

# Automatic High Beam Controller for Vehicles

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**Abstract**— The number of vehicles on our roads is burgeoning day by day. This is turn forced almost all this vehicle manufactures to think about the extra safety instruments and electronic controls to attach with these products for giving the users a safety derived in all road conditions through a mass flow traffic. If asked, one should always mention that the right driving is very cumbersome due to the dazzling light problems and the frequent dipping of headlights by manual means that often causes fatigue to the driver particularly at the time of peak traffic. So naturally to get rid of this perennial problem, an automatic mechanism has to come up to dip the headlamp automatically whenever required. For keeping a motor vehicle under perfect control and reins of the driver, different types of controls and accessories are provided in an automobile around the driver's seat, on the dashboard and at the footboard. Simply, an automatic high beam controller is a unit, which can automatically judge when the headlight beam needs to be lowered, and which dip the headlamp from which beam to a dipped beam. Our work proposes an effective automatic control of the vehicle headlamps based on the detection of head lights and tail lights under night time road conditions. This project is about to control high beam or low beam automatically.

**Index Terms** Transmitting Device, Receiving Device etc

## 1 INTRODUCTION

THE number of vehicles on our roads is burgeoning day by day. For this reason almost all the vehicle manufactures have to think about the extra safety instruments and electronic controls to attach with these products for giving the users a safety. Modern automotive vehicles include a variety of different lamps to provide illumination under different operating conditions. Headlamps are typically controlled to alternately generate low beams and high beams. Low beams provide less illumination and are used at night to illuminate the forward path when other vehicles are present. High beams provide significantly more light and are use to illuminate the vehicle's forward path when other vehicles are not present. Daylight running lights have also begun to experience widespread acceptance. High beam are used for illuminating a road doesn't have very much traffic on it. By that way the driver can see further ahead for any road obstructions. High beam is also used when a driver is one an unfamiliar road and if there isn't much in the way of lighting such as street lamps. Automatic high beam, as explained is opposite beam detector. Another probable application of automatic high beam is our high beam response due to another high beam and automatically our high beam becoming low. Now a day there are many accidents that cause from the beam light. Our work proposes an effective automatic control of the vehicle headlamps based on the detection of head lights and tail lights under night time road conditions. This project is about to control high/low beam automatically. This project will make sure that the consumer will save their time and energy also for those who have the illness of nervous. This project will not disturbing any manual function of the beam.

## 2 CIRCUIT OPERATION

### 2.1 Power Supply Device

Power supply device supplies power to Transmitting device and Receiving device. It supplies +12V to relay switch of the receiving device and +5V to several parts of transmitting and receiving devices.

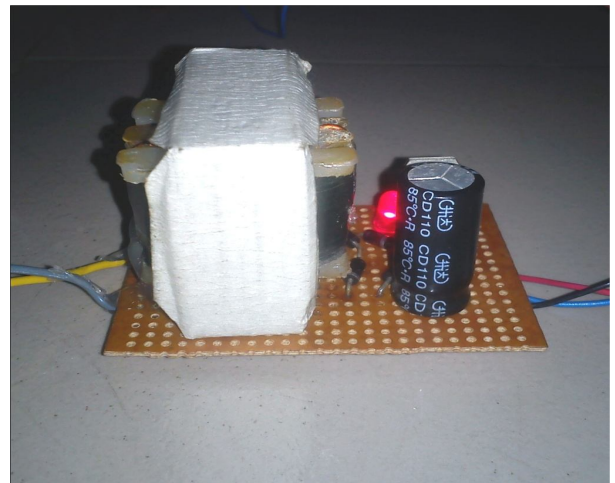


Figure 01: Power Supply

### 2.2 Transmitting Device

Transmitting Device transmits signals to Receiving Device. These signals turn on Receiving Device.

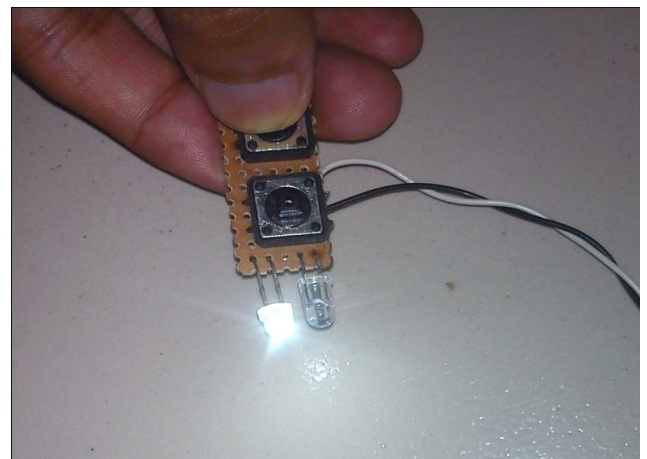


Figure 02: Transmitting Device

There is a LED which transmits light for LDR of Receiving device and there is an IR-Tx which transmits Infrared for IR-Rx for receiving device.

