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Automatic Street Light Control System

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ABSTRACT

Street light is one of the major power consuming factors. The idea of designing of new system for the street light do not consume huge amount of electricity. Power saving is the main consideration forever as the source of the power. The significance of the project is to deliver street light to everyone with saving of energy and no need of manual operation like ON time and OFF time setting This paper overviews the advantages as well as challenges.

Keywords: LDR, LED, Resistance

Introduction

We need to save or conserve energy because most of the energy sourceswe depend on, like coal and natural gas can't be replaced. Once we use them up, they are gone forever. Saving power is most important, instead of using the power in unnecessary times it should be switched off. In any city "STREET LIGHT" is one of the major power consuming factors. Most of the time we see streetlights are on even after sunrise thus wasting lot of energy. Over here we are avoiding the problem by having an automatic system which turns on and off the streetlight at given time or when ambient light falls below a specific intensity. LDR is used to detect the ambient light. If the ambient light is below a specific value the lights areturned on.

It clearly demonstrates the working of transistor in saturationregion and cut-off region.

Basic principle

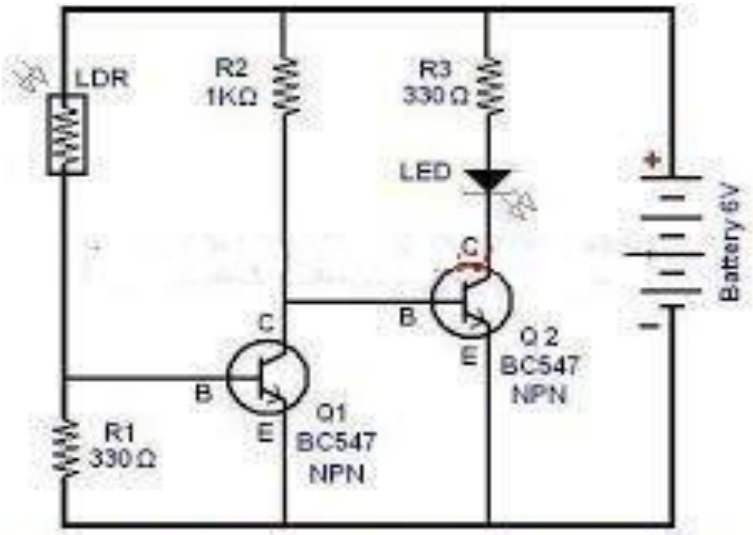
The automatic streetlight control system operates on 12 V DC supply. The automatic streetlight controller has a photoconductive device whose resistancechanges proportional to the extent of illumination, which switches ON or OFF the LED with the use of transistor as a switch.

Light dependent resistor, a photoconductive device has been usedas the transducer to convert light energy onto electrical energy.

The central dogma of the circuit is that the changes in voltage drop across the light dependent resistor on illumination or darkness switches thetransistor between cut-off region or saturation region and switches OFF and ON the LED As we know properly of LDR that during the time of day resistance is low therefore voltage at the inverting input (IE pin 2) is higher than the voltage at thenon-inverting input (pin3) hence the output at the pin6 is low so the transistor goes into the cut off state which means LED or bulb will not glow.

Circuit

Required components



Automatic Street Light Control System.
(Sensor using LDR & Transistor BC 547.)
Very Simple.

- ✓ LDR Light Dependent Resistor
- ✓ Take 2 transistors. (NPN transistor-BC547 or BC147 or BC548)
- ✓ Resistor-1K, 330 ohm, 470 ohm
- ✓ Light emitting diode (LED)
- ✓ Connecting wires- Use single-core plastic-coated wire of 0.6mm diameter(the standard size)- You can use wire that is used for Computer Networking.
- ✓ Power supply-6V or 9V

LDR (Light Dependent Resistor)

Light dependent resistors are very useful especially in light or dark sensor circuits. Normally the resistance of an LDR is very high, but when they are illuminated with light, resistance drops dramatically. Electronic onto sensors are the devices that alter their electrical characteristics, in the presence of light. The best known devices of this type are the light dependent resistors, the photodiode and phototransistors. As the name suggest, depending on light the resistance value varies. LDR are made by depositing a film of cadmium supplied or cadmium selenite on a substrate of ceramic containing no or very few electrons when not illuminated. The longer strip the more the value of resistance. When light falls on the strip the resistance decreases, in the absence of the light the resistance can bein order to 10Kohm to 15Kohm and is called dark resistance. Though LDR is very sensitive to light, the switching times is very high and hence cannot be used for high frequency applications. The below figure shows that when the torch is turnedon, the resistance of the LDR falls, allowing current to pass-through it is shown inthe figure given below.

