

**A Thesis/Project/Dissertation Report**

on

**GLARE HANDLING ON AUTOMOBILES USING IoT**

*Submitted in partial fulfillment of the  
requirement for the award of the degree of*

**B.Tech.(CSE)**



(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

**Under The Supervision of  
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**December, 2021**



**SCHOOL OF COMPUTING SCIENCE AND  
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**CANDIDATE'S DECLARATION**

I/We hereby certify that the work which is being presented in the thesis/project/dissertation, entitled “**Glare Handling on Automobiles using IoT**” in partial fulfillment of the requirements for the award of the B.Tech.(CSE) submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of July, 2021 to December, 2021, under the supervision of Pallavi Jain Associate Professor, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the thesis/project/dissertation has not been submitted by me/us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Pallavi Jain


Associate Professor

**CERTIFICATE**

The Final Thesis/Project/ Dissertation Viva-Voce examination of Abdullah Nawroz : 20SCSE1010139 and Aakash Kumar Sahoo : 19SCSE1010391 has been held on December 24, 2021 and his/her work is recommended for the award of Bachelor of Technology in Computer Science and Engineering.

**Signature of Examiner(s)**

**Signature of Supervisor(s)**



**Signature of Project Coordinator**

**Signature of Dean**

Date: December, 2013

Place: Greater Noida

## **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 cars.

This is an IoT (Internet of Things) based project and the following tools has been used:

- Microcontroller

- Brightness sensor
- Transistors
- Resistors
- Capacitors
- IC (Integrated Circuit)
- Relay
- LED (Light Emitting Diode)
- PCB (Printed Circuit Board)

The output of this project is an (IoT) device which will control the light beams of the car on the basis of the amount of light present in the specific area.

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### **Acronyms**

B.Tech.	Bachelor of Technology
M.Tech.	Master of Technology
BCA	Bachelor of Computer Applications
MCA	Master of Computer Applications
B.Sc. (CS)	Bachelor of Science in Computer Science
M.Sc. (CS)	Master of Science in Computer Science
SCSE	School of Computing Science and Engineering

## **CHAPTER-1 Introduction**

### **1.1 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. These lights are designed to emit two types of light, the low beam and the high beam. The low beam illuminates the road sufficiently and at the same time 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. And 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.

## **1.2 Problem Formulation**

The long lasting issues of inconvenience and road accidents at night time have led to a voracious study and many amendments in laws have been made to prevent or reduce such undesirable conditions. Many people have come up with ways to control this problem and still research is going on as it is a global issue. To keep the vehicle and the intensity of the headlamps under perfect control, different accessories and control unit should be installed in the vehicle in such a way so it reduces the workload of the driver and the unit can automatically detect light which can cause harmful glare and should send a signal to the oncoming vehicle to reduce the intensity of the lamps.

Glare is a strong sensation or a sort of disturbance caused in the eye of a person in its field of view. It is caused due to dazzling light or strong intensity beam and can interfere with the visibility of the person. This certain dazzle causes a temporary blindness in the driver's eyes due to reduced retinal image contrast called as 'Troxler effect'. It has been proved according to a study, that if our eyes are exposed to a very bright light source of more than 10,000 lumens, we can feel a glare . Light gets scattered in the eyes which reduces the contrast of roadway objects. It can result in disability glare. The stronger the intensity of the light and closer the glare is to where the person is looking, the more discomfort and difficulty does it cause.

**What is Glare?**

Glare is a visual sensation caused by excessive and uncontrolled brightness. It can be disabling or simply uncomfortable. It is subjective, and sensitivity to glare can vary widely. Older people are usually more sensitive to glare due to the aging characteristics of the eye. Disability glare is the reduction in visibility caused by intense light sources in the field of view, while discomfort glare is the sensation of annoyance or even pain induced by overly bright sources (Rea 2000). Compare the glare from the streetlight to the glare from the luminaires. Reducing glare is an effective way to improve the lighting.



## 1. Glare

**Road accidents due to glare caused by headlamps ?**

More than 30% percent of accidents during night time happen due to headlight glare. The visibility during night time also reduced due to fog. The correct use of dipper (low beam) during night is essential for the drivers in the presence of street light. The unwanted use of high beam may lead to unnecessary crashes. A survey says that 26.5% alone use dipper correctly out of 73.83%, remaining 48.3% continued in high beam itself and the remaining 25.53% dipped the light for a few seconds and continued to be in a high beam. Headlight are LDR based intensity control, Fuzzy logic based intensity control, wireless sensor network method, IR transmitter-receiver method, and camera based intensity control, pulse width modulation method. In this paper we used LDR based intensity control method. Almost 1,200 luminance of light intensity in case of high beam is more than enough to view the potential obstacles and also to react. But sometimes owners replace the headlight with about 2000-3000 luminance of intensity. This may lead to unavoidable crashes.



