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Design of Street Light Controller using NPN Transistor and Light Dependent Resistor

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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.

KEYWORDS: Streetlight, Energy, Light, Dependent Resistor.

I. INTRODUCTION

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 Dependent Resistor which senses the light actually like our eyes. 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. It is a dark detector circuit based on LDR and a transistor (BC-547 NPN) which automatically switches ON and OFF the street light system [5]. It automatically switches ON street lights when the sunlight goes below the visible region of our eyes.

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 [6]. 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.

II. SPECIFICATIONS OF THE COMPONENTS

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 [1, 2].

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. When the light level is low the resistance of the LDR is high [3, 4]. This prevents current from flowing to the base of the transistors. Consequently the LED does not light.

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 purposes. It has a maximum current gain of 800. Its equivalent transistor. The transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves. This is known as the

biasing. 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.

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.

A power supply is a device that supplies electric power to an electrical load. A regulated power supply is one that controls the output voltage or current to a specific value.

III. RELATED WORK

Whenever light falls on the LDR (Light Dependent resistor), the LED is OFF and the LED does not glow. In the dark, the LED is ON. The Block diagram of the design is as shown in Fig1[1]. The streetlight control system operates on 6-12 V DC supply.

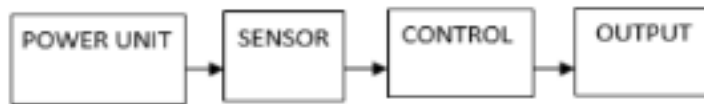


Fig 1: Block diagram of the design

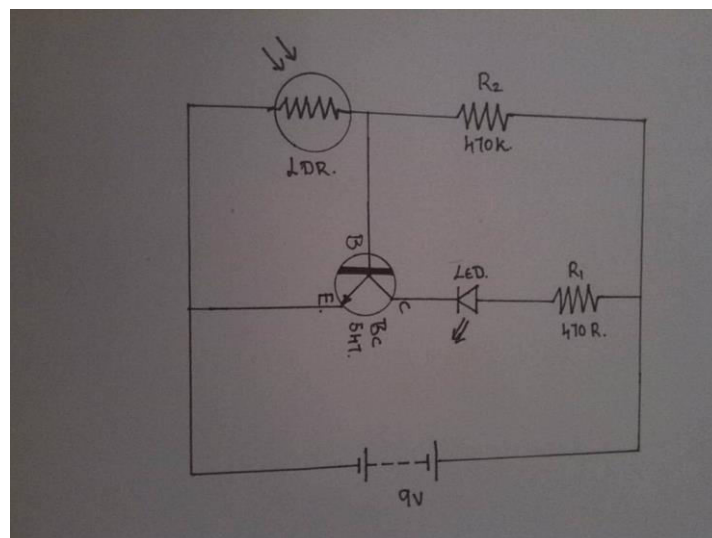
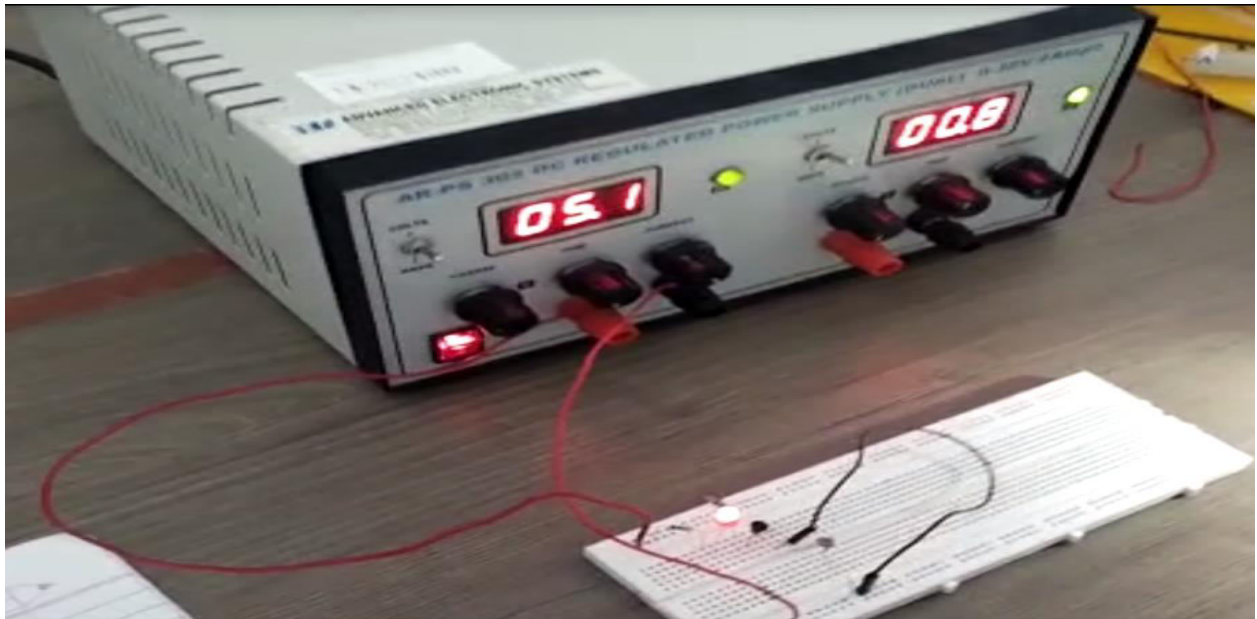
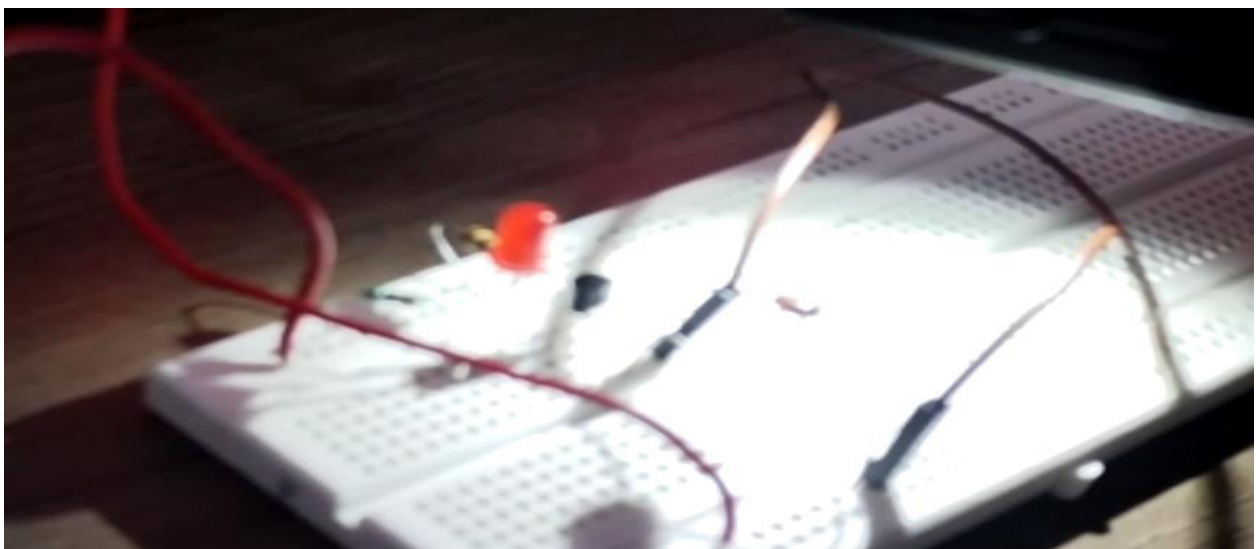


