

Automatic Dipper

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ABSTRACT

Hazards can be occurred anywhere at any time. Safety is only means to avoid injuries and accidents towards these hazards. During the night time, glare occurs due to high beam which leads to accidental cause. Due to lack of knowledge or laziness or being in hurry, we do not switch it to low beam whenever we see a vehicle coming from opposite direction. Automatic Dipper is one of the safety measures used while driving at night or in dark. It switches to low beam automatically whenever a light source comes from opposite direction and further it switches back to high beam when vehicle passed through it. This results in taking precaution from accidents caused by glare.

I. INTRODUCTION

Light is the source to provide vision in the dark but excess of the light can produce glare(Fig. 1.1) which cause temporary blindness to the eyes and creates irritating situation while driving. Automatic dipper is designed in such a manner that it reduces the glare by switching automatically vehicles headlight to low beam(dipper or dim) from high beam(upper or bright), when a source of light is sensed. In India, 74% of vehicles use high beam light due to lack of knowledge or laziness or hurry that leads to tragic accidents which can be life-threatening.



Fig 1.1

Generally, for two wheelers there is only helmet is the safety measures which makes them riskier. During pitch black conditions where there are no other sources of light, high beam is used. On all other cases, low beam is preferred. In a two-way traffic, there are vehicles moving in both directions on the road. So, when the bright light from the headlight of a vehicle coming from the opposite direction falls on a vehicle, it automatically switches to dipper which prevent from temporary blindness and result in providing safety and reduce the accidental chance caused by glare.

II. CIRCUIT

Simple PCB circuit is developed with less possible number of components as shown in Fig. 2.1 below

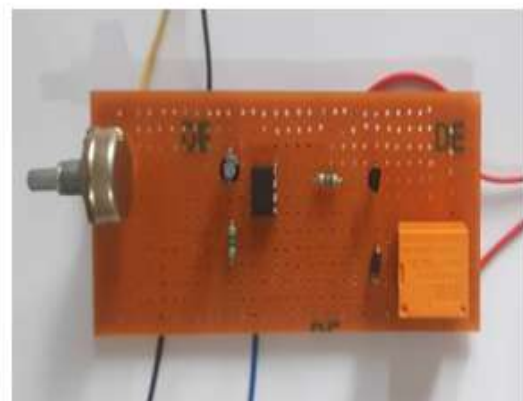


Fig. 2.1

Here, two red wires for three terminals headlamp in which one of them is for upper mode and other is for dipper mode. Black and blue wires is connected to LDR. While, yellow and black is connected to 12V DC Supply.

III. MAIN COMPONENTS

3.1 RELAY

In this system, 12V relay (Fig. 3.1) is used as switch to change the lamp connections from upper beam to dipper beam. Relay is 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 connected to 12V supply.



Fig. 3.1

1.2 VOLTAGE REGULATOR

A voltage regulator (Fig. 3.2) is a component of the power supply unit that ensures a steady constant voltage supply through all operational conditions.

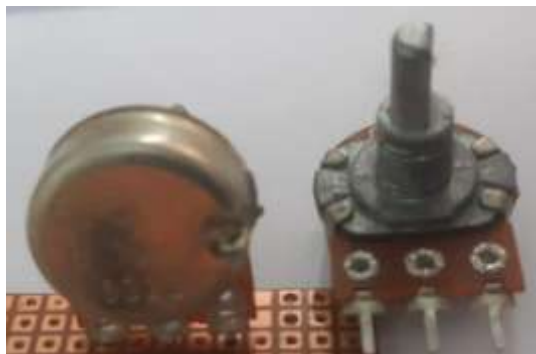


Fig. 3.2

1.3 NE555N TIMER IC

The 555 timer IC (Fig. 3.3) is an integrated circuit (chip) used in a variety of timer, delay, pulse generation, and oscillator applications.



Fig. 3.3

1.4 PCB (PRINTED CIRCUIT BOARD)

A printed circuit board, or PC board, or PCB (Fig. 3.4), is a non-conductive material with conductive lines printed or etched used to connect electronic components to one another in a controlled manner.



Fig. 3.4

1.5 BC547 NPN TRANSISTOR

The BC547 NPN Transistor (Fig. 3.5) is nothing but the transfer of resistance which is used for amplifying the current. It has three pins i.e., Collector, Base and Emitter. A small current of the base terminal of this transistor will control the large current of emitter and base terminals. The main function of this transistor is to amplify as well as switching purposes. Here this transistor is used for Relay Driver.



Fig. 3.5

1.6 LDR

LDR (Light Dependent Resistor, Fig. 3.6) as the name states is a special type of resistor that works on the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light. It is often used as a light sensor. In the dark, LDR's resistance is high as several megohms, while in the light, it can get reduced to 100Ω.

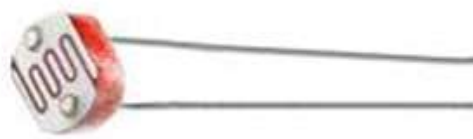


Fig. 3.6

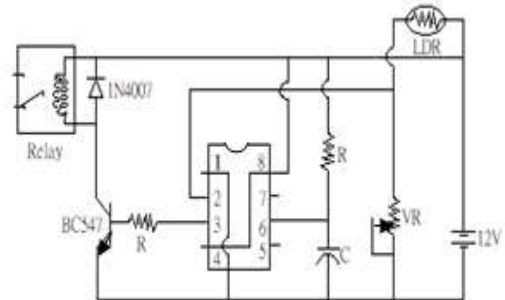
3.7 SWITCH

Switch(Fig. 3.7) is generally used for to make or to break the contact. Here, SPDT (Single Pole Double Through) switches are used, one for selecting the automatic dipper mode and other for manual upper-dipper mode.



Fig 3.7

IV. CONNECTION DIAGRAM



- Resistor(R) of 4.7k ohm is connected throughout the circuit.
 - Capacitor(C) is 0.1 microFarad.
 - Voltage Regulator(VR) is of 100k.
 - BC547 NPN Transistor.
 - 1N4007 is Diode
 - NE555N Timer IC
1. Ground
 2. Trigger
 3. Output
 4. Reset
 5. Control Voltage
 6. Threshold
 7. Discharge
 8. Vcc(Power Supply)

V. WORKING

Based on working circuit, the source required is 12V DC Supply. In real time application, it is carried out by vehicle's own battery pack.



Now we need to simulate the condition where LDR present on the indicator rod is exposed to a bright light i.e., headlight of another vehicle coming from opposite direction. Under normal conditions, the vehicle is using high beam which get tripped with the help of NE555 timer IC which get triggered due to LDR change in resistance and produce output to Relay. Relay help to trip to the low beam and when opposite vehicle passes it then relay trip back to normal high beam condition.

VI. CONCLUSION

Automatic Dipper provides better safety at night in very low cost. Circuit is very compact in size which can be place easily anywhere inside the vehicle by engineers or by any company trained professionals within effective cost of 100 to 150 rupees only. Whole process takes upto 10-20 minutes. In past, problem is of placement of LDR in two wheelers that is solved by placing it on indicator of that vehicle so that it can not be affected by vehicle own light source and exposed only to opposite vehicle light.

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