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Novel Approach in Headlamp Operations for Improving Road Safety

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ABSTRACT: The purpose of this proposed work is done to focus on the design and working of an arduino based automatic headlight system for vehicles. The highest traffic accident rate occurs on curved roads at night time. The static headlamp just provides certain illuminating fields for drivers in the night time and is insufficient to serve for curved and intersection, over 80 percent of all road traffic accidents occur in darkness and bad weather. In most cases the late recognition objects in the traffic zone plays a key role. In order to provide enhanced nighttime safety measures, this works aims to design and build headlights by for introducing automations for achieving significant increase in road safety and driving comfort. While driving in night and during the times when the visibility reduced significantly so as to make the object visible in those dark mode locations and there by prevent accident learns.

KEYWORDS:Arduino; zone; headlamp; safety

I.INTRODUCTION

The main concern of this proposed work is safety. When operating a motor vehicle, aside from functionality. The static headlamp just provides certain illuminating fields for drivers in the night time and is insufficient to serve for curved roads and intersection, over 80 precents of all road traffic accidents occur in darkness and bad weather. The aim is to improve visibility for the driver, thereby achieving significant increase in road safety and driving comfort this places light into the turning radius, with the result that the driver's cornering visibility being dramatically improved.

Now days the no. of vehicle on road is increasing drastically and no. of accidents on road also increases. Especially at night most of the accidents are occurred due to dazzling of headlight. While diving at night the headlight beam of incoming vehicle is directly effects the driver's eye and eye gets blur, it takes 3 to 8 sec to recover to its normal vision shows the high beam of headlight which causes blurriness on driver's eye. If at that time vehicle speed is 70km/hr., causes the vehicle goes out of road or strikes on oncoming vehicle.

In every vehicle dipper beam is provided in addition with the upper beam to reduce the dazzle from oncoming vehicle. Automatic dipper light control is a system which automatically changes the headlight from upper to dipper beam by sensing the headlight of oncoming vehicle.

Use of manual dipper control is not done by most of the drivers due to many reasons because the operation of dipper control switch is hundreds of times at night driving. Other reason is the driver wants to pay more attention to the steering control instead of to dipper the head light beam. Another major cause is 'ego problem', which makes each one wait till the other person initiates dipping, which may not happen.

This proposed work will be useful for automobile sector because it deals with vehicles. It makes headlight Automation in vehicles for improving the road safety because most of the accidents occur due to lack of visualization of road during night time. Main source of the visualization during night time is nothing but the headlamps, for that proper headlamps are used, they are nothing but LED headlamps.

