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Prototype of Adaptive Front Lighting System for Vehicles

Mr. Rajat Kumar sah[1], Mr. Vishal R. Mahajan[2], Mr. Vishal S. Dhangar[3], Mr. Viraj B. Ghangale[4], Mr. R. R. Chakule[5]
[1234]*Students*, [5]*Professor*
Mechanical Engineering Department, Loknete Gopinathji Munde Institute of Engineering Education &Research, Nashik, Maharashtra, India

***Abstract**: We found that illumination of conventional front light system of vehicle is insufficient for driver on curve road for turning the vehicle. This has lead to number of accidents especially at night because of improper vision during turning on curve road. So it is very necessary to get proper illumination during taking a turn on curve road. Hence made a discussion for overcoming this problem .we decided to eliminate this problem and made discussion on various solutions.*
Index Terms: headlights, LDR Sensor, vehicles, Adaptive front-lighting system.

I. INTRODUCTION

In 1912, our innovative Cadillac integrated their vehicle's Delco electrical ignition and lighting system, creating the modern vehicle electrical system.Control and dip systems emerged but the next major changes in automotive headlight technology was not until the sealed beam headlight was introduced in the 1940s, and that both bulbs and sealed beam units were used by all manufacturers in Europe, Japan and North America through the 1960s.. It was a device on automobiles which used a photo resistor to automatically adjust the headlight beams from “high beam” to “low beam” when encountering oncoming vehicles during night time driving and to switch back to high beam after vehicles had passed. With the advancement in light sources (Halogen lamps being replaced by Hid lamps) the light has become brighter causing increase in glare. Glaring is the discomfort or blindness caused by showering of unwanted lights temporarily.

II. OBJECTIVES

A. To eliminate road accidents on curve road.
B. To get large illumination on curve road.

III. LITERATURE REVIEW

Dubal P. And Mr. NanawareIn 2015, The author suggested that major road mishaps occur at night on account of curve roads. Night time driving with conventional headlamps is particularly unsafe: only 25% of the driving is done at night but 55% of the driving accidents occur during this period. The existing conventional light systems do not provide illumination in the right direction on curve roads. Due to this constrain, a need to understand an alternative technology solution. Adaptive front lighting system (AFS) helps improve driver’s visibility at night time hence achieving enhance safety. The objective of this work is to design and build an AFS Prototype that will modify an existing fixed headlamp system. From the results, it is concluded that the headlamp swings in horizontal direction by sensing steering angle. Accuracy, reliability and availability of the components were few considerations during the conceptualization stage.

Parhad S.In 2014, This paper explain about the highest fatal traffic accident rate occurs on curved roads at nighttime. Night time driving with conventional headlamps is particularly unsafe. Only 25% of the driving is done at night but 55% of the driving accidents occur during this period. The existing conventional light systems do not provide illumination in the right direction on curve roads. Due to this constrain, a need to understand an alternative technology solution. The aim is to improve visibility for driver and so achieve a significant increase in safety and driving comfort. This calls for a flexible front light for automobiles to illuminate road ahead in the night at corner. Adaptive front lighting system (AFS) helps improve driver’s visibility at night time hence achieving enhance safety. AFS (adaptive front-lighting system) used to detect information about corner in advance with help of sensor which detect the information send it to motor to adjust headlamps to get the lighting beam which was suitable for the corner. Through this way, it could avoid "blind spot" caused by the fixed lighting area when coming into the corner, and improve driving safety.

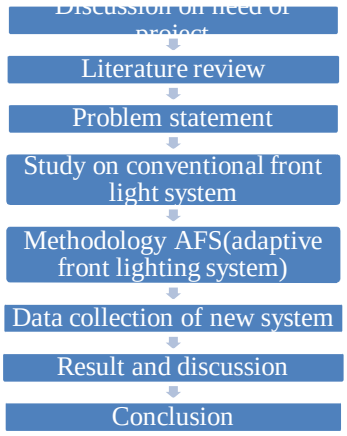
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Hrairi M., Anwar B. and Bakar A.In this paper Author explained about Advanced Front light System (AFS) is an intelligent system that optimizes the illumination of road curves during the night, on the basis of signals representing several quantities such as speed, steering angle and yaw rate of the car. A vehicle equipped with intelligent headlight gives the driver an optimal illumination of the road even in curves. The goal of this paper is to present the operation of such an AFS through its simulation of data exchange in terms of messages flowing through in-vehicle controller area network (CAN).

