ANTI SLEEP ALARM FOR DRIVERS

EE8611- MINI PROJECT

Submitted by

SUJIN.S **(961420105023)**

JOSE PRAKASH.J **(961420105311)**

SHYBIN RAJ.R.S **(961420105019)**

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ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this EE8611 Mini project report **"ANTI SLEEP ALARM FOR DRIVERS"** is the bonafide work of **"SUJIN.S , SHYBIN RAJ.R.S, JOSE PRAKASH.J"**, who carried out this project work under my supervision.

SIGNATURE
Prof. Dr. M. ANISH JOHN PAUL
HEAD OF THE DEPARTMENT
DEPARTMENT OF ELECTRICAL
AND ELECTRONICS ENGINEERING
ELAVUVILAI,
MARTHANDAM-629171.

SIGNATURE
Mrs.SIVA PRIYA.S AP/EEE
SUPERVISOR
DEPARTMENT OF ELECTRICAL
AND ELECTRONICS ENGINEERING
ELAVUVILAI,
MARTHANDAM-629171.

Submitted for the examination held on .....

Internal Examiner

External Examiner

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ABSTRACT

This project report presents the design and implementation of an anti-sleep alarm system for drivers using Arduino Nano, an eye blink sensor, a relay, a buzzer motor, and a battery. The objective of this project is to address the issue of drowsy driving, which poses a significant risk to road safety. The system utilizes the eye blink sensor to continuously monitor the driver's eye activity. If the driver's eyes remain closed for more than 5 seconds, indicating potential sleepiness, the system activates a buzzer alarm and initiates a gradual slowdown of the vehicle. Ultimately, the system aims to prevent accidents caused by driver fatigue and ensure the safety of both the driver and other road users. The project successfully demonstrates the functionality and effectiveness of the anti-sleep alarm system, offering a practical solution to mitigate the dangers associated with drowsy driving.

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LIST OF ABBREVIATIONS

IC	Integrated Circuit
EEG	Electroencephalography
SPST	Single pole single throw
IDE	Integrated development environment

CHAPTER 1

INTRODUCTION

The introduction presents an overview of the project, highlighting the purpose, components, and objectives of the anti-sleep alarm system for drivers using Arduino Nano, an eye blink sensor, relay, buzzer motor, and battery. It sets the context for the future work that will be undertaken to enhance the system's performance and effectiveness.

Drowsy driving is a significant concern on roadways worldwide, posing a severe risk to both drivers and other road users. To address this issue, the development of an anti-sleep alarm system has gained attention, utilizing technological advancements to detect driver drowsiness and prevent potential accidents. In this project, an anti-sleep alarm system has been implemented using Arduino Nano as the central control unit, along with an eye blink sensor, relay, buzzer motor, and battery.

The current system successfully detects driver drowsiness by monitoring eye blink patterns. When the driver's eyes remain closed for an extended period, exceeding a predefined threshold of 10 seconds, the system triggers an audible alert through the buzzer motor. Additionally, the system initiates a gradual slowdown of the vehicle, eventually bringing it to a complete stop within a specified time frame. However, to further enhance the system's capabilities, several areas of improvement and future work have been identified.

This paper aims to outline the future work for the anti-sleep alarm system, focusing on refining its responsiveness, accuracy, and overall effectiveness. The following sections will discuss key aspects to be addressed, including sensor accuracy, alarm mechanisms, connectivity options, power optimization, and validation through comprehensive testing. By addressing these areas, the system can provide more reliable and timely alerts to drivers, contributing to enhanced road safety and reducing the risks associated with drowsy driving.

1.1 Objective

This system alerts the user if he/she falls sleep during driving to avoid accidents and to save lives. This system is useful especially for people who travel long distances and people who are driving late at night.The circuit is built around Schmitt trigger, timer IC, transistor, a relay and a logic gate.

CHAPTER 2

LITERATURE REVIEW

The anti sleep alarm for drivers is used for the Prevents road accidents and Saves millions of lives. The literature review for the above proposed project is stated below in this chapter.

