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Automatic Vehicle Headlight Management System to Prevent Accidents

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ABSTRACT: In our day to day life road accident increases due to increase in vehicles. In this paper, an automatic headlight dimmer which uses a light dependent resistor(LDR) sensor. The main object behind this project is to minimize the road accident in night. The driver of most vehicles are use light beam of light while driving at night. This causes a discomfort to the person traveling from opposite direction the person experience temporary blindness. This is caused due to high intense headlight from other side of vehicle coming towards the person from opposite direction. The most accident happen in night due to this problem. Hence, to overcome these manual dipping problem an automatic mechanism has made which inform to the out coming vehicle and according to their response our circuit divides whether our headlight should be upper mode or dipper mode.

KEYWORDS: Light dependent resistors (LDR), automatic headlight, temporary blindness and manual dipping.

I. INTRODUCTION

In this era of technology we are becoming more careful about driving because of increased rate of accidents. Even if we are getting more advanced and comfortable inventions but at the same time it's also contain lots of drawback. Now a day vehicles are one of the essential part of most of the people life's and traveling at night also common factor. Because of advanced technology in vehicles having high adverse effects on human life in good and bad ways. In many studies it have proven that most of the accident happened during night time. It's also states that because of intense light falls on driver so as he has to face sudden blindness for short period of time because of that he had to lose his control while driving and accident happened. In many cases this is main cause of accident headlight glare. In many movies we watch particular scene of accident where driver is driving in night time from other side sudden light reflect on his face and than for couple of second he loses his control and accident happened. This is what exactly happened in real life also. To overcome this problem the prototype has been designed that to controlling bright high beam headlight of vehicle automatically. It may contain automatic dipper unit which will change the light intensity according to requirement.

II. LITRATURE REVIEW

In current standing automotive industries are highly recommend and enforced automatic headlights systems in vehicles. This systems have high accuracy to stop the accidents that had been occurred because of halogen headlamps systems in old vehicle at the time of night driving. In the era from 90's, advancement in motor lighting system is occurs kaito is initial makers of diode headlamps, this systems consumes less power with extremely load impactor, long service life and are small in size. Although nowadays they're the high expensive head-lamp system available and are generally designated on selected vehicle. LED having high spectrul distribution power but, have a sander distribute when compared to HID technologies. It is expected that diode lighting will bit by bit occupy space of halogen lamp, it is expected 70% vehicle are implementing LED headlights in 2021, leading to a shift within the usually ascertained observed spectral distributed by drivers towards shorter wavelengths. However, the most important proportion of headlamps on the road can still contain halogen technology in 2020, and the expectations is that it will remain constant for some time in future. BMW implemented LED automated headlights with high cost, but now a days due to advance technology it will be implemented on 4 wheeler additionally two wheeler. Auto are facing a large downside because of this high beam light which falls directly onto their eyes throughout the driving. There are several, medical facts and figures which support their issues of night driving. A headlights system is filament of bulb that had been put in to the front of a vehicle to light night the road ahead...

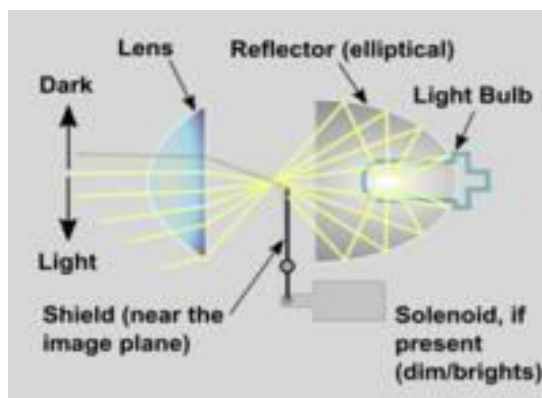


Figure:1. Outlay of a Headlamp

Projector (polyellipsoidal) lamps:-

At this method a filament is found at one focus of an non-circular reflector and encompasses condenser lens at the front of the lamp. A shade is found at the image plane, between the reflector and lens, therefore the projection of the top edge of this shade provides the low-beam cutoff. The form of the shade edge, and its precise position within the optical system, determines the shape and sharpness of the cutoff. The shade could have a solenoid actuated pivot to provide both low and high beam – the shade is removed from the light path to create high beam, and placed in the light path to create low beam, and such optics are known as bixenon or bihalogen projectors, depending on the light source used. If there is no such arrangement, the cutoff shade is fixed in the light path, in which case separate high-beam lamps are required. It used an 85 watt transverse-filament tungsten-halogen bulb and was intended as a mid-beam, to extend the reach of the low beams during turnpike travel when low beams alone were inadequate but high beams would produce excessive glare. So that automatic headlights system that can be reacts according to condition of front road vehicles. Problems arrised due to high beams headlights, Troxler effect is used to describe a kind of temporary blindness. It is otherwise known as the 'fading effect'. A study shows that if our eyes are exposed to a very bright light source of around 10,000 lumens, we experience a glare. This glare is produced due to over exposure of the rods and cones inside our eye. Even after the source of glare is removed, an after-image remains in our eye that creates a blind spot. This phenomenon is called Troxler effect. This means that the driver's reaction time is increased by 1.4 seconds. For example, let us assume a motorist travelling at 60 miles per hour takes 0.5 seconds to react to a hazard and will stop within 41 feet. Due to Troxler effect, the same person travelling under the same conditions will take 0.9 seconds longer to react and hence will come to a complete halt only at 123 feet. There is a overlage difference of 82 feet. This is more than enough to cause a disaster on the road. This Troxler effect is across all ages. Any one exposed to sudden bright light experiences this Troxler effect.

