Eye Protecting Automated System

Project Final Report

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1.Abstract

This system is designed for protect your eye from the long working sessions and make the best lighting environment for the person how to stay in the room and can change it according to persons mod.

2.Introduction

Form my project, I Made an automated light system that can protect your eyes from using a computer or tv in the dark and make you comfortable while reading or writing for a long period. And its gives you a confutable sleeping session Also, you don't need to worry about turning on the light or turning off the light anymore. This will be cheaper than other options in the market right now.

Eye strain is basically fatigue of the muscles in your eyes. Just like any other muscle in your body becomes tired after a strenuous workout, your eye muscles can be strained and exhausted from overuse. That is what is happening when you experience symptoms like:

- Dry, irritated eyes
- Headaches
- Feeling of pressure behind your eyes
- And blurry vision

This kind of issues can be prevented from this system.

Advantages From This product

- Save Eye health
- Low cost save money
- No need to involve to control
- Save privacy not like amazon Alexa
- Easy to control

Features of this Products

- Voice Control
- Deferent Modes for Deferent Situations
- Keep a constant light brightness in the room
- Automatically turn off when lightings are enough at the room

3. Methodology

3.1. Concepts and Theories

Sleeping

specialized photosensitive cells known as ipRGC's are positioned in the retina of our eyes. these cells are capable of detect any light and send messages to part of the brain that helps modify the body's circadian clock. that is the body's master clock that facilitates determine while human beings feel sleepy and unsleeping. these ipRGC cells are most touchy to blue wavelengths of light and least sensitive to purple wavelengths.

Reading

The exceptional coloration of mild for studying at night time is 3000K; it's far a shade temperature that has a warm tone or a yellowish shade. it's far the maximum suitable color for night studying at the bed and snoozing. It's easy-on-the-eyes and doesn't cause eye strain or strain.

