ENGINEERING CLINICS-II

(ECS3001)

“LAB REPORT”

ANTI-SLEEP ALRAM FOR DRIVERS

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ANTI-SLEEP ALRAM FOR DRIVERS

ABSTRACT:

Our ideology presents a novel approach to address the critical issue of driver fatigue and its implications for road safety. The proposed system utilizes a combination of sensing technology and automated alert mechanisms to detect drowsiness in drivers and prevent potential accidents. Through comprehensive experimentation and analysis, the effectiveness of the system in mitigating the risks associated with driver drowsiness is evaluated, offering insights into its potential application in real-world scenarios.

INTRODUCTION:

Driving when you're really tired is super dangerous and causes a lot of accidents and even deaths. The usual ways we try to avoid it aren't always enough. So, this project is about making a special alarm for cars that can tell if the driver is getting too tired and wake them up if they are, so they can stay safe on the road. It'll use sensors and smart tech to watch how the driver is doing and give a warning if they need to take a break, making driving safer for everyone.

OBJECTIVE:

The main objective of the project is to enhance road safety by developing and implementing a reliable system that can detect driver fatigue and prevent accidents caused by drowsy driving.

COMPONENTS:

1. Arduino Uno
2. IR Goggles
3. LCD Screen
4. Mini Buzzer
5. Motor and Wheel (As Vehicle)
6. Jumper Wires.

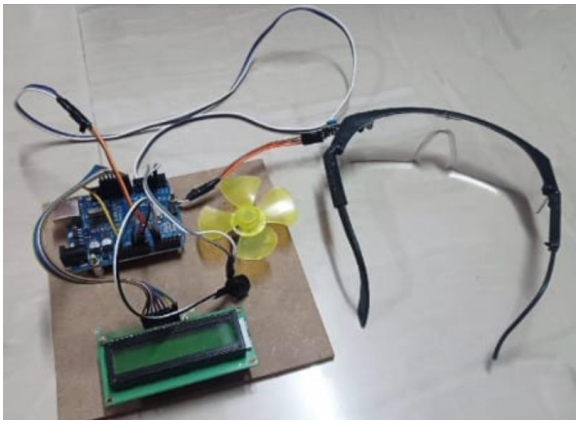
INTEGRATING COMPONENTS:

The successful implementation of the project involved several key components and their integration. Here is a detailed overview:

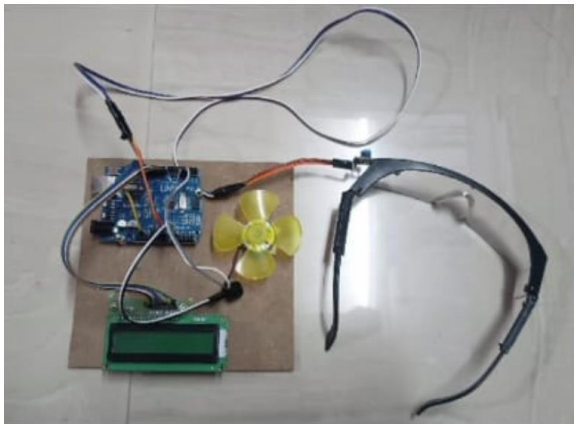
1. **IR Goggles:** The IR goggles were used to detect the blinking frequency of the driver's eyes, which is a key indicator of drowsiness. These goggles were connected to the Arduino board.
2. **Arduino Board:** The Arduino board served as the central control unit for the entire system. It received input from the IR goggles regarding the blinking frequency and processed this information to determine the driver's level of drowsiness.
3. **LCD Screen:** The Arduino board controlled the LCD screen, which was used to display messages and countdowns. This provided feedback to the driver about their drowsiness level and alerted them when intervention was required.

4. **Buzzer:** An audible alert system was implemented using a buzzer connected to the Arduino board. When the system detected that the driver was too drowsy, the buzzer would sound to alert them.
5. **Motor and Wheel:** To simulate vehicle movement, a motor was linked to a wheel. The Arduino board controlled the motor, causing the wheel to spin when the system detected drowsiness. This simulated the effect of the vehicle moving, prompting the driver to react.
6. **Integration:** All these components were intricately linked and synchronized to ensure seamless operation. The Arduino board served as the hub, receiving inputs from the IR goggles, processing the data, and controlling the output devices (LCD screen, buzzer, motor) accordingly.

