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Auto Headlight and Intensity Control Arduino Car

Abhishek[1], Sumit Kumar[2], Yashwardhan Prajapati[3], Dr. S. P. Bihari[4]

[1,2,3] UG Student, Department of Electrical and Electronics Engineering Raj Kumar Goel Institute of Technology, Ghaziabad, U.P., India
[4]Asso. Prof. (Dr. S.P. Bihari) Raj Kumar Goel Institute of Technology, Ghaziabad, U.P., India
Abhishekumar99537@gmail.com, sumitthakur7882@gmail.com, Yashwardhanp3@gmail.com, spbiharinit@gmail.com

ABSTRACT –

The system uses a variety of sensors, including as infrared (IR) and light-dependent resistors (LDRs), to determine the amount of light in the area and when other cars are approaching. The headlights are turned on or off based on the light levels detected by the LDRs, which use this information to identify whether it is daytime or night time. In addition, the system uses infrared sensors to detect approaching cars' headlights and dims them to improve road safety by reducing glare.

Keywords— Stepper Motor ,Arduino UNO,IR Sensors, LED’s, Bluetooth.

Introduction

The development of automotive technology has greatly improved driver convenience and vehicle safety. The optimisation of vehicle lighting systems, especially headlights, is one important area of focus. Conventional headlamp systems might result in safety risks including glare and inadequate illumination since they are manual to operate and do not adjust to changing environmental circumstances. The goal of this project is to use an Arduino microcontroller to create an automatic headlight and intensity control system in order to address these problems.

Purpose and scope

To find a way to stop accidents caused by using high beams at night When travelling at night, the headlight is quite important. When driving, headlight focus from the vehicle across from you could cause an annoyance. It could result in momentary blindness that causes a collision, or occasionally it might cause shap . To find a way to stop accidents caused by using high beams at night When travelling at night, the headlight is quite important. When driving, headlight focus from the vehicle across from you could cause an annoyance. It may result in momentary blindness that causes collisions, or it may occasionally produce accidents that are impossible to manually modify in certain circumstances. This paper describes the automatic light adjustment that is required to solve this issue.

The creation of an automatic headlight management system that improves driver comfort and safety is the main goal of this project. The system makes use of infrared (IR) sensors to identify approaching cars and light-dependent resistors (LDRs) to sense ambient light. Furthermore, servo motors and a motor driver are employed to dynamically change the headlight's direction. This article provides a thorough overview of the system's performance and prospective improvements by covering the system's design, implementation, testing, and evaluation.

PROPOSED SYSTEM

The intensity of light falling on the car is measured using an LDR. The microprocessor lowers the light intensity inside the car when it senses a high amount of light falling on the LDR. This provides drivers with a clear field of vision. As a result, it stops collisions and accidents before they happen.

The majority of night time collisions happen because of the intense amount of light hitting the car. It causes trolling fading and glaring, which can be dangerous.

The amount of light falling on the other car should automatically decrease to solve this issue.

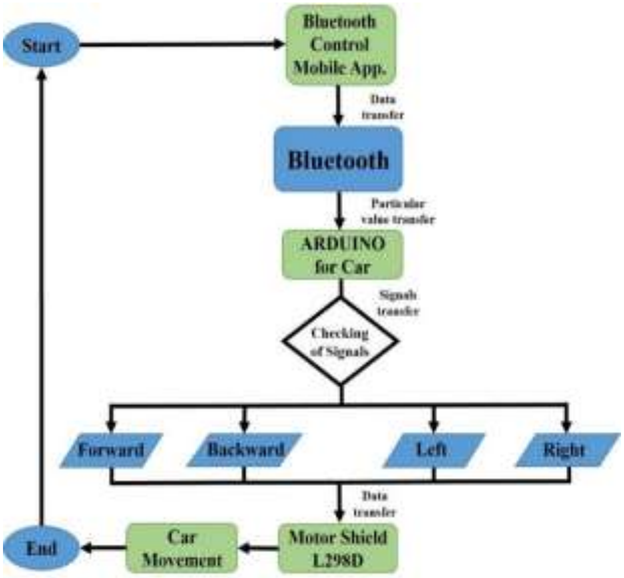
Although the light's intensity can be manually changed, there are times when doing so is challenging .This paper describes the automatic light adjustment that is required to solve this issue.

LITERATURE REVIEW

Several approaches to automatic headlamp control, such as sophisticated algorithms and sensor-based systems, have been investigated in earlier research. Adaptive headlamp systems, for example, have been demonstrated to increase nighttime driving safety by modifying the distribution of light based on the steering angle and speed of the vehicle. By incorporating motor driver technology to provide dynamic headlamp direction control—a topic that isn't as frequently covered in the literature—this effort expands on previous research.

