Automatic Light Intensity Control

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Abstract— Headlight of vehicles poses a great danger during night driving. The drivers of most vehicles use high, bright beam while driving at night. This causes a discomfort to the person travelling from the opposite direction and therefore experiences a sudden glare for a short period of time. This is caused due to the high intense headlight beam from the other vehicle coming towards the one from the opposite direction. In this project, an automatic headlight dimmer which uses a Light Dependent Resistor (LDR) sensor has been designed to dim the headlight of our vehicles to avoid human eye effects. This automatically switched the high beam into low beam, therefore reducing the glare effect by sensing the light intensity value of approaching vehicle and also eliminated the requirement of manual switching by the driver which has not done at all times. The Arduino software was employed to program the microcontroller. The system device was able to automatically switch the headlight to low beam when it sensed a vehicle approaching from the opposite side using LDR sensor. It was observed that the maximum spread angle of headlight was 135 degree. At the time the spread light from other sources reached the sensor, its intensity would be very much reduced below the triggering threshold level. The sensitivity of a photo detector determined the relationship between the light falling on the device and the resulting output signal. A server module could be included to this system for receiving and storing headlight rays parameter information in a database application.

Keywords: LDR, Arduino, Headlight System

I. INTRODUCTION

Light is electromagnetic radiation within a certain portion of the electromagnetic spectrum. The word usually refers to visible light, which is visible to the human eye and it is responsible for the sense of sight. Visible light is usually defined as having wavelength in the range of 400-700 nanometres(nm), or 400×10−9 m to 700×10−9 m, between the infrared (with longer wavelengths) and the ultraviolet(with shorter wavelength). Light can be produced by nature or by humans. "Artificial" light is typically produced by lighting systems that transform electrical energy into light. The human eyes are adaptable to a particular range of vision. There are two visions namely photopic and scotopic vision. Human eyes actually behave differently in different conditions. During bright surroundings, our eyes can resist up to 3cd/m 2 .This is the photopic vision. During dark and unlit conditions, our eye switches to scotopic vision which has the range of 30-45 µcd/m2. It takes 4 seconds for our eyes to change from photopic vision to scotopic vision. This is also an example of TROXLER effect. As the brightness increases, the strain to focus on an object increases. This will increase the response time of that person. The requirement of headlight is very common during night travel. The same headlight which assists the driver for better vision during night travel is also responsible for many accidents that are being caused. The driver has the control of the headlight which can be switched from high beam(bright) to low beam (dim). The headlight has to be adjusted according to the light requirement by the driver. During pitch black conditions where there are no other sources of light, high beam is used. In all other cases, low beam is preferred.

II. LITERATURE SURVEY

The system proposed in [1] is expected to reduce the problem of temporary blindness would sense the intensity of the headlight from the oncoming vehicle in analog form, which would be sent to analog to digital converter(ADC) to convert analog signal to digital signals. The ADC would send this digital signal to the microcontroller where the threshold intensity level is set. It would compare the received intensity in the digital form to the threshold intensity and send this signal to relay circuits. There are two relay circuit one for switching to high beam and another one for switching to low beam. If the relay2 circuit receives the signal the high beam light will go to low beam.

Article presented by A.S.M Asaduzzaman and et al in their paper "The Automatic High Beam Controller" [2] can switches high beam of a vehicle to low beam whenever it gets signal from another vehicle giving high beam of light. If the opposite vehicle also have this device the opposite vehicle will turn it's high beam to low beam automatically. The device will also work even it can detect the presence of any nearby object at the same time. And by using this device, rate of high way road accident can be reduced.

In [3] Amiya Kumar Tripathy and et al conclude that Low latency allows faster headlight intensity adjustment between the vehicles to drastically reduce the cause of temporary blindness. An attempt has been made to come up with a system which would sense the intensity of the headlight of the oncoming vehicle and depending on the threshold headlight intensity being set in the system it would automatically reduce the intensity of the headlight of the oncoming vehicle using wireless sensor network thus reducing the condition of temporary blindness caused due to excessive exposure to headlights.

