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A futuristic digital interface with a glowing Earth globe in the center. The interface is overlaid on a background of a person's hands reaching out towards the globe. The interface includes various data visualizations such as bar charts, line graphs, and pie charts. Text elements include "BUSINESS", "NETWORK SEARCH", "LORDING 100%", "MEDIA", and "WORLD". The overall color scheme is blue and purple with white and yellow highlights.

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# **Development of Driver Sleep Detection & Alarming System using Arduino**

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**ABSTRACT:** The High Tech Developments in Automotive Sector made our living life much easier. The advent of technology has also increased road accidents & traffic hazards which subsequently leads to loss of life. There has been a massive increase in road accident due to unsteadiness of driver while driving which leads to enormous fatal accidents. The driver loses his control when he falls sleep which leads to accident. This is because when the driver isn't in suitable situation to control his vehicle at very high speed on the road. This design can produce a model which can help to avoid such accidents. This Manuscript aims to create a framework to keep the car safe and secure through critical activity. When driver runs his car in ignorance he cannot take care of his own. If we make all vehicles with an automatic safety system that gives the driver a high level of protection by buzzing an alarm & application of brakes. The device has an eye blink sensor. This sensor observes eye blink activity of driver while driving. When eye blink activity is not observed up to set time level signal sends to ARDUINO Nano, transmission module in action to glows the LED with buzzing an alarm & also gradual application of brakes which avoids the crash of vehicle.

**KEYWORDS:** ARDUINO Nano, Anti-Sleep, Driving Alarm, Eye Blink Sensor, Automatic Safety Alarm.

## **I. INTRODUCTION**

A warm vehicle and the smooth motion of the vehicle can make you drowsy and increase your crash risks. Commercial Vehicle drivers are on the wheel for long period of time and this causes boring and inattentiveness of driver. Others who drive for even short periods of time in high-stress situations can find themselves exhausted. In all cases, they're at greater risk of making costly mistakes. The failure of drivers in any vehicle incidents is a very important part of the dangerous problem facing by 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. Driver fatigue may be a significant factor in a large number of vehicle accidents. Recent statistics estimated that annually 1,800 deaths and 96,000 injuries are often attributed to fatigue related crashes. consistent with the global status report on road safety given by WHO which reflects information from about 180 countries has indicated that worldwide the total number of road traffic death has plateaued at 1.25 million per annum, with India reporting about 1.34 lakh fatalities in road accidents per annum, an enormous 70 percent of them being due to drowsiness. 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. 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. 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. A tired driver is not able to steer the car by those who are sleep at work, 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 blink sensor to introduce a car accident Prevention System.

## **II. OBJECTIVE**

- o To Design Car Accident Prevention Program.
- o To study various methods to avoid a collision due to driver's drowsiness.
- o To develop prototype model of Anti-Sleep Driving Alarm.

### III. METHODOLOGY

A device for keeping awake a driver that is about to fall asleep or undergoing drowsiness, comprising of pair of glasses with a frame having two arms, at least one sensor is attached to any of glass for Detecting the movements of an eye blink. At least one battery, and one electrode for generating an electric pulse. Preferably, at least one sensor, Battery and electrode are implanted into the frame at the level of both arms of the pair of glasses, wherein it is even more preferred that the at least one Electrode is located in an area of the arms of the pair of glasses, to enable a download on the parietal area of the skull of a wearer. Providing all the Elements of the device within the regular frame of a pair of looking glasses make the device extremely easy to handle and to operate, as it can be handled Exactly like any other pair of glasses. According to the present invention it may be provided with neutral, graduated or darkened Lenses.

The sensor can detect the movements of the eye blink, considering the frequency of opening and closing of the upper eyelid. Several studies have Shown that in a person who is about to fall asleep, the blinking tends to be more frequent, reaching a threshold of about 15-20 episodes per minute, while at the same time increasing the wink frequency with an eyelid closure duration higher than 0,03 msec. A narrow-band light beam from this emitter is Aimed across the surface of the driver's eye, just above the eyeball, between the eyelids, and it is sensed in the opposite corner of the eye by means of a Light sensor, which has a narrow band light filter mounted in front of it. For waking up the driver, whose eyes have been closed for a longer time period Than about one second or less, an electronic circuitry is activated by means of the closed-eye signal from the light sensor, turning on an alarm signal, a Buzzer or similar, after a one second or shorter time delay. A pair of eyeglasses include a sensing lever that is in constant contact with one of the driver's Upper eyelid muscles.

Downward motion of the eyelid moves the sensing lever downward and actuates a micro switch that is coupled to the sensing lever. A normal blink of a driver's eye does not produce an audible alarm. However, if the driver's eyelid fails to open in a predetermined time, the audible Alarm will sound. As soon as the driver's eyelid opens, a yellow caution light and the audible alarm are reset. Normal eye blinks produce illumination of The yellow caution light in view of the driver, thereby assuring the driver that the sleep awakening device is functioning properly.

