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Driver Drowsiness Detection System

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Abstract: *Fatigue and drowsiness are mainly leading causes of the accidents occurs on highways. The one of the effective solution to prevent this problem is detecting the drowsiness and alerting the driver. So in this project ,we have thought of building a driver drowsiness detection system for drivers using raspberry pi, led, lcd and buzzer. In addition we have also used IR sensor and Vibration Sensor in the project. The basic purpose of this system is to track ,locate and analyse the driver face ,eyes and check whether the driver is drowsy .If the driver feeling drowsy ,then the system will trigger a warning message using a buzzer ,LED will be on and "Driver is sleeping" message will be displayed on LCD .We have used LED and LCD to alert the drivers who are driving the vehicle behind the vehicle in which driver is sleeping .In this project we have used Vibration sensor for accident detection.*

Keywords: Raspberry pi, Camera, IR Sensor, Lcd

I. INTRODUCTION

Driver drowsiness system prevents accidents when the driver is getting drowsy .Various studies have suggested that around 20% of all accidents are fatigue related. The development of technologies for detecting is a significant obstacle for accident prevention systems. With the rise in population occurrence of road accidence has been increasing. As we see that India's Population is increasing and with that the vehicles on the roads are increasing and accidents are also increasing. Accidents are destructive to both people and the environment. According to google every year about 5 lakh average accidents happens and 40% of accidents are occurs due to drowsiness. The drowsy condition is mainly occurring in buses, trucks, commercial vehicles etc. The drowsy condition happens due to long hours of driving. In the project driver eyes gets check continuously to check whether driver feeling drowsy or not.

II OBJECTIVES

The projects' goals are listed below:

- The main objective is to first design a system to detect drivers drowsiness by continuously monitoring the driver eye.
- To alert the driver on the drowsiness detection by using buzzer.
- Check if any obstacle is in front of vehicle.
- To develop a prototype of model.
- To develop cost effective project.

III. LITERATURE SURVEY

[1],Driver drowsiness detection system using raspberry Pi.
In this the drowsiness detection system detects the drowsiness of the driver when the eyes close for 4 or more frames.The detection system differentiates the normal eye blink and drowsiness.

[2],Real-Time Driver Drowsiness Detection System Using Eye Aspect Ratio and Eye closure ratio.
In this paper, a light-weight, real time driver's drowsiness detection system is developed. The technology is to detect the drowsiness as per the Eye aspect and Eye Closure Ratio.

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[3],Vehicle Accident Prevention System.
This paper is introducing sensor based accident prevention system that is we are keeping IR sensor in one side of the Car to detect the obstacles, if obstacles detected then led will be on.

[4], Driver Drowsiness Detection and Alert System.
In this paper drowsiness of the driver is detected after that the alert system is in the work to give alert to driver as an buzzer.