System in [4] uses the GPS system to analyse the geographic location and then determines whether to switch on the LED headlight. To reduce the system complexity, a CAN bus is used to limit the number of control wires required. The LED headlight driver also uses an interleaved boost converter that has low conduction losses and input ripple currents, which improves the conversion efficiency of the headlight drivers and extends the battery lifetime.

In paper [5], Devashree Chilla and et al have emphasized on various methods and techniques that can prove beneficial in monitoring the headlight intensity of vehicles. The light intensity parameter should be within the

human vision comfort zone so as to avoid blind spot to the driver at night and to be less prone to accidents usually occurring due to excess glare of headlamps. If such methods are implemented by manufacturers the device will automatically switch to low beam from high beam as per the headlight intensity of approaching vehicle.

Headlight intensity of vehicles poses a great danger during night travel. The drivers of most vehicles use high bright beam while driving at night. This causes inconvenience for the person travelling from the opposite direction. Person experiences a sudden blaze for a short duration. When these headlights shine brightly, they cause a temporary blindness to a person, resulting in road accident during night. To avoid such incidents, Karthik M.M [6] designed a prototype of automatic headlight intensity control system. The obstacle alerting system helps the driver parking the vehicle during day and night time without colliding the vehicle with obstacles.

The driver should actually turn down the bright lights immediately to avoid glare to the other person which is not happening. Hence, is the idea for the design and development of a prototype circuit called the automatic headlight dimmer. It gives the driver to use high beam light when required. But it automatically switches the headlight to low beam when it senses a vehicle approaching from the opposite side. Thus the implementation of device presented in [7] in every vehicle in future will not only avoid accidents but also provide a safe and a comfortable driving.

In [8] author states that Arduino Uno R3 microcontroller has clock speed of 16 MHz, which means it can execute one instruction set (considered equivalent to one cycle) within 62.5 nanoseconds. Whereas the operation cycle of relay is of 18 ms. Thus, the response of AHBCS is instantaneous to interrupts and sensor inputs. Hence, the system is advantageous over conventional front lighting system as it saves battery drainage and also automatically controls the beam switching, reducing the drivers' efforts.

From the review of literatures, author [9] conclude that, the better road illumination is important to reduce road accidents and hence, to increase night time driving safety. The prototype presented can modify the traditional headlamp system and enhance the illumination of the headlamps on curvature roads. Adapting this kind of automatic headlamp illumination system, driver's safety can be increased without compromising driving comfort.

Automatic dipper [10] provides better safety at night time and drivers can drive comfortably and reach their destination safely. There are two modes provided viz. automatic and manual mode. While driving in the cities there are light everywhere which can affect the working of the device at that time the mode can shift to manual mode to avoid flickering of the headlight. When both the vehicles were fitted with the "Automatic Dipper" then both the vehicles dip the headlight beam of each other efficiently. Main components helps to run the circuit are easily available and are also cheap. The circuit is compatible with any vehicle and doesn't require any other supply; it can efficiently work on battery fitted in the vehicles. Therefore the installation of this safety system in each vehicle give safety at night driving, increase comfort level of driver and decrease the road accidents.

III. ARCHITECTURAL DESIGN

For developing the system which would cater as a solution to the problem of temporary blindness various factors had to be considered as in for developing the architecture. For sensing the light form the headlight of oncoming vehicle LDRs are used. LDR interface with the Arduino controller. Photo transistor (LDR) receives the light from the headlight of oncoming vehicles. Arduino board checks the intensity level of the head light. If the head light intensity is high, it passes the information to the oncoming vehicles to lower the head light intensity. Process will occur similar to both the vehicles.

