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Arduino Based Accident Prevention System using Eye Blink Sensor

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Abstract: *The Drowsiness is the main cause for major accidents which leads to the injuries, deaths and damages. To overcome this problem, we propose a system which uses various sensors. These sensors are used to detect the driver. The buzzer is used to alert the driver whenever the driver feels drowsy. With the help of this system, the major road accidents can be reduced by alerting the driver. Nowadays most of the products of driver anti-sleep detection sold in the market are simply earphone making intermittent noises, which is quite annoying and inefficient. As such, there is a high demand for cheap and efficient driver sleep detection. Therefore, we came up with an idea and successfully developed a sleepy detection and alarming system, which could effectively meet this demand.*

Keywords: Drowsiness Alert, Accident Prevention, Eye Blink Sensing, Arduino Uno

I. INTRODUCTION

In today's world there is a severe increase in the use of vehicles. Such heavy automobile usage has increased traffic and thus resulting in a rise in road accidents. This takes a toll on the property as well as causes human life loss because of unavailability of immediate preventive and safety facilities. Complete accident prevention is unavoidable but at least repercussions can be reduced. This embedded system can prevent the accident to occur and proper preventive measures are taken in this system. The system consists of eye blink sensor, motor, buzzer;LED, battery, relay module, switch motor driver etc. and all these devices are interfaced with the central Arduino uno unit. We are going to use eye blink sensor for detecting sleep by setting the certain time limit. The failure of drivers in any vehicle incidents is a very important part of the dangerous problem facing the community. It can cause serious accidents for a variety of reasons and sometimes fatal as most drivers are out of control. Various things involved in car crashes such as high speed, sleep while driving other distractions such as texting while driving, talking to others, playing with children, etc. Citizens are aware of dangerous drive cars but do not understand the level of driving. fatigue. About 1374 people die every day, and about 400 people die. Approximately 57 road accidents and 17 deaths per hour as a result of motor vehicle accidents. In car accidents, 54.1 percent are between the ages of 18 and 34. The Government of India, the Department of Border Transport and the Department of Highways are planning to reduce the number of road accidents and fatalities by 50 percent by 2022. Globally, car accidents have proven to be one of the world's biggest security concerns. In 2015 about 5 lakh road accidents occurred in India. A tired driver is not able to steer the car by those who are sleep artwork, he is unable to take adequate steps leading to an accident so it is necessary to monitor the driver's drowsiness to avoid accidents. We focused on this issue using the eye twitch sensor to introduce a car accident prevention program. This examines the detection of various collisions and the reduction of such a system.

II. FACTS & STATISTICS

Our current statistics reveal that just in 2015 in India alone, 148,707 people died due to car related accidents. Of these, at least 21 percent were caused due to fatigue causing drivers to make mistakes. This can be a relatively smaller number still, as among the multiple causes that can lead to an accident, the involvement of fatigue as a cause is generally grossly underestimated. Fatigue combined with bad infrastructure in developing countries like India is a recipe for disaster. Fatigue, in general, is very difficult to measure or observe unlike alcohol and drugs, which have clear key

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indicators and tests that are available easily. Probably, the best solutions to this problem are awareness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very lucrative.

When there is an increased need for a job, the wages associated with it increases leading to more and more people adopting it. Such is the case for driving transport vehicles at night. Money motivates drivers to make unwise decisions like driving all night even with fatigue. This is mainly because the drivers are not themselves aware of the huge risk associated with driving when fatigued. Some countries have imposed restrictions on the number of hours a driver can drive at a stretch, but it is still not enough to solve this problem as its implementation is very difficult and costly.

III. LITERATURE SURVEY

Among these methods, the techniques that are best, based on accuracy are the ones based on Human physiological phenomena [5]. This technique is implemented in two ways: Measuring changes in physiological signals, such as brain waves and eye blinking; and measuring physical changes such as sagging posture, leaning of the driver's head and the open/closed states of the eyes [5]. The first method, the most accurate, is not realistic, since sensing electrodes would have to be attached directly onto the driver's body, and hence be annoying and distracting the driver. In addition, long time driving would result in perspiration on the sensors, diminishing their ability to monitor accurately. The second technique is well suited for real world driving conditions since it can be non-intrusive by using optical sensors of video cameras to detect changes.

