A

Project Based Learning Report

"AUTOMATIC STREET LIGHT CONTROL USING LDR"

submitted in the partial fulfillment of

First Year of Bachelor of Engineering

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CERTIFICATE

This is to certify that, the project based learning report entitled **"Automatic Street Light Control Using LDR"** has been successfully completed by

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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 Dependent 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.

Chapter 1
Introduction

1.1 Introduction

We need to save or conserve energy because most of the energy sources we depend on, like coal and natural gas can't be replaced. Once we use them up, they're gone forever. Saving power is very important, Instead of using the power in unnecessary times it should be switched of. In any city "STREET LIGHT" is one of the major power consuming factors. Most of the time we see street lights are controller has an LDR which issued to detect the ambient light.

Have you ever wondered how street lights automatically turn on at night and automatically off in the morning? Is anyone going to TURN ON/OFF these lights? There are a few ways to turn on street lights but the following circuit describes the Automatic Road Light Control Circuit that uses LDR perform this function automatically.

The circuit diagram here is that automatically switches on at night and then shuts off when the sun rises. In fact you can use this circuit to make any type of automatic night light. In This article you can learn How to make automatic street light controller circuit at home.

Chapter 2

Literature Survey

2.1. Literature Survey on Street light using LDR

Automatic street light controller using light dependent resistor(LDR) removes manual works. The street lights are automatically switched ON when the sunlight goes below the visible region of our eyes. It automatically switches OFF the street lights under illumination by sunlight. The component used for light sensing is a Light Dependent Resistor. By using the LDR we can operate the streetlight automatically, when ample amount of light is available the streetlight will be in the OFF state and when it is dark the light will be in ON state, it means LDR resistance is inversely proportional to light falling on it. It 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 [1].

Here two kinds of sensors will be used which are light sensor and photoelectric sensor. The light sensor will detect darkness to activate the ON/OFF switch, so the streetlights will be readyto turn on and the photoelectric sensor will detect movement to activate the streetlights. LDR, which varies according to the amount of light falling on its surface, this gives an induction for whether it is a day-night time, the photoelectric sensors are placed on the side of the road, which can be controlled by microcontroller PIC16f877A. If any object crosses the photoelectric beam, a particular light will be automatically ON.
By using this as a basic principle, the intelligent system has been designed for the perfect usage of streetlights in any place [2].
The project represents a new cost-effective solution for street light control systems. The control system consists of control circuitry, internet and electrical devices. The system also

includes the client-server mechanism where a user can directly interact with the web-based application to monitor the Streetlight of any place from a single position. The base server will run a Java Web Application which will maintain whole street light of Country/State/City. Street light controller will receive that information, and it will decode and find the particular streetlight which will set using relay circuit, the notification came it will then decode and finds the appropriate streetlight which needs to put ON/OFF using relay circuit [3].

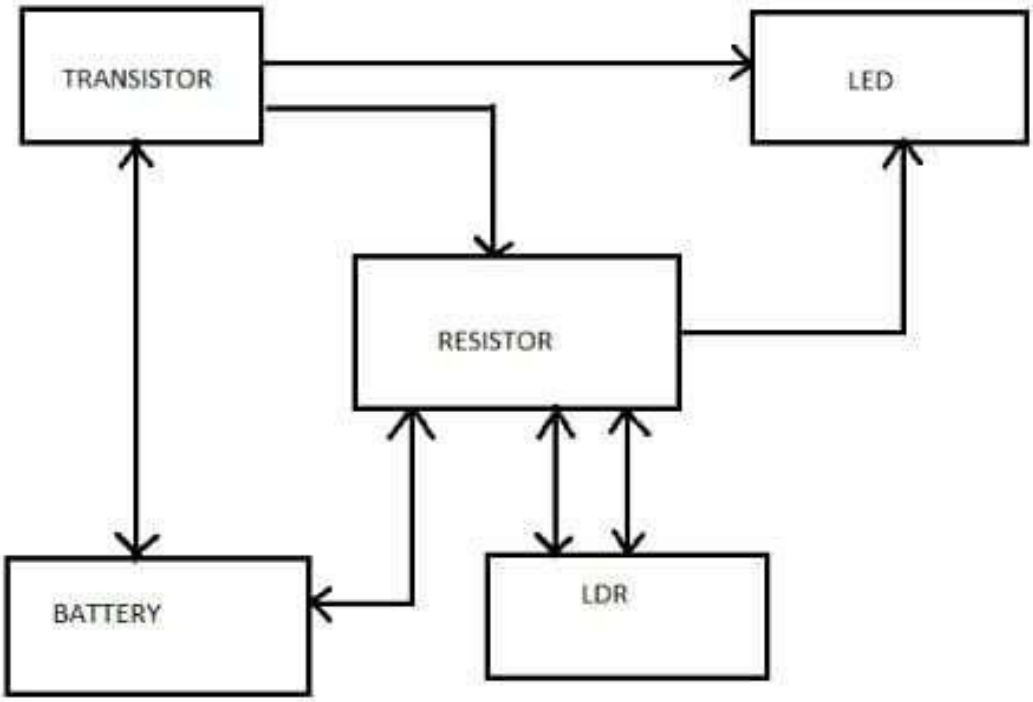
In this paper it senses the Infrared from the surrounding and check whether the lights needs to be ON or not as per the intensity value. This system will eliminate the system of manual control as the system will cause to light up when the infrared value become less than our defined value. Also, the light will automatically switch OFF when detected value of infrared become greater than the defined value. This system works in 2 forms, First, for highways Second for the Streets. For highways the lights remain OFF as long as the motion of the object is detected. If motion is detected the light will be in ON state and Glows for specific time interval. In second form the lights do not remain in OFF state, instead they remain ON but in less intensity [4].