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II. PROPOSED SCHEME OF HEADLIGHT AUTOMATION

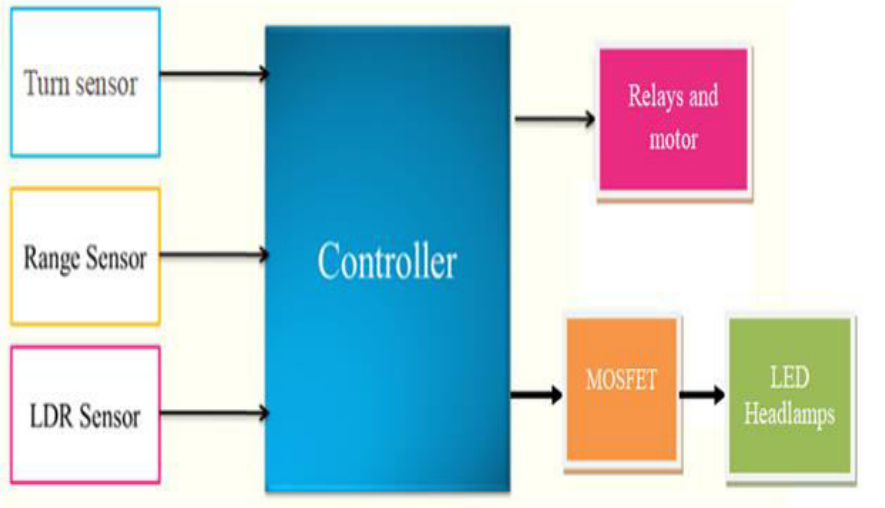

Fig 1. Block diagram of the proposed system

Fig.1 shows the general block diagram of the proposed work. There are mainly four automations in the proposed work. First automation is high beam (upper) and low beam (dipper) for that LDR module used according to that intensity is controlled. Second automation is of sharp turn automation in which the turn sensor gives signal to the controller and according to that motor is going to rotate at turns. Third is zone blackout in this by using Ultra sonic sensor for object detection which gives signal to the controller when object is detected according to that the zone is blackout and it will provide proper visualization for incoming vehicle. And the last one is of follow me headlamp, itprovides time delay to the circuit and according to that the light will be on for particular given time.
The three sensors i.e. LDR sensor, Turn sensor and range sensor are used. The output of these sensors is given to the microcontroller and according to that the LED output will change. Firstly if there is sharp turn then the turn sensor will sense it and accordingly in right or left turn the LEDs are rotate in clockwise or anticlockwise direction with the help of Servo Motor. Whenever any type of object comes on range of sensor that is input given to the sensor then sensor will operate and output of the sensor is given to the microcontroller then the MOSFET connected at the output of microcontroller will change the intensity of the LED lights by using PWM control. The third sensor is LDR sensor according to the intensity of the opposite vehicle the output of the LDR given to the microcontroller then intensity of the LED lights will gets changed. Last one is of follow me headlamp if the vehicle is off and the headlamp and follow me switch is on then the lights are remain on and it will turned off after 10 sec.

III.IMPLEMENTATION OF PROPOSED WORK

The main proposed circuit diagram of hardware model is shown in fig.2, in which the arduino UNO controller is used for making automatic operation. There are three types of sensor used:

1. Ultrasonic Sensor
2. LDR Sensor
3. Turn sensor(indicator)

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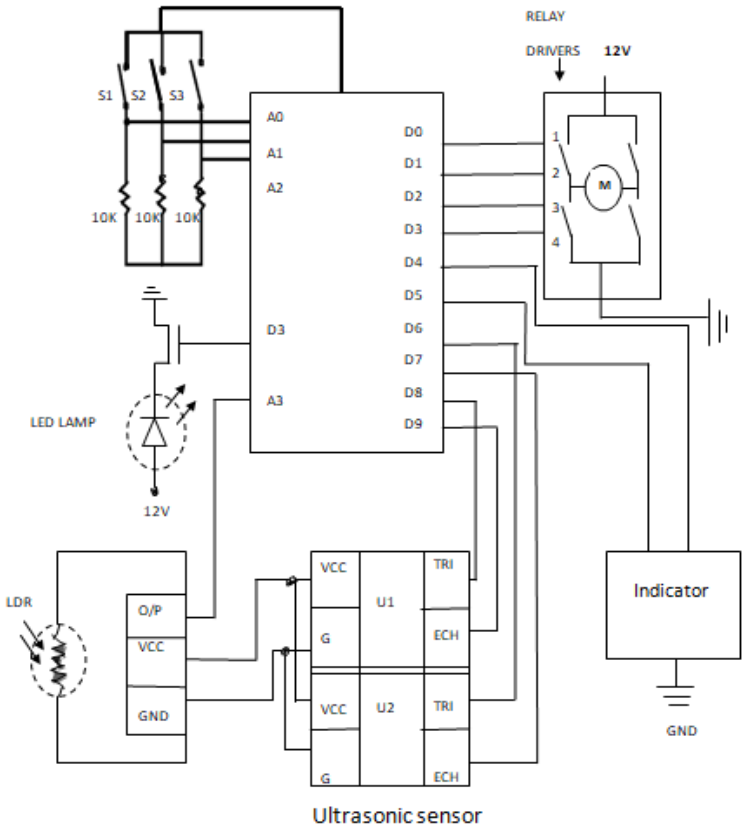

Fig. 2 Circuit Diagram of Proposed Work

There are mainly four automations has been implemented. First automation is high beam and low beam for that LDR module used according to that intensity is controlled. Next one is of sharp turn automation, in which the turn sensor gives signal to the controller and according to that motor is going to rotate at turns.

