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ADAPTIVE OCULAR HEADLIGHTS SYSTEM

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Abstract - *Adaptive ocular is a distinct hardware system designed for automobiles and other compatible transport facilities facing the problem of high intensity of headlights gazing on the eyes of the person controlling respective vehicle. This problem principally occurs during night time when most of the people prefer driving with high beam headlights to have the maximum coverage of the space and the road ahead of them. Using high beam does illuminate the darkness ahead of the vehicle but in a situation when there is another vehicle approaching in the opposite direction of the road the high intensity of the headlight creates a temporary blindness in the vision of both drivers controlling their respective vehicles. Drivers also have the option to change the setting of the vehicle from high beam to low beam in certain situations but it is not possible to switch lights in every moment. This project aims to remove the manual switching of these lights and make the entire process automated and it is done by creating a unique circuit with a LDR sensor that will automatically switch from high beam to low beam whenever two automobiles on the same lane face each other within a particular range and the driver's vision is being blocked by the opposite vehicle's high beam headlight.*

***Key Words*: Gazing, high beam headlight, LDR sensor, ocular, temporary blindness, low beam headlight.**

1.INTRODUCTION

During early days of manufacturing vehicles incandescent lamps were used as headlamps for the headlight. These units consist of a filament which is enclosed by a curved glass like structure that is a bulb. When electricity starts flowing through the filament it starts heating and after some amount of time it produces light energy but it uses large amount of heat energy to generate a small amount of light for illuminating the bulb. In the current generation of manufacturing vehicles industries are using halogen bulbs as headlights. These bulbs use less energy compared to incandescent lamps and generate a higher intensity of light without wasting energy. Other important types of headlamps that are used in most of the vehicles are HID (High intensity discharge) lamps and LED (light emitting diode) bulbs.

Lumen is a term used to measure the brightness level of a particular setting of headlight source and it varies from different type of bulbs available for use. Halogen bulbs have lumens rating ranging from 600 to 1300 and HID bulbs have lumens rating 3 times more than a normal halogen bulb and the rating of HID bulb may change based on the configuration of the type of bulb being used. From the above data it's clear that the type of bulbs used have higher intensity of light and even a small led bulb or any other light source with lumen rating in the range of 70 to 140 can harm the retina of the human eye and because of this whenever the driver experiences a vehicle approaching towards him with high beam setting of headlights the light directly falls on his eye through the laminated glass and blurs his vision for short amount of time and then returns to normal state. By using low beam setting of the headlight the instance of vision getting blurred doesn't occur and that's why technology has to provide less intensity headlamps and maintain a set of rules and regulations for operation of headlights in different conditions of driving but usually drivers will not follow such regulations in all the specified conditions hence this project concentrates on automatic switching of the headlight from high beam to low beam without the need for manual shifting of buttons to the change the headlight setting so that driver can maintain his concentration on driving and his vision will not be affected by the oncoming vehicles.

1.1 Problem Statement

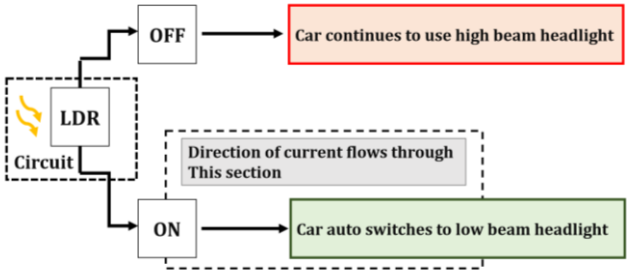
A common experience everyone has witnessed travelling during night is getting blinded and having vision blur by the oncoming vehicle using high beam headlight. With most of the consumers not caring about their headlight settings & configuration they drive with the risk of accident every day. Only some percentage of people use dipper correctly. this unawareness of matter leads to road accidents in many different geographical areas across the world.

1.2 Proposed Solution

In the case when two vehicles approaching each other having high beam headlight ON, when they are within a particular range and the gaze of the high beam falls on the bonnet of the vehicle the sensor attached to the bonnet which is connected to the circuit will automatically switch the high beam headlight to low beam headlight without the need for manual activating of switch by the driver and when the two vehicle are no longer in influence of each other's headlights the circuit reverts back the headlights to high

beam again. This will have a large impact on reducing accidents during such conditions and drivers can also maintain their concentration towards oncoming vehicles in a better way.

