ANTI SLEEP ALARM FOR DRIVERS

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ABSTRACT

Nowadays, it's tough to stay active all the time because everyone's so busy. Imagine you're driving home from work, super tired after a long day. You're struggling to keep your eyes open, and suddenly you nod off at the wheel. Falling asleep while driving can be really dangerous - it could lead to accidents and even loss of life. That's why it's important to find a solution.

That's where the Anti-Sleep Alarm for Drivers comes in. It's a system that helps prevent accidents by alerting drivers when they start to doze off. It's especially useful for people who drive long distances or late at night. The system works by using special sensors that can tell when a driver is getting sleepy. When it senses this, it makes a beeping noise to wake the driver up. Once the driver is alert again, the beeping stops.

INTRODUCTION

The anti-sleep alarm can quickly detect when a driver is getting drowsy. It can tell the difference between a normal eye blink and a drowsy one, helping to prevent the driver from falling asleep while driving. The system works well even if the driver is wearing glasses or if it's dark. It monitors the driver's eyes to see if they're open or closed. If they're closed for too long, it gives a warning signal. The main aim of the system is to prevent drowsy driving. It detects drowsiness based on the driver's eye movements and sounds an alarm to wake them up. This helps reduce accidents and keeps the driver and vehicle safe.

BLOCK DIAGRAM

FUNCTIONS OF THE COMPONENTS

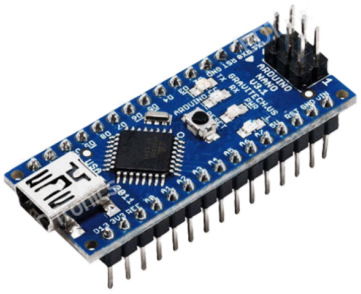
1. **Arduino Nano**: This is the brain of the system, responsible for controlling all the other components. It reads input from the Eye Blink Sensor and activates the alarm when drowsiness is detected. It also controls the timing and behavior of the alarm.

2. **Eye Blink Sensor**: This sensor detects the blinking of the driver's eyes. When the driver's eyes remain closed for an extended period, indicating drowsiness or sleep, the sensor sends a signal to the Arduino Nano to trigger the alarm.

3. **Piezo Buzzer**: The buzzer emits a loud sound when activated by the Arduino Nano. Its purpose is to alert the driver when drowsiness is detected, prompting them to wake up and regain alertness.

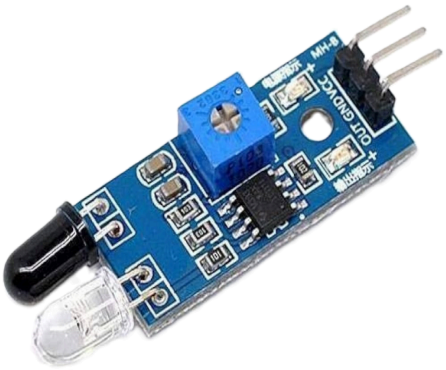
4. **Micro Vibration Motor**: This component provides a physical stimulus to the driver when drowsiness is detected. It can be placed in a location where it will vibrate against the driver's body, such as the seat or steering wheel, to further assist in waking them up.

HARDWARE COMPONENTS



Arduino Nano: The Arduino Nano, introduced in 2008, is a compact and versatile board based on the ATmega328P. It shares the same capabilities and specifications as the Arduino Uno but in a smaller size. Featuring 30 male I/O headers arranged in a DIP-30-like configuration, it can be easily programmed using the Arduino Software IDE, which is compatible with all Arduino boards and supports both online and offline usage. Power can be supplied to the Nano via a type-B mini-USB cable or a 9 V battery. Despite its smaller footprint, the Nano offers nearly identical features to the Uno, with the main differences being the absence of a DC Power Jack and the inclusion of a mini-B type USB connector. Otherwise, the Nano Provides comparable functionality to the Uno.The Nano board is designed in such a way that the pins are breadboard friendly so that you can easily mount it on one for your DIY projects.

IR Sensor: IR sensor is an electronic device that emits the light in order to sense some object of the surroundings. An IR Sensor can measure the heat of an object as well as detect the motion. Usually, in the Infrared spectrum all the objects radiate some form of thermal radiation. These types of radiation are invisible to our eyes, but infrared sensors can detect these radiations. The emitter is simply an IR LED and the detector is simply an IR photodiode. Photo diode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received. There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED's of specific wavelength used as infrared sources.



Piezo Buzzer: The piezo buzzer operates by utilizing the reverse of the piezoelectric effect, where the application of an electric potential across a piezoelectric material generates pressure variation or strain. This principle allows the buzzer to produce sound. It can be employed to alert users of events such as switching actions, counter signals, or sensor inputs, and is commonly used in alarm circuits. Regardless of the voltage variation applied, the buzzer emits a consistent noisy sound. It consists of piezo crystals sandwiched between two conductors. When an electric potential is applied, the crystals push on one conductor and pull on the other, creating a push-and-pull action that generates a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz. To connect the buzzer, the red lead is typically connected to the input, while the black lead is connected to ground.

