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Headlight Automation System

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Abstract: This project is based on safety measures of vehicles.It is inspired by the daily observations while driving at night related to the headlight conditions of the rear vehicle which causes dazzling in the eyes of the driver in the front vehicle.With increase in number of vehicles comes increase in number of road accidents, though the automobile sector have achieved a huge margin on reducing the number of accidents by advancing the safety systems in the vehicles still one major cause of accidents (also the most common cause.) is the blinding vision of the driver while night driving due to the headlight of the approaching vehicle or the vehicle behind. Human eyes are very sensitive to the light, if eyes suddenly comes in contact with the light after darkness, cornea present in eyes gets contract i.e. vision gets blank and require some time to recover the vision. Due to which while night drives the upper mode of other vehicle blinds the vision of the driver which in many cases leads to some deadly accidents, to overcome the issue a Headlight Automation System has been introduced which will surely contribute in making night drive safe. The circuit, working and need of the system is briefly discussed in this paper.

Keywords: Microcontroller,Ultrasonic Sensor(HC-S04),Led,Headlight,etc.

I. INTRODUCTION

Dazzling in the eyes of the drivers due to headlights in upper mode is a major disturbance caused during night drive.When a vehicle with its headlight in upper mode is behind another vehicle, this causes reflection of the headlight in the eyes of the driver by the middle mirror of the vehicle.This problem occurs when rear vehicle is close to the vehicle. To avoid this problem, we have developed the project such that whenever any vehicle is behind another vehicle with a distance less than 20 meters, the rear vehicle's headlight will be in dipper mode until this condition discontinues. The number of vehicles of road has increased with increase in development but considering the present scenario one of the major factor is utilization of time. Due to which most people seek to choose the night drive for travelling long distance even though it is not considered safe. There are many reasons for it to be not safe but one major reason is the dazzling or blinding vision of the driver due to the headlight of the other vehicle, causing the blindness for 3 sec to 4 sec which is enough for an accident to take place.

The above image shows what reflects on the driver's eye if the other vehicle keeps the headlight in upper mode. A dipper mode is provided alongside the upper mode for such instances so both the vehicles pass each other without blinding each other, but the concern with the modes of headlight is that it needs to be shifted manually and hence, if even one of both the drivers fails to do so the other driver suffers. This few seconds of vision blindness is more than enough for a vehicle to crash or get into any major accident.

In the paper (ref. 2) , the automation has been achieved using only an LDR sensor which can be a concern as if any light falling on the LDR sensor (street light, lights from shops, restaurants etc.) and making it reach the required resistance level will shift the headlight from upper mode to dipper mode unnecessarily and in many cases also may cause the driver some issues where the road will not be clear(Steep turns, blind turns, road blocks etc.) as the headlight

