

High Beam Light Controller for Vehicles

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Abstract:- The people who drive during night know the difficulty of high beam light from the opposite vehicles. Driver goes completely blank due to this, this may lead to many accidents and eye problems. We have developed a working model to control the switching of a high beam to low beam automatically when one vehicle come opposite to each other and also in city limits too.

Key Words: Ultrasonic sensor, light depending resistor, radar, Arduino UNO microcontroller, high beam light, override switch.

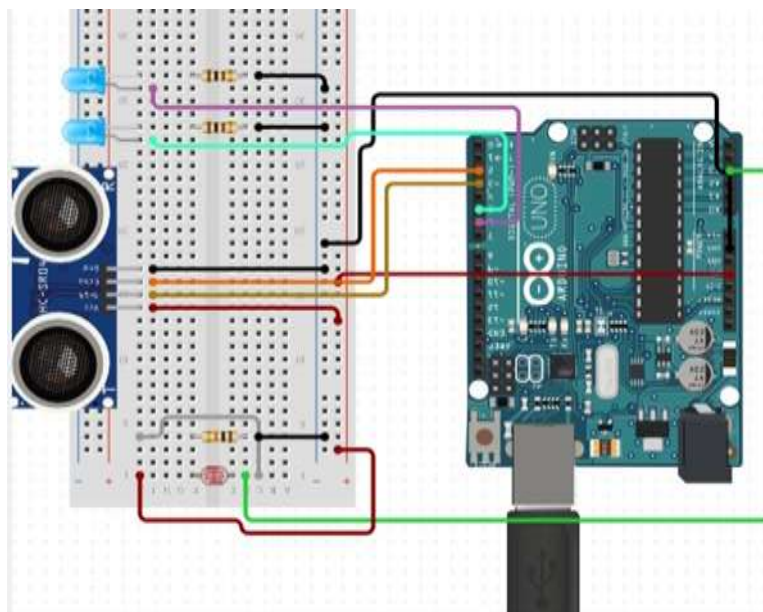
1. INTRODUCTION

Usually, every vehicle has two filaments one is low beam and the other is the high beam. The switching between high beam and low beam is manually controlled by the driver. During night times no driver co-operates to switch from high beam to low beam, during this moment of crossing each other both drivers goes blind on road. Due to this, many accidents happened. To avoid this type of issue we have developed a working model to control the switching of a high beam to low beam and again low to high beam automatically. In the city limits, the headlights of the vehicles remain low beam. We provided the provision of an overriding switch to the driver to switch from low to high beam in case of needy time.

2. COMPONENTS USED

- Audrino UNO
- ULTRASONIC SENSOR MODULE SR-04
- Photo resistor
- 2 LED representing high beam and low beam
- 3 resistors of suitable resistance
- Bread board and jumper wires

3. CIRCUIT DIAGRAM



4. COMPONENTS EXPLANATION

Arduino UNO

Microcontroller ATmega328
 Operating Voltage 5V
 Input Voltage (recommended) 7-12V
 Input Voltage (limits) 6-20V
 Digital I/O Pins 14 (of which 6 provide PWM output)
 Analog Input Pins 6
 DC Current per I/O Pin 40 mA
 DC Current for 3.3V Pin 50 mA
 Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader
 SRAM 2 KB (ATmega328)
 EEPROM 1 KB (ATmega328)
 Clock Speed 16 MHz

Ultrasonic Sensor Module Sr-04

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1" to 13 feet. Its operation is not affected by sunlight or black material like sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with ultrasonic transmitter and receiver module

