

SMART LIGHTING SYSTEM FOR REDUCES THE ENERGY CONSUMPTION

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Abstract- Advanced light scape controlling 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 light 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 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 streetlights are not switched off even when the sunlight comes and switched on earlier before sunset. In this project, there is no need for manual operation like ON time and OFF time setting. This project clearly demonstrates the working of transistors in saturation region and cut-off region. The working of relay is also known.

Keywords: Energy conservation, High intensity light, Low intensity light, Light emitting diode, Pulse width modulation.

1. INTRODUCTION

Streetlight controllers are smarter versions of the mechanical or electronic timers previously used for streetlight ON-OFF operation. They come with energy conservation options like twilight saving, staggering or dimming. Also, many streets 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. The Automatic Street Light Control System is a simple and powerful concept, which uses a transistor as a switch to switch ON and OFF the streetlight automatically. By using this system manual work is removed. It automatically switches ON light 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 (LDR) which senses the light like our eyes by using this system energy consumption is also reduced because now-a-days the manually operated streetlights are not switched off properly even the sunlight comes and not switched on earlier before sunset. In sunny and rainy days, ON time and OFF time differ significantly which is one of the major disadvantages 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 streetlight, lamppost, streetlamp, 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 streetlights 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 a need for light or not. When darkness rises to a certain value.

2. 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.

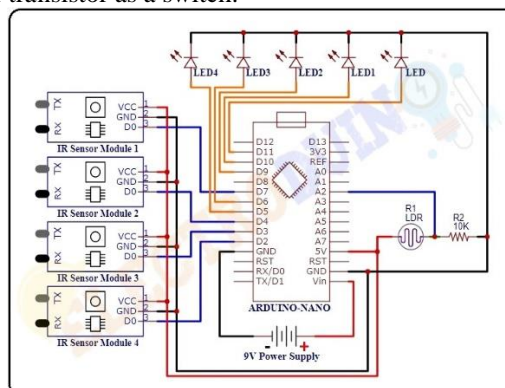


Fig. 2.1 Circuit diagram of Automatic Streetlight Control System

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 LEDs 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.

3. LITERATURE SURVEY AND BACKGROUND STUDY

Some authors mentioned the use of LED DC Road lights as opposed to conventional AC lights in view of their longer lifespan, higher effectiveness, lower support costs and mercury free, thus eco-friendly. Some others suggested that changing lights with LED will save 50% energy from the streetlights. To control and manage the streetlights several new technologies are being developed as of what many research endeavors in the writing talk about. Tang, Hengyu [1] proposed a control core framework based on AT89S52 which controls streetlights. This framework combines the various technologies of LCD, digital clock and a timer, photosensitive induction etc. When vehicles cross by to conserve electricity the lights will turn on and vice versa. With this technology a large amount of power can be saved. To get the details of spoiled light and its information an auto-alarm function is used in this framework. Sudan, Shiliang [2] came up with a system with wireless sensor networks framework to observe the progress. Based on latitude and longitude information the system is adjusted. Using sunset and sunrise procedures and the information of light intensity the system controls the streetlights being kept in automatic programming mode. The system in addition makes use of digital temperature humidity sensor to humidity, real time and temperature of streetlights. Priyashree and Radhi [3] nominated control arrangement for a LED road lighting framework. The proposed control organization empowers disconnection of the road lighting framework from the mains amid pinnacle load time, lessening its effect in the distributed power framework natural utilization, decline the administration cost and screen the status data of every road lighting unit. A.C. Kalaiarasan [4] volunteered a solar powered vitality-based road light with auto-following framework for augmenting power yield from a solar system that is desirable to increase efficiency. To expand the power yielded from the sun light-based boards, one needs to keep boards lined up with the sun. By utilizing this approach, we can gain the maximum utilization from sun rays. This is a far more financially savvy arrangement than buying extra solar panels. Budlike. E.S. Lothar [5] invented a lightening control system consisting of modules like ballast control module, data processing module. The data processing module relates to the number of repeaters. The connections between data processing module, ballast module, repeaters and computer system through wireless connection comprises of a local area network. This system is developed to give the benefits of operating and controlling light intensity, automatic running of streetlights and scheduling through web browser. S.H. Jeong [6] set forth the development of the Control System for streetlights using the Zigbee communication system. This system is presented to reduce the difficulties in maintenance of the lighting systems as well as to decrease the uneasiness of handling the same. This is monitoring and control system of street lights which makes use of system's control command to make the street lights on and off automatically. Rajput and katav [7] propounded an intelligent street lighting system to lessen the large amounts of power wasted in street lightening system. This system makes use of different kind of sensors like CO² sensor, noise sensor, light intensity sensor etc. To receive and send data between concentrator and system GSM modules are utilized. Somchai Hiranvarodom [8] describes a similar analysis of photovoltaic (PV) road lighting framework in three distinct lights.

