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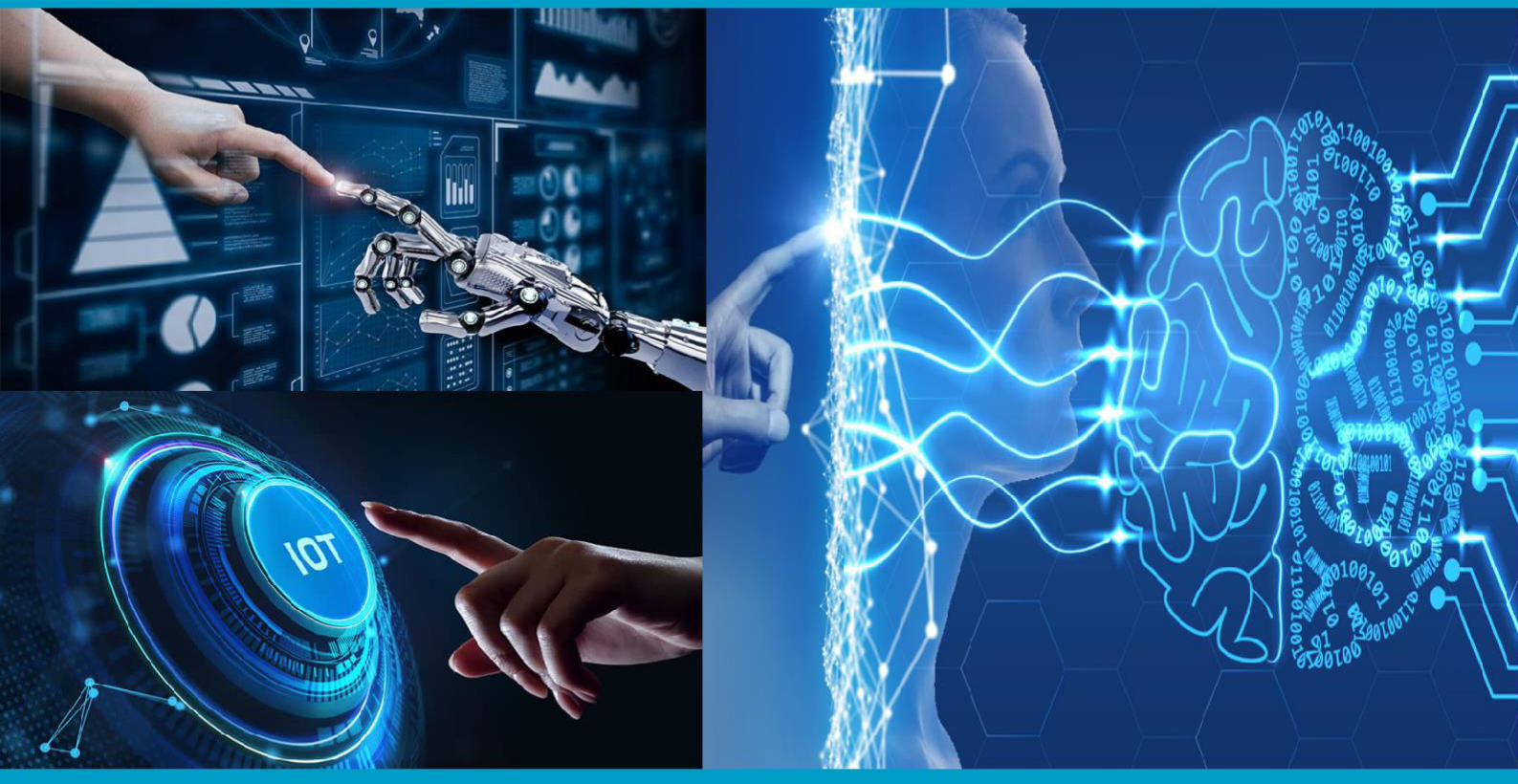

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Automatic Vehicle Headlight Management System to Prevent Accident Due to Headlight Glare

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ABSTRACT: The headlight during the night travel plays a major role. While driving there may be an irritating situation due to the headlight lamp focus from the opposite vehicle. It may cause temporary blindness that leads to collision or sometimes it may lead to accidents. There is a manual way to adjust the headlight focus but it is difficult to adjust manually. This paper provides an automated headlight management system. Here, the headlight beam is reduced in the vehicle according to the intensity of light from the opposite vehicle. LDR is used to detect the high beam from the opposite vehicle.

