Glare Handling on Automobiles using IoT

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Abstract

The full power of the headlights of the cars at night causes accidents on highways and large and small roads. If one side is moving with a full headlight and a car with a beam or full light comes from the other side. So, this problem can have a bad effect on the human eye. And causes the eye to stare or the eye not to open at all, which eliminates the possibility of controlling both sides and causes an accident.

Our proposed solution is to create a device which will make use of brightness sensor to detect the presence of light in an area and the signal will be passed to the microcontroller which will control the light beam of headlamps from high beam to mid beam. When two cars come from opposite direction in the dark, a signal is sent from the sensor to the microcontroller present inside the device of the car which will low down the high beam of headlamps to mid beam in both the carsassist.

Keywords*— Headlamps, sensors, LDR, light, glare, collision, controller.*

INTRODUCTION

Car headlights are one of the most important parts in a vehicle. The presence of various lights in the car, in addition to the aesthetic aspect, improves the driver's performance when the weather is dark.

Car headlights, which can be seen in various shapes and dimensions such as glossy, dome, square, round, raised, forward, etc., have an important application. Therefore, the headlights of the car determine the identity and personality of the car. The shape, type of lamp and the amount of light have changed a lot since the birth of the car until today. In fact, early cars had no headlights at all, and headlight installation became common in the 1920s.

Headlights indicates the identity of the car and the manufacturer the performance of the car headlights (headlights) has undergone many changes and improvements throughout history, mostly due to the large difference between road casualties during the day and night. Other vehicles, such as trains and airplanes, are also required to have headlights. Most bicycles also have headlights, and in some countries all bicycles are required by law to have headlights.

Car headlights (headlights) can protect you from trouble when there is not enough light to see the road. The headlights are designed to emit two types of light, the small stream of light and the large ray of light in the form of intensity of light and distance. This small stream of light illuminates on road sufficiently moreover it does not disturb the view of the driver in front. But the high light mode provides the maximum amount of light, but at the same time this light hits the eye of the opposite driver.

Without a headlight, it is not possible to see the road in low light conditions and therefore accidents may occur. Therefore, the headlights of the car help you to drive more safely and comfortably at night. For this reason, it is necessary to always check that the headlight of the car is in the best possible condition. If the headlights work well, you will have a full view of the road.

In high beam mode, a bright and central distribution of light is created so that the driver has no control over the light directed to the eyes of others. In this way, this light is only suitable when the driver is alone on the road, because the glow of the light created in this case causes other drivers to stare. There are several common problems with today's lights, including the long-term use of them, dirt or mass on the lens reduces the intensity of light and brightness, and on the other hand, if there is a problem in the alternator, the light of the lights may have a problem.

It is also possible to break or crack the bulb or have trouble finding the filament inside the bulb. In such cases, a quick and general review by the mechanic identifies the problem.

LITERATURE REVIEW

Research has been done on the impact of glare produced on the next car on night vision. Studies show that if the distance between the vehicle’s driver and the vehicle that is emitting light diminishes, the effect is much greater. The degree of discomfort gets more to be felt by the driver with less

longitudinal parting and lateral separation. This effect is directly proportional to the effect of visible angle on visibility. If the angle of inclination becomes less, the visible angle becomes smaller and the irritation caused by the blinking light in the eyes becomes more intense. [1]
That is not all, in fact the impact of the glare caused by the head lamps of the vehicle using a high beam persists for a very long time and in many cases, it can persist for 3000ft approximately.

$$\text{Visual angle } \alpha \text{ Lateral separation}$$

$$\alpha \frac{1}{\textbf{Glare Intensity}}$$

The latest works on detection of light that has been done includes the camera usage for the detection of headlights visually after which the subsequent dipping can be seen. This method of detection of light is so much robust that has been given by the students in which they are making use of a camera which captures the live stream of the moving vehicle using light with main beam or dipped beam and simultaneously it goes to transfer a signal to an electronic device that which turns down the intensity of light automatically.