The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes in real-time. By monitoring the eyes, it's believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. Detection of fatigue involves the observation of eye movements and blink patterns during a sequence of images of a face. it'll also send alert to the owner that driver is drowsy. Distraction problem of the driving force can also be solved through this project as it will detect the eye ball movement of the driver and let him/her know that he is not looking in the front and alarm will activate to stop the vehicle.

This paperwork is concentrated on the localization of the eyes, which involves watching the entire image of the face, and determining the position of the eyes, by a proposing well image processing algorithm. Once the position of the eyes is found, the system is meant to determine whether the eyes are opened or closed, and detect fatigue. For our project face and eye classifiers are required. So, we used the training objects method to create our own hear classifier files. If detected, then alert is going to be sent to both the driver and owner of the vehicle and alarm will ring to wake up the driver asking him to stop the vehicle.

### IV. SYSTEM DESIGN

#### • SYSTEM DESCRIPTION

Embedded system devices are an important part of daily life. These are a combination of hardware and Software, in which software is commonly known as hardware embedded software. One of the most important Features of these systems is that they provide o/p within time limits. So we often use embedded systems on Simple and sophisticated devices as well. In many devices like microwave, calculators, TV remote control, home Security and crowded control systems, embedded system applications are very much involved in our real life. Embedded system block diagram is shown in Fig 1. Embedded devices are widely divided into several Categories, depending on the hardware and software and the microcontroller "8 or 16 or 32-bit.

Airbags are currently a variety of features found in cars that are useful for car safety and security. In particular, these vehicles have been standard front airbags since 1998. This function aims that when the driver is sleepy, a Buzzer signal in the system is provided, which reduces the driver’s speed. The marketable design will still shut Off the car power to maximize the chances of avoiding road accidents and opening the window for preventive and mitigation measures.

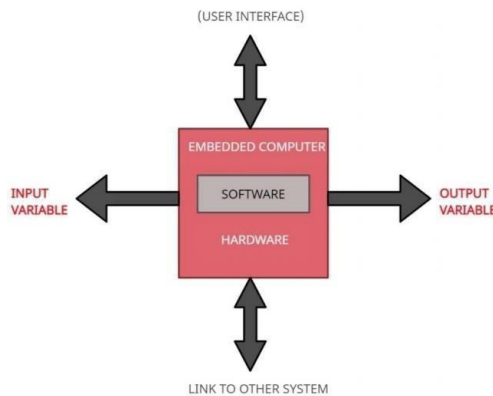


Figure 1: Embedded Systems block diagram

Figure 1: Embedded System Block Diagram

• SYSTEM DESIGN IMPLEMENTATION

System block diagram is comprising of Eye blink (IR) related to sleep detection and alert the driver with the Components used in the proposed operation are Eye blink length and frequency, Power supply, Buzzer, LED ARDUINO (UNO), Relay Module, DC as shown in Figure. The main component is Arduino Uno which is an ATmega328 based microcontroller (MC) that performs all functions related to controlling the embedded System circuit. The blinking module works by illuminating the eye area with infrared light, and then detecting Changes in scattered light using an image transistor and a separation circuit. Each of the components is Described below.