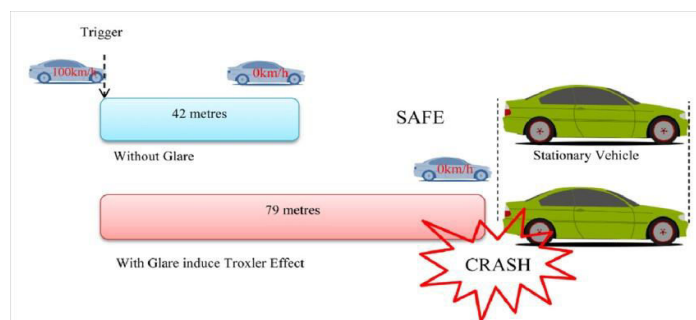


Figure:2. Average stopping distance at 100 kmh with and without glare induced Troxler Effect.

Accidents due to Troxler Effect:

According to Forbes, the statistics shown in table gives the details of accidents that had occurred in the year 2019 in Asia due to over-bright light.

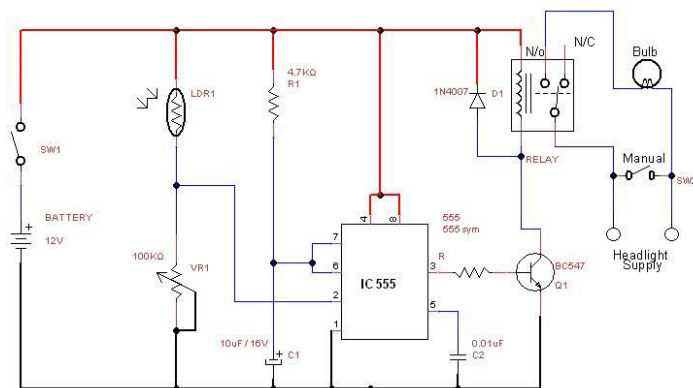
Year	Total Number of Road Accidents(in numbers)	% change	Total Number of Persons Killed (in numbers)	% change	Total Number of Persons Injured (in numbers)	% change
2015	5,01423		1,46,133		5,00,279	
2016	4,80652	-4.14	1,50,785	3.18	4,94,624	-1.13
2017	6,64910	-3.28	1,47,913	-1.90	4,70,975	-4.78
2018	4,67044	0.46	1,51,417	2.37	4,69,418	-0.33
2019	4,49002	-3.86	1,51,113	-0.20	4,51,361	-3.85

Table1. Accident due to glare's effect

Hence, this becomes the foremost concern to consider new innovative answer that's helpful and additionally value effective. This had led to the event of the automated headlamps dimmer prototype. The various elements utilized in the circuit are LDR (light dependent Resistor), two resistors as possible divider, Transistor, IC 555 Relay switch, LED bulbs and a Supply voltage. The LDR is employed to sense the incoming light. Its operation can obsessed with intensity of light. Higher the light intensity, lower its resistance. The resistors used are a typical 0.25 watt, 4.7k. The normally-open contact is connected to the low beam bulb of the vehicle whereas normally-closed contact is connected to the high beam bulb. A supply of 12 volts from battery is required for the circuit. Two 0.25 watt LED bulbs are taken for simulating the headlights of the vehicle. One represents the brilliant mode bulb and therefore alternative, the low beam bulb.