**2. Glare causes accidents**

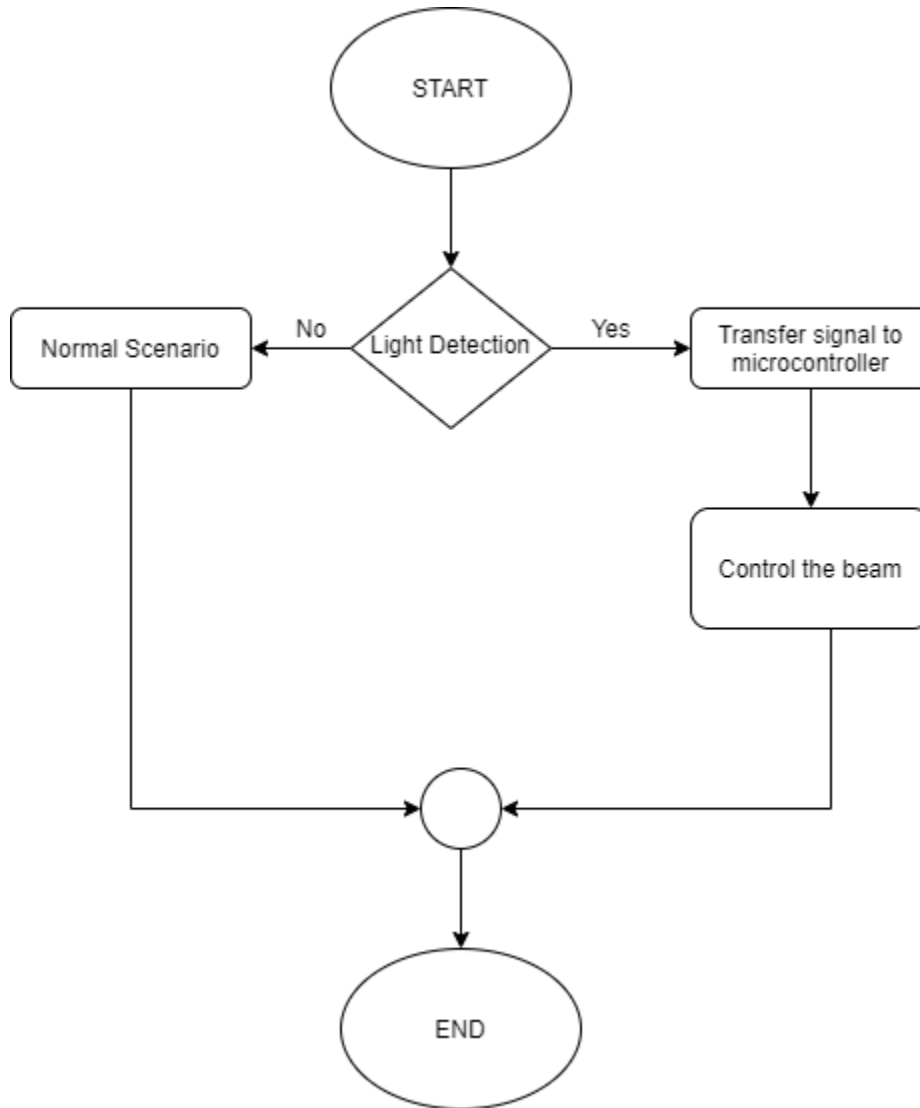


**3. Accident caused due to glare**

Bright headlights that shine in your eyes while you're driving can affect you in a number of ways, according to the National Highway Traffic Safety Administration. First, it can cause temporary blindness, as it can take several moments for your eyes to recover once they have been hit by an intense glare. During this time, your vision may be limited and it can be difficult to see other objects and drivers on the road. As a result, you may experience decreased reaction times to driving hazards as well. In addition, headlight glare can reduce your range of visibility, which means that you may not be able to see as far as you normally would.



### 1.3 Flowchart



**Flowchart for the proposed model**

## Chapter 2 Literature Survey

A study has conducted on the effect of glare produced from an oncoming vehicle on visibility at night. The study states that as the lateral separation between the driver and the vehicle that is producing glare decreases, the effect gets intensified by a lot. The level of discomfort gets more to be experienced by the driver with narrowing lateral as well as longitudinal separation. This effect is directly related to the effect of visual angle on visibility. The more the lateral separation decreases, the visual angle gets smaller and the discomfort caused by the glare to the eyes becomes more.

