

Smart Lighting System Using Light Dependent Resistor [Ldr]

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Abstract: As there is an increase in demand of the electronic devices there is a huge hype and price increase in the electronic component sector majorly the microelectronic components. So as "Necessity is the mother of invention" we have to develop small electronic components in such a way that it will not hamper the performance of the device and also it will be cost economic i.e. less in cost. For major electronics in which the lighting system is governed by some of the specific microprocessor or a microcontroller it can be replaced by LDR's because it is not only cheaper as compared to other but also it will give the similar results as the others.

Keywords: LDR, Transistor, LED, Battery.

INTRODUCTION:

Due to the emerging technologies there is a large development in the electronics and the mechatronics sector. In this era automation has arrived and due to this the systems work on its own with a minimal amount of human interaction and also it a process of reducing the labor. In this research article it is described the process of implementation of LDR in various applications that is used in place of the conventional methods means it can be helpful in replacement of the switches so that it will control the light directly according to the natural light available in the surrounding means during dark period the resistance of the LDR decreases which triggers the transistor which will switch on the lights and during daylight all the corresponding lights will be shut down.

BILL OF MATERIALS:

These are the components that are being used in the undertaking project for the fabrication of the device:

S.NO	COMPONENT NAME	QUANTITY	COST
1.	LDR	1	20
2.	Jumper Wires	1 Set	100
3.	Soldering Iron	1	300
4.	Bc-548 Transistor	1	10
5.	Led	1	10
6.	Relay	1	80
7.	Total	-----	520

LITERATURE REVIEW:

1) LIGHT DEPENDENT RESISTOR PRODUCT SEPARATOR, BY ATHARVA DINGORE, DARSHAN SALUNKHE, HRITIK KALANTRI ON MAY, 2020

Here it has been clearly mentioned about the application of LDR and through the various case studies in a small-scale industry which is being published by this Daniel Acosta Avalos on the Research Gate in the year 2006 which is basically focused on the application of the LDR in the field of spectroscopy setups as a sensor which is using the help of the pulsed light. Here a photoacoustic spectroscopy setup was used along with the substitution of the Photoacoustic chamber by the help of light sensor being proposed. The absorption spectra of the two different liquids were then analysed. The results that were being obtained by the recommendation of LDR as their first choice by the help of the cheap homemade pulsed light spectroscopy systems. In case of another case study which was done on another similar topic that was being published by Mustafa Saad, AbdalhalimFarij, Ahamed Salah and AbdalroofAbdaljalil on the Research Gate in the year 2013 which explained about the LDR which to be used with some photoelectric sensors being used in the Automatic Street Light control system. The various application of the Sensor helps for the saving of electricity as well as reducing of human efforts.

2) DESIGN OF SOLAR OBSERVATION SYSTEM BY LIGHT DEPENDENT RESISTOR, BY MRS. V.G VIJAYA, P JAI RAJESH, ON 2017

Here it is clearly mentioned about the various parts of the sun tracking solar panel like the four LDRs, Solar panel & servo motors and ATMEGA328P microcontroller. Nearby the solar panel four light dependent resistor's arrangement was done. They help in the producing of low resistance whenever the light falls on them. The intensity of the LDR is quite high i.e., lower resistance when comparison is being done with the other varieties of servo motor that helps in rotating the panel at a certain angle. Whenever, the intensity of the light falling on the right part of LDR is more, panel movement is slowly towards the right direction and if the intensity of the LDR is more, the panel movement is slowly towards the left side. In the noon time period, Sun is ahead and the intensity. of light when focused on both the panels is of Same / equal amount. In those cases, the movement of panel is constant and there is no rotation as well. In this project the sun tracking system was developed which was based on the applications of LDR as well as ATmega328P. The ATmega328P is a circuit which is used in the system with a minimal number of components with the usage of various servo motors and LDR which helps in enabling the accurate tracking of the Sun.

COMPONENTS DESCRIPTION:

1) **LDR** (source: <https://en.wikipedia.org/wiki/Photoresistor>)

A photo resistor (also known as a light-dependent resistor, LDR, or photo-conductive cell) is a passive component that decreases resistance with respect to receiving luminosity (light) on the component's sensitive surface. The resistance of a photo resistor decreases with increase in incident light intensity; in other words, it exhibits photoconductivity. A photo resistor can be applied in light-sensitive detector circuits and light-activated and dark-activated switching circuits acting as a resistance semiconductor. In the dark, a photo resistor can have a resistance as high as several mega ohms (MΩ), while in the light, a photo resistor can have a resistance as low as a few hundred ohms.