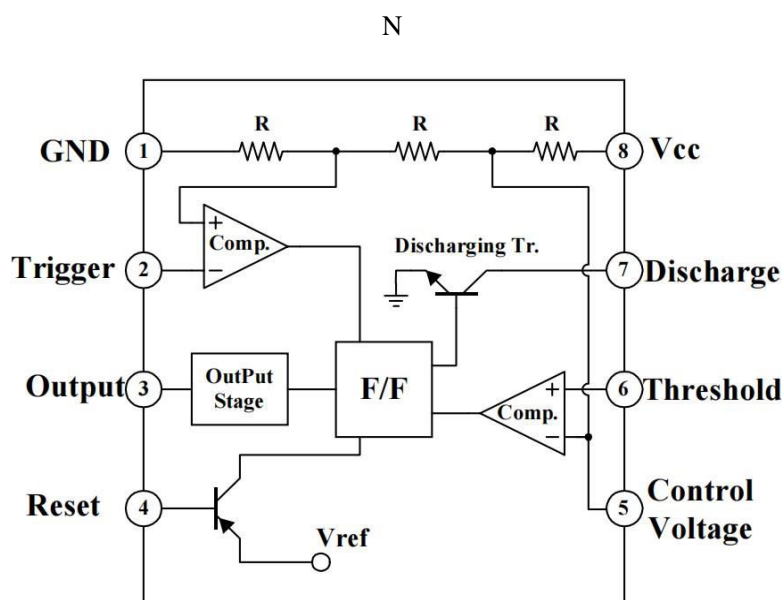
III. EXPERIMENTAL SETUP

Circuit Diagram:

**Figure:3 circuit diagram of automatic dimmer**

Circuit components:

1. IC 555
2. Resistor-4.7k (2)
3. Capacitors
4. LDR
5. Relay-12v
6. Battery-12v

Description of components:**1. IC 555 :****Figure:3 IC555**

The IC 555 timer is an 8 pin mini Dual In-line Package. The 555 timer IC consists of three $5K\Omega$ resistors. It is used for applications of timer, delay, pulse generation, etc. It can produce accurate oscillations and time delays. It has three working modes: mono stable, bistable, and astable.

2. Resistor-4.7k :

Resistor is a passive electrical component which has two terminals and they are used for one purpose either limiting the flow or regulating the flow of electric current in the circuits. The important use of resistor is to reduce the flow of current and lower the voltage in the circuit. They are made from the mixture of powdered carbon and the insulating material such as ceramic.

3. Capacitor:

Capacitor is used to store the electrical energy. It acts as a charge storage device. It consists of two conductors in close proximity and also insulated from each other. When we apply voltage, it holds the electric charge and provides stored charge to the circuit when required.

4. LDR (Light Dependent Resistor):

Light dependent resistors have various names such as photo resistor, photo conductor, etc. When there is a need to detect the presence or level of light in electronic circuits, light dependent resistors are used. It is a component which is sensitive to light. When it gets in contact with light, the resistance gets changed.

5. Relay:

Relay can also be called a switch. The main purpose of a switch is to open or close the circuit manually. The switch which connects or disconnects two circuits is known as a relay. But in a relay, an electrical signal is applied from an outside source which is used for connecting or disconnecting the circuit instead of manual operation. A relay can be operated by AC or DC.



6. Battery:

The device used to convert chemical energy directly into electrical energy is known as Battery. Battery consists of Negative terminal Anode and Positive terminal cathode. It is Electro chemical device which can be charged or discharged as per required.

IV. METHODOLOGY

Working principle:

The fundamental standard of this circuit is, the different forces of light for example high or low light emission falling on the contrary vehicles Headlight and the fundamental general thought of manual plunging and this equivalent thought is changed over into electronic configuration with this circuit.

Working:

- Headlights utilized by vehicles work by utilizing LDR which distinguish how much light is there outside. These sensors are situated on the scramble of the vehicle mostly. The headlights turn on when the LDR recognize a specific degree of dimness (darkness implies the degree of light).
- Essential old executions turn the headlights on at dim and off at rise. Present day executions use sensors to distinguish the measure of outside light (This assisted with turning the lights on during burrows).
- If we talk about sensors, these sensors are just photoelectric sensors which respond to the amount of light and turn on headlights when there is certain level of low lights.
- Most system hold the regular headlight switches, which permit drivers to turn lights on or off and sidestep the sensors (for the individuals who likes manual control).
- Most producers wire the programmed headlights through the start switches of their vehicles. Right when the driver starts the vehicle and light levels are low, the headlights turn on consequently. When he turns off the key, the system turn off the lights.
- Be that as it may, there are limitations to automatic headlights. In some cases they don't turn on during heavy rain or mist, as the light sensor actually identifies some light.
- Automatic headlights don't promptly turn on in cases of sudden darkness, as if the vehicle passes through a tunnel(However it relies upon the reaction season of the sensors). In these cases, drivers need to utilize their best impulses and physically turn on their headlights if necessary.
- One more thing is that the sensor only detects light so, it cannot distinguish if the darkness level is due to sunset or just temporary blackout in the middle of day. This causes the lights to turn on when something blocks the sun or when the driver is just parking.

V. CONCLUSION

This paper presents an automatic headlight dimmer that use LDR sensing technique. Thus, high beam of light is automatically switch to low beam of light when a high beam of light from the another vehicle fall on the light dependent resistor(LDR). The sudden glare during the night driving is a serious problems. Thus, caused due to sudden exposure of our eyes to vary bright light of the headlight of vehicle. This caused a temporary blindness called Troxler effect. The manual dipping is so critical, to overcoming this problem we should made automatically dimmer circuit. The implementation of this circuit in every vehicles in future to avoid accident but also provide safety and comfortable driving.

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