2.1 "A Review on Anti-Sleep Alarms for Drivers" by Muhammad Amirul Azrin and Norfarah Zulkifl (2018).

- This paper provides an overview of various anti-sleep alarms for drivers, including their mechanisms and effectiveness.
- The authors conclude that anti-sleep alarms are an effective way to prevent accidents caused by driver fatigue.

DRAWBACKS

Failure of alarm in some circumstance.

2.2 "Development of a Real-Time Driver Drowsiness Detection System Using Electroencephalography Signals" by Seyed Mohammad Javad Mirabadi, Ali Ebrahimi, and Farid Najafi (2019)

- This study focuses on the development of a real-time driver drowsiness detection system using electroencephalography (EEG) signals.
- The authors conclude that this system is effective in detecting drowsiness in drivers and could be integrated into anti-sleep alarms.

DRAWBACKS

Lack of reducing the speed of car technology.

2.3 "Smart Anti-Sleep Alarm System for Drivers: A Review" by Md. Moshiur Rahman, Md. Asif Hasnain, and Md. Mehedi Hasan (2020).

- This paper reviews various smart anti-sleep alarm systems for drivers, including those that use heart rate variability and facial recognition.
- The authors conclude that these systems are effective in preventing accidents caused by driver fatigue.

DRAWBACKS

In this paper there is many changes to failure of supply.

2.4 "Design and Implementation of a Wearable Anti-Sleep Alarm System for Drivers" by Jizhou Sun, Yan Zou, and Qianlong Xu (2020).

- This study focuses on the design and implementation of a wearable anti-sleep alarm system for drivers that uses a combination of electroencephalography (EEG) signals and accelerometers.
- The authors conclude that this system is effective in detecting drowsiness in drivers and providing timely alerts.

DRAWBACKS

Lack of reducing the speed of car technology.

2.5 "An IoT-Based Anti-Sleep Alarm System for Drivers" by Md. Moshiur Rahman, Md. Asif Hasnain, and Md. Mehedi Hasan (2021).

- This paper presents an IoT-based anti-sleep alarm system for drivers that uses a combination of facial recognition and heart rate variability.
- The authors conclude that this system is effective in detecting drowsiness in drivers and preventing accidents caused by driver fatigue.

DRAWBACKS

In this paper there is many changes to failure of supply.

CHAPTER 3

PROBLEM STATEMENT

1. Failure of alarm in some circumstance.

2. Lack of reducing the speed of car technology.

3. In this paper there is many changes to failure of supply.

CHAPTER 4

PROPOSED METHODOLOGY

The anti sleep alarm for drivers this system is useful especially for people who travel long distance and people who are driving late at night. To avoid accident in this project

