

## **Introduction**

Road traffic injuries and deaths have a terrible impact on individuals, communities, and countries. They involve massive amount of costs too often overburdened health care systems occupy more hospital beds consume resources and result in significant losses of productivity, prosperity with deep social and economic losses. According to the 2021 report of WHO, 1.54 lakh road traffic deaths occur in India . This makes it the number one cause of death among those aged 15-29 years. Imagine a situation where a person is driving home from work, dead tired after facing all the challenges of the day. The hands are on the wheel and foot on the pedal but suddenly started feeling drowsy, the eyes start shutting and the vision blurs and before it knew, the person fall asleep. Falling asleep on the wheel can lead to serious consequences, there may be accidents and people may even lose their lives. This situation is much more common and hence, it is very important to counter this problem.

So, to address this issue, the Project Anti-Sleep Alarm System for Drivers is introduced. This system alerts the Person falls asleep at the wheel thereby, avoiding accidents and saving lives. This system is useful especially for people who travel long distances and people who are driving late at night. The circuit is built using Arduino UNO, a switch, a Piezo buzzer, Micro Vibration Motor and an Eye blink sensor. Whenever the driver feels sleepy and asleep the eye blink sensor detects and the buzzer turn ON with a sound of an intermediate beep. When driver comes back to his normal State eye blink sensor senses that and buzzer turns OFF. The system works well irrespective of driver wearing spectacles and under low light conditions also. During the monitoring, the system is able to decide if the eyes are closed or opened. When the eyes have been closed for too long a warning signal is issued. The ultimate goal of the system is to check the drowsiness condition of the driver. Based on the eye movements of the driver, the drowsiness is detected and according to eye blink, the alarm will be generated to alert the driver and to reduce the speed of the vehicle along with the indication of parking light.

Using eye detection, driver security and safety can be implemented in normal car also. This has the potential to save lives on the road. Long-distance lorry drivers can fall asleep by driving too long hours due to the pressures put on them to get the goods to their destination at certain times. It has the potential to keep them awake or at least to tell them when they are overtired and need to stop driving.

## Proposed System

The proposed system is built in four stages and it is applied to the Microcontroller.

1. IR LED focused to the eye.
2. Photodiode senses the reflected ray and sends a corresponding output to the Arduino.
3. The Arduino compares the output with a set threshold and determines eye status.
4. If closed eye status comes in 10 out of last 60 reading to warn the driver or to wake him.

The sensor was processed by a microcontroller and transfer to sensor-based system. The IR-Led sensor module is focused on the eye with the help of an eyeglass fixed with respect to the eye. It provides the two different level of signal from the sensor which we use to differentiate between a closed eye and open eye. The micro controller considers that the last 60 readings and if 10 of those readings indicate a closed eye then the micro controller decides that the drivers is getting drowsy an alarm is raised to warn the driver attached to the rear of the vehicle. The alarm continues for a minimum of 10 seconds and longer even until the microcontroller.

## Circuit Diagram

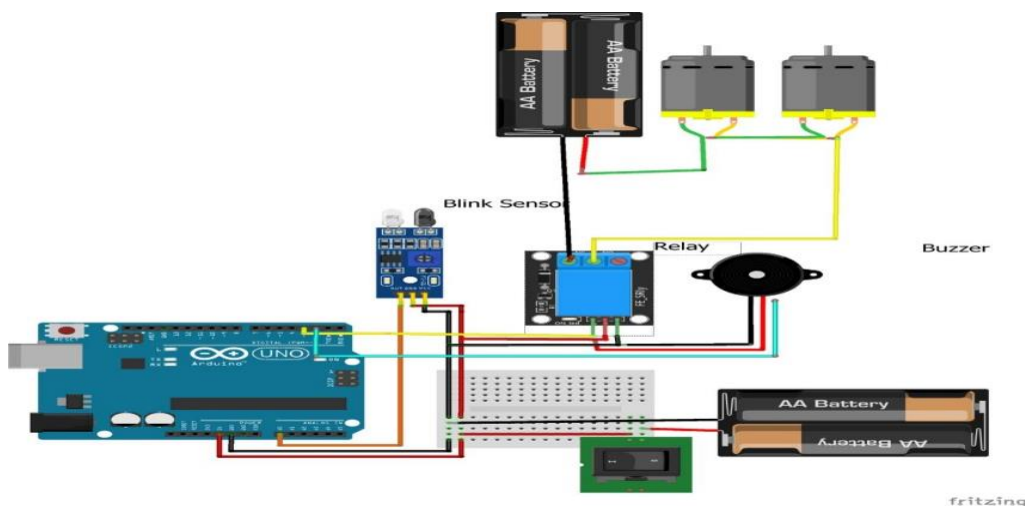


Figure 1: Proposed System

## Components Used:

**IR Sensor:** It is an electronic device used to detect some objects near-by surroundings. It detects the movement of an object. In this project we used IR Sensor as an input to detect the moment of eye-blink.

**Arduino UNO:** It is a Microcontroller board. It is used for technical support, where we dump a code into it and it works as a Controller or a Function. The operating Voltage of 5v, however the input Voltage can vary from 7 to 12v.

**Relay:** A relay module is an electronic component designed to control electrical circuits by using an electromagnetically operated switch. It acts as a bridge between low-power control signals, such as those from microcontrollers, and high-power devices like motors, lights, or appliances.

**Buzzer:** A piezo Buzzer is used to get output of the executed program and any errors occurs in process an immediate buzzer is generated.

## Advantages

The advantages of the proposed system are as follows:

- It is used to avoid the accidents.
- It is more-efficient and simple to use.
- The Device is useful especially for people who travel long distance and drive late at night.
- Using this Device helps the driver to wake up when he/she asleep while driving.
- Affordable Cost and Portable Size.