This paper consists of a single observation station at the cloud to control the overall streetlights in a region. It is a modular system which is expandable easily. The controlling terminal observes the condition of street lights for its perfect working. The sensors are used to control the dim/bright of the street lights based on the intensity of the sunlight. The information about the sensors will be sent using the wireless network to the base station for processing data. During malfunction, the service engineer is informed through graphical user interface and corrective actions are performed [5].

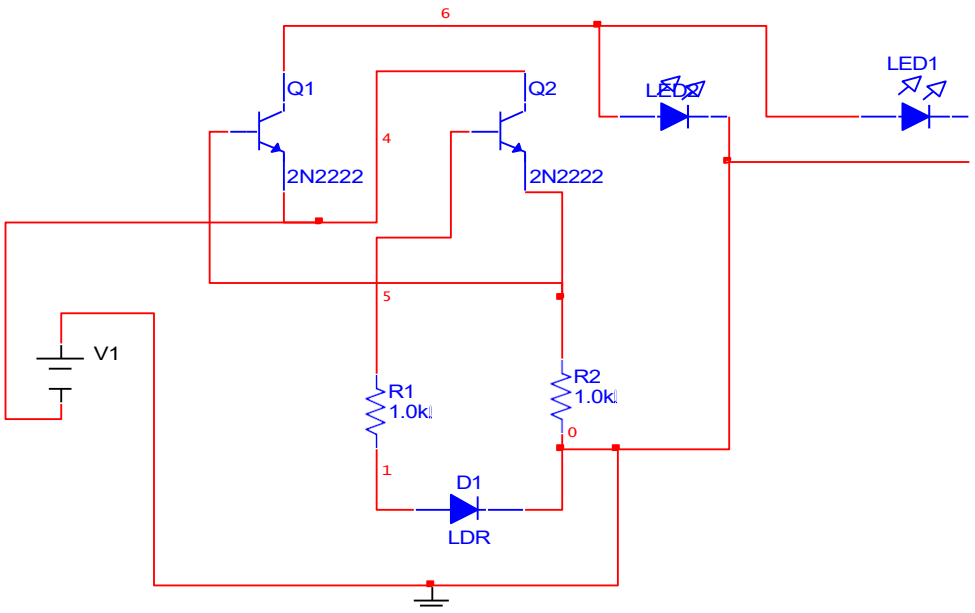
Chapter 3

Block diagram and circuit diagram

3.1. Block Diagram of Street light using LDR



3.2. Circuit diagram of Street light using LDR



When the light struck on LED, then that time Resistance of LDR is increses ,it is an property of LDR. At that time we are observed in our circuit diagram one terminal is connected to the base of 2N2222 transistor. So it will off current passing throught emitter then bulb will be in OFF condition. Vicevarsa during at night time when the darkness is increses then LDR resistance get decreses and current is enable by LDR and current flows through the LED switch ON.

Chapter 4

Component required

4.1 Component used in Street light using LDR

An automatic street light circuit must consist of LDR, transistor, resistor, battery and wires. In combination with a light-dependent resistor, transistor acts as a controller that controls the operation of the street light.

Sr No	Name Of Component	Reatting of componentes
1	LDR (Light Dependent Resistor)	-
2	Transistor	2N2222
3	Battery	9v
4 5	Resistor LED	1K 2.3v

Fig.4.1. component table

4.2 specification of component

1. LIGHT DEPENDENT RESISTOR (LDR):

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 1000000 ohms, but when they are illuminated with light resistance drops dramatically. Electronic onto sensors are the devices that alter their electrical characteristics, in the presences of visible or invisible light. The best-known devices of this type are the light dependent resistor (LDR), the photo diode and the phototransistors.