Overall, the integration of these components allowed the system to effectively detect driver drowsiness and provide timely alerts, enhancing road safety.



5.1 Overall view of the project 1



5.2 Overall view of the project 2

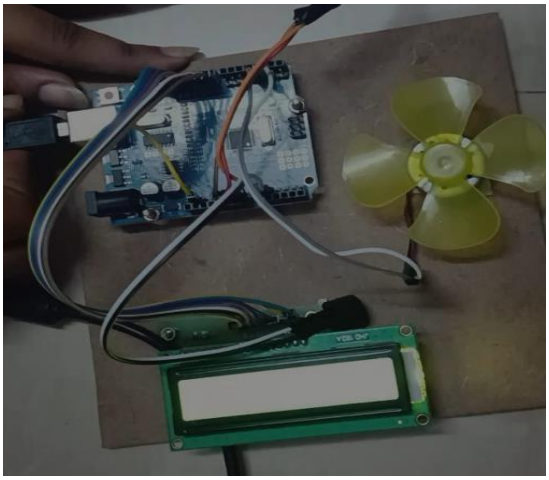
WORKING FLOW:

Here is a detailed working flow of the system:

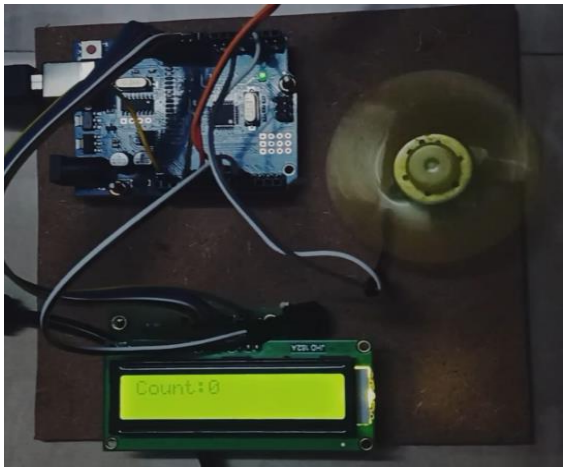
1. **IR Goggles Detection:**
    - The IR goggles detect the blinking frequency of the driver's eyes.
    - The IR sensor sends signals to the Arduino board indicating the blinking frequency.
2. **Arduino Processing:**
    - The Arduino board receives the signals from the IR sensor.
    - It calculates the blinking frequency based on the received signals.
3. **Timer Start:**
    - Once the Arduino detects the blinking frequency, it starts a timer.
4. **LCD Screen Display:**
    - The LCD screen displays a welcome message and starts counting seconds from 0.
5. **Drowsiness Detection:**
    - If the blinking frequency exceeds a certain threshold (e.g., 5 seconds between blinks), the Arduino determines that the driver is drowsy.
6. **Buzzer Activation:**
    - When drowsiness is detected, the buzzer starts sounding at a low volume initially.

7. **Volume Increase:**
    - If the driver remains drowsy for a prolonged period (e.g., more than 10 seconds), the volume of the buzzer gradually increases to alert the driver more effectively.
8. **Vehicle Stop:**
    - If the driver continues to be drowsy and does not respond to the buzzer, the Arduino sends a signal to stop the vehicle automatically.
9. **Reset:**
    - Once the driver responds to the alert by blinking or moving, the system resets. The LCD screen stops counting, and the buzzer stops sounding.

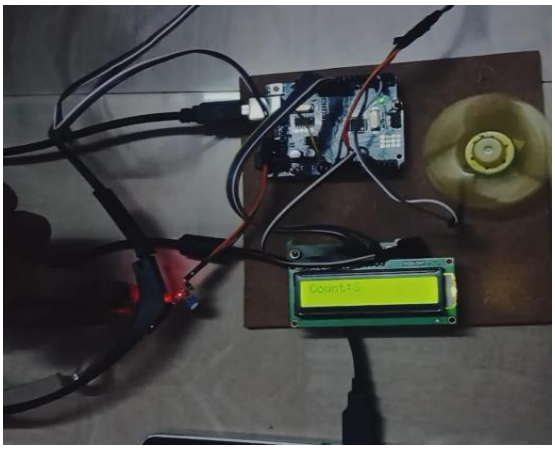
This flow ensures that the system effectively detects drowsiness and alerts the driver, ultimately enhancing road safety by preventing accidents due to drowsy driving.



