Intelligent Automobile System for Accident Prevention and Detection

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Abstract: An Increase rate of roadside mishaps caused because of tiredness amid driving shows a need for a framework that identifies such condition of a driver and cautions driver before the occurrence of an accident. Be it long distant traveling driving drowsy state leads to risky crashes which are hazardous to lives as well. To manage this issue, we propose an eye squint was checking calculation that utilizes eye highlight focuses on deciding the open or closed state of the eye and actuating a caution if the driver is drowsy. In this paper, we audit these three measures with regards to the sensors utilized and examine the favorable circumstances and impediments of each. Some street mishances may then be dodged if an alarm is sent to a driver that is regarded drowsy. As indicated by investigation gives an account of street mishaps of late years, it’s prestigious that the primary driver of street mishaps bringing about passing’s, extreme wounds, and financial misfortunes, is expected to a languid or a tired driver. To manage this issue, we propose an eye blink was observing calculation that utilizations eye include focuses on deciding the open or shut condition of the eye and initiating an alert if the driver is drowsy.

Keywords: Ultra-Sonic Sensor, Eye Blink Sensor, Vibration Sensor, Warning Alarm.

I. INTRODUCTION

"Drowsy" "sleepy" that is, tending to nod off. Tiredness more often than not happens because of lacking rest, an assortment of prescriptions, and furthermore because of weariness caused by driving vehicles for drawn-out stretches of time. In sluggishness express, a driver will lose control of his vehicle bringing about a mishap. As indicated by measurable reports, each year, more than 1.3 million individuals pass on in street mishaps, and 20 to 50 million individuals bear serious wounds and incapacities as a result of street-side mishances. To reduce this issue and to keep away from these dangerous accidents, the condition of a driver should always be under perception. The paper is organized as follows: Section presents a literature survey which discusses previous drowsiness detection methodologies performed by different researchers, their strengths, and weaknesses in detail, discusses the proposed technique in detail describes the results and analysis. In today's fast-paced world, sleep and rest have been neglected mainly by the economically active population due to various factors. Not only are the drowsy drivers of harm to themselves, but they also endanger the lives of different drivers and walkers out and about. A prototype with drowsy driver detection and a vehicle security system is developed. The detection of the level of drowsiness of a driver has achieved that track the driver's eyes making it a complex system. The experimental setup is extremely complicated occupying a lot of area rendering it not used as a compact, low-cost device to embed within a vehicle. Project Stay Alert discussed is an extremely promising idea especially regarding a compact embedded system that easily integrates with the vehicle. This system monitors the driver's eye blinking rate, checks if the driver's head is swaying unevenly and monitors the pressure applied on the accelerator pedal. While this prototype makes use of simple sensors to keep the cost and complexity of the system low, it doesn't provide a vehicle correction mechanism and external notification when drowsy driving is detected This study makes the assumption that when the driver is drowsy and less attentive, the pressure applied by the driver on the steering wheel will reduce which will, in turn, be detected by the pressure sensors and then an alarm will notify the driver of his/her drowsy driving. A driver who nods off at the worst possible time loses control of the vehicle, an activity which frequently brings about a crash with either another vehicle or stationary items. Remembering the true objective to keep these stunning setbacks, the condition of languor of the driver ought to be checked. The accompanying measures have been utilized broadly to monitor. Other than these three, researchers have also used subjective measures where drivers are asked to rate their level of drowsiness either verbally or through a questionnaire. The intensity of drowsiness is determined based on the rating. These methods have been studied in detail, and the advantages and disadvantages of each have been discussed.

II. LITERATURE REVIEW

The deep learning (DL) solutions for prediction of driver's cognitive states (drowsy or alert) using EEG data. We discussed the novel convolution neural network (CNN) and CNN-R which is a CNN variation that uses Restricted Boltzmann Machine to replace the convolution filter. We likewise consider packing classifiers in light of DL shrouded units as another option to the traditional DL arrangements. To test the execution of the proposed strategies, an extensive EEG dataset from 3 investigations of driver's weakness that incorporates 70 sessions from 37 subjects. All proposed approaches are tried on both crude EEG and Independent Component Analysis (ICA)-changed information for cross-session forecasts.
results show that CNN and CNN-R outperform deep neural networks (DNN) and convolution neural networks (CNN), as well as other non-DL algorithms and DL with raw EEG inputs, achieves better performance than ICA features. Monitoring and prediction of the driver's drowsy and alert states to keep drivers from the car accidents are socially and economically desirable. In the literature, different methods have been proposed for this prediction from physiological measurements and by using image processing. In this work, we consider the prediction based on on-line electroencephalograph (EEG) measurements of brain signals. Approaches including especially independent component analysis (ICA) and bagging have shown considerable success in the past. Nevertheless, further improvement of the prediction performance, especially for cross-session and cross-subjects predictions, is still required for real application of this technology. However, DL for driver's cognitive state prediction has not yet been extensively investigated. To prepare for DL solutions, we assemble the EEG data from 37 subjects including 70 sessions from three simulated lane-keeping experiments which represents one of the largest collections of EEG samples for the study of the driver's cognitive states prediction. Then, we investigated deep neural networks (DNN) and convolution neural networks (CNN) and proposed two novel channel-wise convolution neural networks (CNN). Also, we investigate if using DL hidden units as features to sophisticated classifiers can achieve further improvements. Finally, we also consider using ICA as inputs to these DL methods as opposed to the raw EEG data. The results show that DL methods significantly improve that performance of conventional classifiers such as support vector machine and the best performance is achieved with applying bagging to the hidden units of a CNN trained from raw EEG data.