KEYWORDS: Headlight, Vehicle, Temporary Blindness, LDR.

I.INTRODUCTION

High beam from the headlight causes a dangerous situation during night driving. It causes temporary blindness for the drivers that may lead to collision or sometimes it may lead to accident. Pedestrian crossing the road may get hurt. Almost 30% of accidents occurring due to headlight glare. When enough streetlights are available, there is no need of headlight beam with such high intensity. This project helps to automatically control the headlight glare in motor vehicles. LDR is known as light dependent resistor, its resistance varies according to the intensity of light falling on it .Microcontroller used here is arduino uno. Microcontroller controls the high beam falling on it. When a high beam falls on the surface of LDR, the information intensity of incoming light with the desired intensity value. When the intensity value is increased beyond the desired intensity value, it reduces the intensity of light and provides a great relief for the driver from the irritating situation that occurs during the night driving.

II.EXISTING SYSTEM

Piezoelectric Ultrasonic Motor

The driver must always have clear visibility and the Automatic Headlamp Levelers (AHL) are one among several devices used to enhance vision in dim conditions. Typically, dynamic levellers use a stepper motor and present intrinsic play due to the utilization of geared mechanisms that transform the initial rotational movement in a linear one. However, some scenario or even some lighting applications require a higher dynamic behavior with higher precision and repeatability for adjusting the headlamp cut- off, e.g. rough terrain driving, long range illumination with high power sources, etc. In this paper, we study the use of a piezoelectric motor as an actuator for dynamic headlamp levelling, a mechatronic actuator that may be the next step in automotive lighting. The paper describes an experimental setup for headlamp levelling using a piezoelectric motor and a first evaluation of the results.

Image Processing

A novel image processing-based approach is proposed to optimize vehicle headlamps aiming. Currently, most aiming devices rely on numerical derivative oriented methods to find the essential focal features, also called reference points, to perform the aiming process. However, these approaches are not robust, and minor changes in isocurves' smoothness may result in finding inaccurate aiming focal features. To address the associated robustness issue, a statistical signal processing-based approach named penalized contrast for change point detection is proposed. Experimental results indicate a high accuracy level of the proposed method concerning the master-tuned ground truth case studies while suggesting a robust mathematical process.

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III.PROPOSED SYSTEM

The proposed system for Auto-Adjusting Brightness of Headlights and Automatic Headlamp Leveling, incorporating Light Dependent Resistors (LDR) and an Accelerometer MPU6050 sensor, aims to revolutionize nighttime driving by addressing the challenges associated with headlight glare. The system utilizes LDRs to continuously monitor ambient light conditions, allowing for the dynamic adjustment of headlight brightness. By employing the Accelerometer MPU6050 sensor, the system detects changes in the vehicle's inclination and orientation inreal-time. This information is processed to automaticallyadjust the headlamp leveling, ensuring an even distribution of light on the road surface.

The integration of LDRs and the MPU6050 sensor allows for a precise and adaptive response to varying driving conditions. In low-light scenarios, the system optimizes headlight brightness to enhance the driver's visibility, while during well-lit conditions or encounters with oncoming traffic, it adjusts the brightness levels to prevent glare. Simultaneously, the system adapts headlamp leveling based on the vehicle's position, guaranteeing consistent illumination across different terrains and slopes.The proposed system, with its combined sensing capabilities, offers a holistic approach to preventing night glare, prioritizing both driver safety and the comfort of other road users. By providing real-time adjustments to headlight brightness and leveling, the system enhances overall visibility during nighttime driving, contributing to a safer and more efficient driving experience.

BLOCK DIAGRAM OF PROPOSED SYSTEM

Most of the accidents during night occur due to the high amount of light falling on the vehicle. It cause glaring and troxler fading that leads to accident. To overcome this problem the intensity of light falling on the other vehicle should be reduced automatically. There is manual adjustment of intensity of light but it is difficult to adjust manually during some situations. To overcome thisproblem, automatic adjustment of light is needed which described intensity of light is falling on the vehicle. When the LDR detects the large amount of intensity of light falling on it, the microcontroller reduces the amount intensity of light in the vehicle. This gives the clear vision for the drivers. Thus, it prevents the collision and accidents before occurring it.