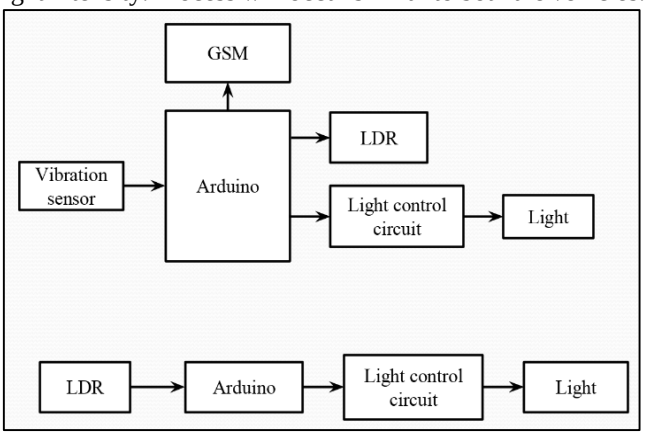

Fig. 1: Proposed system architecture

Vibration sensor is used for detecting hammering effect on vehicle. Whenever something falls on vehicle or collision took place, vibration occurs. This vibration is detected by vibration sensor. When vibrations are greater than threshold, a message is sent to owner via GSM module interfaced to Arduino.

IV. CONCLUSION

Glare during driving is a serious problem for drivers and therefore caused by the sudden exposure of our eyes to a very bright light of the headlights of vehicles. This causes a temporary blindness called the Troxler effect. Eventually this has become the reason for accidents occurring at night and also during bad conditions such as rainy or foggy conditions. The driver should have turned down the bright lights immediately to avoid glare to the other person, however they find it difficult to do. Hence, the idea for the design and development of a prototype circuit called the automatically switches the headlight to low beam when it senses a vehicle approaching from the opposite side. Thus, the implementation of this device in every vehicle does not only avoid accidents but also provides a safe and comfortable driving.

REFERENCES

[1] Aslam Musthafa R, Bala Krishnan T, Seetha Raman N, Shankar M, Asst.prof Ms. Swathi R, "Automatic Headlight Beam Controller", Special Issue Published in International Journal of Trend in Research and Development (IJTRD National Conference on Emerging Trends in Electronics, Instrumentation, Automation & Control (ETEIAC-17) 2017 P a g e 15

[2] A.S.M Asaduzzaman, Mohammad Mahmudul Islam, Shuva Paul, Md Farhat Alam, Md Mashuker Rahman,

"Automatic High Beam Controller for Vehicles", International Journal of Scientific & Engineering Research Volume 4, Issue3, March-2013 1

[3] Amiya Kumar Tripathy, Deepali Kayande, Joel George, Jerome John, Bejoy Jose, "Wi Lights - A Wireless Solution To Control Headlight Intensity", 2015 International Conference on Technologies for Sustainable Development (ICTSD-2015), Feb. 04–06, 2015, Mumbai, India

[4] Jian-Min Wang1 , Sen-Tung Wu2 , Wei-Yuan Su1 , Yu-Liang Lin, "Study and implementation of the LED headlight driver with auto-start function in specific location", ISSN 1751-956X 5th September 2016 E-First on 12th October

[5] Devashree Chilla, Manasi Joshi, Sanjyot Kajale, Seema Deoghare, "Headlight Intensity Control Methods – A Review", International Journal of Innovative Research in Computer and Communication Engineering Vol. 4, Issue 2, February 2016, 1140

[6] KARTHIK M.M, "Automated headlight intensity control and obstacle alerting system", International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 06 | June-2016 Page 2553

[7] Manjula S C, Sushmitha M R, Dr. Parameshachari B D, "Automated Headlight Intensity Control And Obstacle Alerting System", National Conference on Communication and Image Processing (NCCIP- 2017) 3rd National Conference by TJIT, Bangalore

[8] vithalkar Akshay Ganesh, 2khavare Vinayak Vithal, 3maitshaphrang Syiemlieh, 4gawande Prashik Babarao 5 Supriya Y. Sawant, "Automatic Headlight Beam Control System", International Journal of Mechanical And Production Engineering, Volume- 3, Issue-7, July-2015 Automatic Headlight Beam Control System 137

[9] Prof. Pratik Ashok Patil, Shubham Sunil Badave, Shubham Sunil Ingwale, "Automatic Headlamp Illumination Control System", International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Website: www.ijirset.com Vol. 6, Issue 3, March 2017

[10] Tejas Vijay Narkar, "Automatic Dipper Light Control For Vehicles", IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308 Volume: 05 Issue: 03 | Mar-2016.