### 2.3 Receiving Device

Receiving Device receives signals from Transmitting device. After receiving signals LDR and IR-Rx start to work and then relay switch switches to low beam from high beam.

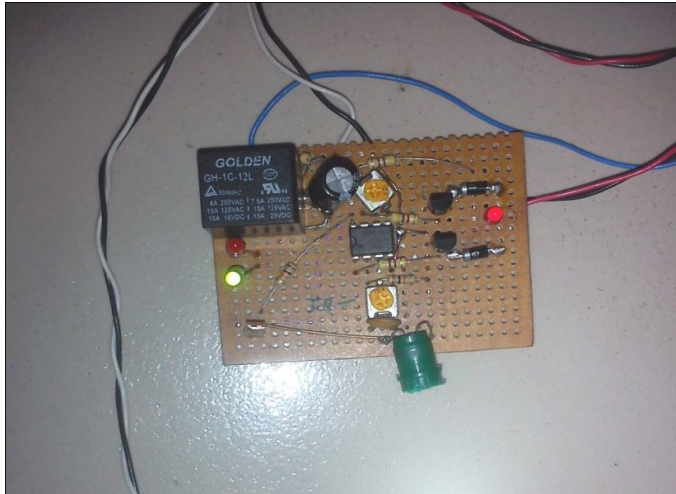


Figure 03: Receiving Device

In Receiving Device there are two LED. One is red and another is green. Red LED indicates high beam and green LED indicates low beam.

### 2.4 The Whole Circuit Operation

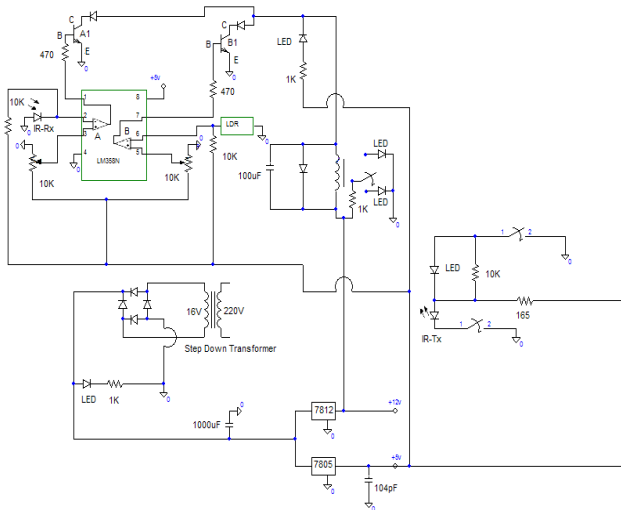


Figure 04: Whole Circuit

### 2.5 Circuit Operation of Power Supply Device

+12V and +5V are required to operate the whole circuit and to supply +12V and +5V to the several parts of designed circuit, a step down transformer is used. This step down transformer converts 220V to 16V. Then 16V output is connected to a bridge circuit. One of the rest two nodes of the bridge circuit is connected to regulator IC7812 and IC7805 and another node is grounded. Before connecting IC7812 and IC7805, a LED is

connected with 1k ohm resistor which ensures that the step down transformer is giving output of 16V and a 1000uF capacitor is also connected to filter the noises. To switch on this two regulator IC, minimum +12V is required and as +16V is the output of the step down transformer so two regulator ICs are switched on. So IC7812 starts to supply constant +12V and IC7805 starts to supply constant +5V. Here, +12V is directly supplied to relay switch. And +5V is supplied to transmitting parts and receiving parts of circuit. A 104pF capacitor is also connected to +5V to filter noise and to get noise free +5V power supply.

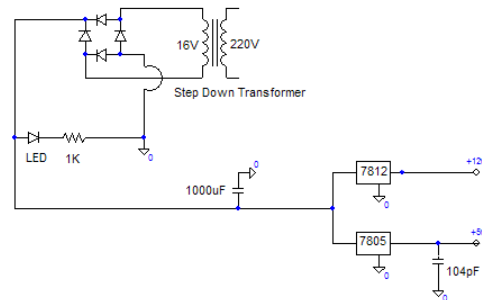


Figure 05: Circuit Design of a Power Supply Device

### 2.6 Circuit operation of a Transmitting Device

Transmitting device is consisted of LED and IR-Tx which are operated by separate switches. +5V is supplied to operate this transmitting device.