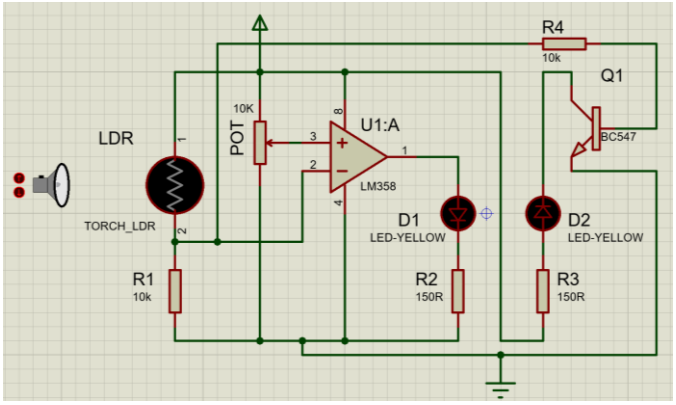
Fig -1: Block diagram of the system.



2. SYSTEM DESIGN

The designed circuit can be interfaced within the automobile as it doesn't require extra space and is relatively small. Following circuit has an LDR, a LM 358 OP-AMP (operational amplifier), a BC 547 transistor, two LEDs (light emitting diode), a 10k-ohm potentiometer, two 10k-ohm resistors, two 330-ohm resistors. LM 358 is an op-amp and its basic functionality is to amplify weak electric signals flowing through the circuit it acts as the default case of the circuit in which the vehicle is operating with high beam headlight. BC 547 transistor is a NPN transistor and has the switching section of the circuit indicating low beam of headlight. In the circuit two resistors named R2 and R3 are having 150-ohm resistance here any resistors of the value in between 150 to 350 ohms can be used, using resistance of higher values in these two positions is not recommended and all other values of resistors must be kept same. In Fig-2 LED D1 anode (Positive) is connected to pin 1 of LM 358 and cathode (Negative) is connected to 150-ohm resistor and similarly LED D2 cathode (Negative) is connected to collector terminal of transistor BC 547 and anode (Positive) is connected to 150-ohm resistor which is connected to power supply and remaining all circuit connections are done as per Fig-2.

Fig -2: Circuit design.



The two LEDs in the circuit only shows the flow of current and the two positions will be extended towards the circuit connections of high beam and low beam setting of headlights.

LDR is activated when a beam of light energy is incident on the surface of the LDR device and then only it starts conducting electricity in the circuit. The conduction of the current starts as soon as the intensity of light is enough to generate electricity in the circuit so the intensity and sensitivity of LDR is important factor. A 12v battery is enough to power the circuit and the positive terminal is connected to point A and negative terminal to point B.

2.1 Working of circuit

In Fig-2 the circuit is not active and both LEDs D1 and D2 are in off condition and LDR is named as TORCH_LDR.

In Fig-3 When a battery is connected across A and B (here points A and B are power and ground terminals) LED D1 is activated and the source of light is away from LDR (TORCH_LDR in Fig-3) this case is the default case and it means the vehicle is not in influence of another vehicle's high beam hence the vehicle continues to use high beam headlight setting that is LED D1 is active.

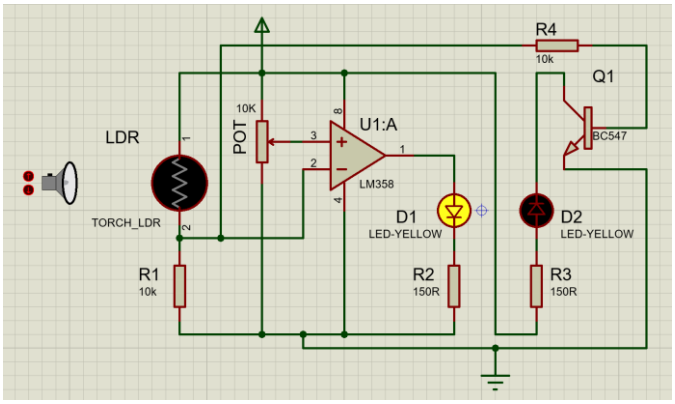


Fig -3: Default condition LED D1 is active.

