Street Light that Glows on Detecting Vehicle Movement

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Abstract - This project employs a solar panel mounted to a time-programmed stepper motor to track the sun so that maximum sun light is made incident upon the panel at any given time of the day. This is better compared to the light sensing method that may not be accurate always – for example, during cloudy days. With the impending scarcity of non-renewable resources, people are considering to use alternate sources of energy. Barring all the other available resources, the solar energy is the most abundant and it is comparatively easy to convert into electrical energy. The usage of solar panel to convert Sun energy into electrical energy is very popular, but due to the transition of sun from east to west, the fixed solar panel may not be able to generate optimum energy. The proposed system solves this problem by an arrangement for the solar panel to track the Sun. This tracking movement is achieved by coupling a stepper motor to the solar panel such that the panel maintains its face always perpendicular to the sun to generate maximum energy. This is achieved by using a programmed microcontroller to deliver stepped pulses in periodical time intervals for 12 hours for the stepper motor to rotate the mounted panel in one direction and then return to the start point for next day light as desired. The Arduino controller used in this project is from the Arduino family. The Stepper motor is driven by an interfacing IC as the controller is not capable of handling the power requirements of the stepper motor. Furthermore, this project can be enhanced by using an RTC (Real Time Clock) to follow the sun. This helps in maintaining the required position of the panel even if the power is interrupted for some time.

Keywords - Microcontroller, Sensor, Street Light

I. INTRODUCTION

Nowadays, street lighting systems in industries or cities are growing rapidly. The important considerations in the field of different technologies like electrical and electronics are cost effective, automation and power consumption. There are different street lighting systems are developed to maintain and control the lighting systems. These lighting systems are used to control and decrease energy consumption. This article illustrates the street light that glows on detecting vehicle movement. Street light controlling is one of the most developing systems in India to conserve the energy.

Generally, street light controlling system is a simple concept which uses a transistor to turn ON in the night time and turn OFF during the day time. The entire process can be done by a using a sensor namely LDR (light dependent resistor). Nowadays conserving the energy is an essential part and day by day energy resources are getting decreased. So our next generations may face a lot of problems due to this lack of resources. This system doesn't need a manual operation to turn ON/OFF the street lights. The street light system detects whether there is need of light or not.

II. COMPONENTS AND METHODS

- Servo Motor (sg90)
- Solar panel
- Arduino Uno
- LDR's X 2 (Light Dependent Resistor)
- 10K resistors X 2
- Battery (6 to 12V)

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo

will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.

IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:

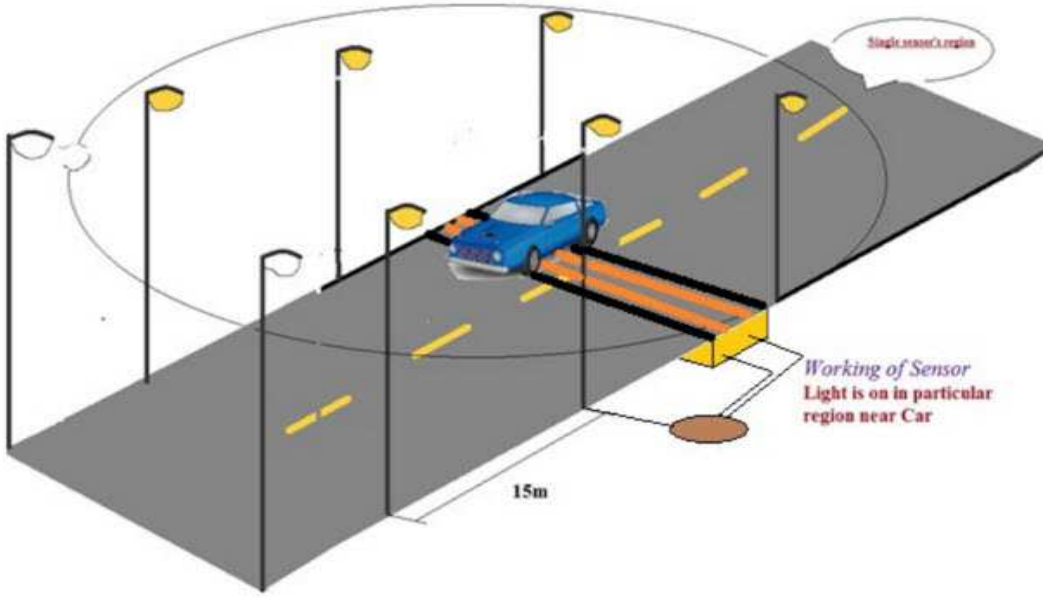

Fig.1 Street Light that Glows on Detecting Vehicle Movement Circuit

The working principle of this circuit is, when light falls on the light dependent resistor, then its resistance will be decreased, which results in an increase of the voltage at pin2 of the 555 IC. This 555 IC is inbuilt with a comparator, which associates between the i/p voltage from pin2 of the IC and 1/3rd of the power supply voltage. When i/p falls below 1/3rd then o/p is fixed to high otherwise it is fixed to the lower.

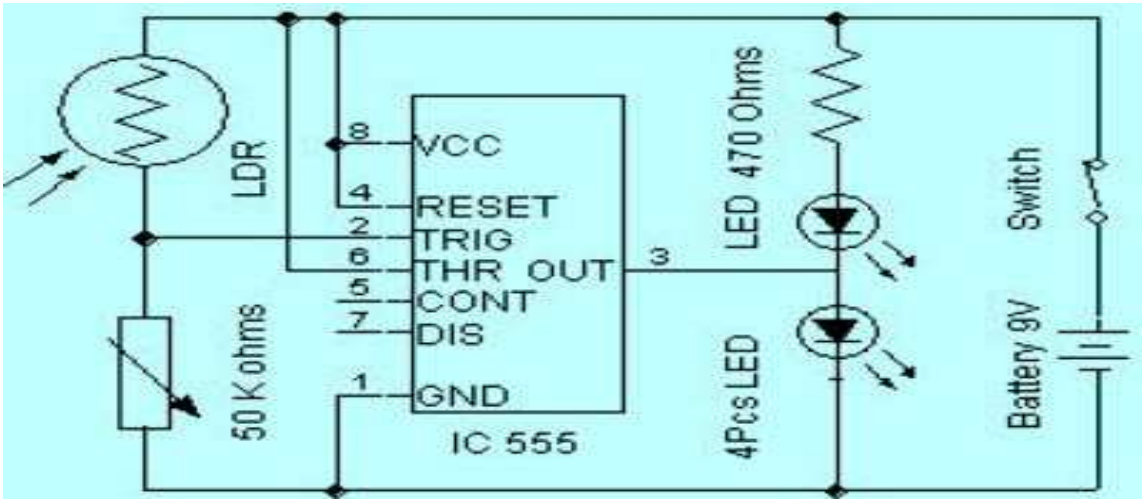

Fig. 2. Street Light that Glows on Detecting Vehicle Circuit

The proposed circuit is built with ATmega microcontroller, DS1307 IC, LDR, LCD, PIR sensor, Array of LED. This circuit is very useful in our day to day life like highways, real time street lights, the parking areas, restaurants and hotels.

V. CONCLUSION

In Proposed system is power saving mechanism for street lights by using LED lamps as replacement of normal lamps and using special power savings mechanism for microcontroller. It turns out most reliable and time efficient way to switch ON/OFF streetlights. It provides an effective measure to save energy by preventing unnecessary wastage of electricity, caused due to manual switching or lighting of street-lights when it is not required..

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