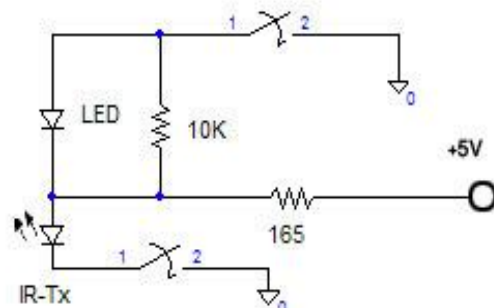


Figure 06: Circuit Design of a Transmitting Device

### 2.7 Circuit Operation of Receiving Device

In Receiving Device, an IC LM358N is used which have 8 pins and connections of the pins are:

- ✓ PIN 1- O/P voltage of comparator A
- ✓ PIN 2- I/P voltage of comparator A
- ✓ PIN 3- Reference voltage of comparator A
- ✓ PIN 4- Grounded
- ✓ PIN 5- Reference voltage of comparator A
- ✓ PIN 6- I/P voltage of comparator A
- ✓ PIN 7- O/P voltage of comparator A

✓ PIN 8- Supply voltage,  $V_{cc} = +5V$

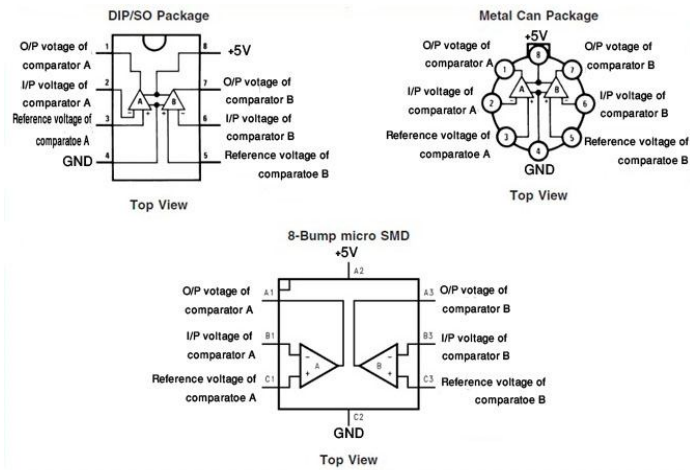


Figure 07: IC configuration of LM358N

When IR-Rx receives the signal from IR-Tx it produces the input voltage for PIN 2 of comparator A which compares with the reference voltage for PIN 3. This reference voltage comes through 10K POT and produces output signal for PIN 1. This output signal works as base current of transistor A1.

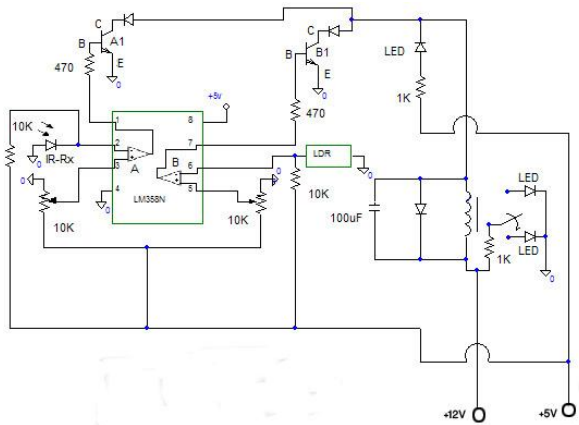


Figure 08: Circuit Design of the Receiving Device

When A1 gets base-current, it flows from collector to emitter. Similarly for comparator B1 input signals come from LDR and output signal from PIN 7 works as base-current for transistor B1. These two transistors A1 and B1 are connected in parallel to the negative PIN of the relay switch. When both or either of the transistors are turned on, relay switch works. Then relay switch changes the connection from high beam to low beam. It remains low beam as long as the transistors are ON. When transistors turn OFF low beam switches to high beam automatically.

Following figure is the picture of whole device. Here, there are one Red LED and one Green LED in receiving device which are connected simultaneously. Red LED indicates High beam and Green LED indicates Low beam.

So when the receiving device gets any signal from either LED or IR-Tx of transmitting device Green LED turns On and Red LED turns OFF. And when the receiving device doesn't get

any signal from transmitting device Red LED turns On and Green LED turns OFF automatically.