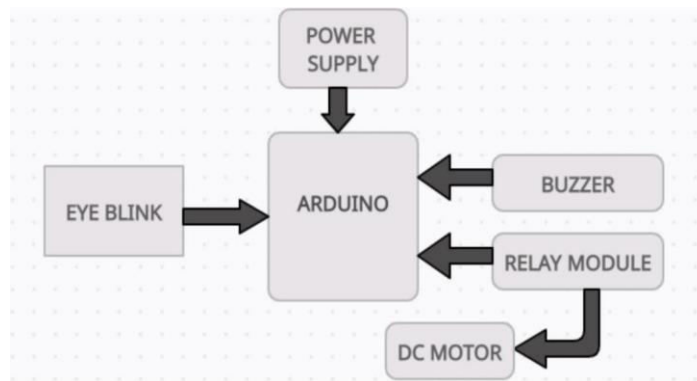


Figure 2: System Design

- Circuit Diagram

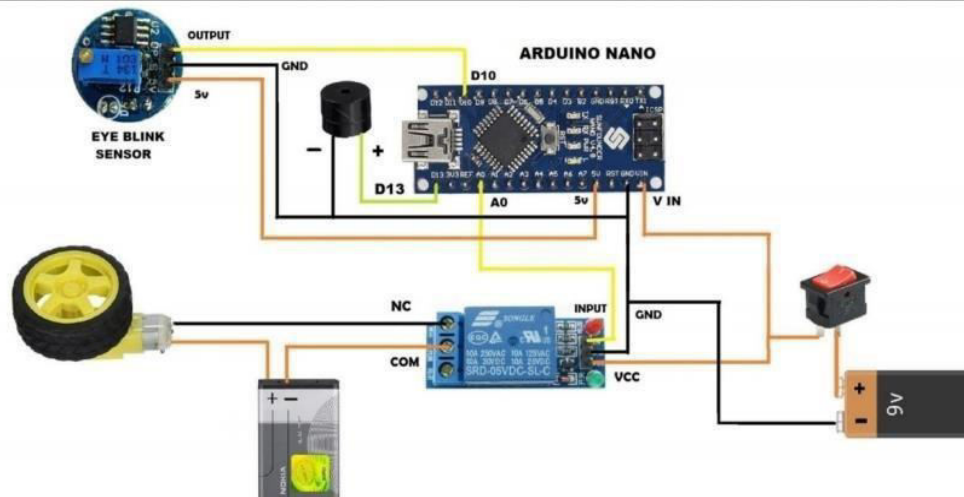


Figure 3: Circuit Diagram

- Hardware requirement

1. Arduino Nano
2. Eye Blink Sensor
3. Battery
4. Switch
5. Gear motor
6. Buzzer
7. LED

### 1. Arduino Nano

Arduino is an open source MC board based on ATmega328P MC and developed by Arduino.cc. The board has 14 PINs and 6 analog pins. All of this will help the microcontroller by attaching the board to a computer for Continuous operation. Strom supply of this board can be made using AC to DC Converter, USB cable, otherwise Plug.

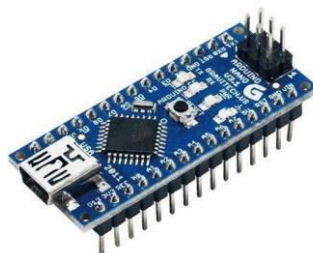


Figure 4: Arduino Nano

### 2. Eye Blink Sensor

Using a phototransistor and a separator circuit, the blink sensor illuminates the eye area and eyelid with Infrared light and detects changes in the reflected light. This study includes measuring and monitoring the blink Of an eye with the help of an IR sensor. Closed eye indicates that the output of the IR receiver is high except that The output from the IR receiver is low. Figure 4 shows an instant blink sensor with an IR attached to it.



Figure 5: Eye Blink Sensor

### 3. Battery

An electric battery is a device consisting of one or More electrochemical cells with external connections provided to Power electrical devices such as flashlights, and electric cars. When A battery is supplying electric power, its positive terminal is The cathode and its negative terminal is the anode. The terminal Marked negative is the source of electrons that will flow through an External electric circuit to the positive terminal. When a battery is Connected to an external electric load.



Figure 6: Battery

### 4. Switch

A switch is a mechanical or controlling device that changes the flow of current direction or interrupts the flow of current within a circuit. Switches are designed in different configurations based on the requirements. They include various sets of contacts that are controlled through a similar knob. These contacts may function sequentially, alternately, or simultaneously. Almost all electronic or electrical systems include a minimum of one switch to turn ON/OFF the device. There are different types of switches available like DPST, DPDT, SPDT, and SPST switch. This article discusses one of these types namely the SPST switch and its working with applications.

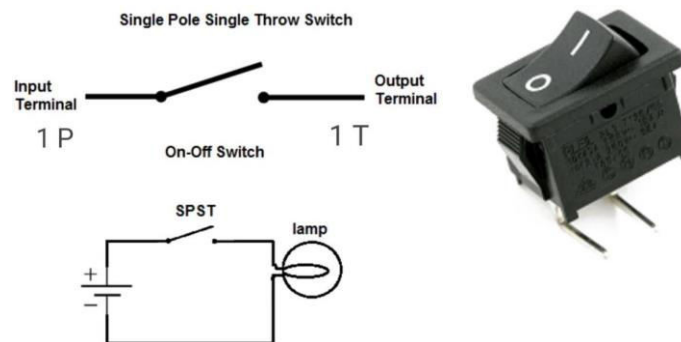


Figure 7: Switch

The term “SPST” in an SPST switch stands for “Single Pole Single Throw” which includes a single input and a single output. Here, a single input is directly connected to a single output. The main function of this switch is to control the circuit by turning ON/OFF.

Once the switch in the circuit is closed, then the circuit will be turned ON whereas the switch is not closed or open, then the circuit will be turned off. The SPST switch example is the 25KV railway DC voltage system & a household lamp switch. The schematic symbol of the SPST switch is shown below.