1. A study of the literature on the haar cascade's use in real-time drowsy driver detection.Dr. Suryaprasad J. Sandesh samples Saraswathi, D. V.J.[5] suggested a technique for employing real-time image processing to recognise a face or an eye. In the project being proposed, It explains how to carry out the Haar cascade tests, identify tiredness, and distinguish between eye blinks. This research essentially presents a real vision-based method for identifying sleepiness. The fundamental challenges are the location of the iris under various lighting situations, facial recognition, and making a instantaneous system.

2. Using the vehicle state (steering wheel) algorithm to detect fatigue using a neurofuzzy system that supports vector machines, Arefnezhad et al. [6] suggested a non-interfering sleepiness detection method based on the vehicle steering data and the optimisation strategy for particle swarms. Mutya et al.'s [7] system was suggested. to use the steering wheel algorithm to overcome the fatigue problem. Its foundation is CNN algorithm and picture-based steering movement for accurate categorization weariness, which can essentially lower the rates of false drowsiness detection.

3. Accident prevention using eye blink sensors,",M. Hemamalini and P. Muhilan, volume 1, issue L11, 2017.

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Brain and visual activity is used in drowsiness detection system.Electroencephalographic (EEG) channel used to monitor the brainactivity. Diagnostic techniques and fuzzy logic are used in EEG-based drowsiness detector. Using blinking detection andcharacterization for visual activity monitored. Electrooculography (EOG) channel are used to extract the Blinking features [5].

Image processing and pattern classification used to take the driver facial pictures, tracking the features of driver face andcategorizing the driver's sleepiness level. 17 different features.Points are determined after examining the facial muscle activitiesusing Active Appearance Model (AAM). K-Nearest-Neighbormethod applied to categorize sleepiness into 6 levels, driver'ssmile also detected with this method [5].

Head posture estimation method is used for detection of drowsydriver. In this method Viola and Jones algorithm for driver facedetection [6].

This method is nonintrusive and sturdy for finding the driverdrowsiness in real time. Support Vector Machine (SVM) is usingfor extracting the face from video frames and Circular HoughTransform (CHT) is useful for mouth and eye state analysis [7].

In this approach machine learning used to determine the humanbehavior during driver drowsiness, for this 30 different facialactions including eye blink, yawning and head movements arecollected to detect the driver drowsiness [8].

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Method of disease detection

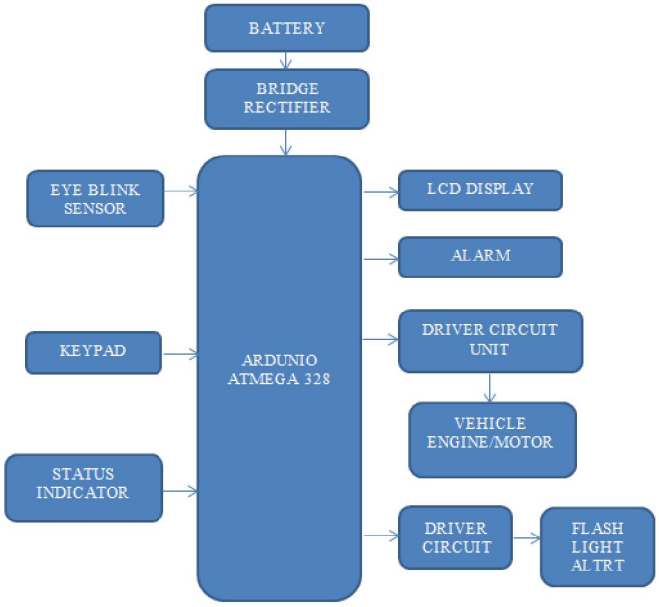

Fig. 1. Block Diagram

Implementing an automated system to vehicles that provides high security to driver and the passengers, by designing an eye blink sensor which continuously monitor number of times the eye blinks, once when the eye blinks count decreases (that means the driver is sleepy), buzzer indication will be given and that wakes driver from sleep. This paper involves measuring the eye blinks using IR sensor. There are two sections in IR sensor .The IR transmitter is used to transmit the infrared rays to our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed then the output of IR receiver is high otherwise the IR receiver output is low. This is to know whether the eye is at close or open position at that condition. In the transmitter section, eye blink sensor is placed near the eye to sense the blink count and this information is transmitted in the form of pulses and is given to the ardunio. The controller processor use this information to compare with the normal eye blink programmed in and if any abnormal situation arises, the buzzer indication is given to the driver to alert him, this operation is enabled by means of the circuit connected to the buzzer and the signal is transmitted via transmitter at the frequency of 433.92 MHz's. The transmitted signal is received and the signal is decoded and given to the Microcontroller, which use this information for displaying the alert message in the LCD as programmed along with buzzer alert. And in case of any fire inside the vehicle the eye blink sensor sense the condition and stops the engine. and deducts the condition and gives the emergency light.

