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Smart And Adaptive Vehicle System

Ms.Uzma Sulthana, Nithyaprakashini R, Pooja K S, Anushree D
Assistant Professor, Student
Atria Institute of technology

Abstract

The headlight is quite important when driving at night. Due to the headlight bulb concentration from the opposing car, there may be an annoying situation when driving. It could result in momentary blindness that triggers collisions or even accidents. When driving at night, the majority of drivers utilize bright beams. The individual coming from the opposite direction finds this uncomfortable. It results in abrupt glare. So an automatic headlight management is offered by this project. Additionally, it has features like an automatic indication that turns on and object detection that recognizes any type of obstruction and indicates it on the LCD screen. If alcohol is detected by the alcohol sensor, the engine is locked. Node MCU that locates the driver in the event of an accident circumstances. This idea offers safety for the driver while driving and is highly helpful in the automotive industry.

Introduction

In accordance with light intensity and any other times of low lighting, such as fog, snow, or rain, which prevents the driver from clearly seeing people, headlights must be turned on before sundown and off after sunrise when operating a vehicle. Even when there is less traffic on the roads at night, more than half of accidents still take place because headlight glare is a significant problem that has gained greater public attention over the past ten years. Driving at night when a vehicle's high beams have a blinding impact and reduce visibility is unsafe. When driving at night, the majority of drivers utilize bright beams. The individual coming from the other direction finds this uncomfortable. It generates a brief period of startling glare. The brief blindness that glare creates leads to nighttime traffic accidents. Additionally, a capability is provided to change bright light to dim light in accordance with the light intensity of cars travelling in the opposite way. Additionally, it has an automated indication with added automatic ON and OFF functionality. In this approach, the system spreads out ultrasonic sound waves and detects the echo after detecting objects. This structure precisely measures the distance travelled from the system to the target and back, as well as the time it takes for the ultrasonic waves to spread out. Typically, this is based on the reflected sound waves. In this research, an ultrasonic sensor is employed, which rapidly and constantly spreads out ultrasound waves. The ultrasonic waves strike the intended target and then return at a defined velocity to the ultrasonic sensor. When the driver forgets to switch on the indicator, the automatic indicator is helpful. Additionally, it has a capability for alcohol detection. This alcohol detection system operates on a straightforward premise: if a driver has consumed alcohol, the alcohol breath analyzer sensor will identify the amount of alcohol in their breath and, if it exceeds a certain threshold, an alert will sound and the vehicle's engine will immediately shut off. This feature is intended to protect passengers inside and outside of the vehicle. Even while road safety is of the utmost importance, accidents will still happen for a variety of reasons. The moments immediately following the accident are extremely crucial for the people involved because, if they can receive medical attention right away, their chances of survival will be significantly higher than if they must wait. The Node MCU will be used in this project to help us develop an accident detection system that will send an emergency message to a registered phone number.

Literature Review

PAPER 1

Topic: Night-time Vehicle Detection for Automatic Headlight Beam Control

Year of Publish: Jan, 2017

Published By: Pushkar Sevekar, S. B. Dhonde

The majority of accidents on the road, according to research, happen at night. Visibility at night is a serious problem for safe driving. Therefore, reckless drivers continue to use their high beams despite seeing an approaching vehicle. These high beams induce glare, which temporarily renders oncoming drivers blind. Nighttime vehicle detection is crucial for resolving this issue. This essay examines many attempts at problem-solving, the necessity for research, pertinent systems that are currently in use, related work, various problem-solving strategies, and applications. The survey demonstrates that sensor-based methods cannot be used to meet a system's real-time requirements. However, in order to be used in every car, a straightforward and dependable solution must be created. To prevent accidents caused by temporary blindness, an effort has been made to provide an image processing-based system that detects vehicles and chooses the appropriate beam.

PAPER 2

Topic: Automatic Headlight dimmer using Arduino and LDR sensors

Year of Publish: April 2021

Published By: B.Kalaimathia, Dr.M.Kasiselvanathanb,R.Swethac, R.Shobikad, S.