Transistors

BC547 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. BC547 is mainly used for amplification and switching purpose. It has a maximum current gain of 800.

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 amplificationapplication, the transistor is biased such that it is partly on for all input conditions. Theinput signal at base is amplified and taken at the emitter, BC547 is used in commonemitter 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 single at its base. In the absence of base signal, it gets completely off.

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, to divide voltages, bias active elements, and terminatetransmission lines, among other uses. High-power resistor 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 resistance that only change slightly with temperature, time or operating voltage. Variable resistor can be used to adjust circuit

elements (such as s volume control or a lamp dimmer), or a sensing device for heat, light, humidity, force, or

chemical activity.

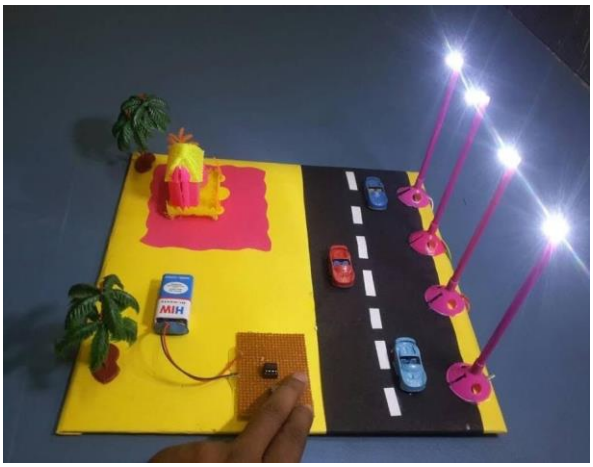
LED (Light Emitting Diode)

A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic pn-junction diode, expect 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 floes. 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.

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 voltageor current to a specific value; the controlled value is held nearly.



Procedure:

Insert first transistor Q1-BC547 (NPN) on breadboard (or generalPCB) as shown in the circuit diagram.

- ✓ Connect another transistor Q2-BC547 (NPN) on breadboard as in step1.
- ✓ Connect wires across emitter pin of both transistors and negative
- ✓ terminal of battery (lowest/bottom row of breadboard).
- ✓ Connect a wire across collector pin of transistor Q1 and base pin oftransistor Q2.
- ✓ Connect a resistor 1K across positive terminal of battery (topmost row ofbreadboard) and collector pin if transistor Q1.
- ✓ Connect Light Dependent Resistor (LDR) across positive terminal of battery(topmost row of breadboard) and base terminal of transistor Q1.
- ✓ Insert a resistor-330 Ohm across base pin of transistor Q1 and negativeterminal of battery (lowest bottom of

breadboard).

- ✓ Connect a resistor 330R across positive terminal of battery (topmost roe ofbreadboard) and anode terminal of LED (Light Emitting Diode) & Connect the cathode terminal of LED to Collector pin of transistor Q2.

Conclusion

The streetlight controller using LDR based Light intensity & traffic density, in the todays up growing countries will be more effective in case if cost, manpower and security as compare with today's running complicated and complex light controlling system. Automatic Street Light Controlling System puts up a very user friendly approach and could increase the power.

This paper elaborates the design and construction of automatic street control system circuit. Circuit works properly to turn street lamp ON/OFF. After designing the circuit which controls the light of the street as illuminated in the previous sections. LDR sensor and the photoelectric sensor are the two main conditions in working the circuit. If the two conditions have been satisfied the circuit will do the desired work according to specific program. Each sensor controls the turning ON/OFF the lighting column. The street light has been successfully controlled by microcontroller. With commands from the controller thelights will be ON in the places of the movement when it's dark. Furthermore the drawback of the street light system using timer controller has been overcome, when the system depends on photoelectric sensor. Finally this control circuit can be used in a long roadways.

Future Scope

We can save the energy for the future use and we can control the losses of the power. We can implemented this project for the home lamp or light lamp of the room. This is also used for the signals.

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