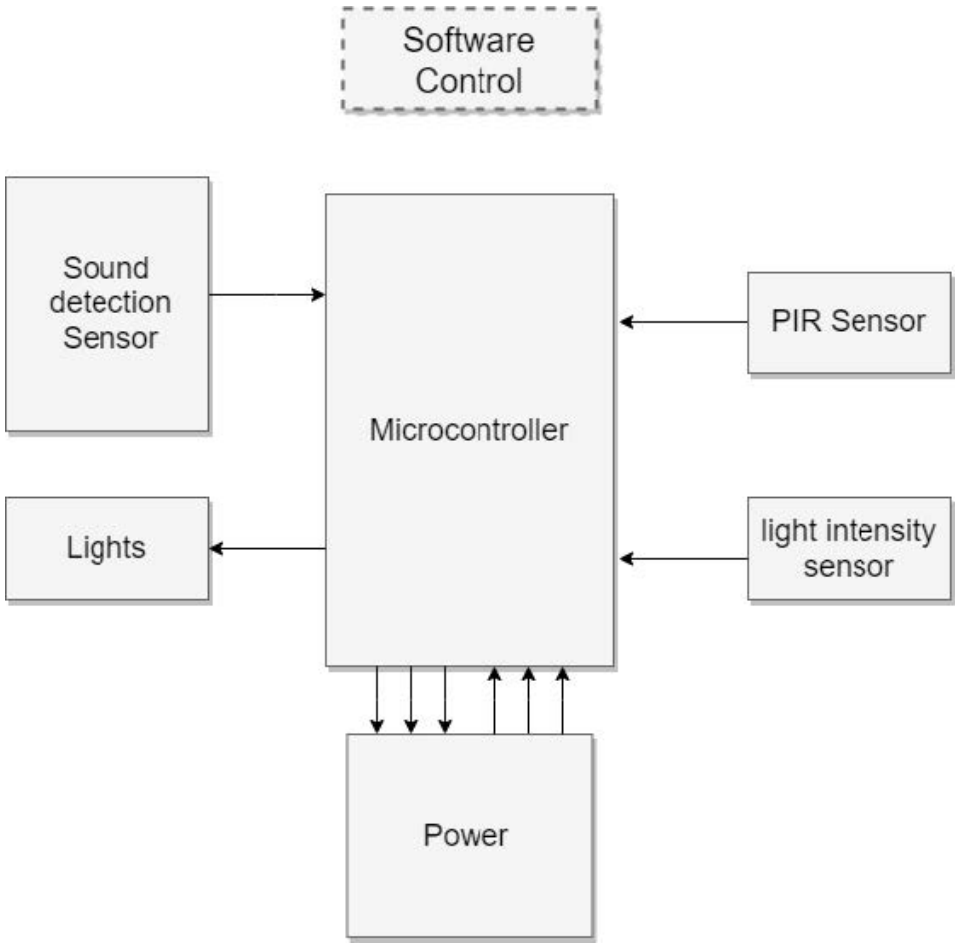
Working

The shade temperature describes how the light seems when the human eye appears without delay on the illuminated bulb.Bulbs with shade temperatures of approximately 2700K seem yellowish white. as the colour temperature increases to 3000K and 3500K, the coloration starts offevolved to appear much less yellow and whiter. shade temperatures above 5000K seem more bluish white.

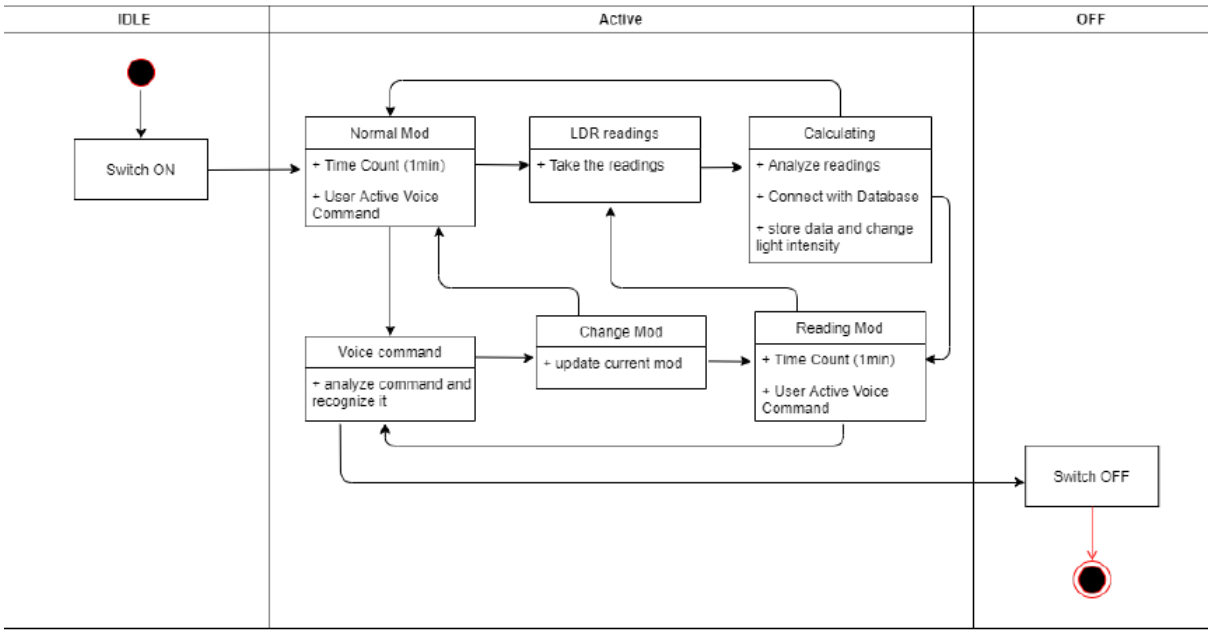
In popular, warmer yellow or orange lights tend to be higher for relaxing, whereas cooler blue and white lighting fixtures are excellent for working, waking up, and concentrating. If viable, the lighting temperature and color must range based at the time of day. inside the morning, light should preferably be brighter and cooler, to help employees live alert and concentrate. because the day goes on, the lights need to be warmer, supporting employees to wind down.

3.2 Design methodology

Component Diagram



Activity Diagram



3.3. Selecting of apparatus

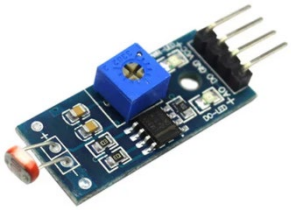
- Arduino uno
- LDR Module
- Sound Sensor Module
- PIR sensor
- RGB Light

Above listing of equipment had been decided on for growing this system however due to a few inconveniences of obtaining a few components and the prize hype, handiest the list of kit shown in the segment 4.3 changed into used with a view to version the device.