Designing the Automatic Headlight Dimmer Prototype Model is the main goal of this work.The headlight of the approaching car strikes the driver's eyes from the opposite end as they are moving at night. Sometimes the opposite vehicle's strong light glares the drivers, which increases the risk of an accident. According to several reports, the Troxler Effect is the primary reason for nighttime traffic accidents on the roads. This model is suggested to provide driver safety as well as a comfortable journey. An LDR sensor can be used to achieve that. With the aid of an Arduino UNO and other parts, the LDR sensor, which serves as a variable resistance, transforms the high beam of the approaching vehicle's headlight into the low beam. This system will be helpful in the automotive industry and provide a new trend to secure the drivers' safety.

PAPER 3

Topic: Automatic Light Control of Vehicle-A Review

Year of Publish: May 2021

Published By: Videep Virat, Rahul Kumar Roy, Doneti Sai Kumar, Ganesh Kanike, Swastik Pradhan

Even though there have been many developments to improve the safety of the people within a car, road accidents have now become a daily issue in the modern world. In order to address the research gap they create when included into newly built cars, this study has focused on the activities based on the usage of a mechanism that switches between high and low beams of headlights throughout the night to prevent accidents with some other elements that could increase the functioning of a vehicle light control.

PAPER 4

Topic: A Multi Featured Automatic Head Light Systems Prototype for Automotive Safety

Year of Publish: 2017

Published By: Mr. Sandip S. Jadhav , Prof. Ansar A. Mulla

The study that has been done in the area of car safety is presented in this paper. As headlights are crucial for nighttime driving, it is necessary to choose a vehicle with headlight intensity comparable to that of the sun because this feature is not offered by most automobile manufacturers. This project involves creating a headlight system prototype with Arduino, sensors, LEDs, and other components. A prototype of a multi-featured headlight system has the ability to turn the headlight on and off and offers the option of an automatic switch from low beam to high intensity beam in bad weather. Additionally, this type does away with the need for the driver to manually switch because switching occurs automatically. Three different headlamp system features were included in this model.

PAPER 5

Topic: Machine learning and artificial intelligence-based Diabetes Mellitus detection and self-management: A systematic review

Year of Publish: April 2021

Published By: B.Kalaimathia, Dr.M. Kasiselvanathanb, R. Swethac, R. Shobikad, S. Swethae

Designing the Automatic Headlight Dimmer Prototype Model is the main goal of this work.The headlight of the approaching car strikes the driver's eyes from the opposite end as they are moving at night. Sometimes the opposite vehicle's strong light glares the drivers, which increases the risk of an accident. The Troxler Effect is the name for the sudden glare the motorist noticed. According to several reports, the Troxler Effect is the primary reason for nighttime traffic accidents on the roads. This model is suggested to provide driver safety as well as a comfortable journey. An LDR sensor can be used to achieve that. With the aid of an Arduino UNO and other parts, the LDR sensor, which serves as a variable resistor, transforms the high beam of the approaching vehicle's headlight into the low beam. This method introduces a new trend to secure the safety of the drivers and will be helpful in the automotive industry.

Methodology

Using an automatic night light control system eliminates the need for manual high-beam and low-beam switching. It independently detects light intensity. When the amount of darkness reaches a particular level, the light automatically turns to high beam. We use an Arduino to monitor high or low voltage levels and a light-detecting resistor as a light sensor to activate a relay coil that connects the control circuit to an external light source.

An LDR has an extremely high resistance, but when illuminated with light, that resistance dramatically decreases. Depending on how strongly the current flows through the LDR when light strikes it. We created a program for Arduino based on the values provided by the sensor, or LDR. If the program's condition is met, output is provided in the form of an LED.

We are utilizing an ultrasonic sensor to detect objects within the car. It operates via ultrasonic waves.

