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EYE TRACKER TO ALERT DRIVERS

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ABSTRACT

This proposed system is used for Driver & Road safety system. Based on computer vision techniques, the driver's face is located from a color video captured in a car. Then, face detection is employed to locate the regions of the driver's eyes, which are used as the templates for eye tracking in subsequent frames. The tracked eye's images are used for drowsiness detection in order to generate warning alarms. The proposed approach has three phases: Face, Eye detection and drowsiness detection. The role of image processing is to recognize the face of the driver and then extracts the image of the eyes of the driver for detection of drowsiness. The Haar face detection algorithm takes captured frames of image as input and then the detected face as output. It can be concluded this approach is a low cost and effective solution to reduce the number of accidents due to driver's Drowsiness to increase the transportation safety.

1. INTRODUCTION

Drowsy driving is one of the major causes behind fatal road accidents. One of the recent study shows that one out of five road accidents are caused by drowsy driving which is roughly around 21% of road accidents, and this percentage is increasing every year as per global status report on road safety 2015, based on the data from 180 different countries. This certainly highlights the fact that across the world the total numbers of road traffic deaths are very high due to driver's drowsiness. Driver fatigue, drink-and-drive and carelessness are coming forward as major reasons behind such road accidents. Many lives and

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families are getting affected due to this across various countries. Real time drowsy driving detection is one of the best possible major that can be implemented to assist drivers to make them aware of drowsy driving conditions. Such driver behavioural state detection system can help in catching the driver drowsy conditions early and can possibly avoid mishaps. With this paper, we are presenting technique to detect driver drowsiness using of Open CV, raspberry pi and image processing. Several studies have shown various possible techniques that can detect the driver drowsiness. Such driver drowsiness detection can be measured using physiological measures, ocular measure and performance measure. Among these physiological measure and ocular measure can give more accurate results. Physiological measure includes brain waves, heart rate, pulse rate measurements and these requires some sort of physical connection with the driver such as connecting electrode to the driver body. But this leads to discomfortable driving conditions. But ocular measure can be done without physical connection. Ocular measure to detect driver eye condition and possible vision based on eye closure is well suited for real world driving conditions, since it can detect the eyes open/ closed state non intrusively using a camera. In Real Time Driver Drowsiness System using Image Processing, capturing drivers eye state using computer vision-based drowsiness detection systems have been done by analyzing the interval of eye closure and developing an algorithm to detect the driver's drowsiness in advance and to warn the driver by in vehicles alarm. This section motivates how face is detected and how eye detection is performed for automotive application and their detection is necessary for assessing driver drowsiness.

2. LITERATURE SURVEY

Paper [1], this paper proposes a Real-Time Drowsiness Detection System (RT-DDS) applicable in motor vehicles with the help of conventional Computer Vision applications. The system employed various Computer Vision applications using blink rate, eye closure, yawning to effectively an quickly identify the drowsiness of a driver during driving the vehicle and alter the driver accordingly. The proposed work tried to contribute in reducing the increased number of road accidents while keeping the methodologies simple and intact.

In Paper [2], this paper works on the real time detection of car driver drowsiness and alcoholic intoxication. This detects large numbers of road accidents which takes place due to

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fatigue or alcohol drinking of driver. Computer vision and alcohol gas sensor application is combined to an embedded system to achieve this goal. This system consists of Drowsiness detection, alcoholic Intoxication, Raspberry pi, Arduino UNO, Open CV and Embedded System.

In Paper [3], Authors have implemented a system using ARM 7 based microcontroller and open CV based machine. This is interfaced to USB camera for continuous images are captured and these images are processed with help of Open CV and compared with existingdatabase. If the current images are matching with any of the existing images the system generates command to the output unit to perform the location identification using GPS and forward the necessary information about the identified person using GSM/GPRS to concern authorities.

In Paper [4] proposes focuses on eye states tracking. Images are captured using a camera and used for tracking as input of the proposed method. In first step we use color space for driver's face detection and crop the face from background. In the next step, we estimate the area of the eyes and crop image from this region. Then top and bottom coordinates of the eyes are located using retrench the face pixels from this area and canny operator for edge detection. In the last step we count the number of white and black pixels and compare the distance between these coordinates for recognition of the driver's fatigue.