4. METHODOLOGY

When the IR sensor detects the vehicle moment on the road it sends the signal to the microcontroller where the microcontroller turnsheet streetlight. If the vehicle detection was not there then the streetlights still glows but glows with only ¼ intensity of light. If the moment of vehicle was detected, then the street light glows with 100% intensity. The proposed method was depicted in fig. 3. The IR transmitter is put straightforwardly in a viewable way with IR sensor, so the IR receiver persistently gets infrared beams. When the IR collector gets infrared beams, the microcontroller will detect Logic 1. If the infrared beams are hindered by certain means the microcontroller will identify logic 0. Thus, the program for the microcontroller must be written so that it will turn ON the LEDs, which implies here the road light, when it identifies Logic 0 and it will turn off the LEDs, when it recognizes Logic 1. Consider the two IR sensors, for example IR Transmitter and IR Receiver, which are set on either side of the street. According to the circuit graph, the IR collectors are associated with the PORT0, and the LEDs are associated with the PORT2 of the microcontroller.

At beginning, when there is no object, the IR recipient continuously identifies IR light transmitted by the IR Transmitter. At the point when a vehicle or some other vehicle hinders any of the IR sensor, the microcontroller will turn ON the immediate three LEDs. If the vehicle hinders the primary IR sensor, the initial three LEDs are turned ON by the microcontroller. As the vehicle pushes ahead and obstructs the second IR sensor, the comparing next three LEDs will be turned ON and the principal LED of the past set is killed. The procedure proceeds with along these lines for all the IR Sensors and LEDs. The following fig.4 shows the circuit for proposed methodology.

This paper explains the design and improvement of Smart Street lighting control system circuit. Circuit meets desires suitably to turn streetlight ON/OFF. In the wake of designing the circuit which controls the light of the street as outlined in previously sections. LDR sensor and the item sensors are the two basic conditions in satisfying the desires of the circuit. In case the two conditions have been satisfied the circuit will do the needed work as demonstrated by the specific framework. Each sensor controls the killing ON or the lighting section. The streetlights have been successfully constrained by Microcontroller. With requests from the controller, the lights will be ON in the spots of the developments. Other than the drawback of the street light system using clock controller has been succeeded, where the system depends on upon photoelectric sensor. Finally, this control circuit can be used as a piece of a long roadway between the urban zones just as the provincial zones. The endeavor indicates were diminish the responses of the present road lighting structure and find a response for power misfortune. In this endeavor, the main activity is to set up the data sources and yields of the structure to control the lights of the road. The model demonstrations of course will end up being uncommonly profitable and will fulfill all the present restrictions whenever completed on an immense scale.

CONCLUSION

This paper explains the design and improvement of Smart Street lighting control system circuit. Circuit meets desires suitably to turn streetlight ON/OFF. In the wake of designing the circuit which controls the light of the street as outlined in previously sections. LDR sensor and the item sensors are the two basic conditions in satisfying the desires of the circuit. In case the two conditions have been satisfied the circuit will do the needed work as demonstrated by the specific framework. Each sensor controls the killing ON or the lighting section. The streetlights have been successfully constrained by Microcontroller. With requests from the controller, the lights will be ON in the spots of the developments. Other than the drawback of the street light system using clock controller has been succeeded, where the system depends on upon photoelectric sensor. Finally, this control circuit can be used as a piece of a long roadway between the urban zones just as the provincial zones. The endeavor indicates were diminish the responses of the present road lighting structure and find a response for power misfortune. In this endeavor, the main activity is to set up the data sources and yields of the structure to control the lights of the road. The model demonstrations of course will end up being uncommonly profitable and will fulfill all the present restrictions whenever completed on an immense scale.

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