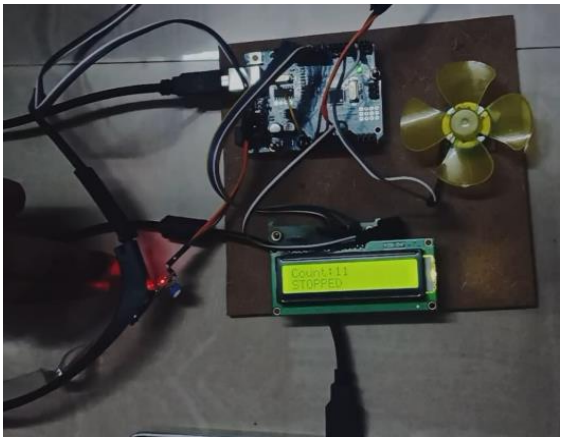
6.1 Step-1:Arduino board is connected to power source(here it is connected to laptop)



6.2 Step-2:Count gets started once the driver closes his/her eyes



6.3 Step-3:Buzzer starts to blow after 'five' Seconds the driver is in eyes closed position (beeps with increasing sound)



6.4 Step-4:Vehicle comes into halt after 'ten' seconds if the driver is still in eyes closed position

CODE:

In this project, we have used the C++ language. The code was installed in the Arduino

```
#include <LiquidCrystal.h>
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 = 12, d7 = 13;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
#define buz A1
#define es A0
#define mt 2
int tm=0;
void setup() {

  Serial.begin(9600);

  pinMode(buz,OUTPUT);
  lcd.begin(16,2);
  lcd.clear();
  lcd.print("WELCOME");

   pinMode(mt,OUTPUT);
   pinMode(3,OUTPUT);

  digitalWrite(buz,0);

  delay(1000);
  digitalWrite(mt,1);
  digitalWrite(3,0);
}

void loop() {

int ev=1-digitalRead(es);


if(ev==0)
{
  tm=tm+1;
}
else
tm=0;

lcd.clear() ;
lcd.print("Count:"+String(tm));
if(tm>5)
{

  digitalWrite(buz,1);

  delay(200);
  digitalWrite(buz,0);

}

if(tm>8)
```

```
{

  digitalWrite(buz,1);

  delay(200);
  digitalWrite(buz,0);

}

if(tm>10)
{
  digitalWrite(buz,1);

   digitalWrite(mt,0);

 lcd.setCursor(0,1) ;
lcd.print("STOPPED");
  while(1);
}

delay(300);
}
```

TEST CASES:

Test Case ID	Description	Expected Output	Actual Output	Status (Pass/Fail)
TC1	Driver's eyes open throughout	LCD shows "Count: 0" continuously	Same as expected	Pass
TC2	Driver's eyes closed for 3 seconds	LCD updates count to "Count: 3"	Same as expected	Pass
TC3	Driver's eyes closed for 6 seconds	Buzzer beeps, LCD shows "Count: 6"	Same as expected	Pass
TC4	Driver's eyes closed for 10 seconds	Vehicle stops, LCD shows "STOPPED"	Same as expected	Pass
TC5	Driver's eyes closed intermittently	Count resets when eyes reopen	Same as expected	Pass

PARAMETERS:

1. **Blinking Frequency Threshold:** This parameter sets the threshold for the number of blinks per minute that is considered indicative of fatigue. It helps in distinguishing normal blinking from fatigue-related blinking patterns.