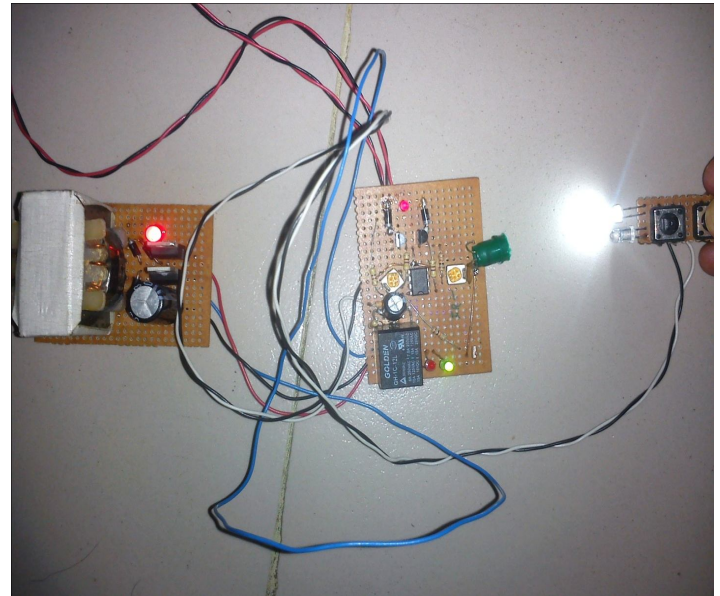


Figure 09: The Whole Device

In headlights of vehicle there are three wires like following figure:

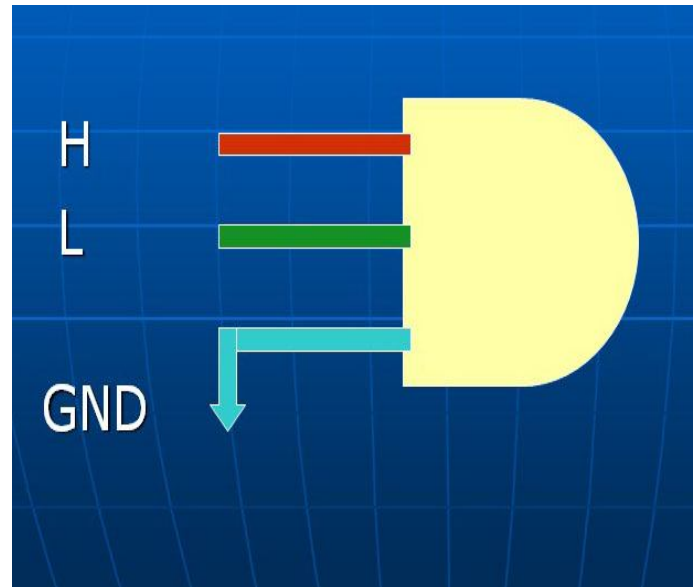


Figure 10: Wire Connection of Vehicle's Head Light

Here,  
H indicates the wire for high beam,  
L indicates the wire for low beam  
And another wire is grounded.

When the device will be placed in a vehicle, H will be connected to Red LED and L will be connected to Green LED simultaneously. And by this way "Automatic High Beam Controller" will control the high beam of a vehicle automatically.

### 3 THE FLOW DIAGRAM OF AUTOMATIC HIGH BEAM CONTROLLER

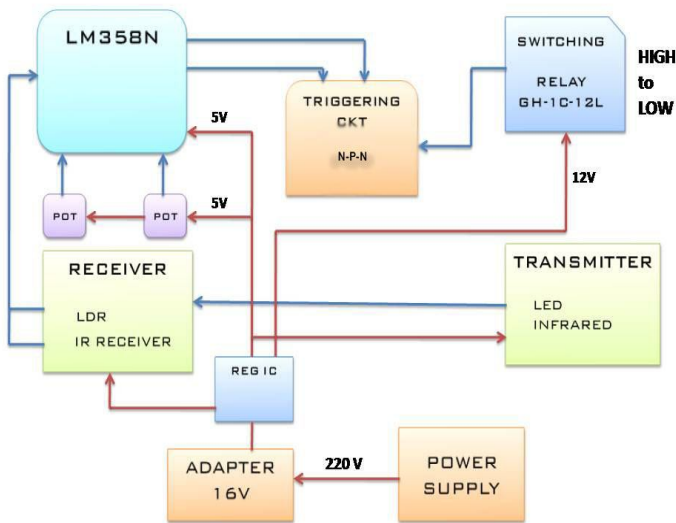


Figure 11: The flow diagram of Automatic High Beam Controller.

