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Dangerous Driving Detection Based on IoT

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Abstract

Today, finding drowsy drivers is perhaps the most important step in stopping any traffic accident, everywhere in the globe. The objective of this study was to develop a smart alert approach for intelligent vehicles that can prevent drowsy driving impairment automatically. But being sleepy is a natural bodily occurrence that might occur for a variety of reasons. Therefore, itis necessary to create a reliable alert systemto prevent the accident's cause. In this proposed research, we discuss a method for developing a drowsy driver alert system that analyses video stream processing (VSP) utilizing the eye blink concept employing the eye aspect ratio (EAR) and Euclidean distance of the eye. The face landmark algorithm is also employed as a reliable method for detecting eyes. The IoTmodule sends a warning message together with collision impact and location information when the driver's weariness is recognized, alerting with the help of a voicespeaking over the Raspberry Pi monitoringsystem.

Keyword: Alert, Facial Recognition,Sensors, Integrated Scenarios.

Introduction

Due to tiredness, tiresome road conditions, and unfavorable weather conditions, driver drowsiness has been the main cause of innumerable accidents. Around 1.35 million individuals worldwide pass away as a result of car collisions each year, according to the National Highway Traffic Safety Administration (NHTSA) and World Health Organization (WHO). Themajority of time, poor driving practices areto blame for road accidents. The risk of these incidents increases if the motorist is intoxicated or sleepy. Using a facial landmark algorithm and Euclidean distance, a camera tracks the driver's eye blinking, eye closure, face detection, head posture, and other behaviorally-based behaviors These traits make it easier to detect driver fatigue, inform him right awayby voice speaker, and send an email to the vehicle owner so that they can reawaken him. IoT module, which relies on wireless transmission, is

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used to send an email to a target. However, the proposed system isbeing made up of a credit card-sized computer called the Raspberry Pi 3 and a Picamera that can track eye movements, which can monitor the intensity of collisioneffects that occur at the time of an accident and alert nearby emergency rooms or property owners along with the GPS location of the accident.

Literature Review

A. Face and Eye Detection by Machine Learning (ML) and Deep Learning (DL) Algorithms

Face recognition is a biometric identification method that uses the individual's face's distinctive features to identify them. By comparing the face print to a database of recognized faces, the majority of facial recognition systemsoperate. The system can recognize the person if there is a match. However, the system cannot identify a person if the face print is not stored in the database. When it comes to security, facial recognition technology is frequently employed to identify criminals and stop identity theft. Itcan also be used for more mundane tasks, such as finding a lost child in a crowded place or identifying VIPs at an event.

B. FPGA-Based Drowsiness DetectionSystem

A field-programmable gate array (FPGA)- based sleepiness detection system has been developed. This technology concentrates oneyeballs with bright pupils that are discovered by an inbuilt IR sensor lightsource. Due to this visual effect, the retinascould be detected up to 90% of the time, which helped locate drivers' eyes foranalyzing tiredness over several frames in order to prevent major accidents. Using cyclone II FPGA, Navaneethan et al. developed a real-time system to follow human eyes.

C. Fatigue Detection Using Vehicle State(Steering Wheel) Algorithm

Arefnezhad et al. proposed a neuro fuzzy system with support vector machine and particle swarm optimization method for a non-interfering sleepy detection system based on vehicle steering data. Developed asolution that uses the steering wheel algorithm to address the issue of drowsiness. It is primarily based on image-formed steering movements or pictorial-based steering movements and the CNN algorithm for accurate drowsiness classification, which can also lower the rateof false drowsy detection.

Existing method

Drowsiness of the driver identified system is built using non-intrusive machine vision-based principles. A camera that is mounted in front of the driver is necessary for many current systems [4]. It directs a straight arrow at the driver's face and watches the driver's eyes to detect tiredness. Large vehicles like buses and heavy trucks are notappropriate candidates for this setup. Buses have a big front glass window so the driver can see far ahead and drive safely. It is not possible to install a camera on the front glass pane since it would obscure the driver's frontal view If the camera is mounted on the frame right next to thewindow, it will not be able to properlycapture the driver's frontal perspective. In a10-minute video recording, the open CV detector only recognizes 40% of the driver'sface while the motorist is in a regular

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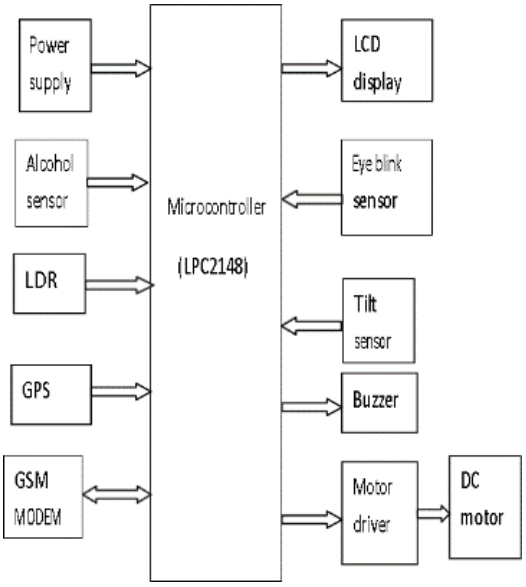
driving position. The Open CV eye detector(CV-ED) usually fails to trace the pair of eyes in the oblique perspective. The algorithm determines that the motorist is nolonger dozing off if the eyes are closed for five consecutive frames and sends out a warning signal [4]. Therefore, the current approach does not work for heavy cars. In this project effort, a new detection system isdesigned in order to address the issue with the current system.