IV. SYSTEM DESCRIPTION:

- Raspberry Pi: We have used Raspberry Pi 3A+ model as an central processing unit of the system.
- Camera Module: We have Connect a compatible camera module to the Raspberry Pi board to capture real-time images. The camera has a suitable resolution for accurate face detection.
- Display Unit: Connect a display(suchasanLCDor HDMImonitor) toprovide the informative feedback on it.
- PowerSupply:DeterminethepowerrequirementsoftheRaspberryPiandothercomponents.Consider using astable power sourceor abackup poweroption.
- Connectivity:EnsureconnectivityoptionslikeWi-FiorEthernetfornetworkcommunicationif needed.
- IR sensor: IR sensor is placed in front of vehicles to detect the obstacle, If the obstacles is detected then the system gives an some indication to driver who's driving the car.
- Image/Video Processing: The system employs image and video processing techniques to analyze the captured data. This may include facial landmark detection, eye-tracking algorithms, and feature extraction methods to identify drowsiness patterns.
- Data Processing Speed: The system should have sufficient processing power to analyze the captured data in real-time. The processing speed can vary depending on the complexity of the algorithms and the hardware used.
- Software and Libraries: Important software and libraries on the Raspberry Pi board installation is carried out. This includes the Raspbian OS to import the code, Python Programming Language, OpenCVcomputer vision library for face detection.
- Facial Expression Analysis: The system analyzes the driver's facial expressions to detect signs of fatigue, such as drooping eyelids, yawning, or changes in facial muscle activity. This helps in assessing the level of drowsiness.
- Head Position and Movement Tracking: The system tracks the driver's head position and movements to identify head nods, sudden jerks, or unusual head positions. These can be indications of drowsiness or loss of focus.
- Detection Accuracy: The accuracy of the system in detecting drowsiness events is an important specification. It can be measured in terms of true positive rate (drowsiness events correctly detected), false positive rate (non-drowsy events incorrectly detected as drowsy), and false negative rate (missed detection of actual drowsiness events).
- Alert Mechanisms: The system should have effective alert mechanisms to notify the driver when drowsiness is detected.
- Compliance and Standards: Depending on the application and region, the system may need to comply with specific safety standards and regulations. Adherence to these standards ensures that the system meets the necessary requirements for deployment and usage.

V. SYSTEM BLOCK DIAGRAM:

We are using the Raspberry Pi processor this is the heart of the drowsiness detection system and it is work as a central processing unit of the entire system. Camera, Buzzer, IR Sensor, led & LCD is connected to the Raspberry Pi. When the Power Supply is given to the system it will be on then, Camera is monitoring the head movement and frames of eyes and then detect the faceofthedrowsydriver.Ifcameradetectsthedrowsinessofdriver,thenbuzzerwillgivebeepand on LCD message will be displayed. IR Sensor is used to detect the object in their specific range after detecting the object led will beo n which is connected to the IR Sensor.

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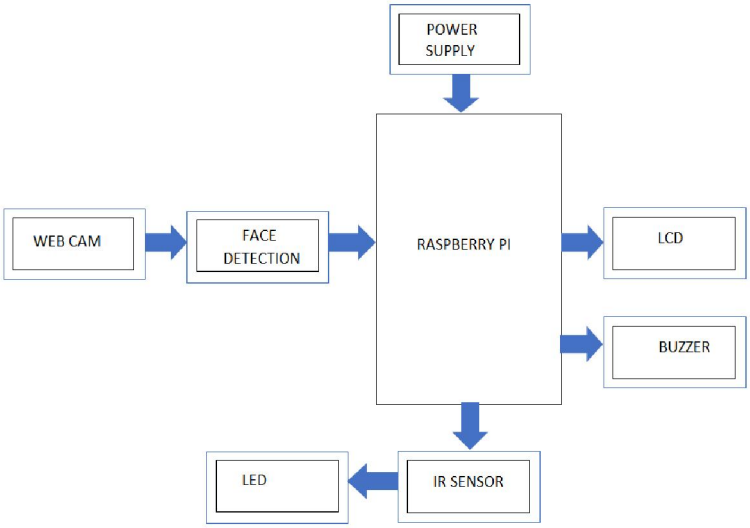