The connections of this switch are two types like the Normally Open (NO) & the common ©. Once the switch is enabled, then the circuit is closed. So the flow of current will be from the common © terminal to the normally open (NO) terminal. When the switch is disabled, the circuit will be an open circuit, so there is no flow of current within the circuit.

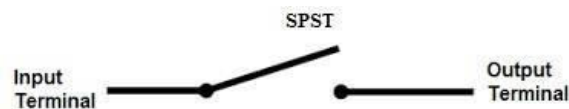


Figure 8: SPST Switch

### 5. DC Gear Motor

gear motor is an all-in-one combination of a motor and gearbox. The addition of a gear head to a motor reduces the speed while increasing the torque output. The most important parameters in regards to gear motors are speed (rpm), torque (lb-in) and efficiency (%). In order to select the most suitable gear motor for your application you must first compute the load, speed and torque requirements for your application.



Figure 9: DC Gear Motor

### 6. Buzzer

As a type of electronic buzzer with integrated structure, buzzers, which are supplied by DC power, are widely used in computers, printers, photocopiers, alarms, electronic toys, automotive electronic devices, telephones, timers and other electronic products for voice devices. Buzzers can be categorized as active and passive ones (see the following picture). Turn the pins of two buzzers face up, and the one with a green circuit board is a passive buzzer, while the other enclosed with a black tape is an active one.

The difference between an active buzzer and a passive buzzer is: An active buzzer has a built-in oscillating source, so it will make sounds when electrified. But a passive buzzer does not have such source, so it will not tweet if DC signals are used; instead, you need to use square waves whose frequency is between 2K and 5K to drive it. The active buzzer is often more expensive than the passive one because of multiple built-in oscillating circuits.



Figure 10: Buzzer

## 7. LED

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The colour of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

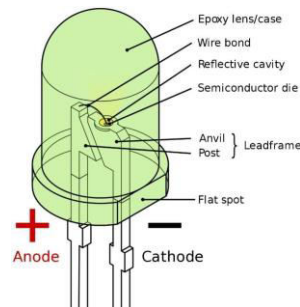


Figure 11: LED

## V. METHODOICAL STEPS FOR EXECUTION

Connect DC motor to relay and give relay connection to the Arduino pin A0. Now dump the code into Arduino Using USB cable Connect USB cable to pc and open Arduino software, enter the code and compile & run then Select the Arduino port and click upload button then your code will be uploaded into Arduino. Now connect the Batteries and check the output of eye blink sensor. If blink of eye is more than 2 seconds car (motor) will be Stopped. The proposed work is completely illustrated.

## VI. EXPERIMENTAL SET UP



Figure 12: Set up Front View



Figure 13: Set up Side View





Figure 14: Open Eye Position  
(Red Light ON in Eye Blink Sensor)



Figure 15: Close Eye Position  
(Yellow & Red Light ON in Eye Blink Sensor)

## VII. ADVANTAGES

**Safety:** The primary advantage of an anti-sleep alarm is that it can prevent accidents caused by drowsiness or fatigue while driving or operating heavy machinery.

**Alertness:** The alarm can keep a person alert and focused on the task at hand, which can be especially useful for long-distance truck drivers, night shift workers, and anyone who needs to stay awake for extended periods.

**Cost-effective:** An anti-sleep alarm circuit can be relatively inexpensive to build or purchase, making it an affordable safety solution.

## VIII. CONCLUSION

People are increasingly exposed to dangers today. Therefore, we need to take action for this, as an engineer we have the solution which we needed. Any automation is designed to protect a person. Such a model is tasked with Developing a system for diagnosing and controlling the speed of vehicles to prevent accidents. To some extent, Modern technology offers some hope of stopping these. Although many devices for detecting sleepiness are available, most proved unsuitable for detecting sleepiness in drivers, due to a variety of factors, such as insensitivity to the early stages of sleepiness, intrusiveness and assumed driver acceptance issues. The conclusions may be drawn from the review is no single method exists that is commonly accepted to detect driver fatigue in an operational context. The study has also identified sleepiness detection devices that are available commercially or as prototypes for use in drivers, and has analysed the scientific evidence for their effectiveness to warn drivers of sleepiness. The Developed system will accurately monitor the open or closed state of the driver's eyes in real-time. A normal blink of a driver's eye does not produce an audible alarm. However, if the driver's eyelid fails to open in a predetermined time, the audible Alarm will sound. This paper includes monitoring the blink of an eye with the help of an IR sensor. On this device the output of the sensor is provided for comparison with ARDUINO. A pair of eyeglasses include a sensing lever that is in constant contact with one of the driver's Upper eyelid muscles. When the value reaches the set level, the buzzer automatically vibrates, the LED glows, and the car stops Automatically when the eye blink sensor receives a signal from the transmission component.

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