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Design and Implementation of Driver Drowsiness Detection System

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Abstract: This project is well-nigh making cars increasingly intelligent and interactive, which may zestful or resist user under unacceptable conditions, they may provide hair-trigger information of real time situations to police. Traffic and population is increasing day-by-day in India. Most of the accidents occur due to drowsy driving. Many lives and families are getting unauthentic due to this reason. To overcome these issues we have designed this project. This project works on the main concept of eye twinkle detection. This project is used to modernize safety for the vehicles and reduces road accidents caused due to the driver's drowsiness.

In this project we are using Arduino, eye twinkle sensor, drunkard sensor. Eye twinkle sensor will continuously monitors the driver's vision in real time and sends the information to the controller. Arduino will verify data whether the suburbanite opened or sealed his eye. If the suburbanite closes his vision for few seconds it will detects the person is drowsy and sends telex indication to zestful the suburbanite and stop the motor. If the person took alcohol, who is driving then the vehicle will be stopped immediately by giving watchtower (buzzing sound).

Keywords: Arduino, Eye blink sensor, Alcoholic sensor.

Introduction:

The increasing number of traffic accidents is attributed to human errors, especially drowsiness. The state of drowsiness causes people to lose their vigilance, hence becoming a danger not only to themselves, but also their surroundings. The survey has mentioned that 30% of all traffic accidents have been caused by drowsiness. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents.

Drowsiness is often caused by four main factors: sleep, work, time of day, and physical. Drowsiness can be detected through three main categories. They are vehicle based, behavioral based and physiological based.

Vehicle based measures a number of metrics, including deviations from lane position, movement of the steering wheel, pressure on the acceleration pedal, etc. Behavioral based measures the behavior of the driver, including yawning, eye closure, eye blinking, and head pose.

Physiological based measures the correlation between physiological signals ECG (Electrocardiogram) and EOG (Electrooculogram). It is detected through pulse rate, heart beat and brain information.

A number of factors have been reported to characterize sleepy-related accidents. The first would be the time of the day. Data shows that most crashes caused by drowsiness occur from midnight to 8 a.m. and from 1 p.m. to 3 p.m.

Second, most crashes involved someone driving alone. A single drive usually has no one to talk to and no one to help keep them alert. Lastly, there are no signs found of the driver attempting to avoid the crash.

This third characteristic can be seen from the lack of skid marks at the scene, indicating that the driver did not hit the brake. It is also observed that the car did not try to swerve out of the way.

These characteristics show that drowsy-related accidents can be avoided by embedding an application that can be used to measure drowsiness to a mobile device to assist a driver while driving.

There are numerous non-driver related causes of car accidents including road conditions, the weather and the mechanical performance of a car. However, a significant number of car accidents are caused by driver error.

Driver error includes drunkenness, fatigue, and drowsiness. Many factors can affect a driver's ability to control a motor vehicle, such as natural reflexes, recognition and perception.

The diminishing of these factors can eventually reduce a driver's vigilance level. Statistically, drowsiness by driver's results in an estimated 1,550 deaths, 71,000 injuries, and $12.5 billion in monetary losses .As mentioned above, the situation in Thailand is even worse compared to the global average.

Car accidents are a daily occurrence on the news in Thailand. Throughout the centuries, there have been numerous "raising awareness" campaigns about drowsiness and drunken driving in Thailand. However, they have been ineffective for the most part. Auto accidents not only affect the drowsy drivers, but also any potential victims. During the years, several real-time face and eye detection techniques have been developed for monitoring the driver drowsiness.