[1]

That's not all, in fact the effect of the glare caused by the high beam vehicle head lamps persists for a very long time and in many cases it can persist for 3000ft approximately.

$$\text{Visual angle} \propto \text{Lateral separation} \propto \frac{1}{\text{Glare Intensity}}$$

The recent work on light detection that has been done includes the use of camera for visual detection of headlights that will be followed by subsequent dipping. This is very robust method that has been proposed by the students where the camera takes

a live video of a vehicle with high beam or low beam and it will successively send a signal to an electronic circuit that will automatically dip the light.

The one and only problem with this proposed model is that it requires a complex set up and image processing and in many cases image processing can be very time consuming and image may lose its clarity so it might not prevent accidents. [2]

Also in one more survey, a system has been developed in which analog to digital converter (ADC) and switching relay circuits have been used. The ADC reads and converts the analog values to digital values and it will accordingly control the relay circuits to switch the headlamp to high or low beam. The major problem with this prototype is that it works within a particular vehicle and the beam of the vehicle is controlled by the driver himself . As such, it can't warn the other vehicle which is causing a trouble to the driver or which might be the cause of the accident even after dipping the beam as the vehicle causing the glare has not been warned. [3]

In Another survey, there is a smart alerting system which helps the driver parking the vehicle during day and night time not to collide with any other obstacle. IR sensors have been used for detection of objects followed by an arm controller for controlling and Zigbee module for data transfer. [4]

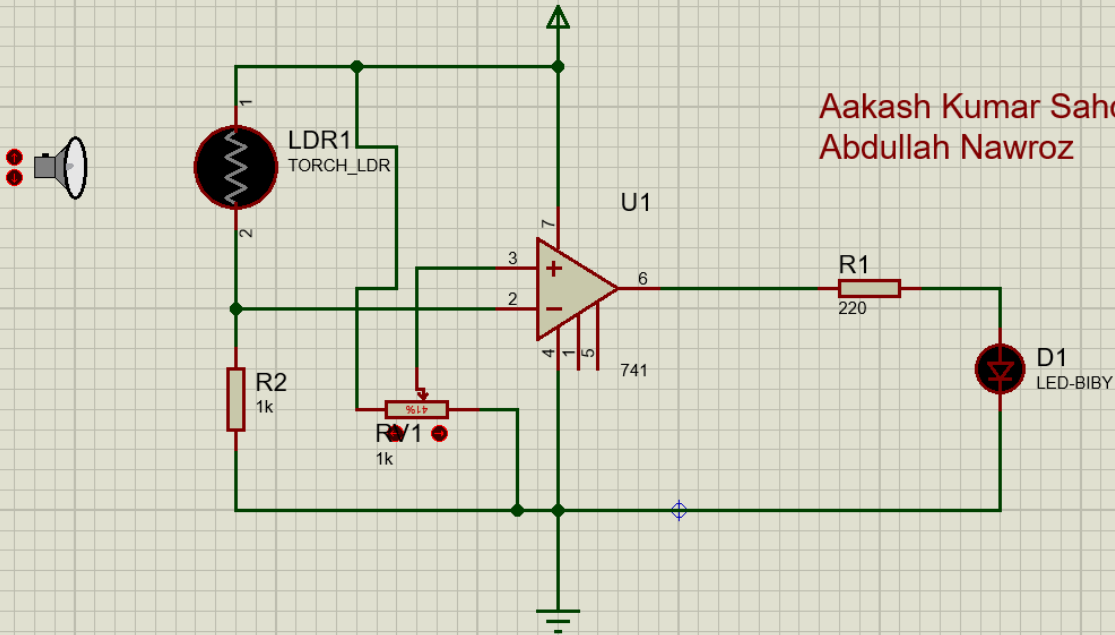
## Chapter 3 Project Design

### 3.1 Circuit Diagram

The proposed circuit diagram for the project is given below which uses the following components –

1. Light Source
2. LDR (Light Dependent Resistor)
3. Resistors
  - R1 (1k ohm)
  - R2 (220 ohm)
  - Variable Resistor RV1 (1k ohm)
4. LED Bulb
5. Operational Amplifier (IC741)
6. Power Supply
7. Connecting Wires

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## 3.2 Working

### Working-

1. Turn the power ON
2. Move the light source close to the LDR1.
3. The resistance of the LDR1 becomes less and starts conducting the electricity.
4. Current passes through the variable resistor RV1, through which the resistance can be varied.
5. The LED bulb D1 starts glowing.
6. On moving the Light Source to and fro towards the LDR1, the intensity of LED bulb D1 changes accordingly.