III. PROPOSED ARCHITECTURE

This module presents a driver-monitoring system that contains both drowsiness detection method and nearest vehicle distance and vibration discovery strategy. Sluggishness includes a driver shutting his eyes as a result of weariness, and diversion includes a driver not giving careful consideration to the street notwithstanding the nearness of impediments or individuals. At the of Eye Awake, the distance between two vehicle lies a microcontroller obtaining various data from different sensors. The microcontroller then provides feedback controlling multiple output functions before any dangerous thing happen. In the system for microcontroller center the ultra sensor and eye blink sensor in using for driver sleeping in controller interfacing eye blink sensor is operating next ultrasonic sensor automating operating in using for vehicle disdains sensing in driver is sleep

automating eye blink sensor operating microcontroller relay tripping motor controlling next working for automating buzzer alarm all program is operating

Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy or if he is alcoholic. Driver drowsiness is recognized as an important factor in the vehicle accidents. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than vehicle accidents. But the life lost once cannot be re-winded. Advanced technology offers some hope avoid these up to some extent. This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This output is give to logic circuit to indicate the alarm. This project involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if anybody looses conscious and indicate through alarm. A study was designed to collect physiological data for validation of this technology. Methodology for analysis of physiological data, independent assessment of driver drowsiness and development of drowsiness detection algorithm by means of sequential fitting and selection of regression models is presented.
3.1. Microcontroller:
The PIC microcontroller PIC16f877a is a standout amongst the most eminent microcontrollers in the business. This controller is exceptionally advantageous to utilize, the coding or programming of this controller is additionally less demanding. One of the fundamental points of interest is that it can be composed delete however many circumstances as could be expected under the circumstances since it utilizes streak memory innovation.

![Microcontroller Diagram]

It has an aggregate number of 40 pins, and there are 33 pins for information and yield. PIC16f877a is utilized as a part of numerous PIC microcontroller ventures. PIC16f877a additionally have numerous applications in advanced gadgets circuits. PIC16f877a discovers its applications in an immense number of gadgets. It is utilized as a part of remote sensors, security and well-being gadgets, home robotization and in numerous modern instruments. An EEPROM is likewise included in it which makes it conceivable to store a portion of the data for all time like transmitter codes and collector frequencies and some other related information. It’s adaptable and can be utilized as a part of regions where microcontrollers have never been used as in coprocessor applications and clock capacities and so forth.

3.2. PIC Microcontroller Architecture:
Peripheral Interface Controller (PIC) is microcontroller created by Microchip; PIC microcontroller is quick and simple to actualize program when we analyze different microcontrollers like 8051. The simplicity of programming and simple to interfacing with different peripherals PIC wound up fruitful microcontroller. We realize that microcontroller is an incorporated chip which comprises of RAM, ROM, CPU, TIMERS, and COUNTERS, etc. PIC is a microcontroller which also consists of ram, rom, CPU, timers, counter, ADC (analog to digital converters), DAC (digital to analog converter). PIC also supports the protocols like CAN, SPI, UART for interfacing with other peripherals. PIC mainly used modified Harvard architecture and also supports RISC (Reduced Instruction Set Computer) by the above specification RISC and Harvard we can see easily that PIC is faster than the 8051 based controller which is made-up of Von-Newman architecture.

3.3. Ultrasonic Sensor:
As shown above, the Ultrasonic (US) sensor is a four pin module, whose pin names are Vcc, Trigger, Echo, and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. Power the Sensor using a regulated +5V through the Vcc ad

![Ultrasonic Sensor Diagram]

It is a four pin sensor and consists of Vcc, Trigger, Echo, and Ground pin. The Vcc pin is connected to the power supply, the Trigger pin is used to generate the ultrasonic pulse, the Echo pin is used to detect the echo, and the Ground pin is connected to the ground.

Fig. 2. Microcontroller

Fig. 3. Ultra-Sonic Sensor

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Ground pins of the sensor. The current devoured by the sensor is under 15mA and subsequently can be straightforwardly controlled by the onboard 5V pins. The Trigger and the Echo pins are both I/O pins, and hence they can be connected to I/O pins of the microcontroller.

3.4. Eye Blink Sensor:

![Eye Blink Sensor](image)

The Objective of this venture is to build up a framework to keep the vehicle secure and ensure it by the control of the gatecrashers. We can't deal with our while in the running by less conscious. If we were done all the vehicles with an automated security system that provides high security to the driver, also gives the alarm. This can be used for the project involves controlling accident due to unconscious through Eye blink.