Proposed Method

In order to overcome this eye blink sensor is used. A spectacle with eye blink sensor isused to detect the driver drowsiness and alerts the driver with buzzer, if driver is affected by drowsiness.

Fig 1. Work flow diagram for proposedsystem



The required operating voltage for controller LPC2148 for this task is 3.3V. And the integrated chips need a 5V D.C. power source. The Bridge Rectifier is used to create the regulated 3.3V. made possibleby cutting down the voltage from 230V to 3.3V. At this time, 1N4007 diodes are being used to rectify the step-downed A.C voltage. A "C" filter is used to filter the bridge rectifier's output voltage. The voltage regulator is now supplied the D.C. voltage that has been rectified and filtered. A voltage regulator is used to maintain a consistent, regulated voltage. The rectified, filtered, and regulated voltage is once again filtered for ripples using a 1000 uf electrolytic capacitor. Now, themicrocontroller receives the output from this portion and uses it to supply operatingvoltage.

As a result, the comparator's output is high, and the controller receives this voltage. It is employed to ascertain if the driver's eyes are open or closed. Therefore, if the driver gets drowsy, the eye blink sensor detects the position of the eye when it closes and alerts them through buzzer and LCD. The eye blink sensor, which is positioned close to the eye, detects an eye blink, and this information is communicated to the ARM7 microprocessor as pulses. The ARM7 controller will compare it with the typical eye blink, which is coded, using this information. The buzzer will sound to inform the driver in case of any unusual circumstance. The alcohol sensor isemployed to determine whether or not the motorist is intoxicated. If the

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driver is intoxicated, the MQ-3 sensor may detect the alcohol concentration; this raises the conductivity of the sensitive material SnO2 and gives an analogue signal to the microcontroller. The LCD receives the warning signal from the microcontroller.

Hardware And Software Requirement.Eye Blink Sensor

In this piece, blinking is required since it propels the device and triggers events. Instructions for image processing provide that if there is no eyelid movement for a predetermined period of time, which is longer than the duration of a typical human eye blink, it is regarded to be a "blink" [10].Since "blink event" differs from "normal eye blinking" in this paper, time should be specified at 5 seconds or more. The test is intended to determine whether the human eye blinks normally.

Alcohol Sensor

Using an alcohol sensor, the amount of alcohol in our breath can be found. Based on alcohol concentration, the sensor produces an analogue output. Figure 3 depicts the MQ-3 sensor in action as an alcohol sensor. The alcohol sensor is extremely sensitive and responds quickly. The sensor detects LNG, iso-butane, propane, alcohol, cigarette, and smoke.

Buzzer Section

Buzzers are used to warn or signal when a process is complete. A buzzer is used to warn when an embedded system has started.

Lcd Section

The status of the event is shown in this LCD area. Information that is required to be displayed or prompted is displayed on aliquid crystal display (LCD).

Keil Compiler

To develop software for embedded systems. It enables assembly-language or Ccomputer code to be created in order to detect the presence of light inside the car. The LDR resistance is large (mega ohms) when light intensity is lower inside the car. Electrons are released, conductivity rises, and lights blow in the car as the light intensity on the LDR rises.

Future Development

The facial recognition and output processes will be improved. Additionally, we intend to offer a user-accessible audio option. It will be quicker to receive the response message because we are developing the wi-fi module. Additionally, for the benefit of the user, more security features will be introduced.

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Result

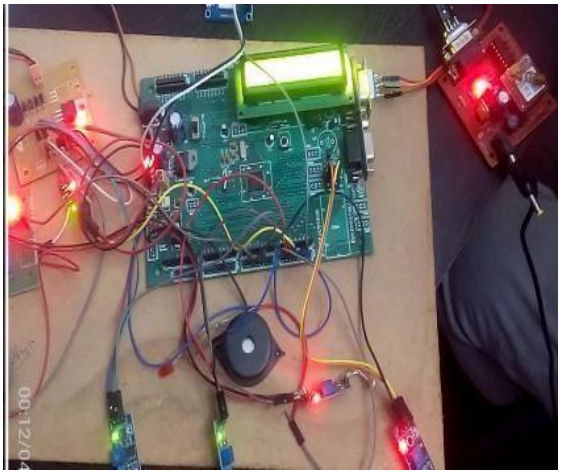

Fig 2. Output of the project

The drowsiness detection system can be used for different applications. One of themis heavy vehicles for example trucks, sincethe drivers of trucks have long driven periods. It can also be used for commercial vehicles. Many people use public transport facility for travelling. For their safety this system can be used in public vehicles. Heavy things are lifted by using cranes andtransporting them to other places. So, for overloaded cranes and mobile cranes this system can be used to avoid accidents related to drowsiness.

Conclusion

The alarm system is also built, the driver's tiredness is analyzed, and the driver's drowsiness is identified. Eye blinking isexplored in this work in relation to the prevention of accidents brought on by drowsiness, and a corresponding system was created. Tests on the project were successful. The project has been implemented effectively with the aid of cutting-edge ICs and developing technologies like GSM and GPS.

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