MAPLE TREE PUBLISHING HOUSE

INTERNATIONAL RESEARCH JOURNAL OF MULTIDISCIPLINARY TECHNOVATION (IRJMT)

http://www.mapletreejournals.com/index.php/IRJMT
Received 17 January 2019 ISSN 2582-1040
Accepted 23 January 2019 2019; 1(1); 19-24
Published online 25 January 2019

Low cost Automation on headlamp control for vehicles

B.Sivashankar[1*], K.R.Pradeep[1], N.A Asfaq Ahamed[1]

[1]Lecturer, Dept of Automobile Engineering, Sri Krishna Polytechnic College, Coimbatore , Tamilnadu, India.

**Corresponding author E-Mail ID: mcesiva@gmail.com, Mobile: 8903903424*

DOI: https://doi.org/10.34256/irjmt1913

ABSTRACT

Nowadays automobile sector plays an important role in day to day life. Most of the people were using private vehicle instead of public vehicle for their convenient. Amount of usage of vehicle in the year 2016 is increased by 4 times while comparing to the year 2011. At the same time accidents are also increased simultaneously. Even though latest technologies are implemented. As such most of the accidents are happened during night time. Most of the accidents are happened due to reflection or Troxler's Effect of light. So far the vehicles are manufactured with manual head light control. Our project is providing an automatic control of head lamp even for the old model vehicles.

Keywords: LDR, Automatic head lamp, Troxler's Effect.

1. INTRODUCTION

There are more technologies available for automatic head lamp control which uses either Micro controller or Microprocessor. But in our project we are using a basic relay logic concept which is easy to construct and easy to maintain. We are using two LDR [Light Dependent Resistor] for complete control of head lamps both ON, OFF, High & Low beams. Our circuit doesn't uses any processor or controller its completely based on the basic electrical and electronic components.

2. METHODOLOGY

The operation of this project is an application of a project named automatic street light controller. There are 2 LDR [Light Dependent Resistors] are used were as LDR 1 is used to turn ON or OFF the head lamp LDR 2 is used to change the beam of head lamp either High beam or Low beam. Here the operation of LDR1 is reversed and operation of LDR2 is directly used to control the head lamp beam. We have provided a regulator to control the triggering of head lamp for the driver convenience.

3. FUNCTIONAL DIAGRAM

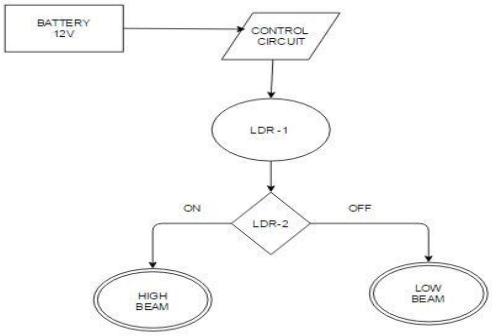


Fig 1. Head lamp by using LDR

4. HARDWARE REQUIREMENTS

4.1.1 LDR

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below.

Fig 2. LDR

A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased.

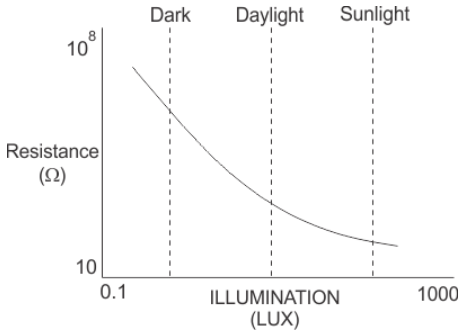


Fig 3. Characteristics of LDR

LDR's are light dependent devices whose resistance is decreased when light falls on them and that is increased in the dark. When a light dependent resistor is kept in dark, its resistance is very high. This resistance is called as dark resistance. It can be as high as 1012Ω and if the device is allowed to absorb light its resistance will be decreased drastically. If a constant voltage is

applied to it and intensity of light is increased the current starts increasing. Figure below shows resistance vs. illumination curve for a particular LDR.

4.1.2 Transistors

SL100 is a general purpose, medium power NPN transistor. It is mostly used as switch in common emitter configuration. The transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves. This is known as the biasing. For switching applications, SL100 is biased in such a way that it remains fully on if there is a signal at its base. In the absence of base signal, it gets turned off completely.