A core and single problem with this suggested model is that it is making use of a very difficult to understand set up and processing of image and in most of the cases image processing becomes so much time consuming and also the captured image may lose its clarity and may be followed by no prevention of accidents. [2]

In another research, students developed a system in which they made use of relay switching circuits and analog to digital converter (ADC). The Analog to digital converter first reads and then converts the analog inputs to digital outputs and in turn, accordingly controls the electrical relay to change the mode of the headlights beam to dim or bright. The major issue by this type of system is that it is installed inside a vehicle with the driver himself controls the light of vehicle manually. As with this sort of issue, it cannot be able to issue a warning to the upcoming automobile that causes problem to the vehicle's driver or it may be the reason for collision after changing the light to low mode because the automobile that is creating the stare had not been issued warning. [3]

In one more survey, a smart system for issuing alerts was suggested that aids the car driver at the time of giving space to the automobile during day and night so that it does not collide with any other obstacle. They made use of infrared (IR) sensors for the recognition of obstacles accompanied with a regulator for the arm which controls the Zigbee module for the transfer of data. [4]

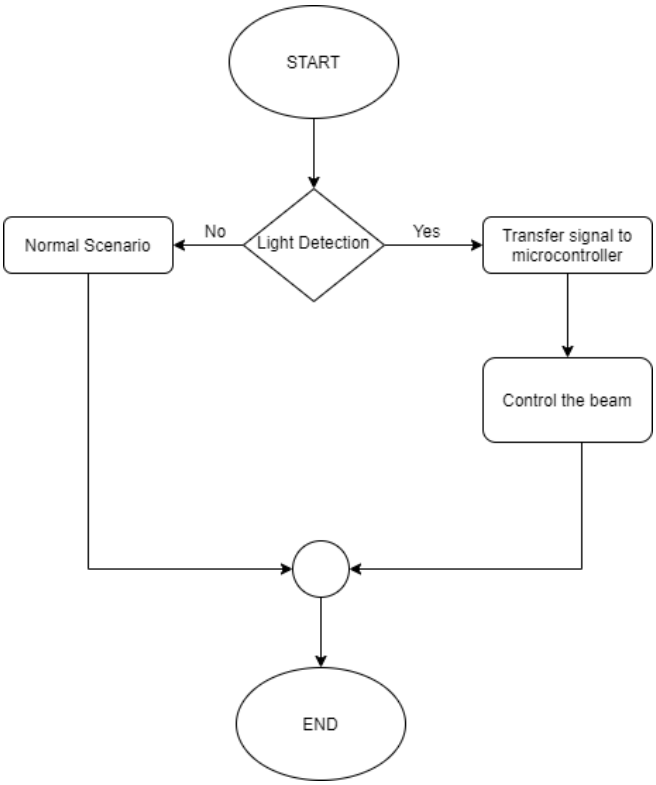
PROPOSED SYSTEM MODEL

COMPONENTS REQUIRED:

1. Light Detection Sensor
2. Operational Amplifier (LM741)
3. Breadboard
4. Resistors (1k, 10k)
5. Variable Resistor (1k)
6. Jumper Wires
7. LED Bulb

BLOCK DIAGRAM:

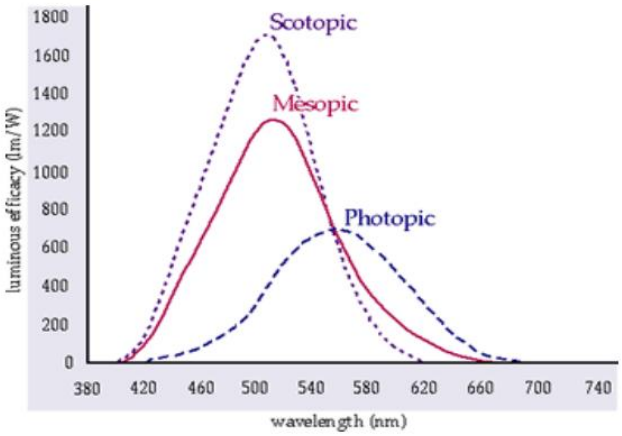
The solution is to create a device which will make use of brightness sensor to detect the presence of light in an area and the signal will be passed to the microcontroller which will control the light beam of headlamps from high beam to mid beam. When two cars come from opposite direction in the dark, a signal is sent from the sensor to the microcontroller present inside the device of the car which will low down the high beam of headlamps to mid beam in both the cars.



SCOTOPIC IDEA:

Scotopic vision comes into a very serious part during dark sight. Eyes of humans contain two sorts of photoreceptor cells- cone cells and rod cells. Scotopic vision happens thanks to the rod cells. The rod cells can also work during day when the intensity is very low. Approximately there are about 9 crore rod cells working inside an eye of human. Majorly, the Rod cells are there at the fringes of the eyes of the humans.