In Fig-4 when the source of light is closer to LDR's surface it is observed that LED D2 is ON and D1 is OFF this instance of the circuit is the switching of high beam to low beam. The source of light in Fig-3 which is away from the LDR is considered to be opposite vehicle approaching towards the vehicle and when this source is close to LDR it means the opposite vehicle's high beam gaze is falling on the LDR sensor which is attached to the bonnet of the circuit and D2 led condition indicates the circuit switched headlight configuration from high beam to low beam.

The source of light must have a higher intensity light just like headlight of modern vehicle does for this concept to work accordingly.

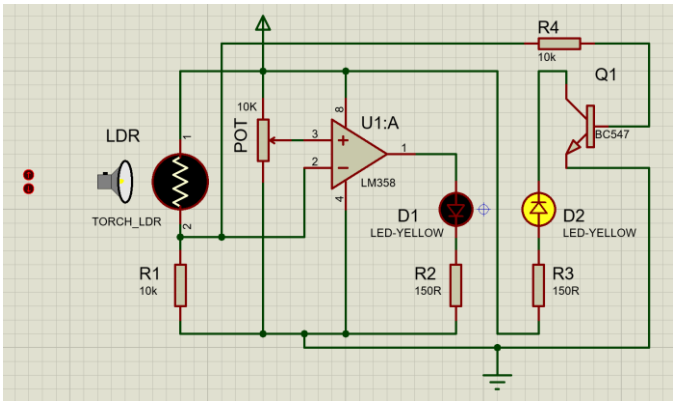


Fig -4: Position of source is closer to LDR & LED D2 is active.

When the source of light is brought back to its initial position in Fig-5 LED D1 is active again indicating high beam is on this condition is the vehicle has passed the oncoming vehicle and is no longer in the influence of another vehicle headlight hence the path ahead is clear and high beam is used.

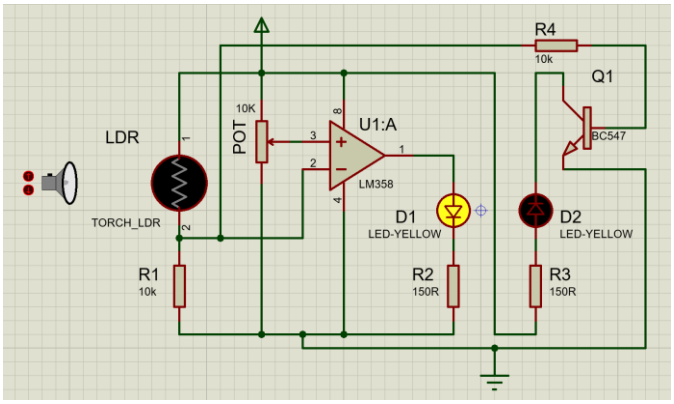


Fig -5: Position of source is away from LDR & LED D1 is active.

3. CIRCUIT ENVIRONMENT

In reference with the above problem statement this system is used in night and the LDR sensor conducts only when there is enough light energy falling on the surface of the device within a particular range to activate the circuit hence the concept of the project can be tested in dark area where LDR is not receiving any form of light to perfectly carry out the execution as mentioned in working of the circuit.

3.1 Need for project

resolution of this project is to make the headlight switching part totally an automatic process so that driver has more flexibility in driving at night which reduces the number of accidents and head on collisions with oncoming vehicles during night time and it also reduces strain of high beam headlight falling on human eyes which causes temporary blindness and vision blur.

4. CONCLUSIONS

Implementation of this project will result in drivers being more attentive towards oncoming vehicle even better than before which reduces the rate of accidents. There wouldn't be any majority changes in the system for the consumers to adapt as it's a minor change in the way the headlights behave in different situation and since the whole system is automated it enhances productivity of driving the automobile. This system also uses less power consumption and is easy to install and is developed using components that have less cost production which reduces overall cost for development.

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