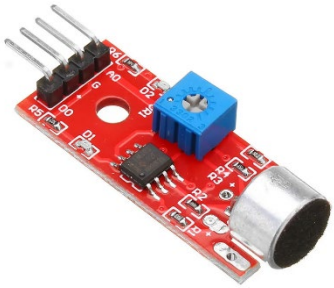
3.4. Used apparatus

01. Arduino Uno

02.4pin Photoresistor, LDR Module



03.KY-037 4pin voice sound Detection Sensor Module



04.LED - RGB Clear Common Cathode

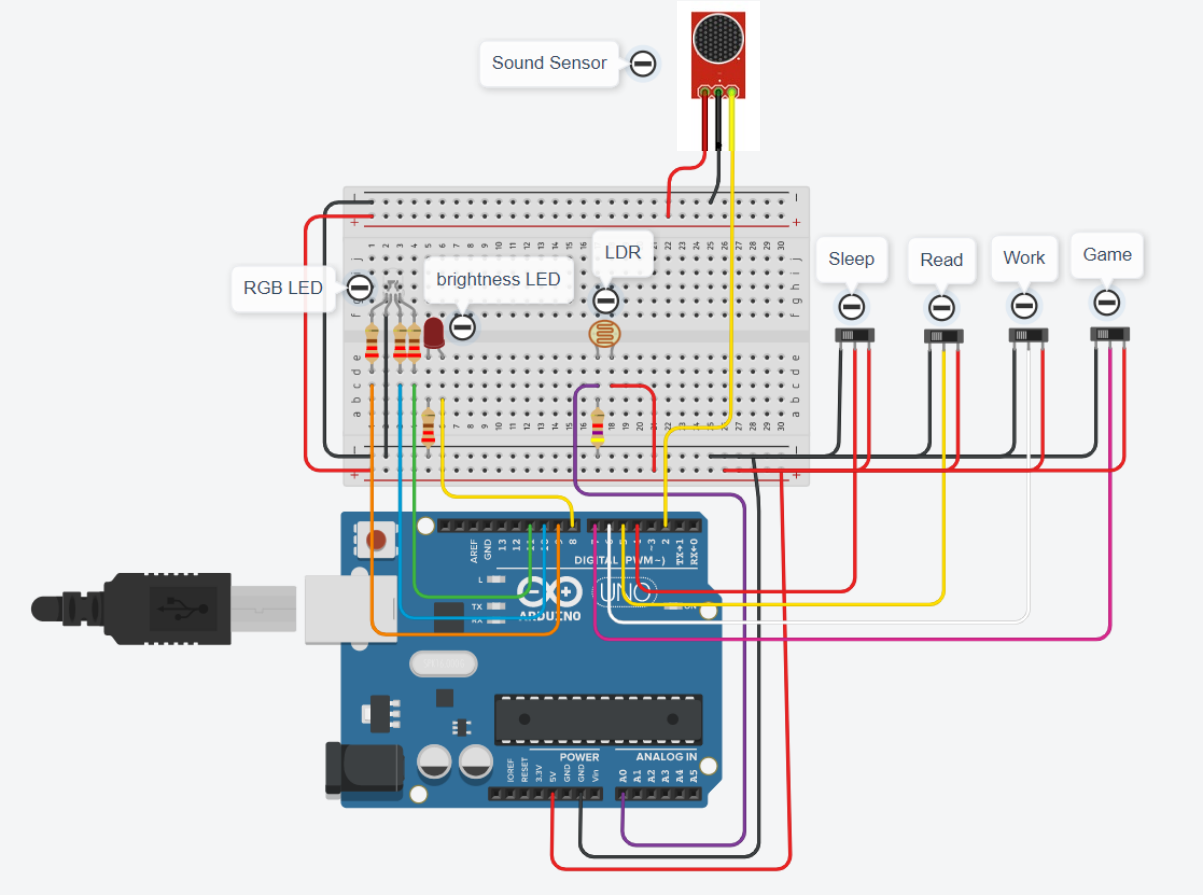
05. 5mm Red LED

3.5 Software Overview

only used Arduino Uno board so the only software used Arduino version 1.8.16

4. Implementation

4.1. Circuit diagrams



4.2. Code

```
int LDRValue = A0; // LDR sensor AO pin to A0 Connected
int SoundSensor=2; // Sound Sensor Digital Pin D0 connected to pin 2
int sleep = 4; //Sleep option switch assign to pin 4
int read = 5; //Read option switch assign to pin 5
int work = 6; //Work option switch assign to pin 6
int game = 7; //Game option switch assign to pin 7
int LED = 8; // This LED show the brightness Coz 4Pin RGB LED cant controle brightness
int R = 9; //add red controler to pin 9
int G = 10;//add green controler to pin 11
int B = 11;//add blue controler to pin 10

boolean RStatus=false;
boolean GStatus=false;
boolean BStatus=false;
boolean LEDStatus=false;

void setup() {
 pinMode(SoundSensor,INPUT);
 pinMode(A0, INPUT);
 pinMode(R,OUTPUT);
 pinMode(G,OUTPUT);
 pinMode(B,OUTPUT);
 pinMode(LED,OUTPUT);
 Serial.begin(9600); //initialize serial
```

```
}

void loop() {
 int SoundData=digitalRead(SoundSensor); // take readings from sound sensor
 //Serial.println(SoundData);//print the value
 int sleepMod = digitalRead(sleep);//take readings from mod switch
 int readpMod = digitalRead(read);//take readings from mod switch
 int workMod = digitalRead(work);//take readings from mod switch
 int gameMod = digitalRead(game);//take readings from mod switch

  if(SoundData==1){//if detect a clap


   if(LEDStatus==false){//if lights off
      LEDStatus=true;

    if (sleepMod == HIGH){//check the Mod Sleep

      LDRValue = analogRead(A0); // read the value from the LDR sensor

      Serial.println(LDRValue); // print the LDR sensor reading so you know its
range
      int Bright = 0 ; // set brightness to 0
      //if 0-255 range 40 is Normal Light brightness (in 50-1000 range brightness
= Readning*3.7)
      Bright = (LDRValue/3.7) -40 ; //Calculate needed brightness to room
```

```
    if (Bright < 0){ //if room have enough brightness lights off

      digitalWrite(R,LOW);
      digitalWrite(G,LOW);
      digitalWrite(B,LOW);

    }
    else if (Bright > 0){//check the Mod Sleep

      analogWrite(R, 255); // Red colour is better for sleeping
      analogWrite(G, 0);
      analogWrite(B, 0);
      analogWrite( LED, Bright ); //adjust the brightness
      delay(10); // Delay a little bit to improve simulation performance

      }

    delay(100); // Wait for 100 millisecond(s)
  }

  else if (readpMod == HIGH){//check the Mod Read

    LDRValue = analogRead(A0); // read the value from the LDR sensor