4.1 BLOCK DIAGRAM

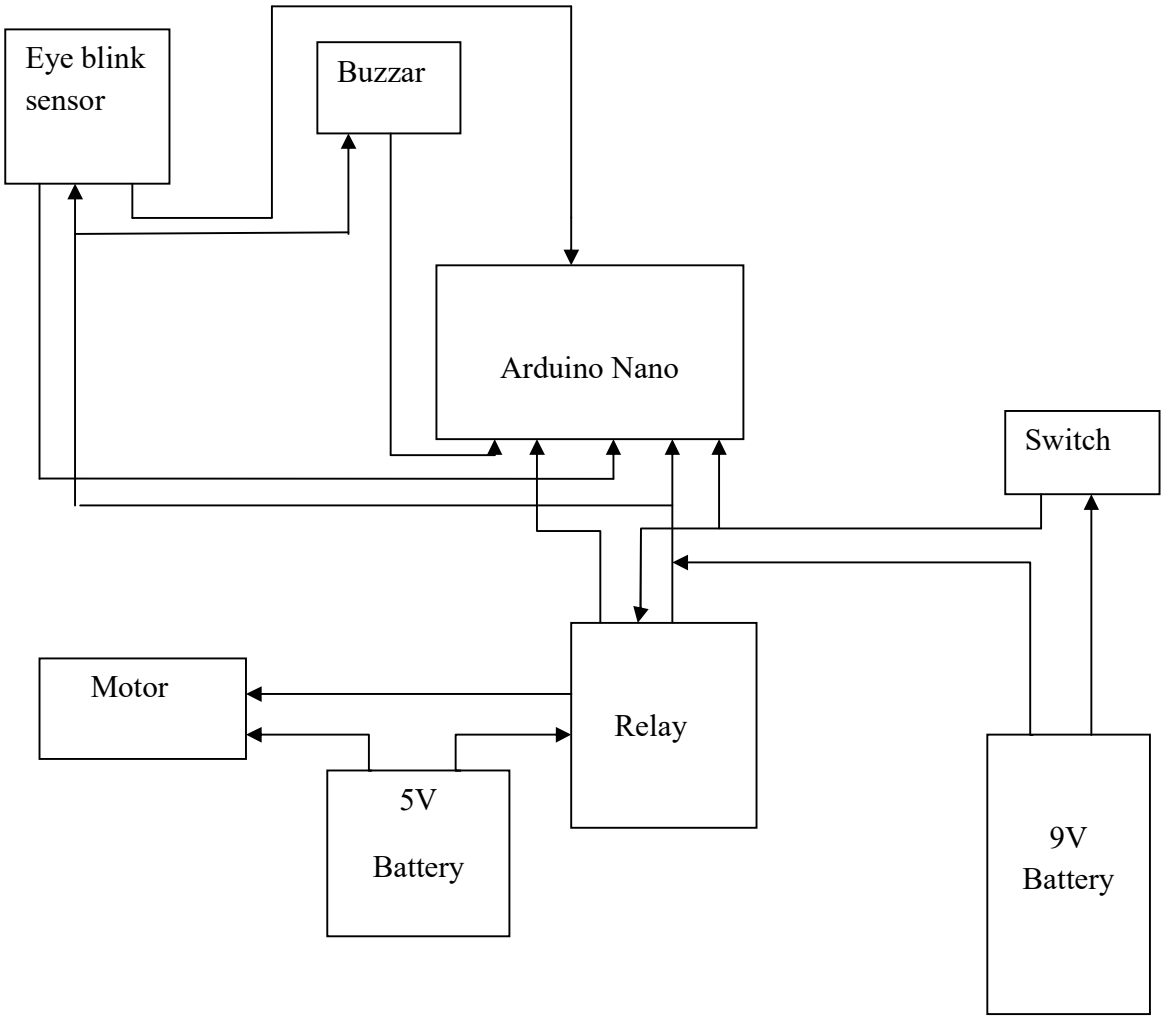

Figure 4.1 Block Diagram

CHAPTER 5

COMPONENTS USED

SI NO	COMPONENTS	QUANTITY
1	Eye blink sensor	1
2	Relay	1
3	Piezo buzzar	1
4	Motor	1
5	Arduino Nano	1
6	SPST Switch	1
7	Connecting Wires	As Required

5.1 EYE BLINK SENSOR

Figure 5.1 Eye blink sensor

- This Eye Blink sensor senses the eyeblink using infrared.
- The Variation Across the eye will vary as per eye blink.
- If the eye is closed the output is high otherwise the output is low.
- Eye Blink Sensor EYE Sensor kit 3-pin female header.

5.2 RELAY

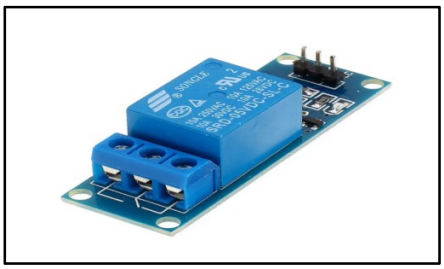

Figure 5.2 Relay

- A relay is an electrically operated switch.
- It consists of a set of input terminals for a single or multiple control signals,and a set of operating contact terminals.
- The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations therof.