Light dependent resistor as the name suggests depends on light for the variation of resistance.

- LDR are made by depositing a film of cadmium sulphide or cadmium selenide on a substrate of ceramic containing no or very few free electrons when not illuminated. The longer the strip the more the value of resistance.
- When light falls on the strip, the resistance decreases. In the absence of light the resistance can be in the order of 10K ohm to 15K ohm and is called the dark resistance.

The below figure shoes that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it is shown in figure.

Fig.4.2. LDR

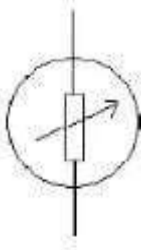


fig.4.3. Symbol of LED

The basic construction and symbol for LDR are shown in above figures respectively. The device consists of a pair of metal film contacts separated by a snakelike track of cadmium sulphide film, designed to provide the maximum possible contact area with the two metal films. The structure is housed in a clear plastic or resin case, to provide free access to external light. Practical LDRs are available in variety of sizes and packages styles, the most popular size having a face diameter of roughly 1Omm. practical LDR is shown in below figure.

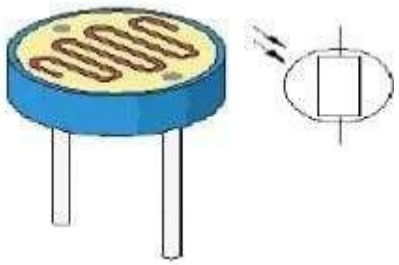


Fig.4.4. Schematic Diagram of LDR

2. TRANSISTORS 2N2222:

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. 2N2222 is mainly used for amplification and switching purposes. It has a maximum current gain of 800. Its equivalent transister 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. 2N22 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.

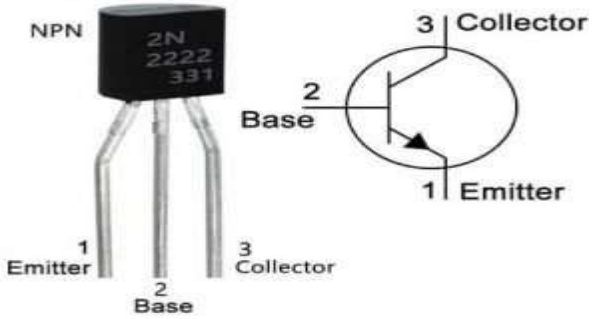


Fig.4.5.Transistor 2N2222

3. RESISTORS

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: 2). If we make an analogy to water flow through pipes, the resistor is a thin pipe that reduces the water flow.

Fig.4.6.Resistor

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.

Fig.4.7.LED

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 of the controlled value is held nearly

Chapter 5

Working

5.1 Working of street light using LDR

The circuit uses a Light Depended Resistor (LDR) to sense the light . When there is light the resistance of LDR will be low. So the voltage drop across the Resistor R2 will be high. This keeps the transistor Q2(2N2222) OFF. The collector of Q2 is coupled to base of Transistor Q1(2N2222). So Q1 will be OFF and so do the LED will remain OFF.

When night falls the resistance of LDR increases voltage drop across the Resistor R2 will be Low and Resistor R2 gives the voltage to Transistor Q2's Base and Transistor will on. This makes transistor Q2 ON which in turn makes Q1 ON. The LED's will glow Automatic Street Light .

5.2 Characteristics of LDR

LDR's are light dependent devices whose resistance is decreased when light falls on them and that 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 10"2 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.

5.3 Applications of LDR

Lighting switch

The most obvious application for an LDR is to automatically turn on a light at a certain light level. An example of this could be a street light or a garden light.

Camera shutter control

LDRs can be used to control the shutter speed on a camera. The LDR would be used to measure the light intensity which then adjusts the camera shutter speed to the appropriate level.

- Used in street light applications.
- Used in Domestic applications.

Chapter 6

Advantages and Disadvantages

6.1 Advantages of street light using LDR

- Less consumption of electrical energy
- Simple construction
- Efficient Method
- Cheap and Economical
- Less Maintenance

6.2 Disadvantages of street light using LDR :

- Can be more intricate to align detector pairs.
- Is sensitive to ambient light and require careful shielding .
- It causes light pollution.

6.3 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 night lamp of the room. This is also used for the signals.

Chapter 7

Conclusion

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 The Streetlight controller using LDR based Light intensity && traffic density, in the todays up growing countries will be 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. Further more 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 them.

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