Third is zone blackout in this by using Ultra sonic sensor for object detection which will give signal to the controller when object is detected, according to that the zone is blackout and it will provide proper visualization for incoming vehicle. And the last one is of follow me headlamp, it provide time delay to the circuit and according to that the light will be on for particular given time. In actual hardware, there are mainly three toggle switches and one indicator switch.they provide time delay to the circuit and according to that the light will be on for particular given time.

Arduino Uno is used as a microcontroller which is based on 8-bit ATmega328P microcontroller.It is the most popular of all AVR controllers as it is used in arduino boards. It takes input from the sensors like LDR sensor, UV sensor, and turn sensor and controls action on the LED headlamps according to the sensor output. LED headlights are the latest innovation for vehicle forward lighting. They are much brighter than regular halogen bulbs LED lights consume much less power and turn on instantly when compared to their halogen counterparts. There are three sets of LED headlights having 15W power wattage each and the voltage rating is 9 to 90 volt. Ultrasonic sensors (HC-SR04) are used in proposed work to measure the distance. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. Supply voltage of 5v is given to ultrasonic sensor with the maximum range 4cm and minimal range 3 cm.

DC servo motor is also used which has the advantage of higher starting torque, quick starting and stopping. The servo motor powered from supplies in the range of 4 – 6 V and 100 mA - 2AAnd having Operating speeds in the range of 0.05 to 0.2 second per 60 degree.Arduino UNO is connected with power component i.e. MOSFET, IRF250.to control the intensity of led headlamps as per the proposed scheme.

LDR module is utilized in the proposed scheme to sense the headlight beam of oncoming vehicle. LDR senses the headlight beam of oncoming vehicle, resistance of LDR decreases up to few of 100 ohm and vice versa. In this

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proposed work 4 channel isolated 5v 10a relay module is used to control or to change the direction of servo motor (clockwise or anti clockwise)

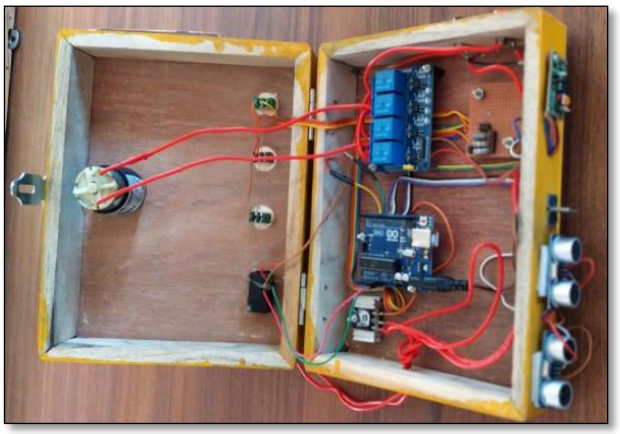

Fig. 3 (a) Component Assembly of Proposed Work

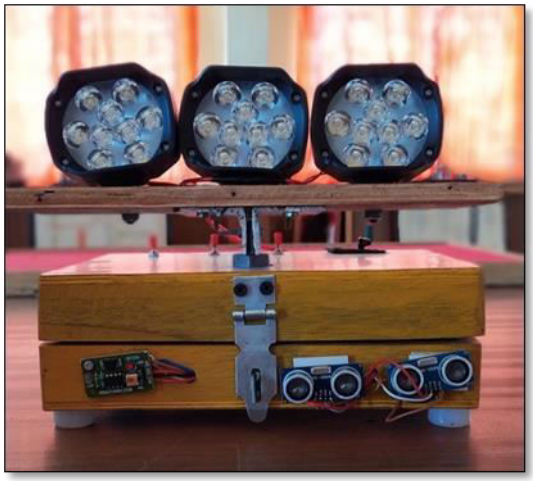

Fig.3 (b) Hardware Implementation of Proposed System

In this proposed work there are mainly three toggle switches and one indicator switch. The purpose of that toggle switches are given below, first toggle switch is used for checking vehicle is on or off which is connected to the arduino through resistor the pin no. is analog pin A0, second one is for checking the headlights status which is connected to the arduino through resistor the pin no. is analog pin A1, third one is for follow me headlamp which is also connected to the ardunio through resistor to the analog pin no. A2 and at last the indicator switch is used.