Fig 1: Block Diagram

VI. FLOW CHART

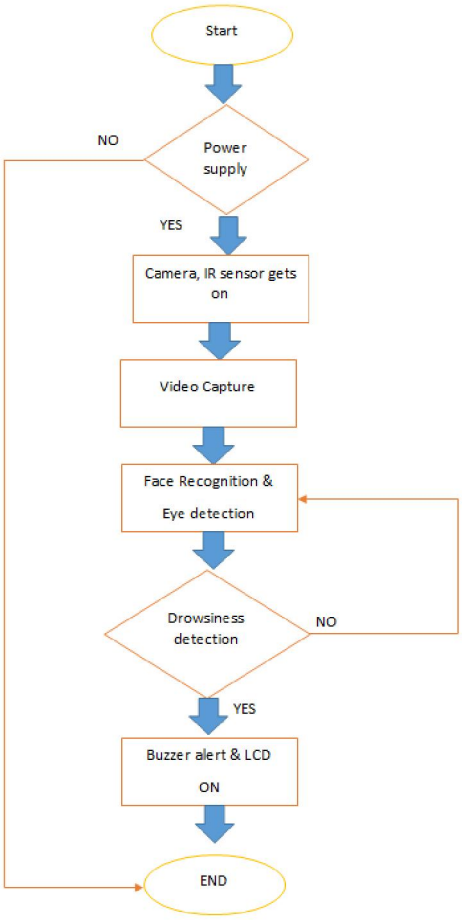

Fig 2: Flowchart

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VII. SYSTEM WORKFLOW

- Capture Video: The camera module captures real-time video frames.
- Face Detection: By using face detection algorithm from OpenCV to monitor the eyes frame of the driver.
- Drowsiness Detection: Based on the extracted features, a drowsiness detection algorithm is applied to determine the driver's alertness level. This algorithm could be a machine learning model trained on labeled data to classify drowsy and alert states.
- Alert Generation: If the system detects signs of drowsiness, it generates an alert to grab the driver's attention and prompt them to take corrective action.
- Obstacles Detection: IR sensor is connected to the raspberry pi to detect obstacles in front of vehicle.
- Display Unit: It is used to show visual feedback to the driver.
- Continuous Monitoring: The system continuously monitors the driver throughout the journey, updating the drowsiness detection and adapting the alertness thresholds based on real-time data. This ensures that the system remains responsive and can adjust to changing conditions.
- Buzzer alert: Buzzer will on and give the beep when the drowsiness of the driver is detected.
- Power Supply and Connectivity: Provide a stable power supply to the Raspberry Pi and other components to ensure uninterrupted operation. Consider using battery backup or uninterruptible power supply (UPS) for power continuity. Establish a reliable network connection (e.g., Wi-Fi, Ethernet) for data transmission or remote monitoring.
- Data Storage: All the measurement and detection results, database or log file are stored for analysis and reporting.