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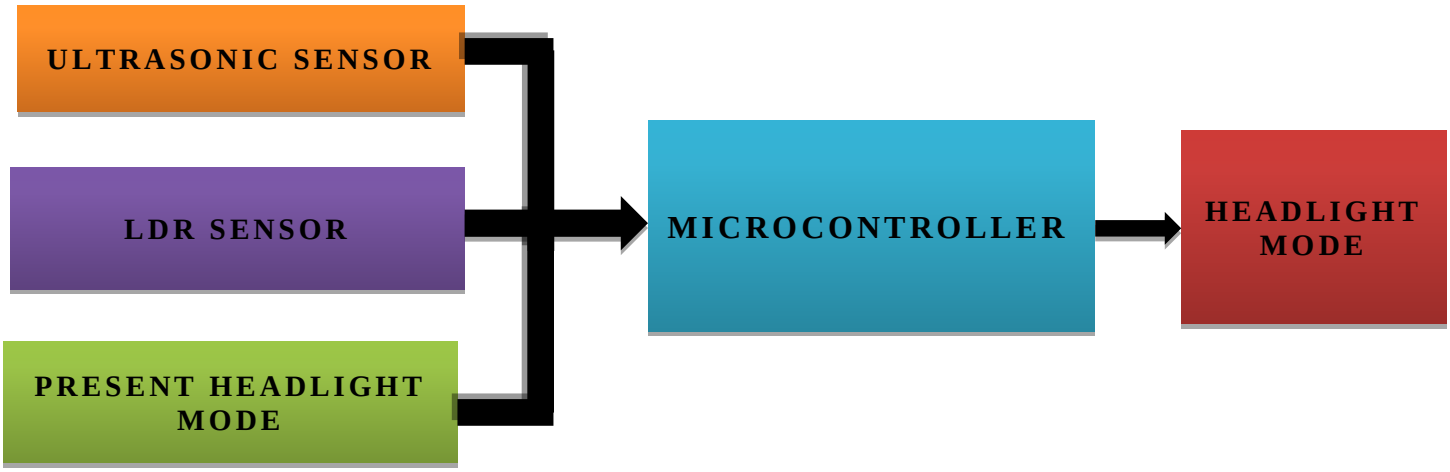
might have turned to dipper mode due to the surrounding light. To overcome this issue an ultrasonic sensor has been added which will now sense the upcoming vehicle within 50 metres and then the headlight will be switched to dipper mode until the other vehicle passes completely. Also a microcontroller has been used so the further development of the system becomes easy and still remain compact.

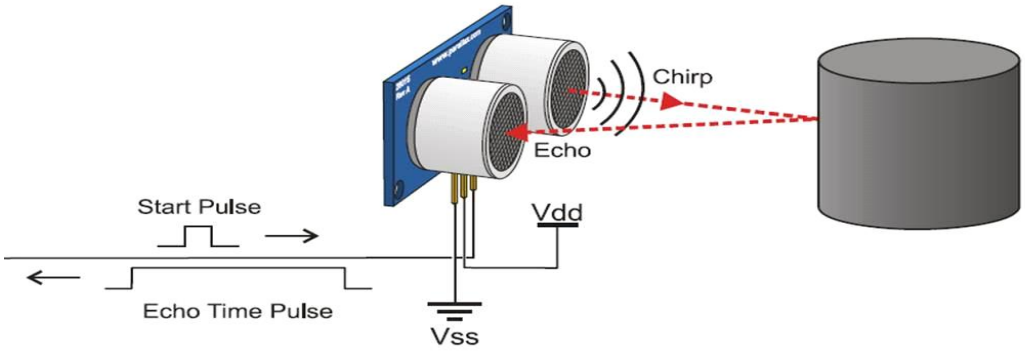
II. PROPOSED SYSTEM

Below shown is the block diagram representation of the "**HEADLIGHT AUTOMATION SYSTEM**".



The system consists of total five blocks, the function of the five blocks are as follows:

1.Ultrasonic Sensor : An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). In this system the purpose of the sensor is to detect the presence of any object within 50 meters of range and send the corresponding signal to the microcontroller. Below shown is a working diagram of an ultrasonic sensor.



2.LDR Sensor : A Light Dependent Resistor (LDR) is also called a photoresistor or a cadmium sulfide (CdS) cell. It is also called a photoconductor. It is basically a photocell that works on the principle of photoconductivity. The passive component is basically a resistor whose resistance value decreases when the intensity of light decreases. In this system the purpose of the sensor is to detect the light approaching from the vehicle in front and send the corresponding signal to the microcontroller.Below shown is a working diagram of LDR sensor for better understanding.