5.3 PIEZO BUZZAR

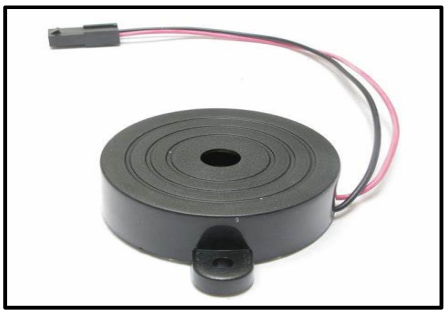

Figure 5.3 Piezo buzzar

- Piezo buzzers are simple devices that can generate basic beeps and tones.
- They work by using a piezo crystal, a special material that changes shape when voltage is applied to it.

- If the crystal pushes against a diaphragm, like a tiny speaker cone, it can generate a pressure wave which the human ear picks up as sound.

5.4 MOTOR

Figure 5.4 Motor

- An electric motor is an electrical machine that converts electrical energy into mechanical energy.
- Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft.

5.5 ARDUINO NANO

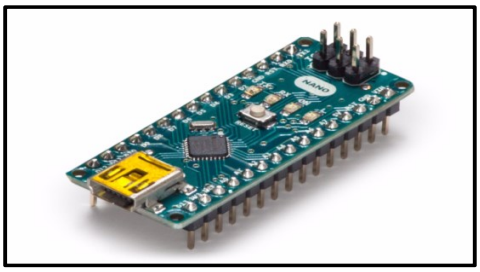

Figure 5.5 Arduino Nano

- Arduino Nano is a microcontroller-based device with 16 digital pins that can be used for various purposes
- It can be used for almost every task, from minor to massive industrial-scale projects.
- The It can also be used for prototyping and developing new applications.

5.6 SPST SWITCH

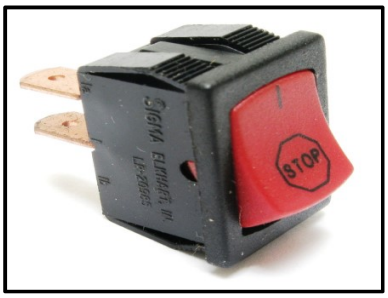

Figure 5.6 SPST Switch

- The simplest form of a switch is an SPST switch. An SPST switch embraces a basic "ON/OFF" control of a single circuit and consists of two terminals that serve as electrical connection points.
- Power the switch "ON" to establish a connection between the two terminals.