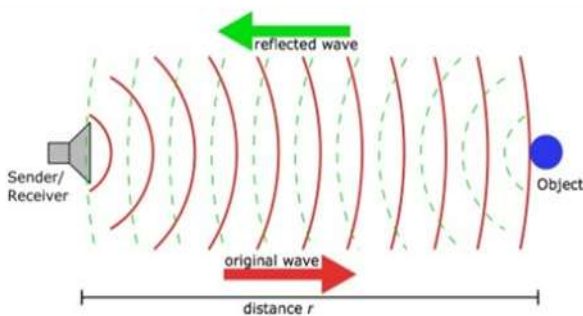
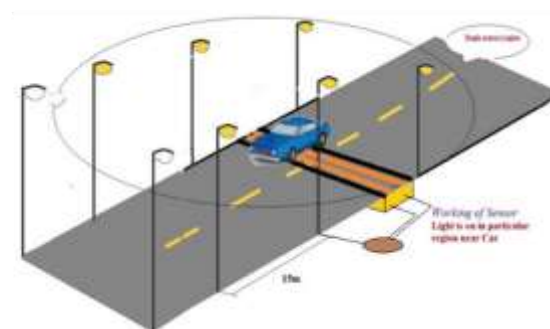
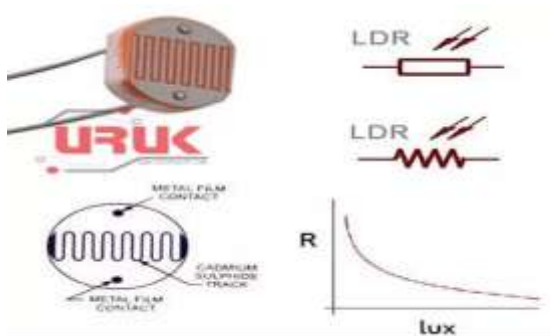
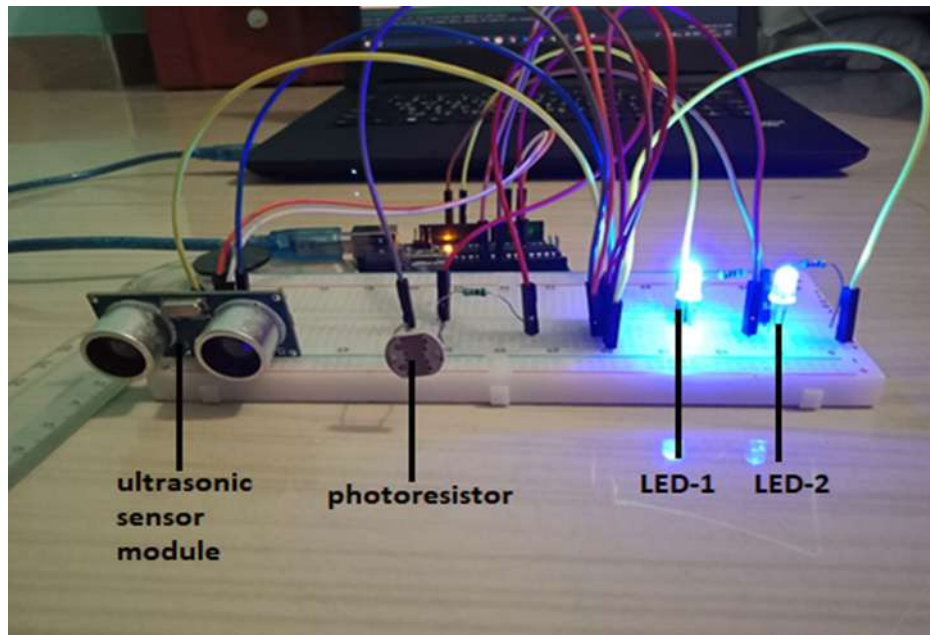


Photo Resistor

When the light falls on the photoresistor, some of the valence electrons absorb energy from the light and break the bonding with the atoms. The valence electrons, which break the bonding with the atoms, are called free electrons. And these free electrons conduct and thus it acts as an open circuit when there is light and closed circuit when there is no light.



5. MODEL REPRESENTATION



6. WORKING CASES

Case 1:

The ultrasonic sensor constantly sends a signal from the transmitter and if an object is detected in its range, the signal is reflected back to the receiver part of the ultrasonic sensor module. Consider a vehicle coming opposite to the test vehicle where this model is installed. We have preset the distance of the ultrasonic sensor module range (say 3 feet) in the code. If any vehicle is detected by ultrasonic sensor it sends a signal to the microcontroller and the high beam (LED-1) light goes off until that vehicle passes through. Thus, making the easy pass through way for both the vehicles during the night. For practical application radar can be used instead of ultrasonic sensor modules for a larger range of detection.

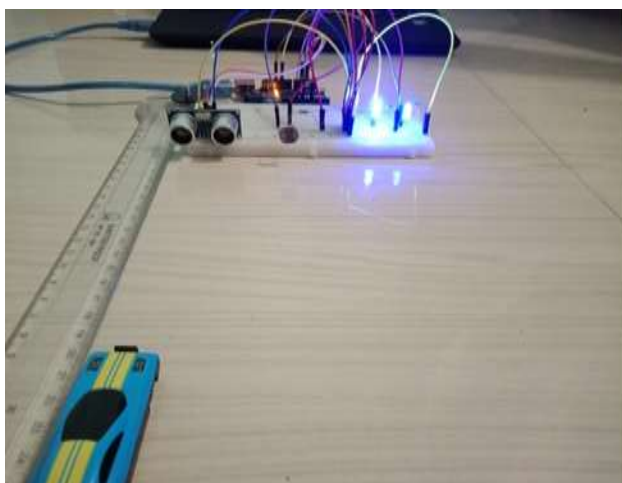


FIG-1

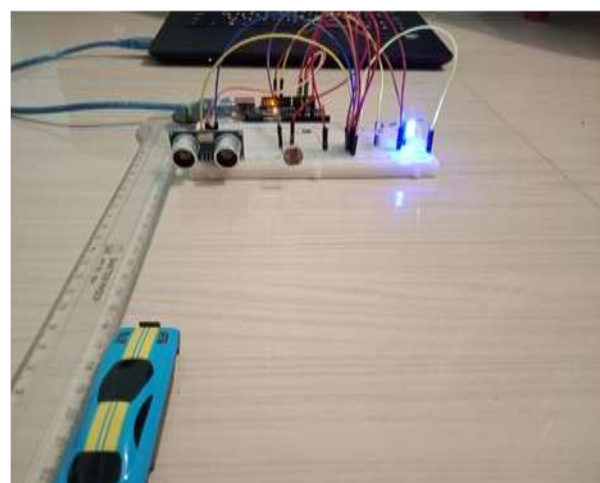


FIG-2

Fig-1:

The vehicle is far away from the range of the ultrasonic sensor, hence the both LED-1 and LED-2 remain glowing.