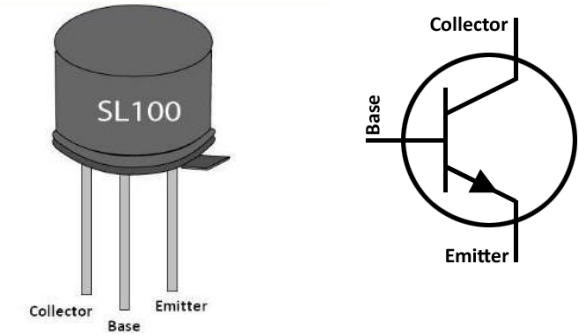


Fig 4. Transistors

The emitter leg of SL100 is indicated by a protruding edge in the transistor case. The base is nearest to the emitter while collector lies at other extreme of the casing.

4.1.3 Resistors

Fig 5. Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits.

The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

4.1.4 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

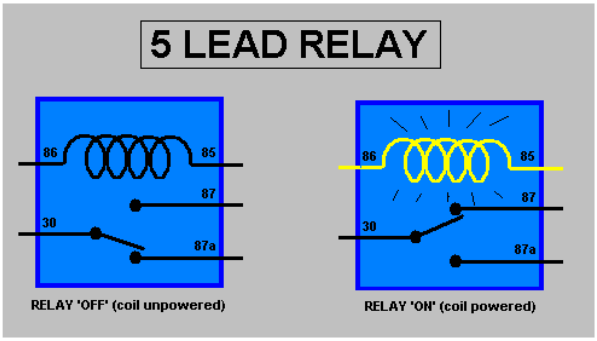


Fig 6. Relay

4.4.5 Potentiometer

A potentiometer, informally a pot, is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.

The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.

Fig 7. Potentiometer

Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.

4.4.6 Voltage regulator [7809]

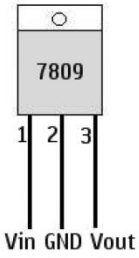


Fig 8. Voltage regulator [7809]

7809 is a voltage regulator integrated circuit(IC) which is widely used in electronic circuits. Voltage regulator circuit can be manually built using parts available in the market but it will take a lot of time to assemble those parts on a PCB. Secondly, the cost of those parts is almost equal to the price of 7809 itself so professionals usually prefer to use 7809 IC instead of making a voltage regulator circuit from scratch. Before you start using 7809, you will need to know about the pin structure of IC 7809. Apparently, it looks like a transistor. It has three pins namely source, drain & negative.