SYSTEM DESIGN

- **BLOCK DIAGRAM** –



HARDWARE COMPONENTS

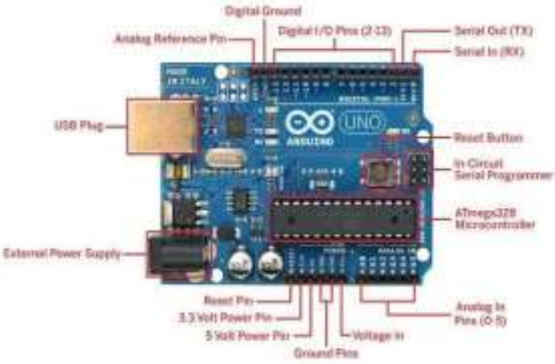
- Lithium battery (12.5v)
- Arduino Uno
- Bluetooth (HC05)
- Motor Driver (L293D)
- LDR
- Stepper Motor

- Lithium battery(12.5v) –

The lithium battery has a steep rise in voltage at the very end of the charge cycle. At this stage the charge current drops extremely quickly and the charger then switches to power supply mode.

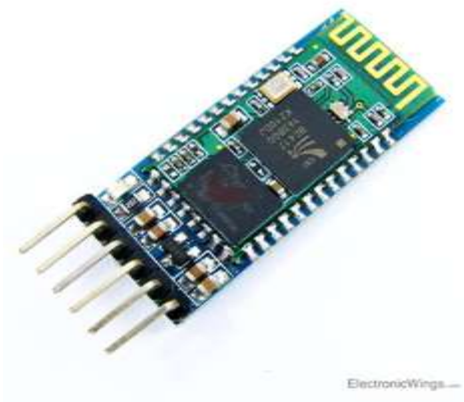
- Arduino UNO –

The main microcontroller that handles system control and sensor input processing.



- Bluetooth (HC05) –

The android Bluetooth package contains the Bluetooth API. A nearby Bluetooth adapter initiates the connection through an RFCOMM (RS-232 serial line via Bluetooth) capable Bluetooth socket, which is then directed towards a remote Bluetooth device

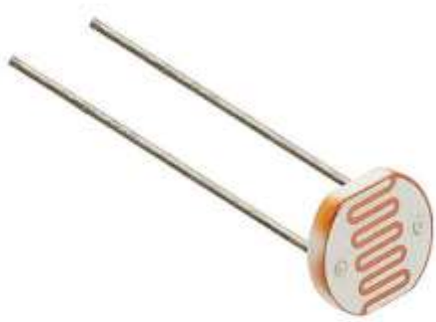


- Motor Driver (L293D) -

Motor drivers perform a variety of tasks, including providing precise speed control, boosting electrical impulses to power and operate the motor, and having strong safeguards like over-current protection (OCP) and over-temperature protection (OTP).

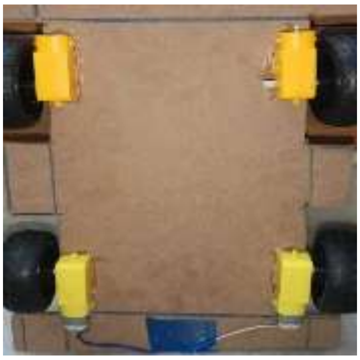
- LDRs –

To decide whether to turn on or dim the headlights, measure the amount of ambient light.



- Stepper Motor-

Stepper motors use electric pulses to function as an electrometric device. The stepper motor only rotates when everything is in order and is clear. Sequence signal logic via the motor shield implemented.



Software Implementation

The way the Arduino code is written allows it to read sensor inputs, process the information, and adjust the direction and condition of the headlights recognition of ambient light, recognition of approaching vehicles, and motor driver control for headlight adjustment are important features.

EXPERIMENT SETUP AND METHODOLGY

The experimental setup involves testing the system under various lighting conditions and road scenarios. The tests are conducted in controlled environments to simulate different times of day and weather conditions. Sensor calibration is performed to ensure accurate readings, and the system's response to real-world driving conditions is evaluated through extensive testing.

RESULT

- Accuracy of Light Detection-

By precisely differentiating between day and night, the LDRs make sure that the headlights are turned on or off as needed. The calibration threshold values turned out to be effective in a variety of settings.

- **RESPONSIVENESS TO ONCOMING VEHICLES-**

The infrared sensors quickly and accurately identify approaching cars, which activates the headlight dimming feature. This function improves overall road safety by successfully reducing glare for other drivers.

- **Energy Efficiency-**

The automatic control system makes sure that headlights are only used when necessary , it has shown to save a large amount of energy. The adjustable brightness function further contributed to energy conservation.

- **System Reliability-**

Long-term testing revealed that both the software and hardware components operated as intended. The robustness of the system was verified by practical testing under a range of driving circumstances.

- **Adaptive Headlight Control-**

The ability to precisely change the direction of headlights made possible by the integration of the motor driver enhanced visibility on curved roadways. Test drivers were pleased with the system's capacity to dynamically modify the headlight angle based on steering input and road curvature.

Discussion

The outcomes show how well the automated headlamp and intensity management system works to improve car safety and fuel economy. The motor driver offers substantial value by enabling adaptive headlamp direction control, which enhances vision and lessens glare. Nonetheless, issues including environmental influences on sensor accuracy and sensor calibration must be resolved. More sophisticated sensor integration and the application of machine learning algorithms for improved decision-making may be future developments.

Conclusion

The viability and advantages of an automatic headlight and intensity control system based on Arduino are demonstrated by this study. The system's dynamic lighting intensity and direction adjustment improves driving comfort and safety. The overall performance and encouraging feedback from test drivers indicate that this system has a great deal of potential for commercialization and real-world use, even though there is still room for improvement**.**

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