    Serial.println(LDRValue); // print the LDR sensor reading so you know its
range
    int Bright = 0 ; // set brightness to 0
```

```
    //if 0-255 range 40 is Normal Light brightness (in 50-1000 range brightness
= Readning*3.7)
    Bright = (LDRValue/3.7) -40 ; //Calculate needed brightness to room

    if (Bright < 0){ //if room have enough brightness lights off

      digitalWrite(R,LOW);
      digitalWrite(G,LOW);
      digitalWrite(B,LOW);

    }
    else if (Bright > 0){//if room is dark

      analogWrite(R, 255); // Yellow colour is better for Reading
      analogWrite(G, 255);
      analogWrite(B, 0);
      analogWrite( LED, Bright ); //adjust the brightness
      delay(10); // Delay a little bit to improve simulation performance

      }

    delay(100); // Wait for 100 millisecond(s)

  }

  else if (workMod == HIGH){//check the Mod Work
```

```
LDRValue = analogRead(A0); // read the value from the LDR sensor

Serial.println(LDRValue); // print the LDR sensor reading so you know its range
int Bright = 0 ; // set brightness to 0
//if 0-255 range 40 is Normal Light brightness (in 50-1000 range brightness = Readning*3.7)
Bright = (LDRValue/3.7) -40 ; //Calculate needed brightness to room

if (Bright < 0){ //if room have enough brightness lights off

  digitalWrite(R,LOW);
  digitalWrite(G,LOW);
  digitalWrite(B,LOW);

}
else if (Bright > 0){//if room is dark

  analogWrite(R, 255); // White colour is better for Working
  analogWrite(G, 255);
  analogWrite(B, 255);
  analogWrite( LED, Bright ); //adjust the brightness
  delay(10); // Delay a little bit to improve simulation performance

  }

delay(100); // Wait for 100 millisecond(s)
```

```
    }

    else if (gameMod == HIGH){//check the Mod Game

      LDRValue = analogRead(A0); // read the value from the LDR sensor

      Serial.println(LDRValue); // print the LDR sensor reading so you know its range
      int Bright = 0 ; // set brightness to 0
      //if 0-255 range 40 is Normal Light brightness (in 50-1000 range brightness = Readning*3.7)
      Bright = (LDRValue/3.7) -40 ; //Calculate needed brightness to room

      if (Bright < 0){ //if room have enough brightness lights off

        digitalWrite(R,LOW);
        digitalWrite(G,LOW);
        digitalWrite(B,LOW);

      }
      else if (Bright > 0){//if room is dark

        analogWrite(R, 255); // Blue colour is better for Gaming
        analogWrite(G, 0);
        analogWrite(B, 255);
        analogWrite( LED, Bright ); //adjust the brightness
```

```
      delay(10); // Delay a little bit to improve simulation performance

      }

    delay(100); // Wait for 100 millisecond(s)
  }

}


else if(LEDStatus==true){
    LEDStatus=false;

    digitalWrite(R,LOW);
    digitalWrite(G,LOW);
    digitalWrite(B,LOW);
    digitalWrite(LED,LOW);
}}}
```