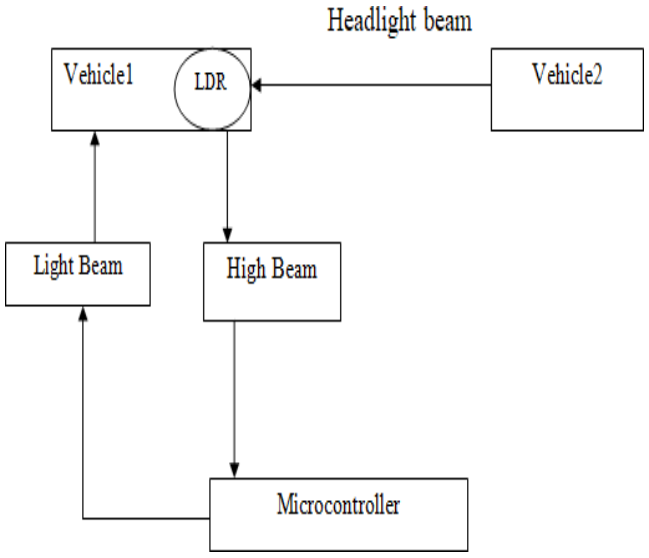

Figure.1.Block Diagram of Proposed System

LIGHT DEPENDENT RESISTOR (LDR)

LDR is a sensor that changes its resistance according to the amount of intensity of light falling on it. Increasingthe intensity of light decreases the resistance and increases the conductivity of LDR. The output of LDR is an analog output.

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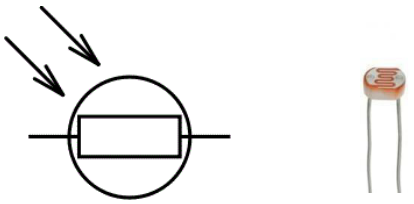

Figure.2.Symbol of LDR

The Light Dependent resistor works on the principle of Photo conductivity i.e. the conductivity of the LDR increases by increasing the intensity of light falling on it. When the LDR is kept in dark, the resistance of it is very high that is up to $10^{12}\Omega$. At the same time, when the LDR is placed in sunlight, there is a drastic fall in the resistance of LDR. LDR is most commonly used light sensor. It is of low cost and has a simple structure. It helps to find the amount lightintensity.

HEADLAMP

Headlamp is attached to the front side of the vehicle to provide a light vision to the road ahead. The light beam from the headlamp is called headlight. There are two types of beam that emerges from the headlamp. They are low beam and high beam. Low beam which is also called as dipped beam, passing beam, meeting beam headlamp provide a distribution of light designed to provide lateral and forward illumination that are limited which helps to control the glare for the other road users.

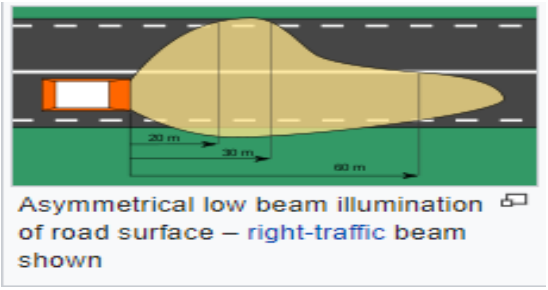

Figure.3.Low beam of Car headlight

High Beam is also called as main beam, driving beam, fullbeam that provides a bright, centre-weighted distribution of light and it does not possess any control of light that are directed towards the other road user's. High beam is only suitable for road with no other users, as the glare from the high beam may dazzle the other drivers.