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LITERATURE SURVEY

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Annual Global Road Crash Statistics:

- Nearly 1.25 million people die in road crashes each year, on average 3,287 deaths a day.
- An additional 20-50 million are injured or disabled.
- More than half of all road traffic deaths occur among young adults ages 15-44. Road traffic crashes rank as the 9th leading cause of death and account for 2.2% of all deaths globally. Road crashes are the leading cause of death among young people ages 15-29, and the second leading cause of death worldwide among young people ages 5-14. Each year nearly 400,000 people under 25 die on the world's roads, on average over 1,000 a day.
- Over 90% of all road fatalities occur in low and middle-income countries, which have less than half of the world's vehicles.
- Road crashes cost USD $518 billion globally, costing individual countries from 1-2% of their annual GDP.
- Road crashes cost low and middle-income countries USD $65 billion annually, exceeding the total amount received in developmental assistance.
- Unless action is taken, road traffic injuries are predicted to become the fifth leading cause of death by 2030.

Annual United States Road Crash Statistics Over 37,000 people die in road crashes each year An additional 2.35 million are injured or disabled Over 1,600 children under 15 years of age die each year Nearly 8,000 people are killed in crashes involving drivers ages 16-20 Road crashes cost the U.S. $230.6 billion per year, or an average of $820 per person. Road crashes are the single greatest annual cause of death of healthy U.S. citizens traveling abroad.

Reducing Road Crashes

Road safety is a shared responsibility. Reducing risk in the world's road traffic systems requires commitment and informed decision-making by government, industry, non-governmental organizations and international agencies. It also requires the participation of people from many different disciplines, including road engineers, motor vehicle designers, law enforcement officers, health professionals, educators, and community groups.

PROPOSED SYSTEM

In this paper we are using Arduino with Eye twinkle sensor and swig sensor. Eye twinkle sensor will continuously capture the driver's vision in real time and sends the information to the Arduino. Arduino will verify the frames sent from the eye twinkle sensor whether the suburbanite opened or sealed his eye. If the suburbanite closes his vision it will detects the person is drowsy and sends telex indication to zestful the driver. If the suburbanite taken swig the motors will stop.

BLOCK DIAGRAM

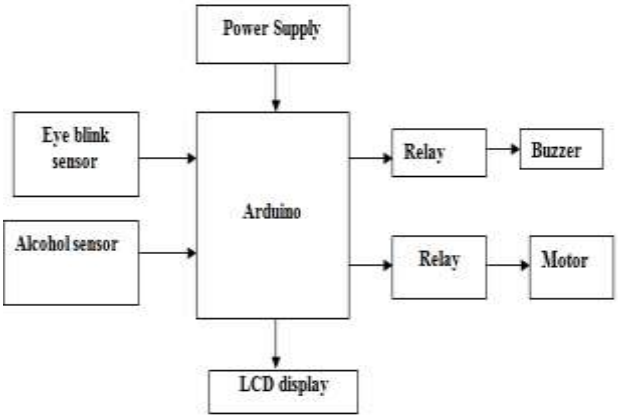

Fig 1: Block diagram

EYE BLINK SENSOR

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.

ALCOHOL SENSOR

Small like a nose, gas sensors spontaneously react to the gas present, thus keeping the system updated about any alterations that occur in the concentration of molecules at gaseous state. Gas sensors are available in wide specifications depending on the sensitivity levels, type of gas to be sensed, physical dimensions and numerous other factors.

When a gas interacts with this sensor, it is first ionized into its constituents and is then adsorbed by the sensing element. This adsorption creates a potential difference on the element which is conveyed to the processor unit through output pins in form of current.

BUZZER

The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles.

A Buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as microwave oven. 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.

RELAY

Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.

MOTOR

In some of the electronics projects you may want to control a DC Motor with microcontroller. The maximum current that can be sourced or sunk from a microcontroller is 15 mA at 5v. But a DC Motor need currents very much more than that and it need voltages 6v, 12v, 24v etc, depending upon the type of motor used. Another problem is that the back emf produced by the motor may affect the proper functioning of the microcontroller.

ARDUINO

The Arduino is what is known as a Physical or Embedded Computing platform, which means that it is an interactive system that through the use of hardware and software can interact with its environment.