We use an alcohol sensor to detect alcohol, and if alcohol is found, the sensor limits the vehicle's speed.
IR sensors are used to identify items coming from left and right sides.
In this project, the Node MCU will assist us in creating system for accident detection that will send an emergency message to a registered phone number.

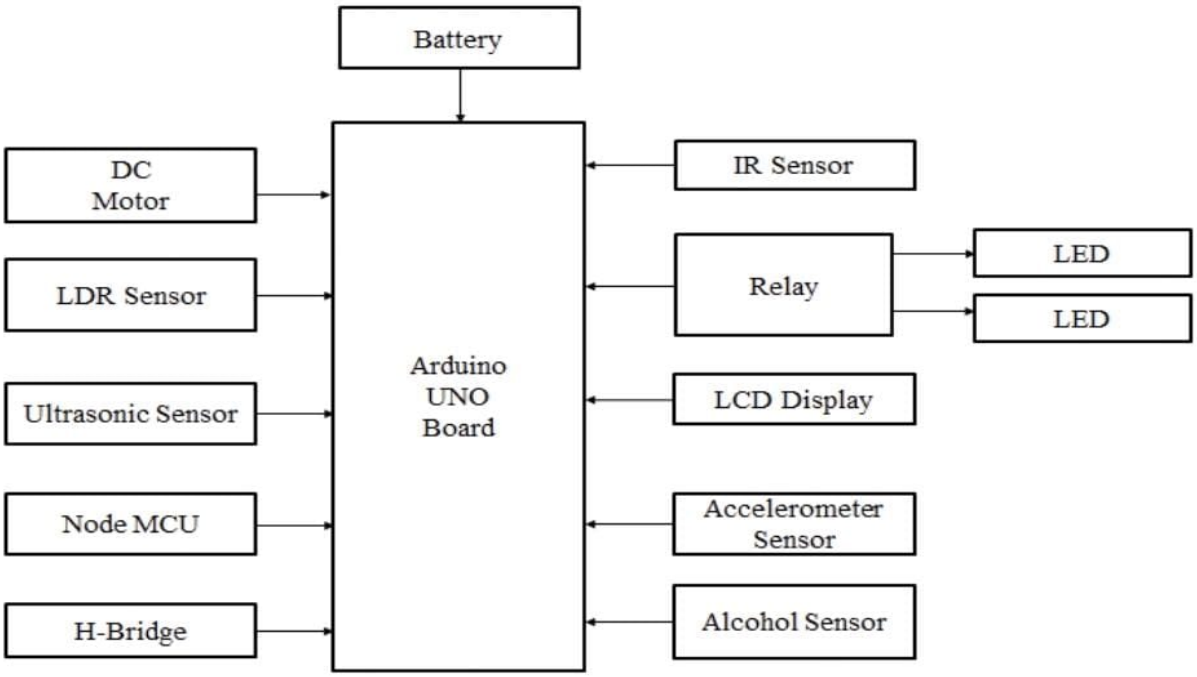

Fig: Block Diagram

Results and Discussion

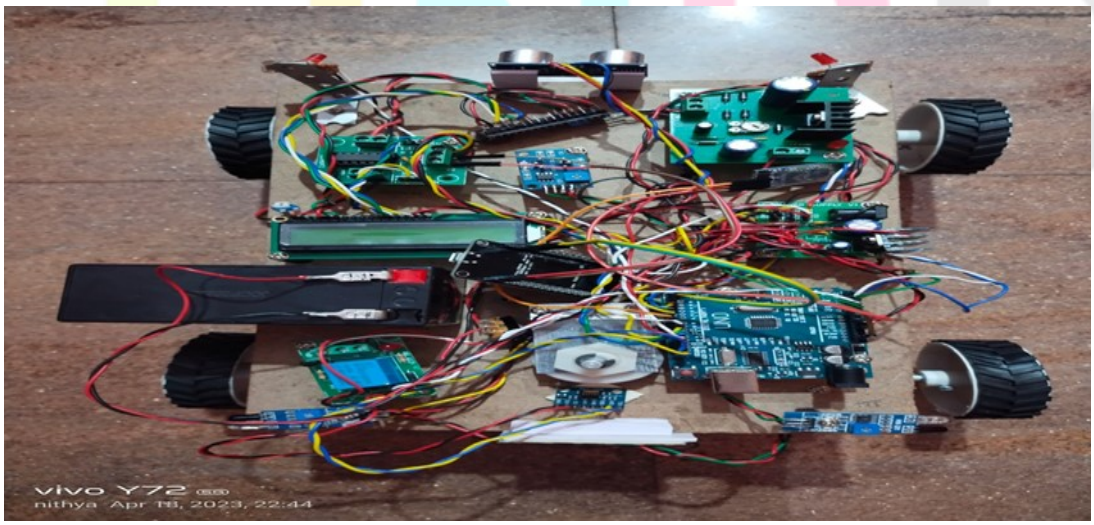

Fig 1: Screenshot of the Model

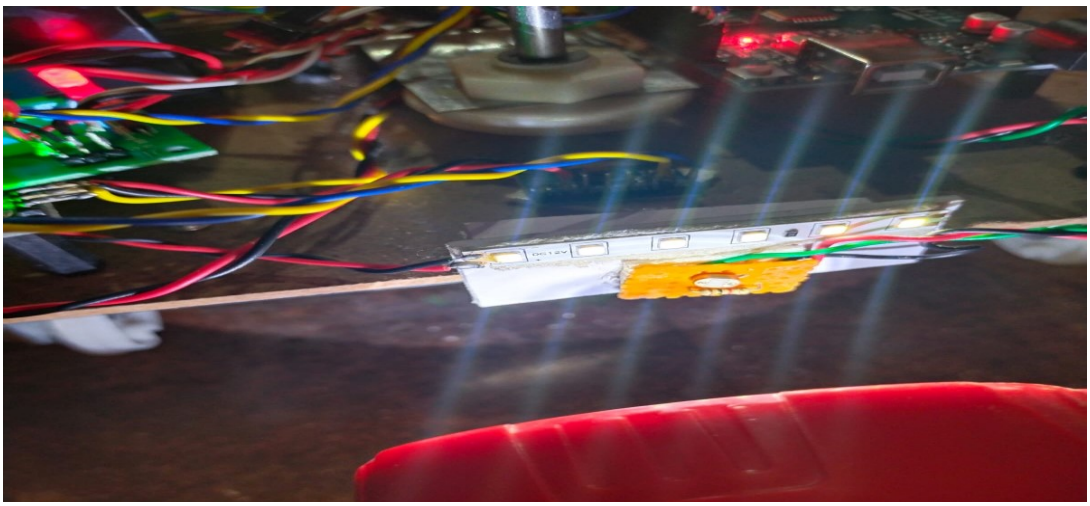

Fig 2: Screenshot of Headlight

Fig 3: Screenshot of Object Detection

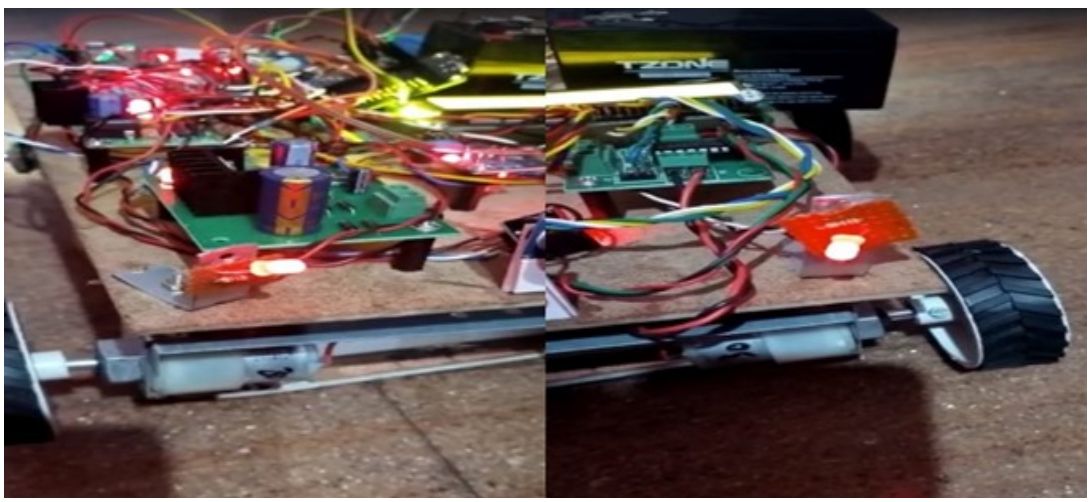

Fig 4: Screenshot of Left and Right Indicator