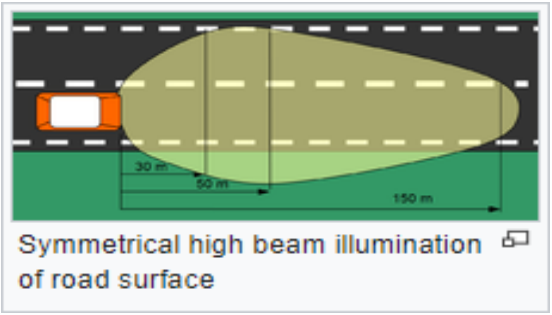

Figure.4. High Beam of Car headlight

ARDUINO UNO

Arduino is a most commonly used physical computing platform and an interactive developing environment. It isa standalone platform that interacts with arduino softwareon the computer. The arduino software consist of anarduino IDE (Integerated Development Environment). Arduino IDE is used for programming. Ardunio uno is the most

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frequently used development board though it is not a first board in the market. Arduino uno is a microcontrollerbasedonATmega328p.Itconsistsofcrystal oscillator, voltage regulator, communication protocol etc. It has 14 digital input/output pins, out of which 6 can beused for PWM and 6 analog pins.

IV.EXPERIMENTAL RESULTS

The result of the system is given below. The amount of intensity of light falling on the LDR is displayed in the serial monitor. Whenever the amount of light falling on the LDR is greater than the desired intensity value, the headlight beam starts fading out. The hardware setup and the result are shown below. Asheadlight needs12v power supply, it is connected to12vbattery. Using a 5v relay, headlight is connected to the Arduino Uno.

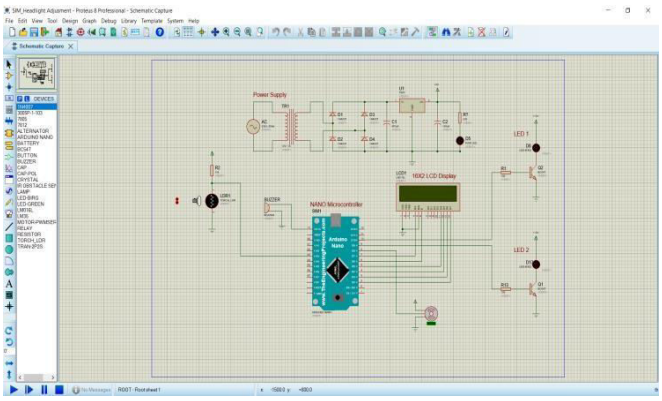

Figure.5.Simulation Results

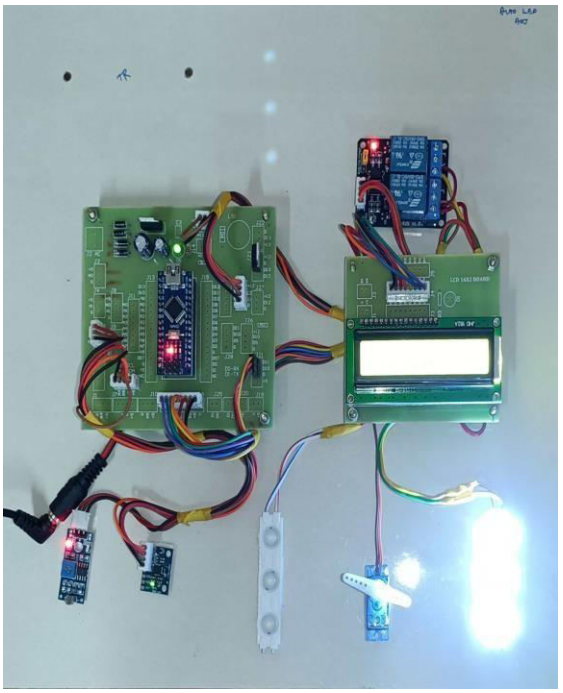

Figure.6.Implementation Model

This paper presents the automatic headlight dimmer that uses LDR .Here, high beam is automatically switched to low beam when a high beam of light from the another vehicle falls on the LDR. Glaring of light from the opposite vehicle during the night travel is one of the majorproblems. Though there is a manual method to reduce the headlight beam, it will be difficult during some situations.

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V.CONCLUSION

Auto-Adjusting Brightness of Vehicle Headlights and Automatic Headlamp Leveling system, powered by an Arduino Nano microcontroller and incorporating Light Dependent Resistors (LDR), high beam and low beam controls, and an accelerometer, presents a comprehensive and effective solution to prevent night glare and optimize visibility during night time driving. The successful implementation of this system demonstrated its ability to dynamically adjust headlight brightness based on ambient light conditions, seamlessly transitioning between high and low beams to provide the optimal illumination for the driver while minimizing glare for other road users. Moreover, the real-time headlamp leveling, facilitated by the accelerometer, contributed to an even distribution of light on the road, ensuring consistent visibility on varying terrains. The system's continuous feedback loop, orchestrated by the Arduino Nano, showcased its responsiveness to changes in environmental conditions, underscoring its reliability andadaptability.