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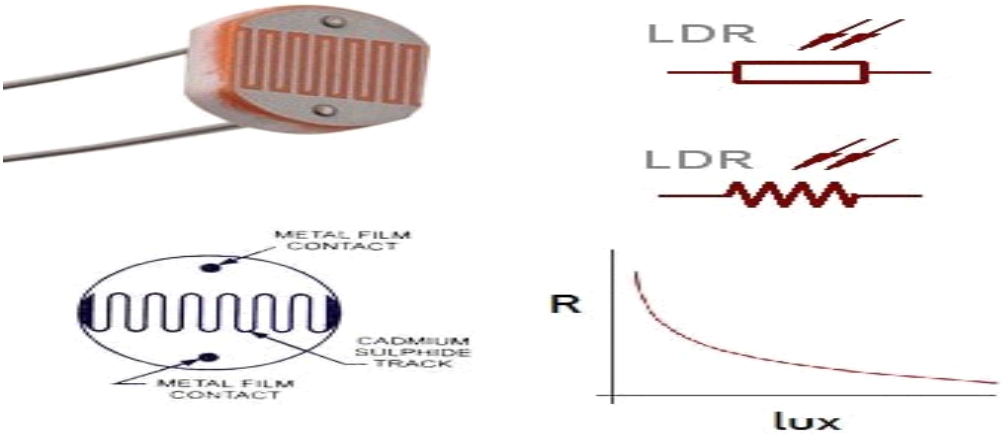
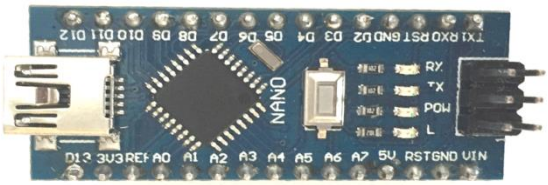


3.Microcontroller :A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. In this system we are using ARDUINO NANO as microcontroller. The purpose of choosing this as a microcontroller is due to its compact size and number of input/output pins available (14 digital and 8 analog pins available) which will make future development of the system of the easy and compact alongside.



4.Present Headlight Mode: This block is the input to the microcontroller about the condition driver has set of the headlight. The conditions include whether the headlight is on or off and the mode of the headlight that is whether the headlight is in upper or dipper mode.

5.Headlight turn to Dipper Mode : This block is the output of the microcontroller. The part of this block is to turn the headlight mode from Upper to Dipper.

III.NEED OF THE SYSTEM

A study of 3,200 vehicles on 2,500km of single carriageway stretches of national and states highways in Punjab and Haryana has found that vehicle drivers do not care if their headlights are blinding those coming from the opposite direction. Only 26.15% of car/SUV drivers used dipper correctly while a staggering 73.83% either continued on high beam (48.3%) or dipped the light for a few seconds and then back on the high beam (25.53%), says a survey conducted by road safety NGO ArriveSafe**.**Every day road accidents snuff out 400 lives giving India the dubious distinction of having the highest road crash fatalities in the world. We have seen ‘use dipper at night’ at the back on nearly every truck but most do not follow it. The visibility is substantially reduced at night and is further reduced due to fog. Correct use of dipper (low beam) is crucial to drive safe at night. Hence, all these boils down to one solution that if the driver is not using the headlight modes right why not automate it and contribute in reducing the number of accidents and making night driving a bit safe. This project is based on safety measures of vehicles. It is inspired by the daily observations while driving at night related to the headlight conditions of the rear vehicle which causes dazzling in the eyes of the driver in the front vehicle.

IV.WORKING

There are five stages in this project:

1) In the first stage, the condition is checked whether the headlight is on or off. If it is on, the mode of the headlight is checked, whether the headlight is in upper mode or dipper mode. This data is given to themicrocontroller.