![IR Sensing Circuit](image)

3.5. Vibration Sensor:

The vibration checking and examination equip, the assurance of sensors have mounted the machine remain fundamental factors in deciding the accomplishment of any observing project.

![Vibration Sensor](image)

3.6. Relay:

![Relay](image)
A relay is an electromagnetic gadget which is utilized to isolate two circuits electrically and interface them attractively. They are precious gadgets and enable one circuit to switch another while they are particular. They are frequently used to interface an electronic circuit (working at a low voltage) to an electrical circuit which works at high voltage. For instance, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. A transfer switch can be partitioned into two sections: information and yield. The info segment has a loop which produces attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Utilized transfers are accessible in the various arrangement of working voltages like 6V, 9V, 12V, 24V, etc.

3.7. Motor:

![Fig. 7. Motor](image)

A DC motor is any of a class of revolving electrical machines that believers coordinate current electrical energy into mechanical energy. The most widely recognized compose depend on the powers created by appealing fields. About an extensive variety of DC motors have some inside framework, either electromechanical or electronic, to discontinuously change the course of the present stream in part of the motor. DC engines were the primary sort utilized since existing direct-current lighting power appropriation system could power them.

3.8. Buzzer:

![Fig. 8. Buzzer](image)

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete simple circuit design. 5V Buzzer Module. A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric speaker like a Son alert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

3.9. Liquid Crystal Display (LCD):

An LCD consists of two glass panels, with the liquid crystal material sandwitched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. One each polarisers are pasted outside the two glass panels. These polarisers would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarizers’ and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizer’s, which would result in activating highlighting the desired characters. The LCD’s are lightweight with only a few millimeters thickness. Since the LCD’s consume less power, they are compatible with low power electronic circuits, and can be powered...
for long durations. The LCD does not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD’s have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD’s more customer friendly.

**IV. DESCRIPTION**

All the sensor and PIC micro controller are operating in the +5vDC supply. The main power supply is AC voltage, typically 220rms, is connected to a transformer, which steps that ac voltage down to the level of the desired DC output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage change.

**Eye Blink Sensor:**

The “effective blinking event” for which lid closure is set 40% of closing of eye & above which if eye lid closes the event is occurred the lid closure % versus Time before/after accident meanwhile which the time is used to prevent the accident by using various techniques for eg: Buzzing the Alarm. This effect will be monitored and measured by PIC controller. If the pre-set value and time example 3sec is exceed the controller will alert and display will show the drowsiness detection for the driver.

**Ultrasonic Sensor:**

The implementation for the ultrasonic sensor is for long length vehicle if the vehicle takes over take or Cross the road while driving driver need to know if the vehicle is cross the another automobile properly are not. This impact will overcome using ultra sonic sensor. Example ultrasonic distance is 1meter the controller alert the system through display and alarm.
V. OPERATION

The eye-blink sensor works by illuminating the eye and eyelid area with infrared light, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye.

**Specification:**
- EYE blinks alerting with buzzer
- Instant output digital signal is directly connecting to Controller
- Working voltage +5v
- Time for EYE blink detection 3ms

Ultrasonic Sensor:

The project is designed to measure the distance of near object by using an ultrasonic transducer. Ultrasonic means of distance measurement is a convenient method compared to traditional one using measurement scales. This proposed system uses an ultrasonic module interfaced to a microcontroller. An ultrasonic transducer comprising of a transmitter and receiver are used for the project. The transmitted waves are reflected back from the object and received by the transducer again. The total time taken from sending the waves to receiving it is calculated by taking into consideration the velocity of sound. Then the distance is calculated by a program running on the microcontroller and displayed on an LCD screen interfaced to the microcontroller.

**Specification:**
- Ultrasonic distance range near 20 cm
- Analyzed by micro controller
- Alert by buzzer
- Working voltage +5v

Advantages:
- Vehicles prevention and security to drive.
- Accident alert indication is implemented.
- High security system

VI. CONCLUSION

A low cost simple embedded system is presented in this paper to detect drowsy driving. Eye Awake in its current stage makes a good device for drowsy driver detection and providing basic vehicle correction regarding slowing down and eventually stopping the vehicle. The system shall be able to learn the driver's particular blinking patterns, driving patterns like acceleration, deceleration rate, nearest vehicle ranges and activity when the driver is about to fall asleep. In this way the system will predict and warn the driver before him falling asleep, thus saving him from an accident. If drivers are not quite sober, the car locks up the ignition system thereby preventing the driver from getting on the road. This system only looks at the number of consecutive frames where the eyes are closed. At that point it may be too late to issue the warning. By studying eye movement patterns, it is possible to find a method to generate the warning sooner. Using 3D images is another possibility in finding the eyes. The eyes are the deepest part of a 3D image, and this maybe a more robust way of localizing the eyes. We can automatically park the car by first using Automatic braking system, which will slow down the car and simultaneously will turn on the parking lights of the car and will detect the parking space and will automatically park the car preventing from accident. By using wireless technology, if the driver is drunk it will send signals to Vehicles nearby about this so other driver become alert.

VII. REFERENCES


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