POWER SUPPLY

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and VIN pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

LCD Display

An **LCD** is an electronic **display** module which uses **liquid crystal** to produce a visible image. The 16x2 LCD display is a very basic module commonly used in circuits. The 16x2 translates a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix.

RESULTS AND FUTURE SCOPE

As shown in figure 20 the System consists of Eye blink sensor, Alcohol sensor, Power supply, Buzzer, Motor, LCD. When a person is driving a vehicle, if he has taken alcohol or if he was sleepy by using this detection system we can alert them by giving a buzzer sound, and reduces the accidents.

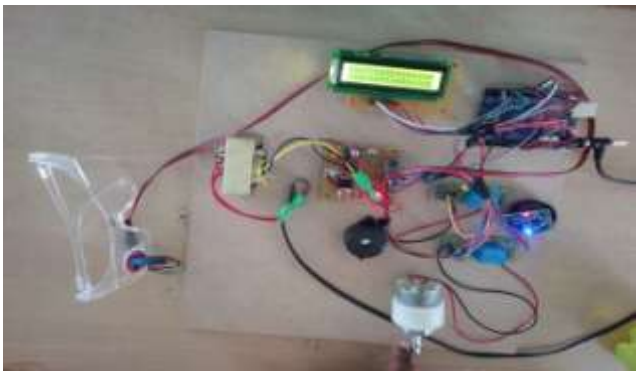

Fig 1.1: Displaying no alcohol and no sleep in LCD

In the above figure 21 shows when people is driving if he/she is not in sleepy mode and not taken alcohol, the motor runs fastly and display no sleep and no alcohol in the LCD.

Fig 1.2: Displaying no alcohol and driver sleeps in LCD

In the above figure 22 shows that when a person drives the vehicle if he/she was in sleepy mode and the person was not taken alcohol then the motor stops and displays no alcohol and driver sleeps in LCD.

Fig 1.3: Displaying no sleep and alcohol taken in LCD

In the above figure 23 shows that when a person is driving a vehicle and he had taken alcohol and he is not in a sleepy mood then in LCD it displays as driver sleeps and no alcohol then the motor runs slowly and stops for certain time and again it will start, this process continues

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until they wake up and by this we can avoid accidents.

Fig 1.4: Displaying alcohol taken and driver sleeps

In the above figure 24 shows that when a person is driving a vehicle , if that person had taken alcohol and also he is in sleepy mood then automatically the vehicle stops and they came to know the problem and take immediate actions regarding it .By this manner we can reduce the accidents.

APPLICATIONS:

- In Vehicles

ADVANTAGES:

- Reduces accidents.
- Saves lives

FUTURE SCOPE

- If the person took alcohol, who is driving then the vehicle will be stopped immediately by giving alarm.
- It is also used for security alerts where 2 hours surveillance is required.
- High security, low cost
- Medical accent.
- Drink and drive production.
- Anti drowsiness alarm.
- Make easy drive.

CONCLUSION

Safe driving is increasingly snooping for societies all over the world. Thousands of people are died due to car accidents and increasingly are injured. These accidents are caused due to drivers falling sleep. Hence, suburbanite drowsiness is the main issue overdue these accidents. There are many techniques to snift the suburbanite drowsiness and those are based on eye shimmer of a driver. In this project, we are using eye twinkle sensor and drunkard sensor to snift the suburbanite drowsiness. Suburbanite drowsiness detection system used to awake the suburbanite while driving in order to reduce the accidents. Eye twinkle sensor will continuously monitors the driver's vision in real time and sends the information to the controller. Arduino will verify data whether the suburbanite opened or sealed his eye. If the suburbanite closes his vision for few seconds it will detects the person is drowsy and sends telex indication to zestful the suburbanite and stops the motor. The purpose of drunkard sensor is to detect, if the person took alcohol, who is driving the vehicle, it will be stopped immediately by giving watchtower (buzzing sound). By this manner we can reduce the accidents.

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