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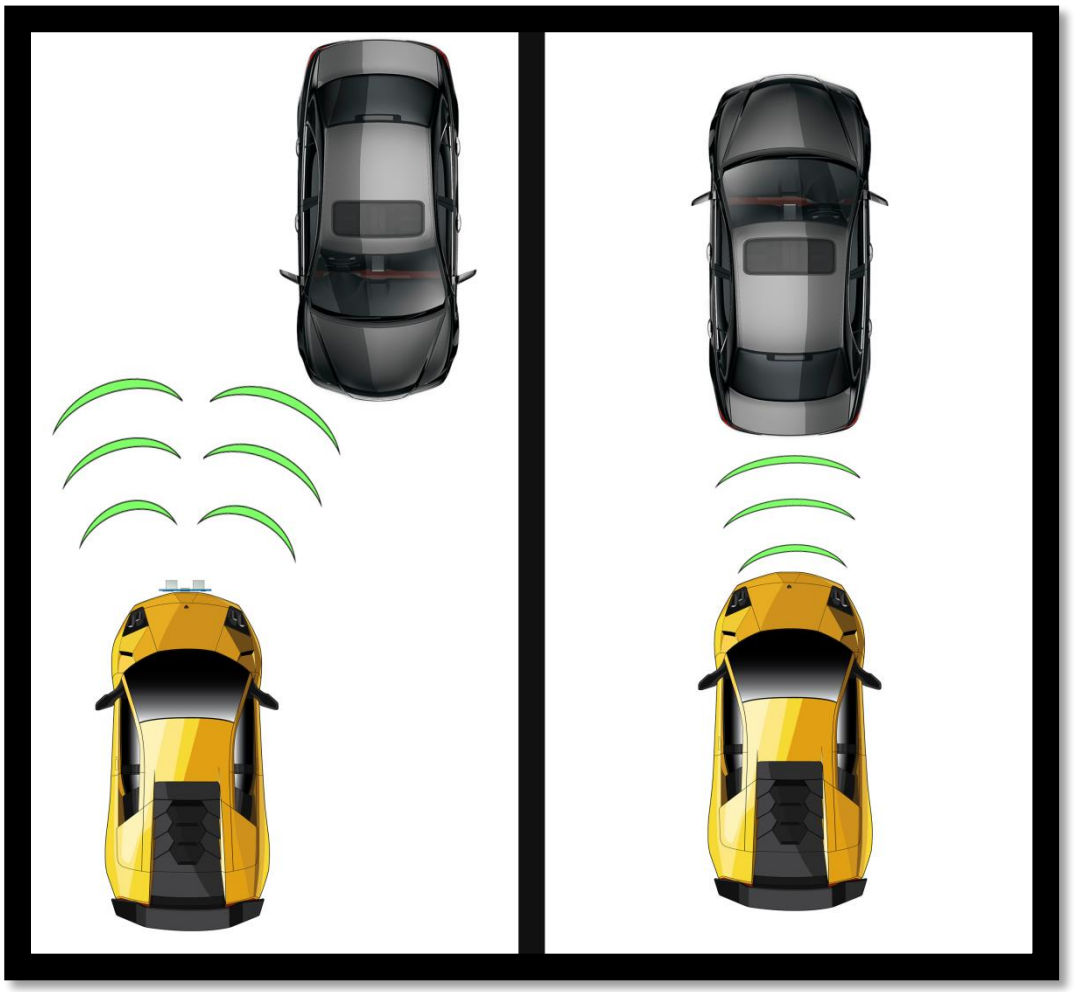
2) In the second stage, there will be a condition check in the microcontroller. If the headlight is in Dipper mode, there will be no change. But if the headlight is in upper mode, the LDR reading and Ultrasonic Sensor reading will be given as input to the microcontroller.
3) The microcontroller will check the condition of both LDR and Ultrasonic Sensor. The LDR will give the information whether it is day time or night time .The Ultrasonic Sensor will give the data of the approaching vehicle and the front vehicle.
4) If the approaching vehicle is less than 20 meters and if the headlight mode is Upper, the microcontroller will turn the headlight mode to Dipper until the approaching vehicle passes.
5) In the traffic, when two vehicles stop right behind other and if the rear vehicle's headlight mode is in Upper, then there is direct reflection of light from the middle mirror of the front vehicles. This can cause disturbance for the driver in the front vehicle. This project will take care to Dipper the headlight mode in these two situations.

Below shown are the two situations which causes disturbance during night driving for the drivers.
1) During the night drive, if the headlight mode is Upper and a vehicle is approaching.
2) During traffic and at signal, when two vehicles are in linear and if the rear vehicle's headlight mode is Upper.



