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SUBMITTED TO:

Mr. Alok Kumar

Asstt. Prof. ECE Department

SUBMITTED BY:

Name: SANYAM AGARWAL

Roll No:2100270310122

III SEM EC-3

Ajay Kumar Garg Engineering College, Ghaziabad
27th Km Stone, Delhi-Hapur Bypass Road, Adhyatmik Nagar, Ghaziabad-201009

Dr. A. P. J. Abdul Kalam Technical University, Lucknow

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TABLE OF CONTENTS

Chapter 1. Introduction **1-3**

1.1 Introduction 1

1.3 Basic Principle 3

Chapter 2. Work Done/Assigned Project Work **4-11**

2.1 Circuit Diagram 4

2.2 List of Components 5

2.2 Block diagram 8

2.3 Working 9

2.4 Procedure 11

Chapter 3. Conclusion and Future Scope **12-15**

3.1 Advantages & Disadvantages 12

3.2 Applications 12

3.3 Conclusion 13

3.4 Future Scope 14

Chapter 4. Results

4.1Proteus simulation 15

5. References 16

INTRODUCTION

Automatic street lights are lighting systems that switch on and off automatically, based on the presence of light and/or the absence of people. The system typically uses sensors, such as light-sensitive photodiodes or infrared motion detectors, to detect changes in ambient light levels and trigger the lights accordingly. The goal of automatic street lighting is to provide better lighting for roads and streets, while also reducing energy consumption and costs. It is a common feature in many cities and towns around the world, and is considered a smart and sustainable solution for street lighting.

Street light controllers are smarter versions of the mechanical or electronic timers previously used for street light ON-OFF operation. They come with energy conservation options like twilight saving, staggering or dimming. Also many street light controllers come with an astronomical clock for a particular location or a Global Positioning System (GPS) connection to give the best ON-OFF time and energy saving.

Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF the street light automatically. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by

sunlight. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes.

By using this system energy consumption is also reduced because now-a-days the manually operated street lights are not switched off proper even the sunlight comes and also not switched on earlier before sunset. In sunny and rainy days, ON time and OFF time differ significantly which is one of the major disadvantage of using timer circuits or manual .

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.

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.

BASIC PRINCIPLE:

The automatic streetlight control system operates on 12 V DC supply. The automatic streetlight controller has a photoconductive device whose resistance changes 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 used as the transducer to convert light energy into electrical energy. The central dogma of the circuit is that the change in voltage drop across the light dependent resistor on illumination or darkness switches the transistor between cut-off region or saturation region and switches OFF or ON the LEDAs we know property 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 the non-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 DIAGRAM:

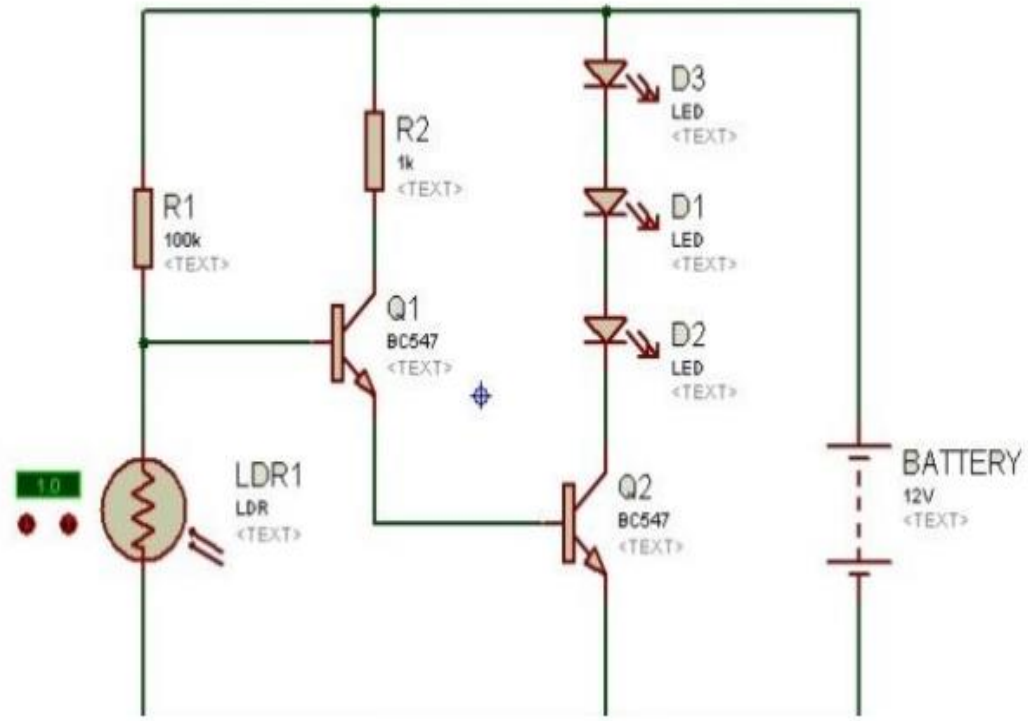


Figure – Circuit diagram of automatic street light controller

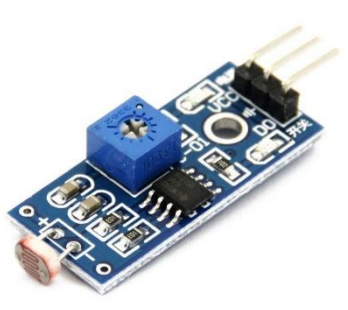
LIST OF COMPONENTS:

S.NO.	PARTS	RANGE	QUANTITY
1.	LDR		1
2.	TRANSISTOR	BC -547 NPN	2
3.	RESISTOR	1K, 330 ohm	3
4.	LED		1
5.	PCB		1
6.	POWER SUPPLY	6V OR 9V	1

5. SPECIFICATION OF COMPONENTS:

5.1 LDR (LIGHT DEPENDENT RESISTER)

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors



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5.2. TRANSISTORS

BC547 is an NPN bi-pola 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 purposes. It has a maximum current gain of 800. Its equivalent transist 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 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. BC547 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.

5.3. 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.

5.4. LED (LIGHT EMITTING DIODE)

A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic pnjunction 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.

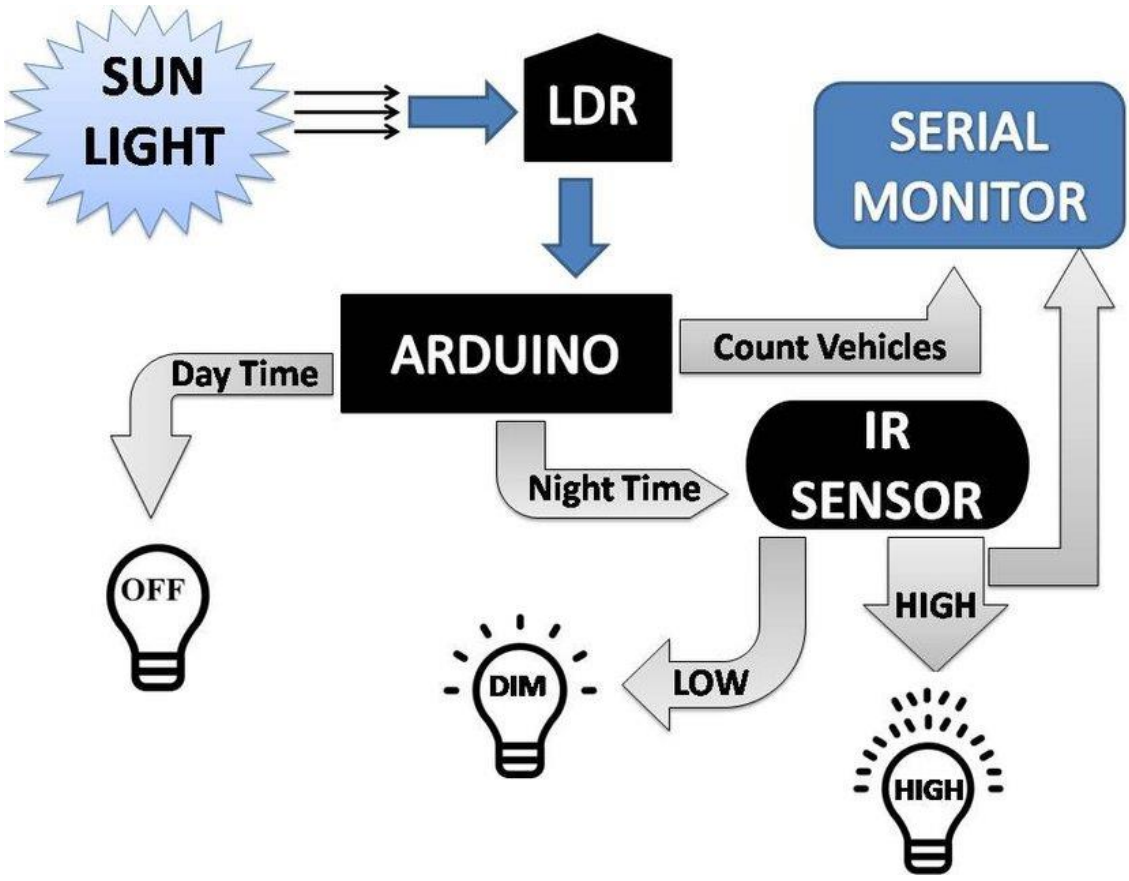
5.5. PCB (PRINTED CIRCUIT BOARD)-

A printed circuit board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. PCBs can be single sided (one copper layer), double sided (two copper layers) or multi-layer. Conductors on different layers are connected with plated-through holes called bias. Advanced PCBs may contain components - capacitors, resistors or active devices - embedded in the substrate.