## Disadvantages

These are few drawbacks of the proposed system:

- Device may not work when the system circuitry fails.
- Yawning repeatedly or rubbing the eyes may get the circuit ON.

## Applications

There are various applications of the proposed system, some of them are as follows:

- Eyelid distance tracking to detect the Sleepiness.
- Sleepiness detection is Efficient and alarms will generate only when demanded (while in asleep).
- This can be used in high-end manufacturing cars to prevent accidents.
- Not only for Drivers but also, the device is used in number of ways like, ATM Guard Security, Military Base Security, bank Security and so on.

## **Executed Work**

The developemt of Anti-Sleep alarm system is in its final stage. About 85% of the work has been completed. Below is a list of tasks that have been completed. It clearly shows that progress wise, the project is ahead of schedule when comparing to what else is required from the project.

### **1) Connection of hardware components**

- All hardware components have been arranged and connected according to the circuit diagram. All connecting have been done using jumping wires and connecting pins to eliminate the risk of system failure due to loose wire and the connection remains stable.

### **2) Interfacing the IR Sensor**

- The IR Sensor has been successfully interfaced with the microcontroller through its VCC pin to UNO's 5V pin using the jumper wire and has been calibrated. It is fixed on one side of the glasses using M2.5 bolts to detect the blinking of the eyes and send the signal to the microcontroller.

### **3) Programming of Microcontroller**

- Microcontroller has been programmed according to the proposed methodology, as soon as IR sensor detect drowsiness , the piezo buzzer will start beeping to alert the driver. The buzzer will automatically stop as soon as driver comes in his previous state.

### **4) Connecting a DC power supply source**

- As we already know, that Arduino UNO Microcontroller needs a DC power supply to perform its various functions. A lithium ion battery has been connected for power supply to microcontroller. These batteries are rechargeable and can provide higher energy than any other batteries.

### **5) Fixing all the components on a flat surface**

- All the hardware components have been fixed on a solid cardboard surface using hot-glue. This will ensure the stability and a neat arrangement of the system.

### **6) Testing of the present model**

- Working of all the components and the present program has been tested and minor delay was found in the response which is being corrected, apart from that the system response is satisfactory.

## **Remaining Work**

Below are a list of tasks that are yet to be completed. The project is ahead of schedule which means that either more tasks can be added on or more time can be delegated to the more difficult tasks that await. It is vital that the initial objectives outlined in the brief are met first before any extra tasks are tempted, therefore it is probably best that the original development plan doesn't differ much and if time allows at the end, more features can be added to the project.

### **1) Integrating braking mechanism along with Piezo buzzer**

- Since we are making an anti-sleep alarm system for the road safety, it is essential that this system should be fullproof and well designed so that it cannot go wrong and save lives. It may be best to integrate the braking system along with the piezo buzzer so as soon as the buzzer starts beeping the braking mechanism immediately stop the vehicle to prevent any possible accident.

### **2) Re-programming the Microcontroller**

- Now that we are making an anti-sleep alarm system with an integrated braking mechanism, we need to program the Arduino UNO microcontroller accordingly. When it comes to saving lives each and every second is precious, therefore we are working on an efficient code which can integrate both buzzer and brakes simultaneously without any delay.

### **3) Developing the final project and its real-time testing**

## **Conclusion & Future Scope**

The project is ahead of schedule, all required tasks and events to date have been met on time.

The project should be finished and have a working demonstration available on time.

The ultimate goal of this system is to prevent the road accident, where the values measured in life. This system detects the drowsiness in quickly. This system which can differentiate normal eye blink and drowsiness can prevent the driver from entering the state of sleepiness while driving and create a safer driving environment.

In future, small micro camera will replace the eye sensor and will incorporate GPS module in the device to track the location of the driver. It can be added to every high-end manufacturing car to prevent accidents. Sleepiness detection is Efficient and alarms will generate only when demanded (while in asleep). Due to portable size, it can be used in different applications.

## References

- [1] C.Prabha, R.Sunitha, R.Anitha “Automatic Vehicle Accident Detection and Messaging System
- [2] Using GSM and GPS Modem”, IJAREEIE, Vol. 3, Issue 7, pp: 10723 – 10727, July 2014.
- [3] Arun Sahayadhas,KennethSundaraj, "Detecting Driver Drowsiness Based on Sensors A Review",pp.16937- 16953, ISSN 1424-8220, Malaysia
- [4] Raoul Lopes, D.J Sanghvi, Aditya Shah,"Drowsiness Detection based on Eye Movement, Yawn Detection and Head Rotation", Vol. 2, No.6,2012
- [5] Anirban dasgupta,anjith george,"A Vision Based System For Monitoring The Loss Of Attention in Automotive Drivers",IEEE Transaction, vol.14,no.4 2013..
- [6] Drowsy Driver Sleeping Device and Driver Alert System, International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064
- [7] X. Xie, R. Sudhakar and H. Zhuang, -RealTime Eye Feature Tracking from a Video Image Sequence Using Kalman Filter,IIIEEE Transactions on Systems, Man, and Cybernetics, Vol. 25,No.12, pp. 1568-1577, 1995.
- [8] [https://www.academia.edu/34469825/A\\_Survey\\_Paper\\_On\\_Drowsiness\\_Detection\\_and\\_Alarm\\_System\\_for\\_Drivers](https://www.academia.edu/34469825/A_Survey_Paper_On_Drowsiness_Detection_and_Alarm_System_for_Drivers).
- [9] D.Jayanthi, M.Bommy.: Vision-based Real-time Driver Fatigue Detection System for Efficient Vehicle Control. In: International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 - 8958, Volume-2, Issue-1, October 2012.