2. **Monitoring Duration:** This parameter defines the duration for which the system continuously monitors the driver's blinking patterns. It could be set to, for example, 30 minutes, after which the system might alert the driver or take other actions if fatigue is detected.
3. **Alarm Duration:** If the system detects that the driver's blinking frequency exceeds the threshold for a specified duration, it triggers an alarm. The alarm duration parameter sets how long the alarm should sound or remain active to alert the driver.
4. **Action on Engine:** This parameter defines what action the system should take when fatigue is detected. For instance, it could suggest a break, reduce the vehicle's speed, or issue a warning to the driver.
5. **Response Time:** This refers to the time taken by the system to detect fatigue once it occurs. A shorter response time is crucial for timely intervention to prevent accidents.
6. **Reliability and Accuracy:** These parameters assess how well the system performs in detecting fatigue accurately. Reliability indicates the system's ability to consistently detect fatigue, while accuracy reflects how often the system correctly identifies fatigue and avoids false alarms.

These parameters collectively contribute to the effectiveness of a fatigue monitoring system in ensuring driver safety.

SIGNIFICANCE:

1. **Real-time Drowsiness Detection:** By continuously monitoring driver behavior, such as blinking patterns or head movements, the system can detect signs of drowsiness as they occur. This real-time detection allows for immediate intervention, such as alerting the driver or triggering a safety feature, reducing the risk of accidents.
2. **Accident Prevention:** By alerting drivers before they reach a critical level of drowsiness, the system helps prevent accidents. This early warning can prompt the driver to take a break, change their driving behavior, or seek help, reducing the likelihood of an accident due to drowsiness.
3. **Driver Awareness Enhancement:** The system raises driver awareness by actively monitoring signs of drowsiness and providing timely alerts. This can help drivers better understand their own fatigue levels and take proactive steps to avoid driving when they are too tired.
4. **Regulatory Compliance Assurance**: Many regions have regulations in place aimed at addressing drowsy driving. Implementing a drowsiness detection system can help ensure compliance with these regulations, reinforcing a culture of safety and responsibility among drivers and vehicle operators.
5. **Economic Burden Reduction:** Road accidents due to drowsy driving can have significant economic costs, including medical expenses, vehicle repairs, and lost productivity. By mitigating the frequency and severity of accidents, a drowsiness detection system can help reduce these economic burdens.
6. **Technological Innovation Showcase:** Implementing a drowsiness detection system showcases the transformative potential of technology in improving road safety and enhancing the quality of life. It demonstrates how advanced technologies can be used to address complex challenges and make a positive impact on society.

Overall, these points highlight the multifaceted benefits of implementing a drowsiness detection system, ranging from immediate safety improvements to broader societal impacts.

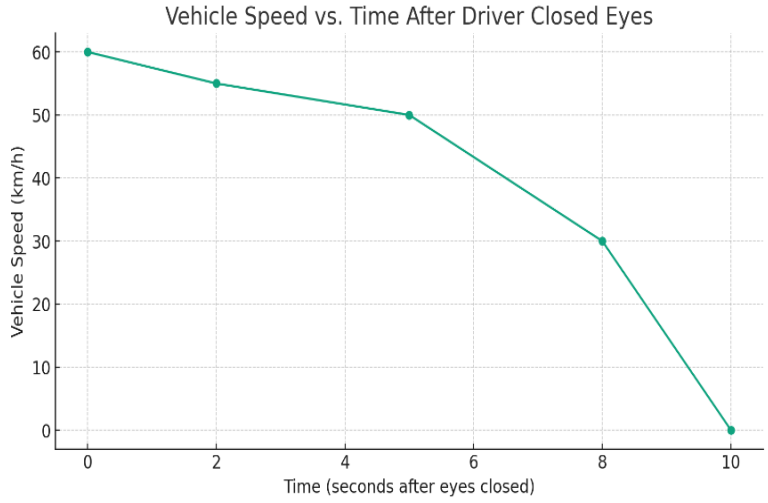
APPLICATIONS:

1. **Road Safety Enhancement:** The primary application is to enhance road safety by preventing accidents caused by drowsy driving. The system can detect driver fatigue and alert the driver, reducing the risk of accidents.
2. **Commercial Vehicles:** The system can be especially useful for commercial vehicles, such as trucks and buses, where long hours of driving increase the risk of driver fatigue. Implementing this system can help prevent accidents and protect both the driver and other road users.
3. **Personal Vehicles:** The system can also be used in personal vehicles to prevent accidents due to drowsy driving. It provides an added layer of safety, especially during long drives or late-night journeys.
4. **Fleet Management:** For companies managing a fleet of vehicles, this system can be integrated into their fleet management systems. It can provide real-time alerts and data on driver fatigue, helping them monitor and manage driver safety more effectively.
5. **Research and Development:** The project can also be used for research and development purposes, to further improve the technology and explore other applications in the field of driver safety and vehicle automation.

