

# Automatic Upper Dipper Headlamp for Vehicle

Harshad Bhagwat  
Student, Department of Mechanical Engineering,  
Guru Gobind Singh Polytechnic,  
Nashik, India  
[harshadbhagwat333@gmail.com](mailto:harshadbhagwat333@gmail.com)

Nutan Patil  
Student, Department of Mechanical Engineering,  
Guru Gobind Singh Polytechnic,  
Nashik, India  
[2004nutanpatil@gmail.com](mailto:2004nutanpatil@gmail.com)

Yash Aher  
Student, Department of Mechanical Engineering,  
Guru Gobind Singh Polytechnic,  
Nashik, India  
[aheryash10@gmail.com](mailto:aheryash10@gmail.com),

Priyanka Kadam  
Department of Mechanical Engineering,  
Guru Gobind Singh Polytechnic,  
Nashik, India  
[kadampriyankav@gmail.com](mailto:kadampriyankav@gmail.com)

## ABSTRACT

Headlights of vehicles are inherent for night driving. These bright headlights which assist the driver for vision, while driving at night, pose a great threat to the other road users coming in the opposite direction. The bright light of the vehicles causes a discomfort in the form of a glare to the oncoming driver. As a rule in night driving, every driver is expected to switch their headlights from high beam to low beam once they spot an oncoming vehicle within 150 meters in order to reduce the glare, but this practice is hardly adhered to. This is one of the major causes of accidents during the night, as the opposing driver will not be able to see the road clearly due to the brightness of the oncoming vehicle's lights. This automatic headlight switching system switches the high beam lamp to low beam as soon as it senses a vehicle approaching from the opposite direction and switches it back to high beam when the cars pass each other. The prototype is an electronic circuit that incorporates the use of a 12 volts power supply which is provided by the car battery itself, a light dependent resistor which acts as the sensor, a potential divider network which serves as a comparator to trigger an NPN transistor connected to an SPDT relay which does the switching. It was designed, constructed, tested and it worked, sensing to a distance of 147 meters. This design minimizes night accidents occurring as a result of this glare by the introduction of automatic headlight control in automobiles. This solves the problem of switching which is not done most of the time, reduces the stress of continuously switching beams manually, hence giving

the driver more concentration on the road while driving at night. This paper brings to limelight the need for manufacturers of automobiles to inculcate this in modern cars to improve on the deficiency of the existing ones. The purpose of this project is to develop vehicle accident prevention in an effort to reduce traffic accident cases based on driving.

**Keywords**— *deficiency, accident, senses, incorporates*

## I. INTRODUCTION

Now days the number of vehicles on road is increasing drastically and number of accidents on road also increase. Especially at night most of the accidents are occurred due to dazzling of headlight. While driving at night the headlight beam of oncoming vehicle if directly affect the drivers eye and eye get blur, it takes 3 to 8 seconds to recover to its normal vision. Fig. Shows the headlight which causes blurriness on drivers eye. If at that time vehicle speed is 70km/hr. causes the vehicle goes out of road or strikes on oncoming vehicle.



Fig1. Head light of vehicle

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

## II. LITERATURE SURVEY

Aslam Mustafa [1] built up an automatic headlight controller. It will sense the light intensity value of opposite vehicle and automatically switches the high beam into low beam and it will reduce the glare effect.

Abdul Kadar Riyaj [2] proposed an graphene coated LED based automatic street lighting using Arduino microcontroller. In this the author introduces Gan based LED which acts as a heat sink. They have used Arduino uno microcontroller. The headlight vehicle is fitted with double filament bulb. Here one filament is used for upper beam and another for dipper beam. While driving at night, the headlight is the only source of vision and it requires essentially from evening 6.00pm to morning 6.00am. Driver can switch the headlight from upper beam to dipper beam or vice versa using manual switch. Upper beam covers the larger distance up to 70m and dipper beam covers the small distance up to 25m and at both the times intensity of headlight is different.

## III. PROBLEM ASSOCIATED

In current practice, to control dipper beam manually by using switch this is placed on the steering column. 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 headlight beam. Another major cause is 'ego problem', which makes each one wait till the other person initiates dipping, which may not happen.

## III. CIRCUIT COMPONENT

**a. IC 555:** - The 555 timer IC is the main control of this system and it is mainly known for generating stable time delays. Here for this system, constant mode is used for developing the timing logic. It is an 8 pin IC available in dual-in-package (DIP).

**b. LDR:**- In this system LDR acts as a sensor to sense the headlight beam of oncoming vehicle. LDR is a light dependent resistor, the resistance of LDR increases in dark up to 20 k $\Omega$  and decreases up to few hundred  $\Omega$  in light.

**c. Relay:**- In this system relay is used as a switch to change the lamp connections from upper beam to dipper beam. Relay is an electromagnetic switch which operates when current is flowing through its coil. Connection of upper beam is given to NC (normally close) terminal; dipper beam is given to NO (normally open) terminal and common is connected directly to 12V supply.

**d. Switches:**- Switch is generally used for to make or to break the contact; here two SPDT (Single Pole Double Throw) switches are used, one for selecting the automatic or manual dipper control mode and other for manual upper-dipper of headlight.