Fig-2:

Now the vehicle is in the range of the sensor, hence high beam light (LED-1) goes off and LED-2 remain on

Case-2:

Here comes the working of LDR (light dependent resistor) or photoresistor. When the vehicles enter into the city limits, photoresistor detects the light from street light during the night and makes high beam light to turn off. It also is able to detect light from other vehicles and can make high beam light to go off. Thus, making smooth clearance in city limits.

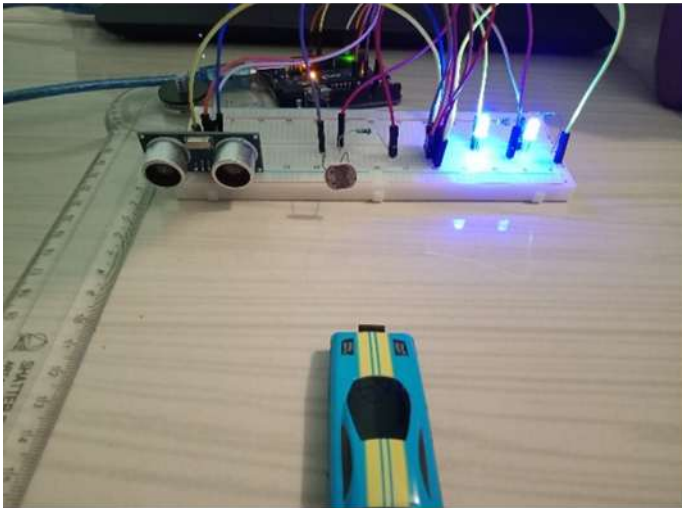


FIG-3

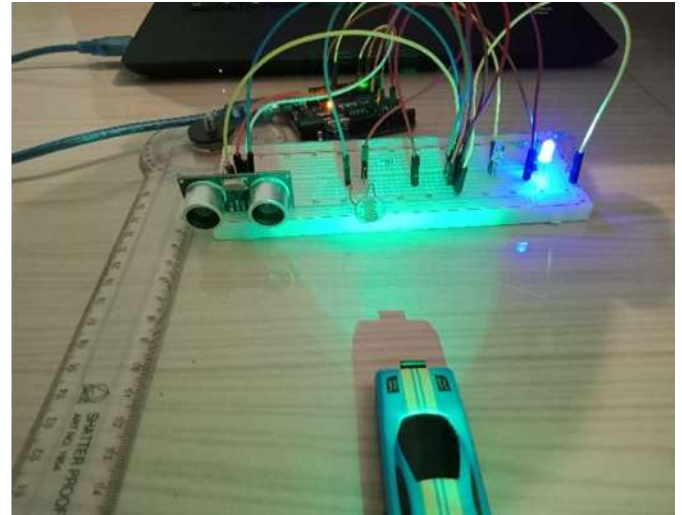


FIG-4

Fig-3:

Both LED-3 and LED-4 remains on because photoresistor is not detecting any light

Fig-4

Now, the LDR detecting the light from the opposite vehicle and from the street light also. Thus, the high beam light turns off automatically until no light is falling on LDR

7. TESTING AND ANALYSIS

Model	Accuracy for detecting distance /light intensity	Power Consumption	Model Size	Energy Efficiency
Micro controller	-----	Low	Medium	High
Ultrasonic Sensor	96%	Low	Small	High
LDR(Light Dependent Resister)	98%	Very Low	Small	High
Head lamps	-----	Medium	Medium	Average

8. COST COMPARISION WITH DIFFERENT MODELS

S. No	Item Name	Quantity	Approx. Cost(Rs.)
1.	Micro Controller	01	3000/-
2.	High definition cameras	01	2600/-
3.	GPS System	01	2500/-
4.	Head lamp	02	600/-
	Total cost	05	8700/-

FIG-5

S. No	Item Name	Quantity	Approx. Cost(Rs.)
1.	Micro Controller(Arduino)	01	500/-
2.	LDR(Light Dependent Resister)	01	50/-
3.	Ultrasonic Sensor	01	150/-
4.	Head lamp	02	600/-
	Total cost	05	1300/-

FIG-6

Fig-5 is the estimation of amount using high definition camera and GPS system. Which is high cost compared to our model. Fig-6 is the estimation of our model. Which is very economical and low installation charges.

9. ADVANTAGES

1. Cost of the components is economical.
2. Components used are easily available in the market.
3. The device can be fixed into existing vehicles also.
4. Automatic switching capability.
5. Gives good security while driving the vehicle at night.

10. DISADVANTAGES

1. The dust and dirt particles accumulated on the sensors leads to errors in detection. Therefore, often the vehicle should be washed.

11. CONCLUSION

Implementation of this device in existing vehicles would reduce the accident during the night. Drivers would be easily able to drive during the night. No more eye problems from high beam lights of vehicles.

12. REFERENCES

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