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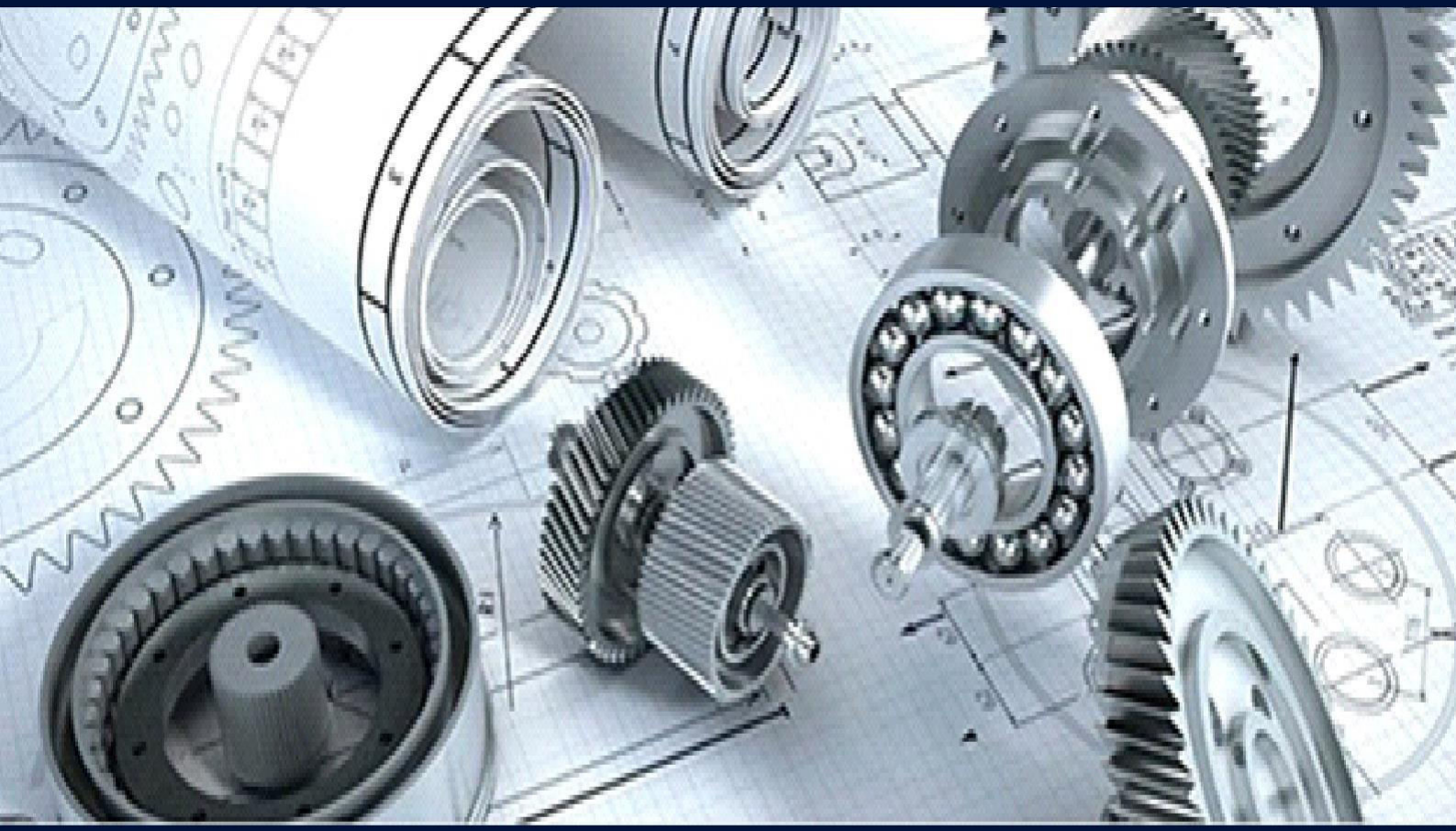

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