

“AUTOMATIC STREET LIGHT CONTROL SYSTEM”

PROJECT REPORT

Submitted for CAL in B.Tech Semiconductor devices and circuits (ECE1002)

By

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CERTIFICATE

This is to certify that the Project work entitled “**automatic street light control system**” that is being submitted by” Meghna Lohani , Yogita Gupta , Prachi Thakur ” for CAL in B.Tech Semiconductor devices and circuits (ECE1002) is a record of bonafide work done under my supervision. The contents of this Project work have not been submitted for any other CAL course.

Place : Chennai

Date : 3rd May 2017

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ABSTRACT

Automatic Street Light Control System is a simple yet powerful concept, which uses transistor as a switch. By using this system manual works are 100% removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes, visible to our eyes.

By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even the sunlight comes and also switched on earlier before sunset. In this project, no need of manual operation like ON time and OFF time setting.

This project clearly demonstrates the working of transistor in saturation region and cut-off region.

1.Introduction:

A **street light, lamppost, street lamp, light standard, or lamp standard** is a raised source of light on the edge of a road or walkway, which is turned on or lit at a certain time every night. Modern lamps may also have light-sensitive photocells to turn them on at dusk, off at dawn, or activate automatically in dark weather. In older lighting this function would have been performed with the aid of a solar dial. It is not uncommon for street lights to be on poles which have wires strung between them, or mounted on utility poles.

This project exploits the working of a transistor in saturation region and cut-off region to switch ON and switch OFF the lights at appropriate time with the help of an electromagnetically operated switch

Automatic Streetlight needs no manual operation of switching ON and OFF. The system itself detects whether there is need for light or not. When darkness rises to a certain value Light switches ON.

S.No	Components	Range	Quantity
1.	LDR		1
2.	Transistor	BC107	2
3.	Resistor	6.8 K , 1K*2, 330	4
4.	LED		1
5.	Bread Board		1
6.	Power supply	9 volts	1

SPECIFICATION OF COMPONENTS

1. LDR (LIGHT DEPENDENT RESISTER)

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.

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.

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. This is the most common working principle of LDR.

Specifications of LDR

- Resistance Tolerance: 0.1
- Max. Voltage (VDC): 150
- Resistance: 20-30Kohms
- Rated Power: 150vdc
- Max. power (mw): 150

2. TRANSISTORS

BC107 is an NPN bi-polar junction transistor. A transistor, stands for transfer or resistance commonly used to amplify current. A small current at its base controls a larger current at collector & emitter terminals. BC107 is mainly used for amplification and switching purposes. It has a maximum current gain of 800. Its equivalent transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves. This is known as the biasing. For amplification applications, the transistor is biased such that it is partly on for all input conditions. The input signal at base is amplified and taken at the emitter. BC107 is used in common emitter configuration for amplifiers. The voltage divider is the commonly used biasing mode. For switching applications, transistor is biased so that it remains fully on if there is a signal at its base. In the absence of base signal, it gets completely off.