Overall, the applications of this project are aimed at improving road safety and reducing accidents caused by drowsy driving, benefiting both individual drivers and the larger community.

RESULTS:

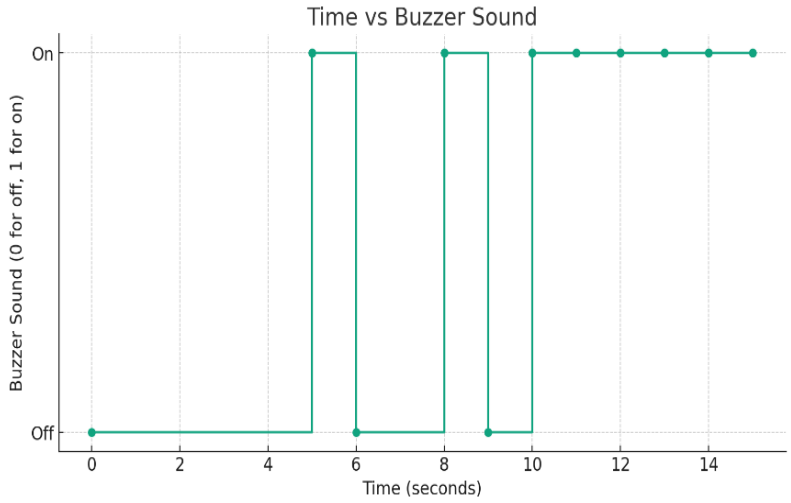
Graph 1: Vehicle Speed vs Time After Driver Closed Eyes



Time (seconds after eyes closed)	Vehicle Speed (km/h)
0	60
2	55
5	50
8	30
10	0

For this graph, we'll assume that the vehicle gradually reduces speed as time progresses after the driver's eyes close, eventually stopping.

Graph 2: Time vs Buzzer Sound



Time (seconds)	Buzzer Sound (0 for off, 1 for on)
0	0
5	1
6	0
8	1
9	0
10	1
11	1
12	1
13	1
14	1
15	1

Here, the buzzer's sound is activated intermittently as a warning before the vehicle stops. We'll assume the buzzer sounds briefly at critical times.

CONCLUSION:

In conclusion, our Anti-Sleep Alarm for Drivers project represents a significant step towards enhancing road safety through innovative technological solutions. By effectively detecting and addressing driver drowsiness, we have contributed to the prevention of accidents and the preservation of lives on the road. Through diligent integration of components and a clear focus on our objectives, we have created a functional prototype with promising implications for the future of driver safety.

FUTURE SCOPE:

1. **Implement machine learning algorithms for more accurate drowsiness detection:** Machine learning algorithms can be trained on large datasets of driver behavior to better understand patterns associated with drowsiness. These algorithms can then be used to classify driver state based on real-time data, such as blinking patterns, head movements, and facial expressions. By leveraging machine learning, the system can achieve higher accuracy in detecting drowsiness compared to traditional rule-based approaches.
2. **Integrate GPS for location-based alert mechanisms:** GPS integration can enhance the system by incorporating location-based information into the alert mechanism. For example, the system can use GPS data to determine if the vehicle is approaching a known rest area or exit where the driver can take a break. This information can be used to provide more relevant and timely alerts, such as suggesting a rest stop when drowsiness is detected.
3**. Enhance the system to provide real-time monitoring and data logging:** Real-time monitoring allows the system to continuously track driver behavior and provide immediate alerts when drowsiness is detected. Additionally, data logging can capture information about drowsiness events, including the driver's behavior leading up to the event and the system's response. This data can be valuable for analyzing trends, improving algorithm performance, and providing feedback to drivers and fleet operators.

By implementing these enhancements, a drowsiness detection system can become more accurate, responsive, and informative, ultimately improving driver safety and reducing the risk of accidents due to drowsy driving.