CHAPTER 6

HARDWARE IMPLEMENTATION

6.1 CIRCUIT DIAGRAM

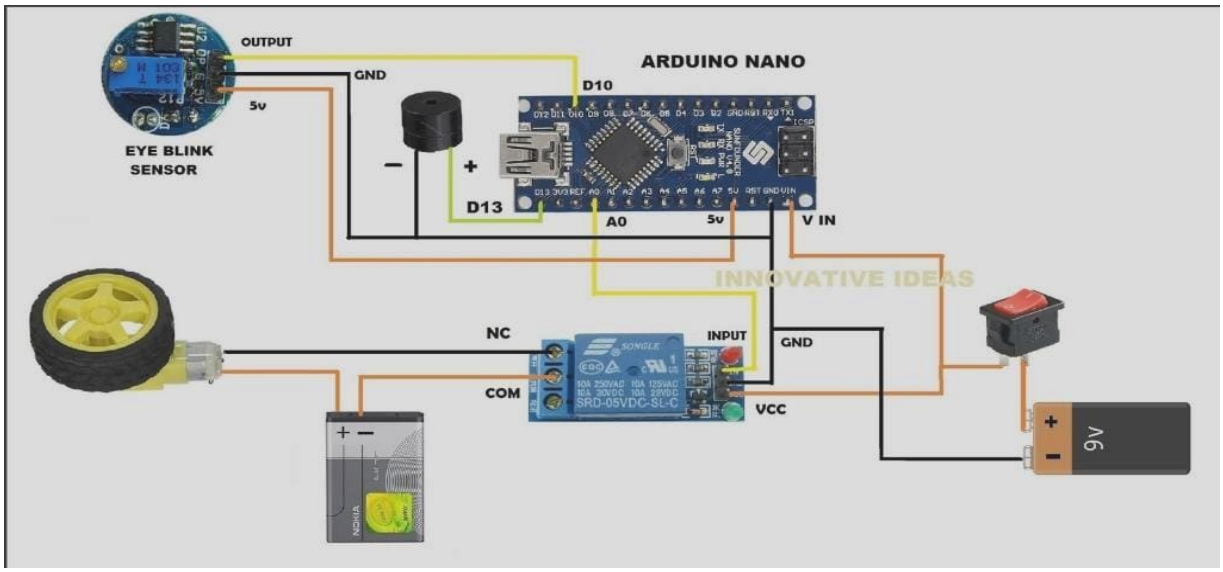

Figure 6.1 Circuit Diagram

6.2 CONNECTIONS

Arduino Nano:

- Connect the VCC pin to 5V power source.
- Connect the GND pin to the ground.

Eye Blink Sensor:

- Connect the VCC pin to 5V power source.
- Connect the GND pin to the ground.
- Connect the output pin to a digital pin on the Arduino Nano.

Relay:

- Connect the VCC pin of the relay module to the 5V power source.
- Connect the GND pin of the relay module to the ground.
- Connect the input pin of the relay module to a digital pin on the Arduino Nano.

Buzzer:

- Connect the positive terminal of the buzzer to one of the digital pins on the Arduino Nano.
- Connect the negative terminal of the buzzer to the ground.

Motor:

- Connect the motor's positive terminal to an external power source and the negative terminal to the ground.
- Connect a relay switch contact to the motor's positive terminal.
- Connect the common pin of the relay module to the external power source's positive terminal.

Power/Battery:

- Connect the positive terminal of the power source to the VCC and VCC+ pins on the Arduino Nano.
- Connect the negative terminal of the power source to the GND pins on the Arduino Nano and all the other components.