5.6. 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

BLOCK DIAGRAM:



WORKING:

Circuit of a compact and true solid-state automatic lawn light is described here. The circuit can be used to switch on incandescent garden light bulbs at desk and switch off them at dawn. A 10 mm encapsulated light dependent resistor (LDR) here works as the twilight detector.

The whole circuit can be housed in a very small plastic cabinet. For powering the circuit AC household supply is needed. With a little skill and patience, you can easily modify this circuit to drive a number of white LED strings, instead of the incandescent bulb load at the output.

When ambient light is normal, transistor T1 is reverse biased by the low resistance of LDR. Multiturn plastic trimpotP1 sets the detection sensitivity. If ambient light dims, transistor T1 turns on to drive the triac T2. Now the lamp load at the output of T2 energises. When the ambient light level restores, circuit returns to its idle state and light(s) switched off by the circuit.

Working voltage for the circuit is derived directly from the AC supply input through components R1, R2 and R3. This obviates the requirement of a bulky.

If you wish to operate the, light bulb(s) on a little reduced power, just replace the triac T2 with a suitable silicon controlled rectifier (SCR). This may give a long life to the incandescent load. Finally, the LDR should not be mounted to receive direct sunlight. It may be mounted at the top of the enclosure, pointing to the sky say southwards.

LDR offers Very high Resistance in darkness. In this case the voltage drop across the LDR is more than 0.7V.This voltage is more sufficient to drive the transistor into saturation region. In saturation region, IC (Collector current) is very high. Because of this IC. The relay gets energized, and switches on the lamp.

LDR offers Very low Resistance in brightness. In this case the voltage drop across the LDR is less than 0.7V.

This voltage is not sufficient to drive the transistor into saturation region. Hence, the transistor will be in cut-off region. In cut-off region, IC (Collector current) is zero. Because of this IC, The relay will not be energized, and the lamp will be in ON state only. Diode is connected across the relay to neutralize the reverse EMF generated.

PROCEDURE:

1. Insert first transistor Q1-BC547 (NPN) on PCB board shown in the circuit diagram.

2. Connect another transistor Q2-BC547 (NPN) on PCB board shown in the circuit diagram.

3. Connect wires across emitter pin of both transistor and negative terminal of battery on the PCB board.

4. Connect a wire across collector pin of transistor Q1 and base pin of transistor Q2.

5. Connect a resistor 1k across positive terminal of battery on the PCB board and collector pin transistor Q1.

6. Connect LDR (Light Dependent Resistor) across positive terminal of the battery and base terminal of transistor Q1

7. Insert a transistor 330 ohm across base pin of transistor Q1 and negative terminal of battery.

8. Connect a resistor 330 ohm across positive terminal of battery and anode terminal of LED connect the cathode terminal of LED to collector pin of transistor Q2.

ADVANTAGES & DISADVANTAGES-

By using this automatic system for street light controlling ,we can reduce energy consumption because the manually operated street lights are not switch off properly even the sun light comes and

Also not switched on earlier before sunset

- Low cost
- Automated operation
- Low power consumption
- Very flexible
- Easy to manufactured

In sunny and rainy days, on and off time differ notice which is one of the major disadvantages of using timer circuit or manual operation for switching the street light system.

APPLICATION:

1. Used in street light applications
2. Used in Domestic applications.

Smart automatic street light system helps in controlling the street lights intelligently and automatically to minimize power consumption and reduces man work by fluctuating the street lights time to time and in certain conditions toggling as well as turning OFF of some lights concerning the motion observed on the roads ...

CONCLUSION:

The Streetlight controller using ldr based Light intensity & traffic density, in the todays up growing countries will be more effective in case of cost, manpower and security as compare with today's running complicated and complex light controlling systems. 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 illustrated in the previous sections. LDR sensor and the photoelectric sensors 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 or OFF the lighting column. The street lights has been successfully controlled by microcontroller.

With commands from the controller the lights 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, where the system depends on photoelectric sensor. Finally this control circuit can be used in a long roadways between the roads.

FUTURE SCOPE:

Harnessing the Power of Smart Street Lights

These smart lights will help cities reduce electricity costs, lower CO2 emissions, and improve maintenance. With auto-dimming, scheduling, and a host of other capabilities, **cities could see a 50-75% reduction in energy costs via smart street lighting**.

Smart Street Lighting System is a boon for both **rural areas and even metropolitan cities for conserving power**.

Here a smart method is proposed which uses street light automation system based on IOT. In this method street lights are automatically controlled which increases energy efficiency and cost savings of things.

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

1. It can control the unnecessary use of electricity.
2. It uses low cost of electricity.
3. It can also use low amount of natural resource.
4. And last one is privacy.

References:

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- I have taken help from my mentors.

THANK YOU…