Micro Vibration Motor: Here is the micro vibration motor, featuring two wires, red and black. The red wire signifies the positive connection, while the black wire serves as the ground connection. Operating within a voltage range of 2 to 5 volts, the motor's rated voltage is 3.7 volts, with a current rating of 0.07 amps, equivalent to 70 milliamps. Due to its small, thin wires, interfacing this motor directly with an Arduino can be challenging. Therefore, I opted to mount the vibration motor onto a small PCB board for easier integration.

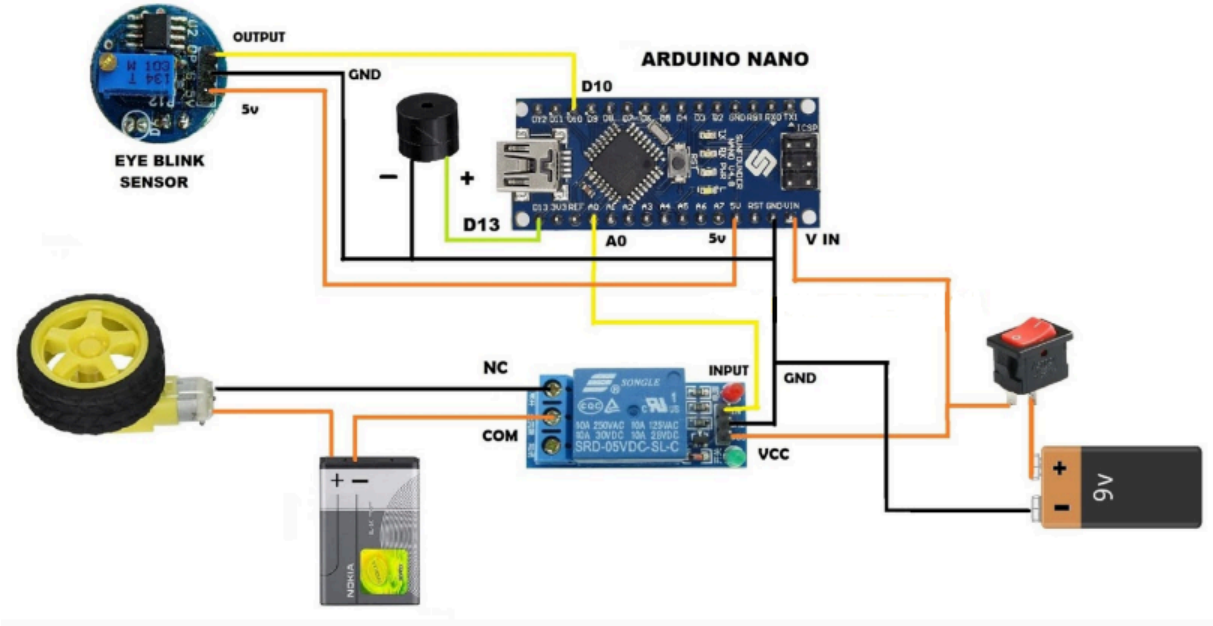
POWER SUPPLY

A 9V Battery:
The 9-volt battery is a type of electric battery designed to deliver a nominal voltage of 9 volts. Its actual voltage typically ranges from 7.2 to 9.6 volts. In this setup, we utilize a 9V battery to provide power for the operational functions.

SPST Switch:
An SPST (Single Pole Single Throw) switch is a basic two-terminal switch used to connect or disconnect one terminal from another (alternating between ON and OFF states.