### **3.3 Component Details**

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.

#### **Light Source**

A light source is anything that makes light. There are natural and artificial light sources. A few samples of natural light sources include the Sun, stars and candles. A few samples of artificial light sources include light bulbs, lamp posts and televisions.

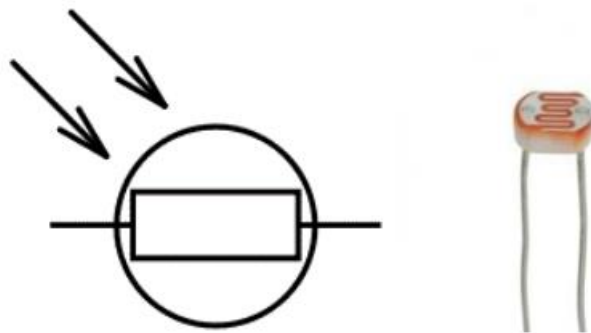
#### **LDR (Light Dependent Resistor)**

A photoresistor or light dependent resistor is an electronic element that's sensitive to light. When light falls upon it, also the resistance changes. Values of the resistance of the LDR may change over numerous orders of magnitude the value of the resistance falling as the position of light increases.

It isn't uncommon for the values of resistance of an LDR or photoresistor to be several megohms in darkness and also to fall to a many hundred ohms in bright light. With such a wide variation in resistance, LDRs are easy to use and there are numerous LDR circuits available. The perceptivity of light dependent resistors or photoresistors also varies with the wavelength of the incident light.

LDRs are made from semiconductor accoutrements to enable them to have their light-sensitive parcels. Numerous accoutrements can be used, but one popular material for these photoresistors is cadmium sulphide, CdS, although the use of these cells is now confined in Europe because of environmental issues with the use of cadmium.

Also cadmium CdSe is also confined. Other accoutrements that can be used include super eminent sulphide, PbS and indium antimonide, InSb.



5. LDR



Although a semiconductor material is used for these photoresistors, they're purely unresistant bias because they don't retain a PN junction, and this separates them from other photodetectors like photodiodes and phototransistors.

### **Resistors:**

Resistors are used in virtually all electronic circuits and many electrical ones. Resistors, as their name indicates resist the flow of electricity, and this function is key to the operation most circuits.



6. Resistor

### **LED Bulb:**

An LED lamp or LED light bulb is an electric light that produces light using light-emitting diodes (LEDs).

LED lamps require an electronic LED driver circuit to operate from mains power lines, and losses from this circuit means that the efficiency of the lamp is lower than the efficiency of the LED chips it uses.



## 7. LED bulbs

### **Operational Amplifier (IC741)**

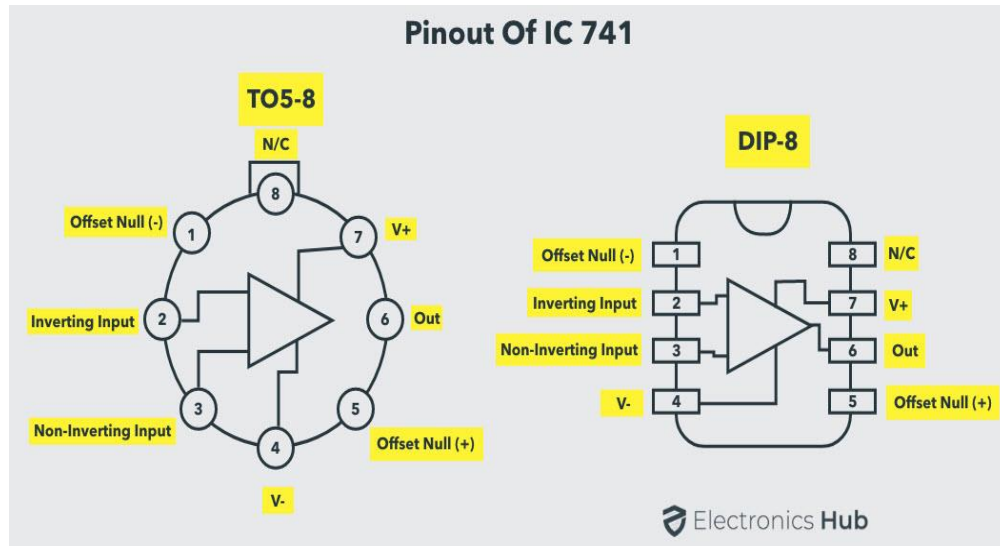
The 741 Op Amp IC is a monolithic integrated circuit, comprising of a general purpose Operational Amplifier. It was first manufactured by Fairchild semiconductors in the year 1963. The number 741 indicates that this operational amplifier IC has 7 functional pins, 4 pins capable of taking input and 1 output pin.