2) **SOLDERING IRON** (source: https://en.wikipedia.org/wiki/Soldering_iron)

A soldering iron is a hand tool used in soldering. It supplies heat to melt solder so that it can flow into the joint between two work pieces. A soldering iron is composed of a heated metal tip and an insulated handle. Heating is often achieved electrically, by passing an electric current (supplied through an electrical cord or battery cables) through a resistive heating element. Cordless irons can be heated by combustion of gas stored in a small tank, often using a catalytic heater rather than a flame. Simple irons, less commonly used today than in the past, were simply a large copper bit on a handle, heated in a flame.



3) **BC-548 TRANSISTOR** (source: <https://en.wikipedia.org/wiki/BC548>)

The BC548 is a general-purpose NPN bipolar junction transistor commonly used in European and American electronic equipment. It is notably often the first type of bipolar transistor hobbyist's encounter and is often featured in designs in hobby electronics magazines where a general-purpose transistor is required. The BC548 is low in cost and widely available.



4) **RELAY** (source: <https://en.wikipedia.org/wiki/Relay>)

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

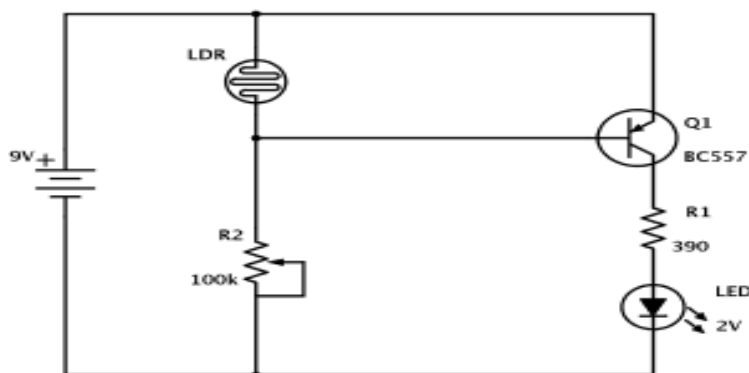


5) **LED** (source: https://en.wikipedia.org/wiki/Light-emitting_diode)

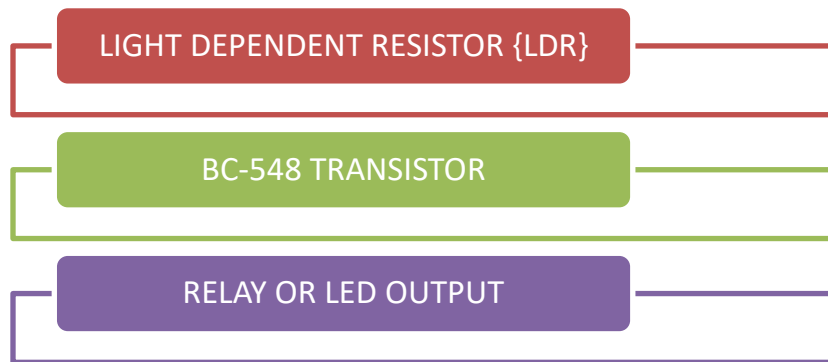
A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.^[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.



CIRCUIT DIAGRAM:



BLOCK DIAGRAM:

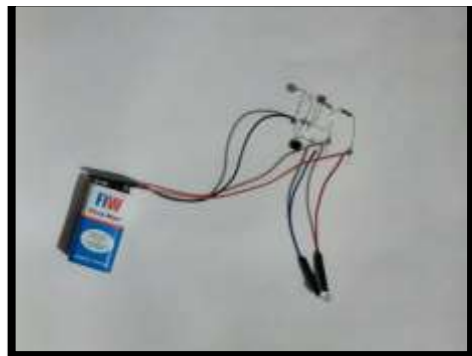


WORKING PRINCIPLE:

The working principle of these types of devices is very simple because the heart of these is a transistor which is used for amplification purpose and act as the brain. These transistors are the heart of all the modern electronic devices such as computers, smart phones etc....

In this the LDR resistance varies according to the light intensity of the surrounding and gives the value of the resulting resistance to the driving transistor and according to that the light intensity of the output light varies.

WORKING PROTOTYPE:



APPLICATIONS:

- 1) Homes
- 2) Office use
- 3) Industry applications
- 4) Stadiums
- 5) Parks

ADVANTAGES:

- 1) Saves Electricity
- 2) Reduces Global warming
- 3) Cost Effective
- 4) Economic
- 5) Eco-friendly

CONCLUSION:

These types of devices are very cost economic as well as working is similar to other devices and it can be used in various applications.

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