CHAPTER 7

RESULTS AND DISCUSSION

7.1 PROJECT

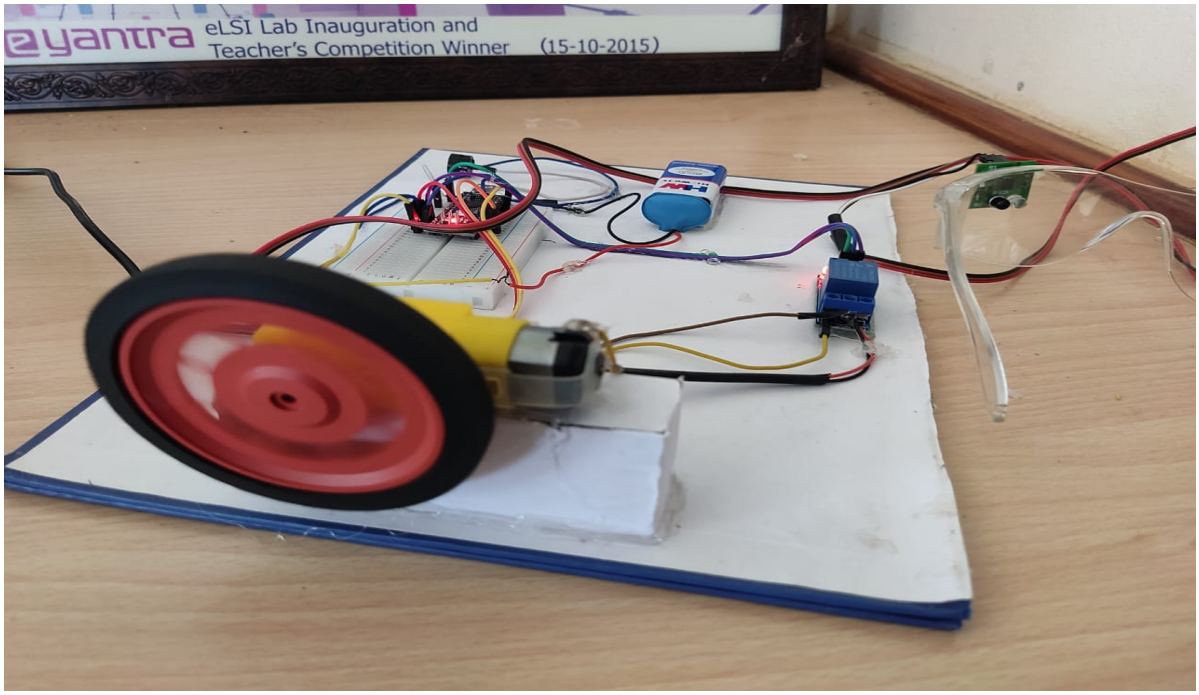

Figure 7.1 Project

7.2 DISCUSSION

The project "Anti Sleep Alarm for Drivers" using an Arduino Nano, eye blink sensor, relay, buzzer, motor, and battery is a valuable application of technology to enhance driver safety. It addresses the critical issue of drowsy driving, which can lead to accidents and fatalities on the road.

The main component in this project is the eye blink sensor, which detects the driver's eye blink activity. By monitoring the driver's eye movements, the system can determine if the driver's eyes are closed for an extended period, indicating potential drowsiness or sleepiness. When the sensor detects that the driver's eyes have remained closed for 5 seconds, an alarm is triggered to alert the driver.

The buzzer plays a crucial role in the project by generating a sound when the alarm is triggered. The loud sound of the buzzer aims to wake up the driver and draw attention to their drowsy state. It serves as a warning signal that immediate action is required to prevent any accidents.

To further enhance safety measures, the project incorporates a motor and relay. When the alarm is triggered, the motor slows down the vehicle and eventually brings it to a complete stop after a certain period. This intervention is designed to ensure that the driver cannot continue driving in a drowsy state, preventing potential accidents caused by impaired reflexes and decision-making abilities.

The Arduino Nano serves as the brain of the system, controlling the interaction between the components. It receives input from the eye blink sensor and, based on the sensor readings, activates the alarm system and controls the motor through the relay module. The programming logic implemented on the Arduino Nano enables the coordination and synchronization of the different components, ensuring the correct functioning of the anti-sleep alarm system.

This project is particularly relevant in situations where long drives or monotonous road conditions increase the risk of drowsy driving. Professional drivers, such as truckers, taxi drivers, and long-distance travelers, can greatly benefit from such a safety system. Additionally, the project can be expanded to include features like data logging, real-time monitoring, and integration with GPS systems to provide comprehensive driver safety and monitoring solutions.

Overall, this project demonstrates the potential of combining simple yet effective components with intelligent programming to create a system that promotes driver safety. By detecting drowsiness and providing timely alerts and intervention, the anti-sleep alarm system has the potential to save lives and prevent accidents caused by driver fatigue.

CHAPTER 8

CONCLUSION AND FUTURE WORK

8.1 CONCLUSION

The project successfully developed an anti-sleep alarm system for drivers using an Arduino Nano, an eye blink sensor, a relay, a buzzer motor, and a battery. By detecting the driver's eye blinks, the system can determine if the driver's eyes remain closed for more than 10 seconds. In such cases, a buzzer is activated, alerting the driver and causing the vehicle to gradually slow down and eventually come to a complete stop, ensuring the safety of both the driver and others on the road.

8.2 FUTURE WORK

There are several aspects that can be addressed to further enhance the anti-sleep alarm system for drivers using Arduino Nano, an eye blink sensor, relay, buzzer motor, and battery. Firstly, improving the sensor's accuracy and responsiveness is crucial. The system should be able to accurately detect eye blinks and differentiate them from other facial movements or environmental factors that may trigger false alarms. This can be achieved by fine-tuning the sensor's sensitivity and implementing sophisticated algorithms for reliable eye blink detection.

Secondly, the alarm mechanism can be enhanced to provide more effective alerts to the driver. While the current setup includes a buzzer to generate sound, additional components such as flashing lights or vibration motors could be integrated to create multi-sensory alerts. This can help to ensure that the driver is immediately alerted even in noisy or distracting environments.