VIII. CIRCUIT DIAGRAM

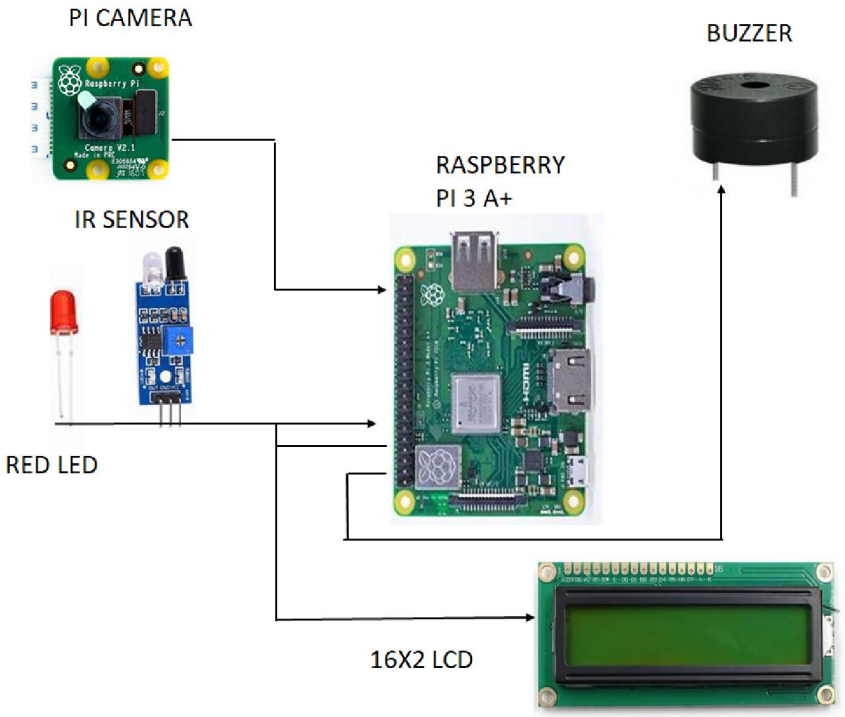

Fig 3: Circuit Diagram

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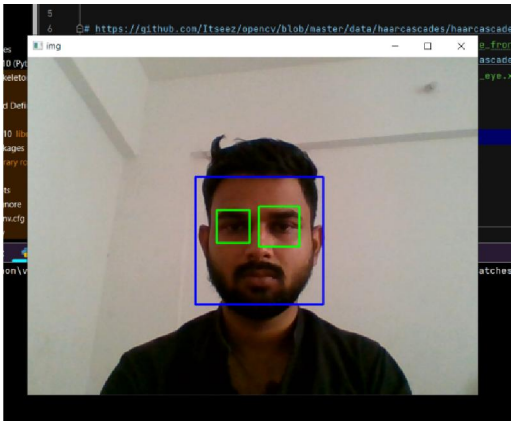
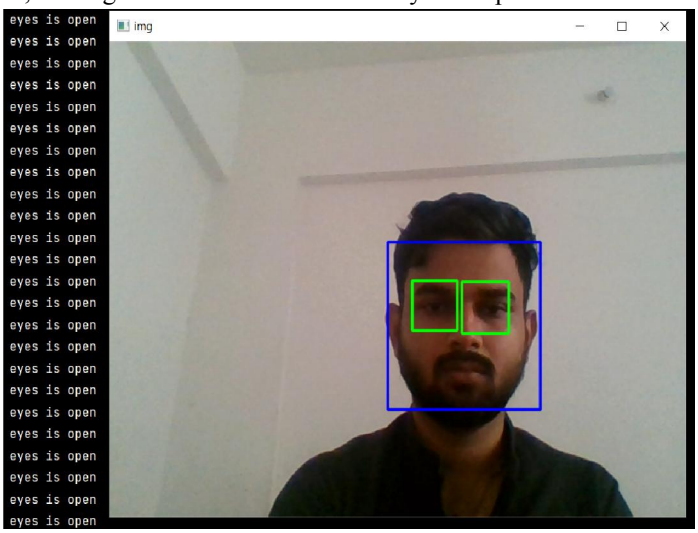
IX. RESULTS

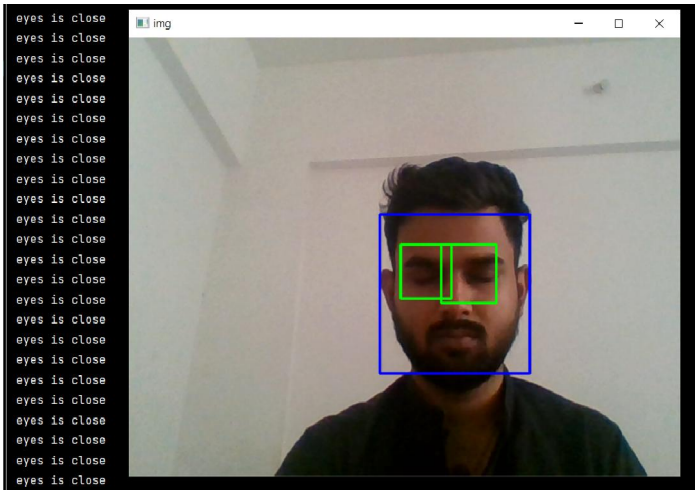
I] Detecting the Face and Eyes Of the driver who's driving the car:



II] When eye will be open then, message shows on Lcd like this "Eyes is Open":



III] When eye will be getting close then, message shows on Lcd like this"Eyes is Closed":



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X. CONCLUSION

The drowsiness detection system has the ability to instantly identify tiredness. The motorist may avoid being sleepy while driving thanks to a technology that can tell the difference between regular eye blinking and tiredness. The device functions effectively even when the driver is wearing glasses and in poor light. The monitoring system is able to determine if the eyes are open or closed. The system's main objective is to determine the driver's level of tiredness.

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