection device can identify sleepiness quickly. A typical blink may be distinguished from the tiredness by the system. What can be done to prevent drivers from becoming drowsy behind the wheel? There is room for improvement and commercial usage of the technology in the automobile industry. Knowledge is built from the many photos taken, which may assist the system determine the sleepy state. The real-time device will sound an alert the moment it detects a sleepy state. There will be less opportunity for accidents caused by sleepiness when such a technology is used in cars.

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