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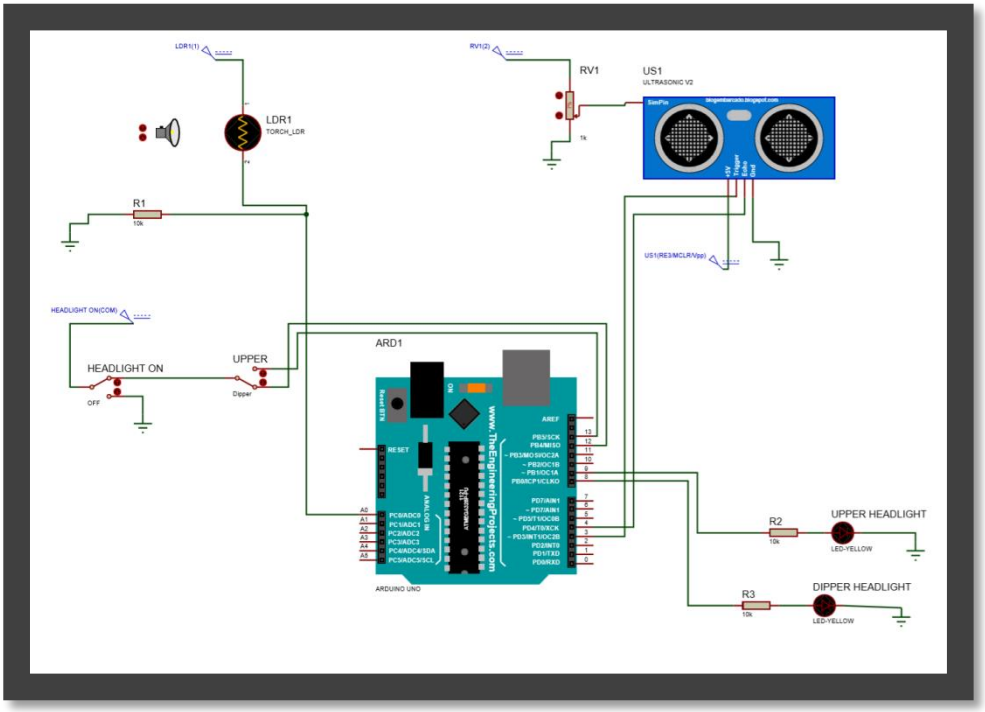
V. CIRCUIT DIAGRAM




```
int Trig = 3;
int Echo = 4;
int UPPERLED=9;
int DIPPERLED=8;
int UPPER=13;
int DIPPER=12;
long duration,cm;
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
   pinMode(Trig,OUTPUT);
   pinMode(Echo,INPUT);}
void loop() {
 int ldr=analogRead(A0);
digitalWrite(Trig,LOW);
  delayMicroseconds(2);
  digitalWrite(Trig,HIGH);
  delayMicroseconds(5);
  digitalWrite(Trig,LOW);
   duration  = pulseIn(Echo,HIGH);
int  m=duration/29/2;
Serial.println(m);
delay(100);
if(DIPPER==HIGH)
{digitalWrite(DIPPERLED,HIGH);
digitalWrite(UPPERLED,LOW);}
if(UPPER==HIGH)
{  if(ldr<15 && m<50)
  {  digitalWrite(UPPERLED,HIGH);
digitalWrite(DIPPERLED,LOW);}
if(ldr>40 && m>100)
{  digitalWrite(UPPERLED,LOW);
digitalWrite(DIPPERLED,HIGH);}
 }
 else
{digitalWrite(DIPPERLED,LOW);
digitalWrite(UPPERLED,LOW);}    }
```

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BIOGRAPHY

Rohit Kothawale is pursuing Bachelor of Engineering in Electronics and Telecommunication at Sinhgad College of Engineering, Pune. His field of interests include Embedded System ,Robotics& Automation.

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