IV. PROBLEM DEFINITION

The headlamp is an important active safety component on the automobile, it will provide appropriate lighting function when we driving at night. Especially when we turning at night, if we cannot see each other very well in time, it will lead to a serious traffic accident. The associated survey shows that the number of traffic at night is less than one-fifth during in the day, the traffic accidents occurred at night is more than a quarter of the total accidents and the majority accidents happened in the turn.

V. METHODOLOGY



Flow chart:Methodology

VI. PROTOTYPE OF PROJECT

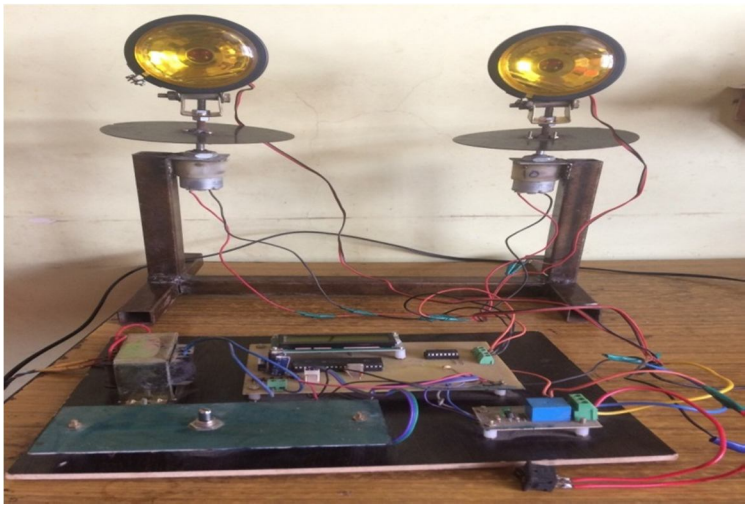


Fig. 9: Prototype setup

A. Principle of Operation

1) Vertical turning of light in response to distance obtained: Ultrasonic sensor has two signal pins. One is trigger and second is echo. Ultrasonic module needs trigger pulse of 10µs to initiate its operation. In response to the pulse an echo pulse will be generated with width proportional to the distance between the vehicles. A pulse will be received on echo pin. ON width of this signal is proportional to distance of obstacle. If distance decreases speed has to be decreased. So program will reduce ON width

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of PWM proportionally to distance from obstacle. The output if feed to the controller and the controller will update PWM width to rotate headlight vertically.

VII. RESULTS AND DISCUSSION

A. Digital storage Oscilloscope (DSO)

A digital storage oscilloscope (often abbreviated DSO) is an oscilloscope which stores and analyses the signal digitally rather than using analog techniques. It is now the most common type of oscilloscope in use because of the advanced trigger, storage, display and measurement features which it typically provides. The input analogue signal is sampled and then converted into a digital record of the amplitude of the signal at each sample time. The sampling frequency should be not less than the Nyquist rate to avoid aliasing. These digital values are then turned back into an analogue signal for display on a cathode ray tube (CRT), or transformed as needed for the various possible types of output—liquid crystal display, chart recorder, plotter or network interface. We went Electronics and Telecommunication lab and firstly took readings on cathode-ray oscilloscope (CRO) but we could not get accurate results then we discussed this problem with lab expert and they suggested us to take readings on Digital storage oscilloscope (DSO) . DSO has two terminals each terminal has two wires red and black, which we connected to servomotors of both the head lamps, while turning potentiometer we got different readings at different angle. We got various parameter such as width, frequency, V_{max}, V_{avg} etc on DSO which helped us to get accurate results. the standard signal period of servo motor is 20us.from discussions and research paper we came to know that there two conditions : PWM waveform with 1us+width (ON time) shows that servo motor is rotating at 0 degree When the motor was at 0 degree the width was 2.429us and frequency 295.3 kH_z PWM waveform with 2us+width (ON time) shows that servo motor is rotating at 90 degree When the motor was at 0 degree the width was 4.655us and frequency 212.6 kHz these two conditions are shown in fig.12 and fig.13.

PWM Waveform Results at 0degree



Fig. 12: PWM waveform with 1us + width

PWM Waveform Results at 90degree



Fig. 13: PWM waveform with 2us + width

The signal period is always 20us. PWM waveform with 1us + width (ON time) shows that servo motor is rotating at 0 degree. In this case off time is 2.429us.

From figure 12 , Vpp :14.4mV, Vavg:804uV, Frequency:295.3 kHz

PWM waveform with 2us + width shows that servo motor is rotating at 90 degree. Off time in this case is 4.655us.