### 4 ADVANTAGES AND LIMITATIONS

#### 4.1 Advantages of Automatic High Beam Controller

- ✓ Low price - Cost of the components and making cost of the device is low. The total cost will be almost 200 TK or \$2.
- ✓ Availability - The parts or components of the device are available in the market.
- ✓ High beamed light detection - It can detect high beamed light which have high light intensity through a LDR.
- ✓ Object detection - It also can detect any object through IR technology. In that case object must have to carry the IR-Tx.
- ✓ Duel operation capability - The device can give signal to relay switch through LDR and IR at the same time.
- ✓ Automatic switching capability - Whenever relay switch get the signal high beam switches to low beam. After complete operation it can switch back to high beam automatically.
- ✓ Longevity - It is expected that the life expectancy of this device will be almost 2 years.
- ✓ Repairable - If any damage happens to this device it is possible to repair.
- ✓ Efficiency - The device performs in the best possible manner with the least waste of time and effort.
- ✓ Several uses - The device can be used as smoke detector too.

#### 4.2 Limitations of Automatic High Beam Controller

In this device IR technology is used to detect an object. So opposite object must have to carry an IR-Tx so that IR-Rx of receiving device will detect the opposite object. Instead of IR technology Proximity sensor can be used. A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. In that case opposite object doesn't need to carry transmitting device.

### 5 SUMMARY

The summary of this project is "The Automatic High Beam Controller" 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.

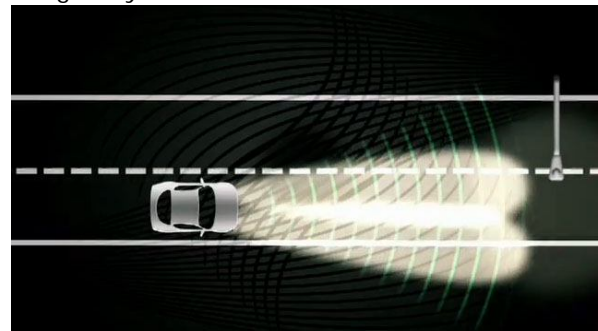


Figure 12: Vehicle running with high beam

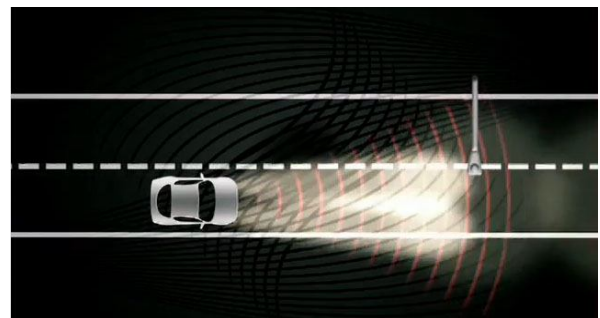


Figure 13: Vehicle running with high detects another light object

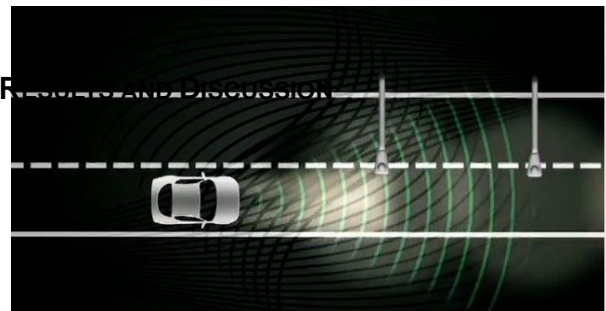


Figure 14: Vehicle's high beam switches to low beam automatically

## 6 CONCLUSION

Road accident is being increased deadly day by day. Especially in our country most of the drivers don't follow the driving rules and regulations. Even they don't know that high headlights beam might be the cause of dangerous Road Accident. Thousands of people lost their lives in every year by Road Accident. Matter is that our government is also not concerned about this problem.

So if we can implement this device in all vehicles of our country, the device will switch the high beam of those vehicles to low beam whenever it will get another vehicle coming towards with high beam. In fact if there is no light the device will work through IR technology.

As a result the road accident will be decreased rapidly. It is possible to implement because the device is cheap in cost, easy to implement and it works automatically. We hope our designed device "Automatic High Beam Controller" will reduce the rate of road accidents mostly high way road accidents.

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