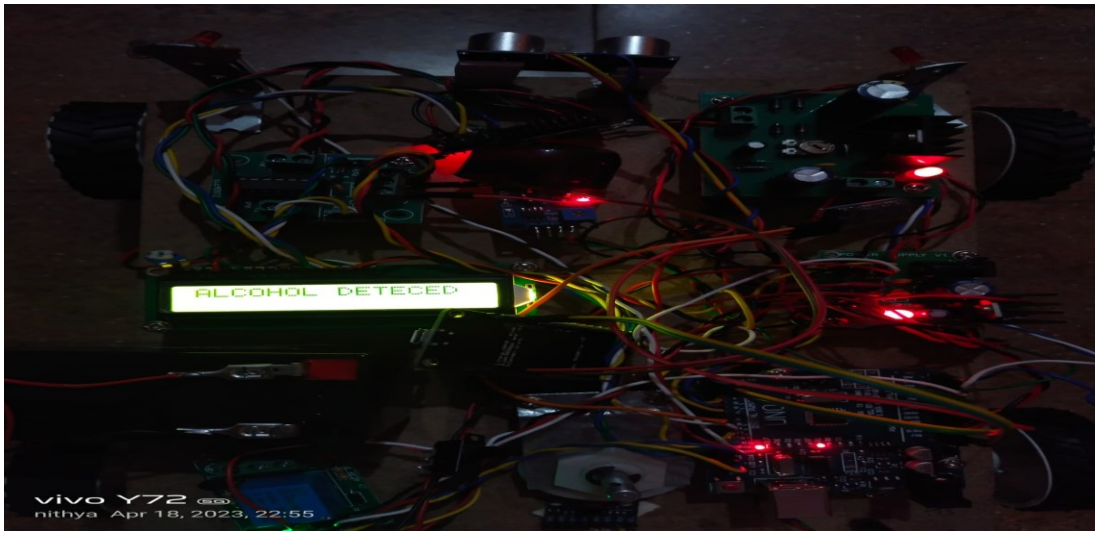

Fig 5: Screenshot of Alcohol Detection

Fig 6: Screenshot of Accident Alert message

Conclusion

In conclusion, the application of the latest technologies can significantly increase the safety of automobiles on the road. Examples include headlights utilizing LDR, object identification using UV sensor, alcohol detection with engine locking system, accident detection using accelerometer, and Node MCU. These technologies can assist in preventing accidents and saving lives by identifying and reacting to potential hazards such poor light conditions, objects in the path of the vehicle, driver impairment, and accidents. It is crucial that both car makers and drivers adopt these improvements and place a high priority on road safety.

By reducing accidents and fatalities, these technologies can help make all roadways safer for everyone. Drivers and automakers alike must acknowledge the significance of these technologies and place safety above convenience. Utilizing these technological breakthroughs to increase road safety is essential given the rise in traffic-related accidents and the number of vehicles on the road. In the end, funding these technologies has the potential to save lives and have a substantial positive effect on society as a whole.

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