3. RESISTORS

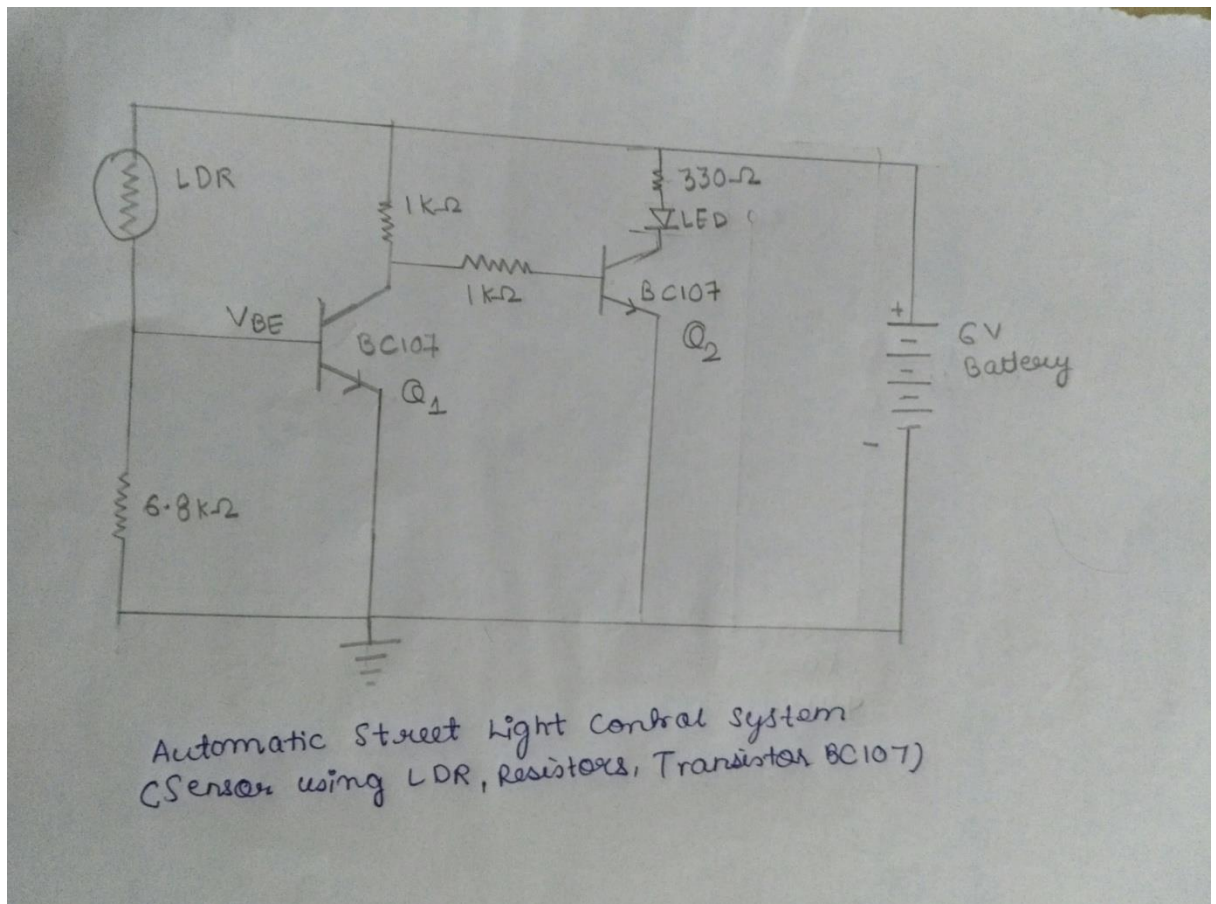
Resistor is an electrical component that reduces the electric current. The resistor's ability to reduce the current is called resistance and is measured in units of ohms (symbol: Ω). If we make an analogy to water flow through pipes, the resistor is a thin pipe that reduces the water flow.

4. LED (LIGHT EMITTING DIODE)

A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic pn junction diode, except that an LED also emits light. When an LED's anode lead has a voltage that is more positive than its cathode lead by at least the LED's forward voltage drop, current flows. Electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

5. POWER SUPPLY

A power supply is a device that supplies electric power to an electrical load. The term is most commonly applied to electric power converters that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (mechanical, chemical, solar) to electrical energy. A regulated power supply is one that controls the output voltage or current to a specific value; the controlled value is held nearly.



Methodology: Experimental/Simulation

Working

- The LDR works on the principle on photo conductivity.
- When there is light, photon of sufficient energy falls on the LDR and electron gets excited from valence band to conduction band and as a result large amount of current flows through LDR.
- The resistance across LDR is less. Therefore more voltage drop across 6.8 k ohm resistor and transistor Q1 is on switch on mode. But this voltage is not sufficient to switch on the next component.
- Q2 is in off stage. As a result LED does not glow.
- When there is darkness resistance of LDR is high, drop across 6.8 k ohm is high and Q1 is in off stage.
- We have selected 1Kohm resistor such that when there is darkness the voltage across the transistor is greater than 0.7 volts which creates a closed path and LED glows.
- We use 330 ohms resistor to increase the sensitivity of the circuit and to protect the LED.
- LED glows in forward biased region.

3. Results and Discussion

ADVANTAGES

- By using this Automatic system for street light controlling, we can reduce energy consumption because the manually operated street lights are not switched off properly even the sunlight comes and also not switched on earlier before sunset.
- In sunny and rainy days, ON and OFF time differ noticeably which is one of the major disadvantage of using timer circuits or manual operation for switching the street light system.
- Low cost
- Automated operation
- Low power consumption
- Very flexible
- Easy to manufacture

4. Conclusion

Alternate uses of our circuit

- We can save the energy for the future use and we can control the losses of the power.
- We can implement this project for the home lamp or the night lamp of the room.
- This is also used for traffic signal.

5. REFERENCES

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