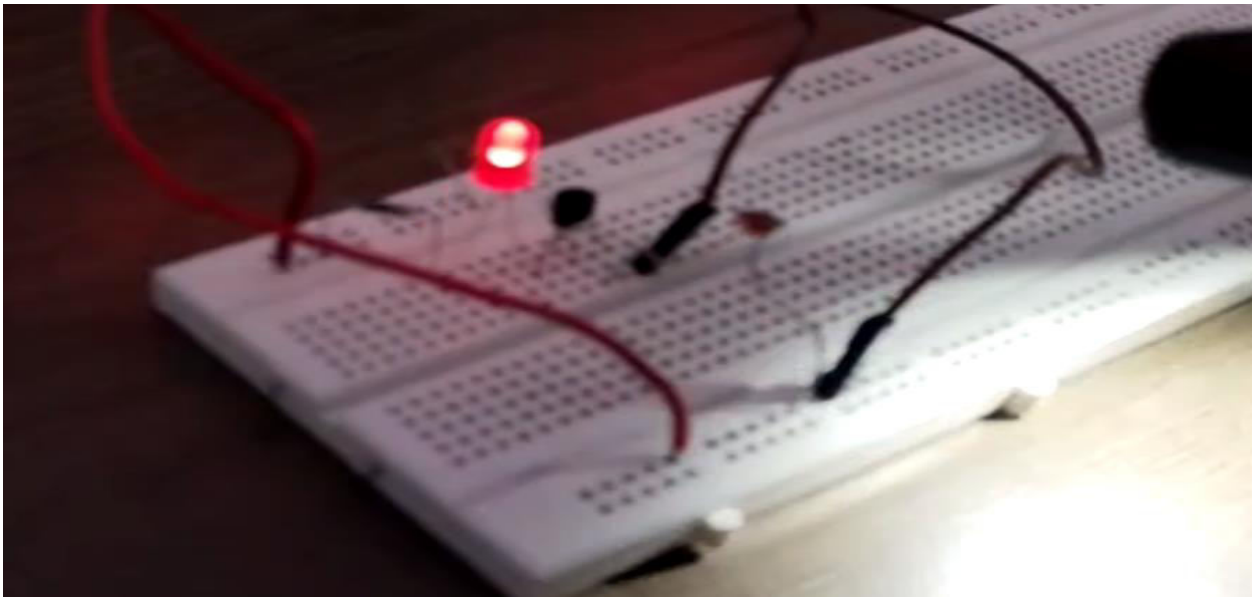
Fig 2: Circuit diagram of Street Light Control

Fig 2 shows diagram of Street Light Control circuit in which 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 LED. The following are the screen shots of the work carried out [7,8].



The 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. As we know property of LDR that during the time of day resistance is low. Hence the output is low, so the transistor goes into the cut off state which means LED or bulb will not glow. During the time of night resistance is high and LED or bulb glows.





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

REFERENCES

1. Komal, J; Apeksha, M; Shrraddha, R; Payal, S; Arya, C S (2017). Automatic Street light Control System: Imperial Journal of Interdisciplinary Research (IJIR) 3, pp1362-2454
2. Komal, J; Apeksha, M; Shrraddha, R; Payal, S; Arya, C S (2017). Automatic Street light Control System: Imperial Journal of Interdisciplinary Research (IJIR) 3, pp1362-2454
3. Komal, J; Apeksha, M; Shrraddha, R; Payal, S; Arya, C S (2017). Automatic Street light Control System: Imperial Journal of Interdisciplinary Research (IJIR) 3, pp1362-2454
4. Mohelnikova, J (2008). Electric Energy Savings and Light Guides, Energy & Environment: 3rd IASME/WSEAS International Conference on, Cambridge, UK, pp.470-474.
5. Rajput KY, Khatav G, Pujari M, Yadav P. Intelligent street lighting system using GSM. International Journal of Engineering Science Invention. 2013; 2(3):60-69.
6. Innocent A. Design and Construction of an Automatic Streetlight Controller, <https://hiclassproject.com/design-and-construction-of-an-automaticstreet-light-controller2.html>; 2019 [accessed 13 October 2019].
7. Akaeze A. Lagos blind streetlight, <https://jigc.media/stories/tech/lagos-blind-street-lights/>; 2018 [Accessed 14 November 2019].
8. Uthman S. Design and Construction of an Automatic Street Lighting with Fault Detection Unit, <https://www.myschooltrick.com/2016/04/design-and-construction-of-automatic.html>; 2017 [Accessed 16 October 2019].
9. Chaitanya BK, Suresh R, Kaushik ASK, Mahesh M, Kala C, Kumar KR, et al. Automation of streetlights using Arduino & NI Lab View. In 2015 IEEE UP Section Conference on Electrical Computer and Electronics (UPCON), 2015, (1-3).
10. Kadirova SY, Kajtsanov DI. A real time street lighting control system. In 2017 15th International Conference on Electrical Machines, Drives and Power Systems (ELMA), 2017, pp.174-178.
11. Komal, J; Apeksha, M; Shrraddha, R; Payal, S; Arya, C S (2017). Automatic Street light Control System: Imperial Journal of Interdisciplinary Research (IJIR) 3, pp1362-2454.



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