5. CIRCUIT DIAGRAM

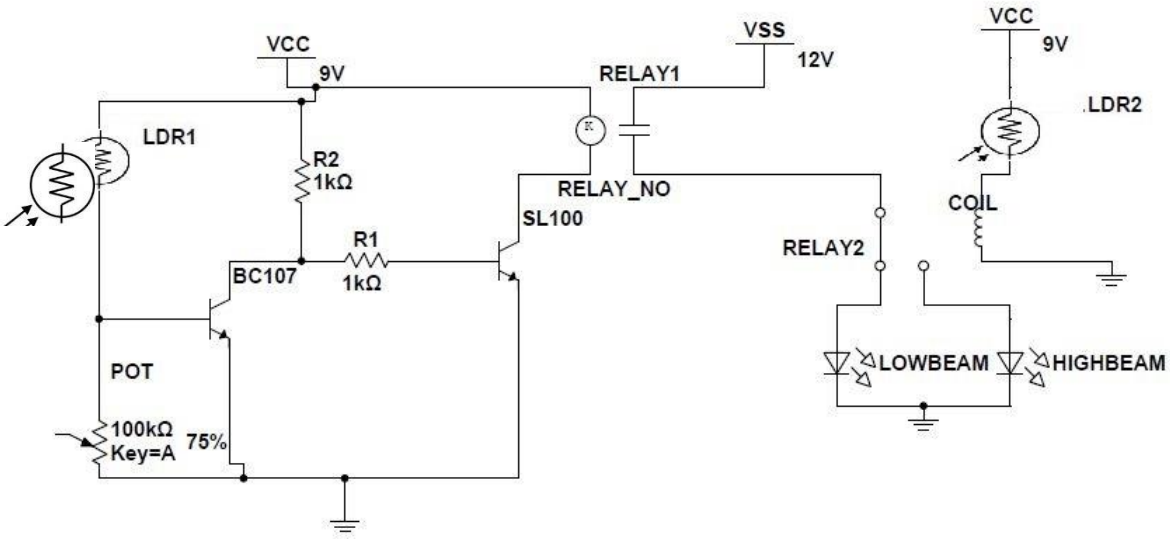


Fig 9 Circuit Diagram

6. WORKING PRINCIPLE

LDR1 plays a vital role in this concept, were as LDR2 is only to control the supply to the High/Low beam of head lamp. Once the LDR1 senses the low light it enable the Relay-1 which is normally open contact becomes normally closed contact, which passes the 12v supply to the relay 2 which is single pole double throw [SPDT] type.

The normally closed contact of the relay 2 is connected to the anode of low beam. So once the LDR1 senses the head lamp turns ON in Low beam. When the LDR 2 senses the light source it enables the Relay 2, were as normally open contact become normally closed and normally closed becomes normally open.

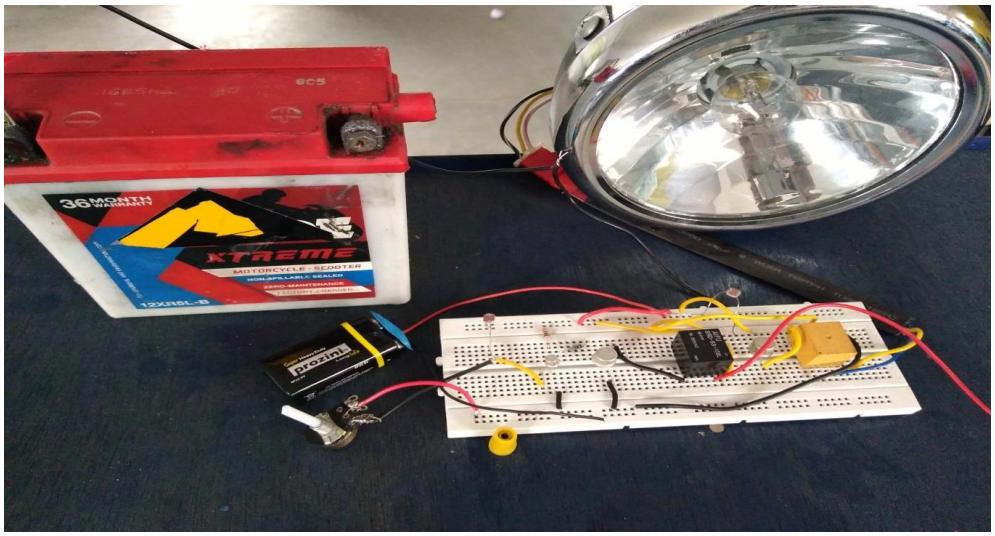
In which results the supply to low beam cuts off and supply is given to high beam. The time period of high beam is depends on the LDR2 output once the LDR2 stops sensing the light source it automatically disables the Relay2 and changes High beam to low beam.

7. POSITION OF SENSORS

Fig 10. Position of Sensors

The sensors should be kept in the vehicle as shown in the above image which helps the sensors to easy identification of light source from the opposite vehicle.

8. PHOTOGRAPHS



In the above image we have used a 9v battery for the control circuit, but in real time application we can use a 7809 Voltage regulator as we mentioned earlier instead of an additional power source.

REFERENCES

[1] Muralikrishnan. R, "Automatic headlight dimmer a prototype for vehicles," IJRET, 3, 2014.

[2] S. G. Magar, "Development of adaptive front light systems," IJERT, 3, 2014.

[3] S. Parhad, "Development of automotive adaptive front lighting system," proceedings of IRF international conference, 2014

[4] S. S. Kapse, A. A. Abhale, A. C. Kudake, and B. S. Shirsath, "Automatic street light control system," IJETAE, 3 2013.

[5] Ying Li, and S. Pankanti, "Intelligent headlight control using camera sensor," US 8493446 B2, 2013

[6] Victor Nutt, and S. Kher, "Headlight intensity controller design using wireless sensors," International Journal of Computer applications (0975-8887), 2012.

Conflict of Interest

None of the authors have any conflicts of interest to declare.