**e. Diodes and Potentiometer:**- While using manual mode there is possibility of flowing reverse current through circuit and relay driver always needs a diode for blocking reverse current. In this system three diodes were used mainly for blocking the reverse current flow through the circuit because diode can operate only in one direction (forward bias) and block all current in reverse direction (reverse bias). Potentiometer of 10K is used for adjusting intensity as well as to control time period 555 IC.

**f. Battery Source:-** This system uses 12V supply which is directly taken from vehicle battery, already present in each vehicle. It provides constant DC supply and the system is Safely operated on vehicle battery supply and does not require any external components.

**IV.WORKING**

Basically, there are two modes of working viz. manual and automatic mode, for selecting manual and automatic mode SPDT switch (S1) is provided. In manual mode for the general practices use the SPDT switch (S2) for controlling upper and dipper condition of the headlight. In manual mode avoidance of flowing reverse current through automatic system, diode D2 and D3 are connected to NC and NO terminal, it only operates in forward direction it means only for automatic mode.

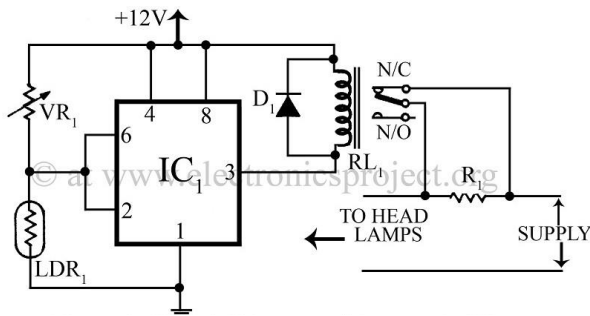


Fig.2. Circuit Diagram of Automatic Dipper

Automatic mode is consisting of light dependent resistor (LDR), 555 IC, relay and few other components as shown in fig.11. Normally, LDR's resistance is high (20 kΩ) in darkness and low (2 kΩ) in brightness. VR and LDR work as the potential divider and VR is used to control output voltage of potential divider which causes change in controlling time period and intensity of LDR.

Fig.3 shows the internal structure of 555 IC, in that three resistors of 5 kΩ act as voltage divider and gives the voltage

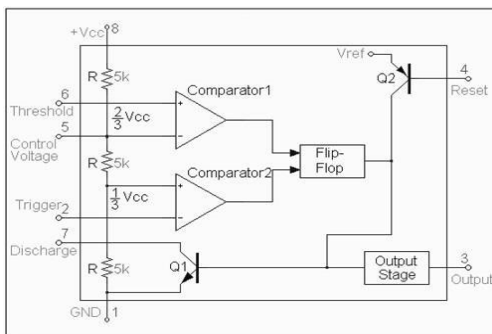


Fig.3. Internal structure of 555 IC

$\frac{2}{3} V_{cc}$  to comparator 1 and  $\frac{1}{3} V_{cc}$  to comparator 2, where  $V_{cc}$  is the supply of 12V. These two voltages give the timing interval [6].

When light of approaching vehicle falls on LDR the resistance of LDR get decrease to 2 kΩ and voltage which is directly given to threshold and trigger pin gets shorted to ground. Due to that a negative voltage is going to trigger pin, which is set at  $\frac{1}{3} V_{cc}$  by comparator 2. If that voltage is equal to  $\frac{1}{3} V_{cc}$ , the comparator 2 output goes high and comparator 1 is not equal to  $\frac{2}{3} V_{cc}$  so its output is low. It sets FF at S=1, R=0 and output of FF is Q=1,  $\bar{Q}$ =0, this output is inverted by inverter present at pin 3 hence output of 555 IC becomes high. Relay coil gets energized and changes its connections from upper (connected to NC) to dipper (connected to NO). This condition is present till the light continuously falls on LDR means approaching vehicle light beam still falls on LDR sensor. Once the approaching vehicle is passed away, LDR sensor goes in darkness. The resistance of LDR get increases to 20 kΩ and voltage which is get shorted due to low resistance of LDR, is recovered and given to threshold and trigger pins of 555 IC. Due to that the positive voltage is going to threshold pin which is set at  $\frac{2}{3} V_{cc}$  by comparator 1. If that voltage is equal to  $\frac{2}{3} V_{cc}$  the comparator 1 output goes high and comparator 2 is not equal to  $\frac{1}{3} V_{cc}$  so output is low. It sets FF at S=0, R=1 and output of FF is Q=0,  $\bar{Q}$ =1, this output is inverted by inverter present at pin 3 hence the output of 555 IC becomes low. Relay coil will be de-energized and changes its connection from dipper (connected to NC), this condition is present till any light beam of approaching vehicle falls on LDR sensor.

**V.CONCLUSION**

Automatic dipper provides better safety at night time and drivers can drive comfortably and reach their destination safely. There are two modes provided viz. automatic and manual mode. While driving in the cities there are light everywhere which can affect the working of the device at that time the mode can shift to manual mode to avoid flickering of the headlight.

When both the vehicles were fitted with the “Automatic Dipper” then both the vehicles dip the headlight beam of each other efficiently. Main components helps to run the circuit are easily available and are also cheap. The circuit is compatible with any vehicle and doesn't require any other supply; it can efficiently work on battery fitted in the vehicles. Therefore the installation of this safety system in each vehicle give safety at night driving, increase comfort level of driver and decrease the road accidents.

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