Usually, the rod cells are more susceptible than the cone cells and that is the reason that it comes into a critically minute part in chromatic vision. Sometimes it is the major reason behind that the colors cannot be seen clearly by the eyes of the humans at the place where light is dim. Scotopic vision is known by one more name i.e., night-sight. [5]



OPERATIONAL AMPLIFIER (LM741):

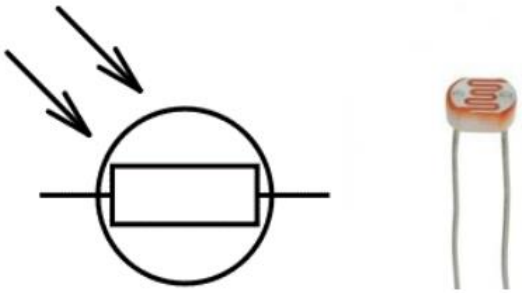
The 741- Op Amp (Integrated Circuit) can be an immovable microcircuit, it comprises of a commonly used Operational Amplifier. That was initially produced by Fairchild semiconducting material in the year 1963. The amount 741 shows that this operational amplifier integrated circuit consists of 7 functional pins, 4 pins that are able to feed input and consists of 1 output pin. [6]

IC 741 Op Amp is able to provide high voltage gain and may be worked at a good level of powers, created it the simplest option to apply in integrators, summing amplifiers and also all-purpose opinion submissions. This also structures low guard and inner rate of recurrence compensation circuits inbuilt into it. This Op-amp IC comes within the following procedure features:

- 8-Pin DIP Package
- 8-Pin SOIC
- TO5-8 Metal can package

LIGHT DEPENDENT RESISTOR (LDR):

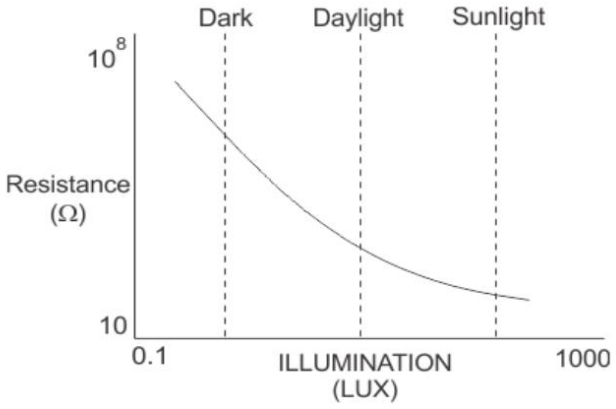
It a type of sensor whose resistance changes with respect to the power of light incident on it. If the power of light falling on the resistor is more, the resistance of the Light Dependent Resistor will fall drastically. [7]



CHARACTERISTICS OF LDR:

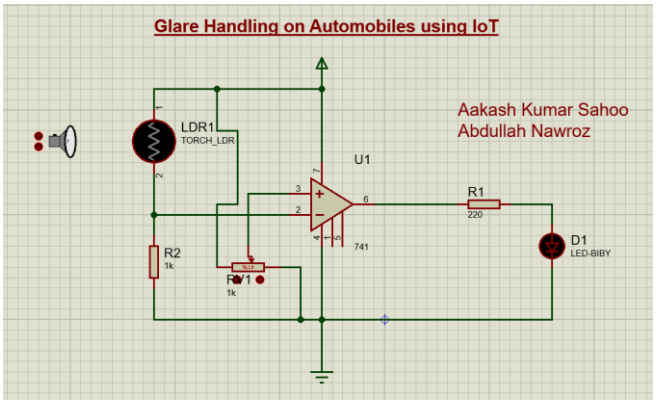
This resistor operates on the principal of photo conduction which shows that conductance of Light Dependent Resistor (LDR) gets increased on raising the power of light incident on the resistor.

In the dark, the resistance value of the LDR can go as high as upto 1012 Ω while the resistance falls drastically when the sunlight is incident on it.



CIRCUIT DIAGRAM

In the below diagram, we have demonstrated the proposed model, in which on moving the light source close to the LDR1, the resistance of the LDR decreases and the current starts flowing through the circuit and the circuit becomes closed and the LED Bulb D1 gradually stop glowing which is the desired outcome of our project. [8]



CONCLUSION

This paper presents the automated dimmer for headlamps of vehicles that makes use of LDR. With the help of our system, beam of vehicle changes automatically to small beam when a light beam from the upcoming automobile incidents on the LDR in case the beam is high. Glare of beam of light coming from the other automobile when travelling at night time is one among the main issues. Although there is a way to manually scale back the beam of light of headlamps, it can be difficult during many situations to control the beam.

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