IC 741 Op Amp can provide high voltage gain and can be operated over a wide range of voltages, which makes it the best choice for use in integrators, summing amplifiers and general feedback applications. It also features short circuit protection and internal frequency compensation circuits built in it. This Op-amp IC comes in the following form factors:

8 Pin DIP Package

TO5-8 Metal can package

8 Pin SOIC



## 8. IC 741

### Power Supply

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.

### Connecting Wires

Electronics wire for connecting is often categorised by the insulation. The type of insulation is important because it often governs the type of use for which it is suitable.



## 9. Jumper Wires

Bare copper wire: Wire that is not insulated can be used in a variety of ways. It may be used to correct problems on a printed circuit board where insulation may not be a problem. It may also be used in areas where sleeving may be slid over the wire to protect it from causing shorts, or it may be used in areas where it is not possible to cause short circuits. Although it is possible to use bare copper wire, usually it is pre-tinned to enable easier soldering.

Enamelled copper wire: This type of copper wire has a form of insulation made from enamel. This is effectively like a varnish over the copper wire. Enamelled copper wire is used in applications such as coils where insulation is required but the

thickness of the insulation may be an issue. The enamel is not as robust as other forms of insulation so it is not used where it may be scratched or knocked.

there are some forms of enamelled wire where the insulation or enamel will burn off when being soldered. This enables the wire to be used on circuit boards and removes the need for stripping the wire before connections are made. However care must be taken when using this wire as accidental connections may be made if the insulation is abraded.

PVC wire: PVC wire is the most common form of wire today. Although it is usually termed PVC wire, it should be more correctly termed PVC coated wire as the PVC forms the insulation. The advantage of PVC wire is that it is adequate for most situations and the ends are easy to strip to make connections. However it can melt or in severe cases it can burn when it becomes hot. Also when it is cold, the PVC becomes brittle and can crack if bent.

PTFE wire: PTFE wire is far more expensive than PVC wire. Like PVC wire, it should be more correctly termed PTFE coated wire. The PTFE insulation is more robust, and can be used over a much wider range of temperatures. However it is much more expensive and it is also much more difficult to strip to expose the bare copper wire for making connections or soldering.

## **Chapter 4 Results and Discussion**

The unit is really effective and reduces the chances of accidents to a greater extent. It ensures a safety drive during night time and health of middle aged drivers or drivers with eye problems is also not affected. Further, it gives a lot of relief to the driver as he does not have to manually detect and inform the oncoming vehicle to reduce the beam. It saves a lot of time and reduces the time in which an accident might occur.

Moreover, it is not very expensive and can be used in almost all type of vehicles eventually reducing the risk of accidents. This unit can also be used in low cost vehicles in semi-urban areas, thus, making the lives of the common mass easier. The color of the headlamps should be made subtle so that it cannot cause a strain to the eyes. It can also be fitted in two-wheelers.

## **Chapter 5 Conclusion and Future Scope**

### **5.1 Conclusion**

The automatic beam controller is a simple and efficient system that must be installed in all vehicles which will help detect high intensity light during night time and will automatically send signal to the vehicle causing the glare so that beam gets controlled and journey becomes safer and hassle-free for people. Apart from that every one of us should have ample knowledge of road safety and we should make sure that we follow all the safety rules and make everything easy for ourselves as well as for other travelers. If we maintain the standards of road safety and remain disciplined at all times, life will become so smoother and easy for all human beings. Apart from that, geometry of roads is one of the key elements in determining the amount of discomfort that glare might produce. Effect of visual angle, lateral and longitudinal separation and their effects on the intensity of light are directly related to the geometry of roads and hence, the position of the vehicle. Health of the driver is a key concern and measures must be taken for implementation of health tracking unit and reduction of harmful glare by the use of high quality headlights. With integration of all the factors into a real time working module and working as per the demand of the situation, this issue can easily be brought under control and we will rarely meet with any mishap or tragedy.

## **5.2 Future Scope**

Camera based vision in addition to IoT will aid in implementation of autonomous automobile using machine learning algorithms. Further, the system can be enhanced using smart sensors and advanced image processing techniques. Through which the travel can be made safe and reliable



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