PROJECT WORKING AND RESULT

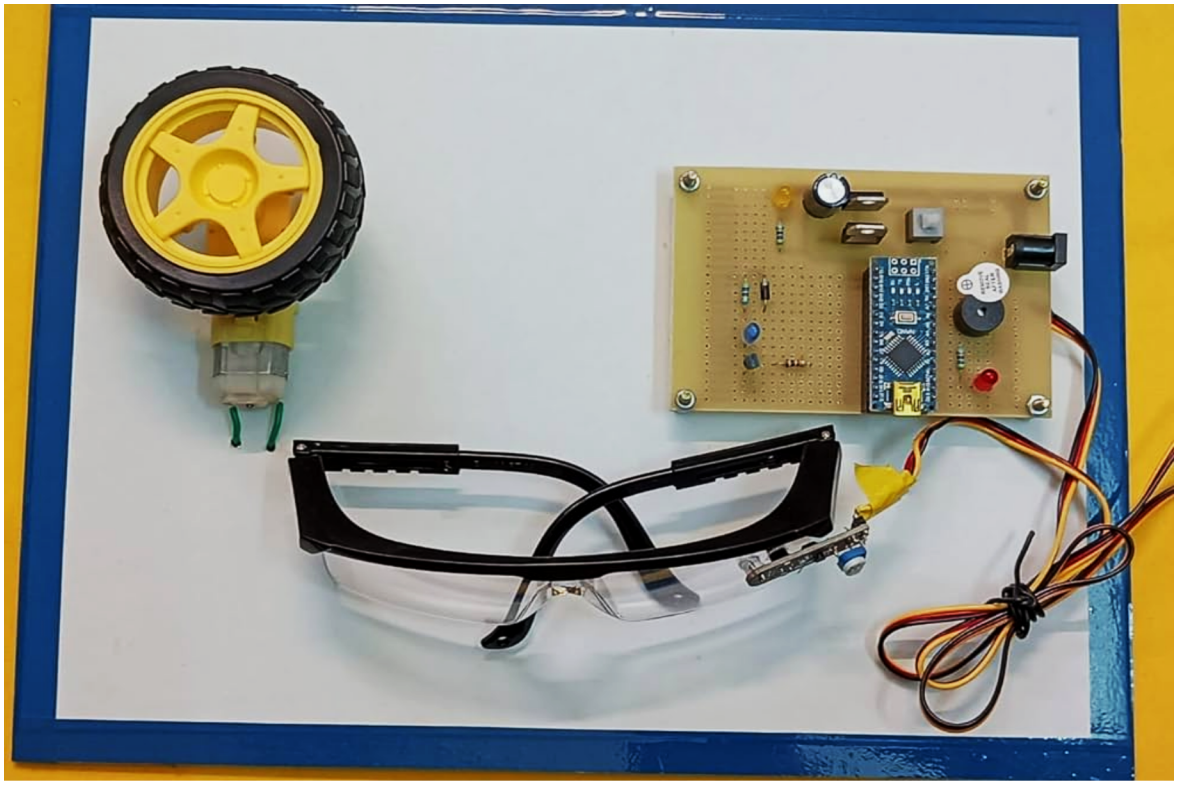
CIRCUIT DIAGRAM:



PROCEDURE:

1. All components are connected according to the circuit diagram provided above.
2. The necessary code is uploaded to the Arduino NANO using the Arduino IDE by connecting a USB cable to a laptop/computer.
3. The circuit is powered using a 9V battery.
4. An IR Sensor is employed to detect eye blinks or the closure of a person's eyes. If the eyes remain closed for a certain duration, the buzzer activates automatically.
5. The buzzer deactivates automatically when the person returns to a normal state.
6. Simultaneously, the micro vibration motor activates along with the buzzer.

RESULT:



OUTPUT

The project is used to detect the Eye-blink or closing the eyes of a person, if eyes are closed for a while. The buzzer automatically turns ON, when the person comes back to his normal State. The buzzer goes OFF.

FUTURE SCOPE

Though the prototype model worked very efficiently with remarkable output, the real life situation is going to be way more challenging and demanding. This system is an attempt to help in decreasing and/or prevent road accidents that happen due to drivers' drowsiness. Using our Anti Sleep Alarm System the drivers will be benefited and be alert while driving with a low price. We believe that our model has lots of societal impact which will reduce the accidents. In future we will use a small micro camera which will replace the eye sensor and will incorporate a GPS module in the device to track the location of the driver. Since the price is very affordable, we have a plan to market it in future. 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.

CONCLUSION

The "ANTI-SLEEP ALARM FOR DRIVERS" project has been successfully designed, tested, and a demonstration unit has been created. The project aims to develop a device that accurately detects drowsy driving and sounds alarms accordingly, with the goal of preventing drivers from falling asleep at the wheel and promoting safer driving conditions. The system utilizes an IR sensor to quickly detect drowsiness. By distinguishing between normal eye blinks and signs of drowsiness, it can help prevent drivers from reaching a sleepy state while driving. When a driver begins to fall asleep due to drowsiness, the buzzer continuously emits beeps until the driver returns to an alert state. Ultimately, the system's primary objective is to prevent road accidents, as human lives are invaluable.

ADVANTAGES

- Enhanced safety by alerting drivers of drowsiness.
- Prevention of accidents due to fatigue.
- The Device is useful especially for people who travel long distances and Drive late at night.

DISADVANTAGES

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

APPLICATIONS

1. Tracking eyelid distance to identify drowsiness.
2. Efficient detection of drowsiness ensures alarms activate only when necessary
3. Suitable for integration into high-end cars to enhance safety and prevent accidents.
4. Besides drivers, the device has diverse applications such as ATM guard security, military base security, and bank security.

REFERENCES

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