Arduino Atmega328

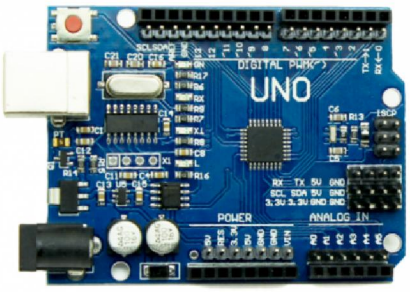

Fig. 2.Atmega328 Arduino

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The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digitalinput/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHzceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Itcontains everything needed to supportthe microcontroller,simply connect it to a computerwith a USB cable or power it with a AC-to-DC adapter or battery to get started. The Unodiffers from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serialconverter.

LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD

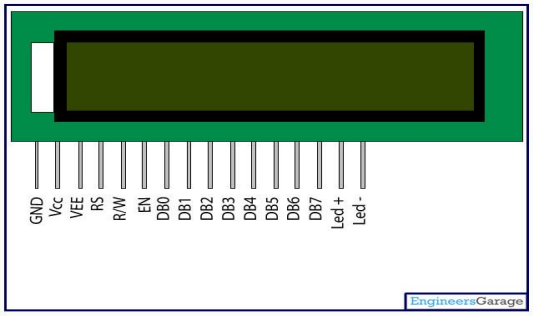

Fig. 3. LCD Display

Eye Blink Sensor

Here we use the CNY 70 IR transmitter. It is a reflective sensor that includes infrared emitter and phototransistor ina lead package which blocks visible light[1]. One main condition is that the IR transmitter and receiver should be ina straight line for optimum performance. The transmitter transmits IR rays into the eye of the driver. Depending on whether the eye is closed or open, there will be high output for closed eye and low output for open eye. The transmitted signal is captured by the IR receiver. This receiver is connected to the comparator. The comparator is an op amp where the reference voltage is given to inverting input terminal and the output of receiver is given to non-inverting terminal. When the IR transmitter passes the rays to the receiver, the receiver is conducting due to the fact that non inverting input voltage is less than inverting input voltage. Now the output of comparator is GND, so output is given to microcontroller

Fig. 4.Eye Blink Sensor

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DC Motor

DC Motor – 10RPM – 12Volts geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all-terrain robots and variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.10 RPM 12V DC geared motors widely use for robotics applications. Very easy to use and available in standard size. Also, you don't have to spend a lot of money to control motors with an Arduino or compatible board. The most popular L298N H-bridge module with onboard voltage regulator motor driver can be used with this motor that has a voltage of between 5 and 35V DC or you can choose the most precise motor diver module from the wide range available in our Motor divers category as per your specific requirements.

Fig. 5.DC Motor

Flowchart

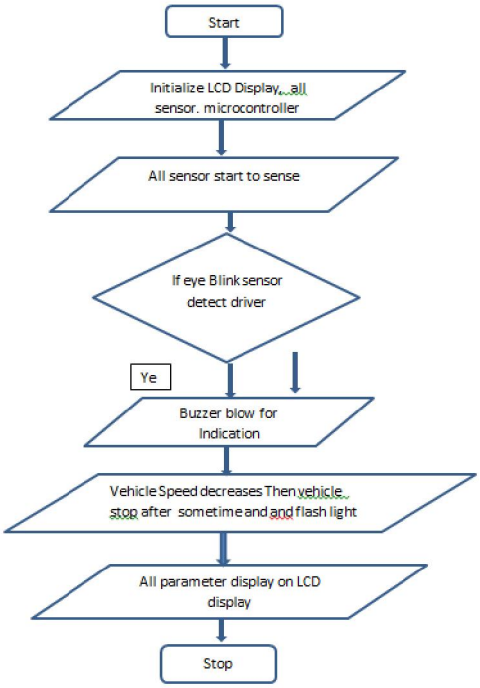

Fig. 6.Flowchart

IV. CONCLUSION

The analysis and design of driver drowsiness detection and alert system is presented. The proposed system is used to avoid various road accidents caused by drowsy driving. And also this system used for security purpose of a driver to caution the driver if any fire accident or any gas leakage

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This paper involves avoiding accident to unconsciousness through Eye blink. Here one eye blink sensor is fixed in vehicle where if driver lose his Consciousness, then it alerts the driver through buzzer to prevent vehicle from accident.

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