3. EXISTING SYSTEM

The existing system of driver drowsiness detection system has following disadvantages. Mainly, using of two cameras in the system one for monitoring the head movement and the other one for facial expressions. The other disadvantage is aging of sensors and all these sensors are attached to the driver's body which may affect the driver, so to overcome all these disadvantages we designed a system in which a live camera is used for monitoring the driver drowsiness condition and alert the driver which reduces the road accidents. A driver nods off, at that point the driver loses power over the vehicle, an activity which regularly brings about an accident with either another vehicle or any article. So as to forestall these overwhelming mishaps, there was the past methodology created, right now condition of laziness of the driver was observed. The accompanying measures were utilized broadly for observing laziness:

1. Vehicle-based location: various activities/measurements, including deviations from path position, development of the directing wheel, pressure on the quickening pedal, and so on., are continually

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checked and any adjustment in these that crosses a predefined limit demonstrates an essentially expanded likelihood that the driver is sleepy.

2. Behavioral measures: The conduct of the driver, including yawning, eye conclusion, eye squinting, head present, and so forth., was observed through a camera and the driver was cautioned if any of these laziness side effects are recognized.

4. PROPOSED SYSTEM

EYE DETECTION

Once the face detection function has detected the face of the driver, the eyes detection function tries to detect the automobile driver's eyes. After face detection find eye region by considering eyes are present only in upper part of the face and from top edge of the face, extract eyes Region of Interest (ROI) by cropping mouth and hair, we mark it the region of interest. By considering the region of interest it is possible to reduce the amount of processing required and also speeds up the processing for getting exact eyes. After the region of interest is marked, the edge detection technique is applied only on the region of interest. Then search for eyes in ROI; Circular Hough Transformation is used here to find shape of eyes (Rhod Chester, 2005).

DROWSINESS DETECTION

After getting eyes the algorithm then counts the number of open eyes form each frame and determines the drowsiness. If the criteria are satisfied, then the driver is said to be drowsy. The buzzer connected to the system performs actions to correct the driver abnormal behavior. For this system, the eye and the face classifiers are required. The HARR Classifier Cascade files built-in there with the Open CV contains different classifiers for the face and eye detection. The inbuilt Open CV xml "haarcascade_frontalface_alt2.xml"and function "Hough circles ()" is used to search and detect the face followed by individual frames. The face detection and open eye detection have been carried out on each frame of the driver's captured facial image. The variable Eyes total is assigned to store the number of open eyes found in each frame. A variable will store the number of successive frames in which the eyes found to be closed with the values like 0, 1, 2, 3… etc. Initially, this variable is set to 0.When both the eyes are open, and then Drowsy count

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will be 0. Drowsy count will increase when Eyes total < 2. For an eye blink, Drowsy count value is raised by 1. If the eye blinks in more than 4 frames, i.e., variable count is greater than or equal to 4, then the condition for drowsiness is met and an alarm will be signaled at real time.

5. BLOCK DIAGRAM

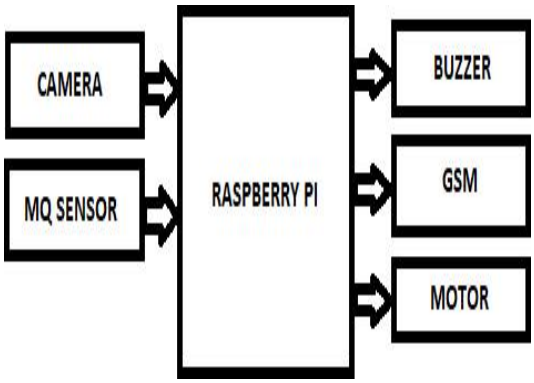

Fig. 1 Block diagram

6. HARDWARE USED:

6.1 Raspberry pi

It is a cheap, credit-card-sized device that uses a daily keyboard and mouse and joins to a TV or computer monitor. It is a thin weighable computer that let every person of all ages todiscover programming and gain how to program in variant languages like Python and Scratch. From exploring the internet and watching high-definition video, word-processing, to creating spreadsheets, and it can do every possible thing we'd expect a desktop computer to do and playing sports.

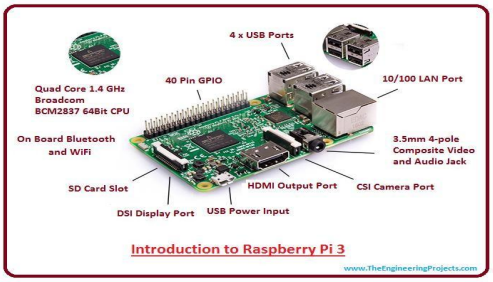

Fig. 2 Raspberry pi

Including, the device has the potential to link with the outer world and has been used in a large variety of communicative developer ventures, including music machines and infra-red cameras tweeting birdhouses and parent detectors to weather stations. Raspberry Pi (/pa ⁇ /) is a span of slight single-board computers created in the United Kingdom in partnership with Broadcom by the Raspberry Pi Foundation. Earlier, the Raspberry Pi device stress on supporting basic computer science instructing in schools and in progressing countries. The real type later became much more popular than targeted, selling for works such as robotics the target outside market.