5. Discussion

Primarily, I was instrumental in carrying out this project due to a personal issue I had. I usually use the computer continuously for a long time and most of the evening I do not pay much attention to the light in the room. So, I have to deal with various problems such as severe headaches and tears in the eyes. Over time, I came to realize that working in a lesser world meant that I had to deal with this situation. So, I decided to do this project.

For this, I created a demonstration module, Due to the current economic difficulties and the inability to procure the required goods under the prevailing conditions in the country. I used a breadboard to connect the circuit and jumper wires to maintain the connection

A PIR sensor could not be provided. Also voice commands would have to find and use libraries to upgrade the system but could not do so due to time and other tasks available. But as a substitute, I used four slide switches for the relevant 4 mods I can also take this project to the next level by using a Bluetooth module or a Wi-Fi module and giving voice commands over the mobile phone.

All I need to use for the system is an RGB light bulb. But I had to use a four-pin RGB LED. The problem here is that the brightness of the RGB LED cannot be controlled. So, I used another LED to show the Light intensity.

Simply put, depending on the needs of the person in the room, the light color of the room and the intensity of the light, which is favorable to the health of the average person, should be maintained in the room.

6. Conclusion

Although there were some financial and technical problems, they were successfully overcome so that the project could be completed successfully.

7. References

Yetman, D. (2021, January 15). *Do Some Types of Light Help You Sleep Better?* Healthline. https://www.healthline.com/health/best-color-light-for-sleep

Advisor, S. (2021, November 17). *What is The Best Nightlight Color? How Can It Affect Your Sleep?* Sleep Advisor. https://www.sleepadvisor.org/best-nightlight-color/

Fun!, S. M. (2020, July 1). *This Color Night Light Is Best For Sleep - The Color Will Surprise You!* High Touch High Tech. https://sciencemadefun.net/blog/this-color-night-light-is-best-for-sleep-the-color-will-surprise-you/

Ebbett, D. (2021, August 27). *What Is The Best Color Light For Reading And Studying*. BlockBlueLight UK. https://www.blockbluelight.co.uk/blogs/news/best-color-light-for-reading-and-studying

O., B. (2021, March 26). *What Color of Light is Best for Night Reading?* LED Light Ideas. https://ledlightideas.com/best-colour-of-light-for-reading-at-night/

LED Office Lighting: the Best Color Temperature to Increase Productivity. (2018, December 20). Superior Lighting. https://www.superiorlighting.com/blog/led-office-lighting-the-best-color-temperature-to-increase-productivity/#:%7E:text=To%20give%20the%20perception%20of,temperatures%20of%205000K%20or%20higher.

Effects of LED Lighting on Visual Comfort with Respect to the Reading Task. (2017, January). https://www.researchgate.net/publication/320868090_Effects_of_LED_Lighting_on_Visual_Comfort_with_Respect_to_the_Reading_Task

LIGHTING QUALITY AND ITS EFFECTS ON PRODUCTIVITY AND HUMAN HEALTS. (2016, March). https://www.researchgate.net/publication/308032041_Lighting_Quality_and_its_Effects_on_Productivity_and_Human_Healts

Giménez, M. C. (2017, April 1). *Patient room lighting influences on sleep, appraisal and mood in hospitalized people*. Wiley Online Library. https://onlinelibrary.wiley.com/doi/full/10.1111/jsr.12470