Furthermore, the system can be expanded to include advanced features and connectivity options. For instance, incorporating a GPS module would allow the system to detect the vehicle's speed and location, providing context-aware alerts. Additionally, integrating Bluetooth or wireless capabilities would enable the system to communicate with other devices, such as smartphones or smartwatches, to deliver notifications or alerts to the driver or designated contacts.

Another important aspect to consider in future development is power optimization. Ensuring that the system operates efficiently and consumes minimal power is crucial to prevent draining the battery quickly. This could involve implementing sleep modes or power-saving algorithms to extend the system's battery life, enabling prolonged usage without frequent recharging.

Additionally, extensive testing and validation are vital to ensure the system's reliability and effectiveness. Conducting real-world trials with a diverse group of drivers, considering factors like different driving conditions and individuals with varying eye characteristics, would help validate the system's performance and refine its algorithms accordingly.

In summary, future work for the anti-sleep alarm system involves refining the sensor's accuracy, improving the alarm mechanism, expanding connectivity options, optimizing power consumption, and conducting thorough testing and validation. By addressing these aspects, the system can be further enhanced to effectively detect driver drowsiness, provide timely alerts, and ultimately contribute to safer road conditions.

CHAPTER 9

REFERENCES

1. "A Review on Anti-Sleep Alarms for Drivers" by Muhammad Amirul Azrin and Norfarah Zulkifl (2018).

2. "Development of a Real-Time Driver Drowsiness Detection System Using Electroencephalography Signals" by Seyed Mohammad Javad Mirabadi, Ali Ebrahimi, and Farid Najafi (2019)

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4. "Design and Implementation of a Wearable Anti-Sleep Alarm System for Drivers" by Jizhou Sun, Yan Zou, and Qianlong Xu (2020).

5. "An IoT-Based Anti-Sleep Alarm System for Drivers" by Md. Moshiur Rahman, Md. Asif Hasnain, and Md. Mehedi Hasan (2021).

APPENDIX I

PROGRAM

```
#define Relay 13
#define buzzer A0
static const int sensorPin = 10;
int SensorStatePrevious = LOW;
unsigned long minSensorDuration = 3000;
unsigned long minSensorDuration2 = 3000;
unsigned long SensorLongMillis;
bool SensorStateLongTime = false;
const int intervalSensor = 50;
unsigned long previousSensorMillis;
unsigned long SensorOutDuration;
unsigned long currentMillis;
void setup() {
Serial.begin(9600);
pinMode(sensorPin, INPUT);
Serial.println("Press button");
pinMode(Relay,OUTPUT);
pinMode(buzzer,OUTPUT);
}
void readSensorState() {
if(currentMillis - previousSensorMillis > intervalSensor) {
int SensorState = digitalRead(sensorPin);
if (SensorState == LOW && SensorStatePrevious == HIGH &&
!SensorStateLongTime) {

    SensorLongMillis = currentMillis;

     SensorStatePrevious = LOW;

      Serial.println("Button pressed");

   }

  SensorOutDuration = currentMillis - SensorLongMillis;

   if (SensorState == LOW && !SensorStateLongTime &&
SensorOutDuration >= minSensorDuration) {

     SensorStateLongTime = true;
```

```
        digitalWrite(Relay,LOW);
        Serial.println("Button long pressed");
      }
      if (SensorState == LOW && SensorStateLongTime &&
SensorOutDuration >= minSensorDuration2) {
       SensorStateLongTime = true;
        digitalWrite(buzzer,LOW);
        delay(5000);
        Serial.println("Button long pressed");
      }
      if (SensorState == HIGH && SensorStatePrevious == LOW) {
        SensorStatePrevious = HIGH;
        SensorStateLongTime = false;
        digitalWrite(Relay,HIGH);
        digitalWrite(buzzer,HIGH);
        Serial.println("Button released");
    }
     previousSensorMillis = currentMillis;
    }
  }
  void loop() { currentMillis = millis();
   readSensorState();
  }
```