From figure 13, Vpp:22.4mV, Vavg:549uV, Frequency:212.6 kHz

VIII. CONCLUSION

The existing conventional light systems do not provide illumination in the right direction on curve roads. Due to this constrain, a need to understand an alternative technology solution. This paper propose the new system which is based on camera as input sensor to adjust the horizontal rotation of headlamp and this newly proposed Adaptive front lighting system (AFS) helps to improve driver's visibility at night time hence achieving enhance safety.

AFS system minimizes the limitation of conventional light systems; the adaptive front lightning system (AFS) is more applicable and economically feasible. We have developed a prototype model to fulfill the objective. This technique is more applicable in automobile sector.

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AFS appears to offer potential for a favorable night driving behavior, potentially reducing accident risk, compared to standard headlights.

The result obtained from adaptive front lighting system is fulfilled the objectives, so we can developed AFS system in automobile sector in large scale to minimize the limitation of conventional light systems.

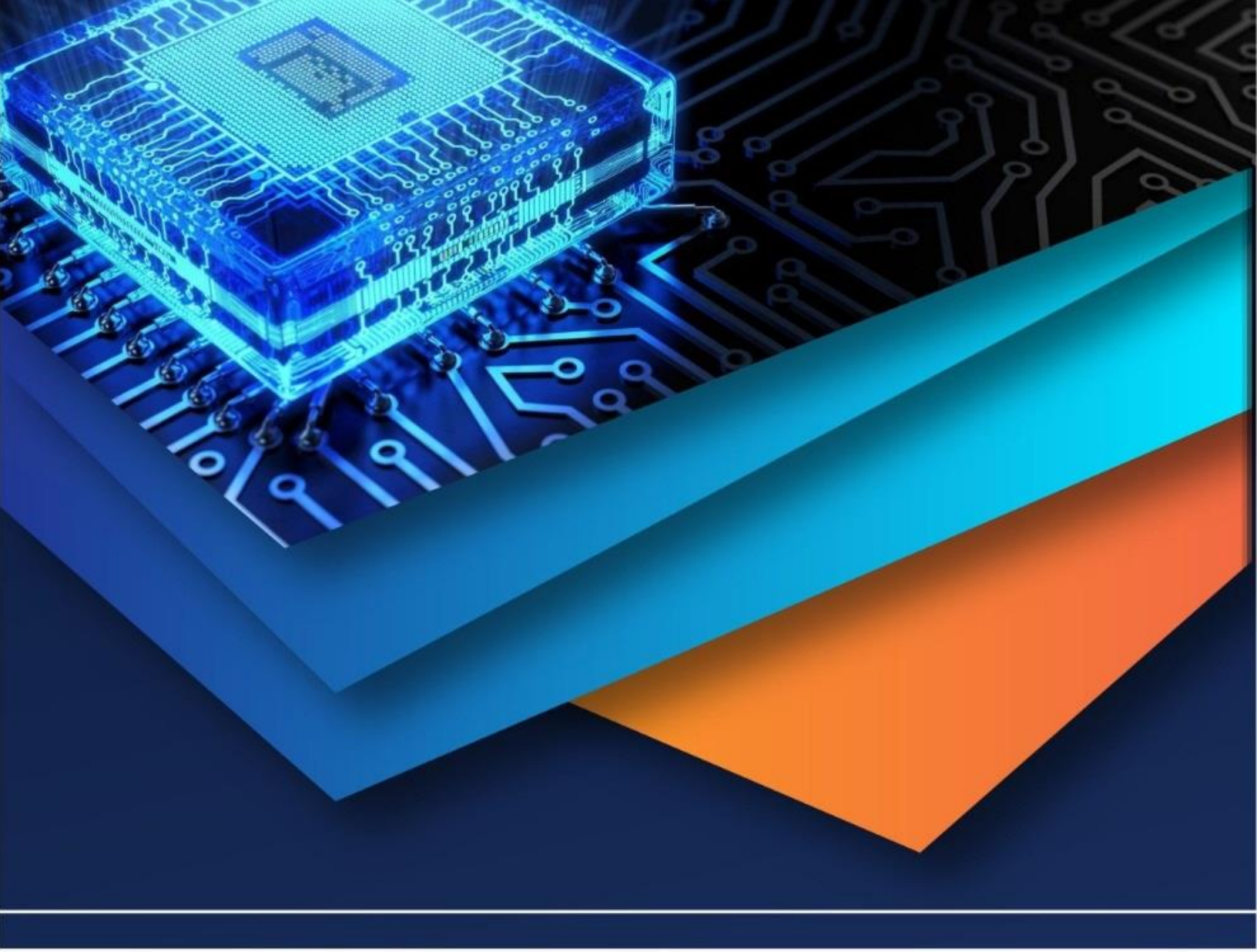
IX. ACKNOWLEDGEMENT

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