6.2 Motor driver

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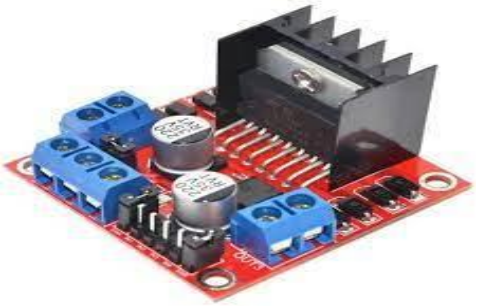
The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V**.** Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-



supply applications.

Fig.3 Motor driver

6.3 Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft.

Fig.4 Motor

6.4 Camera

A camera is an optical instrument that captures a visual image. At a basic level, cameras consist of sealed boxes (the camera body), with a small hole (the aperture) that allows lightthrough to capture an image on a light-sensitive surface (usually photographic film or a digital sensor.

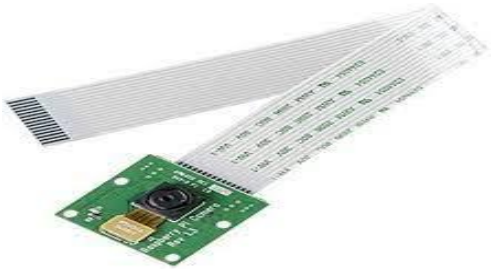


Fig. 5

Raspberry pi camera

The Raspberry Pi Camera Board is a custom designed add-on module for Raspberry Pi hardware. It attaches to Raspberry Pi hardware through a custom CSI interface. The sensor has 5-megapixel native resolution in still capture mode. In video mode it supports capture resolutions up to 1080p at 30 frames per second. The camera module is light weight and small making it an ideal choice for mobile projects.

6.6 Buzzer

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is

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to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

Fig.6 Buzzer

The pin configuration of the buzzer is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '- 'symbol or short terminal and it is connected to the GND terminal.

6.5 GSM module

Digital cellular technology like GSM (Global System for Mobile Communication) is used to transmit mobile data as well as voice services. This concept was implemented at Bell Laboratories using a mobile radio system in 1970. As the name suggests, it is the standardization group name that was established in the year1982 to make a general European mobile telephone standard. This technology owns above 70% of the market share of the digital cellular subscriber around the world.

Fig.7 GSM module

This technology was developed by using digital technology. At present, GSM technology supports above 1 billion mobile subscribers around the world in the above 210 countries. This technology provides voice and data services fromfundamental to complex. This article discusses an overview of GSM technology.

6.7 MQ GAS SENSOR

Sensors are the electronic devices used for interaction with the outer environment. There arevarious types of sensors available that can detect light, noise, smoke, proximity etc.… With the advent in technology, these are available as both analog and digital forms. Besides forming a communication with the outer environment, sensors are also a crucial part of safetysystems. Fire sensors are used to detect the fire and take appropriate precautions on time.

Fig.8 MQ gas sensor

7. CONCLUSION

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The driver abnormality monitoring system developed is capable of detecting drowsiness, drunken and reckless behaviors of driver in a short time. The Drowsiness Detection System developed based on eye closure of the driver can differentiate normal eye blink and drowsiness and detect the drowsiness while driving. The proposed system can prevent the accidents due to the sleepiness while driving. The system works well even in case of drivers wearing spectacles and even under low lightconditions if the camera delivers better output. Information about the head and eyes position is obtained through various self-developed image processing algorithms. During the monitoring, the system is able to decide if the eyes are opened or closed. When the eyes have been closed for too long, a warning signal is issued. Processing judges the driver's alertness level on the basis of continuous eye closures.

8. FUTURE SCOPE

In future it can implement drowsiness detection system in aircraft in order to alert pilot. The alcoholic sensor is also used for drunk drivers and alerting to their families and police about drunk and driving.

In future it can implement drowsiness detection system in schools and colleges to alert the staffs to find the drowsy student in class.

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