First automation is regarding with the turn sensor, for that indicator switch is used the indicator is connected to the arduino at digital pin 4 and pin 5, then when indicator is turn on then according to that the arduino is going to work and that is connected to the relay at digital pins, pin no.10, pin no.11, pin no.12, pin no.13 and according to that the working of turning the motor is done, in order to anticlockwise or clockwise. Here in this proposed work4 channel relay in H bridge manner is used.

Second automation is of ultrasonic sensor, is used for sensing the obstacles which is connected to the arduino digital pins and the pin no's are pin no. 6, pin no. 7, pin no.8, pin no.9 there are mainly four parts in ultrasonic sensor are trigger, echo, VCC and last one is ground. These pins are connected to the arduino, whenever obstacle comes in contact with this, then it will work. Third automation is regarding with high beam and low beam, for this purpose mainly LDR is used LDR is nothing but light depended resistor. Whenever light falls on the LDR then it gives signal to the arduino the LDR module is connected to the arduino at analog pin no.A3. Intensity of light is going to controlled by using the arduino controller.

Forth automation is regarding with follow me headlamp automation in which time delay is provided for the headlamp. The application of this is based on customer's convenience, because the headlamp is still on whenever the

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vehicle is off. The component assembly and hardware implementation of proposed work is shown in fig 3(a) and 3 (b) resp.

IV. SIMULATION AND RESULTS

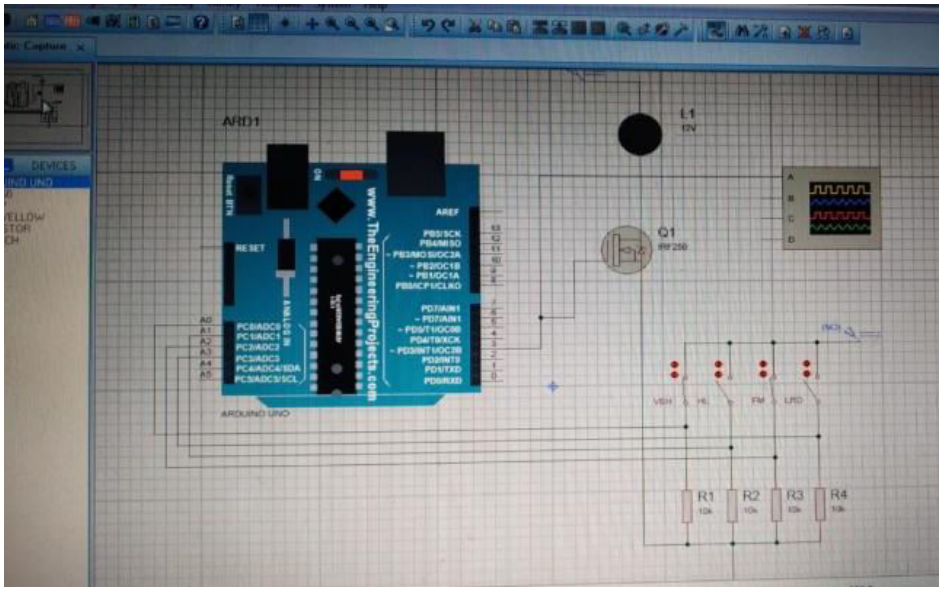

Fig.4 Simulation Model

The simulation model of proposed system is shown in fig 4. Purpose of this simulation model is to check the compatibility of proposed system with the major components of arduino and MOSFET. The simulation is done through proteous 8 professional software**.** The main proposed work structure is hardware model and it will work with real implementation on hardware.

The output of this simulation is showing in the scope of proteous8 professional software as shown in fig. 5. In which by analyzing the waveform it is insured that proposed system is compatible with compiled circuit.

Fig. 5 Control Signal of MOSFET

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V.CONCLUSION

There are many problem statements taking under consideration and overcome that problem successfully. There are different types of automations in this proposed system. First is of sharp turns during night time: there is no visibility for the driver when taking sharp turn to overcome that the sharp turn automation is implemented that provide the visibility to the driver during sharp turn. Second automation, the automatic high beam and low beam is implemented in prosed system control to reduce the effect of high intensity light of oncoming vehicle.

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