

Motion Control Solar LED Street Light

Priyanshu Agarwal¹ Prafful Garg² Nitish Sharma³ Anchal Tyagi⁴

^{1,2,3,4}Department of Electronics and Communication Engineering

^{1,2,3,4}ABES Institute of Technology, India

Abstract— The street light in the areas having low traffic at times remains on throughout the night even if there is no vehicles present. this causes high light energy loss and makes the lamps or led less durable. The idea behind this whole project is to reduce the wastage of the light power by using the street light at high intensity only when any object is detected in the range of the street light otherwise street light would glow at low intensity. Solar panels are used to produce the light and sensors like LDR (light dependent resistance), IR(infrared) are used to regulate the light intensity. The proposed system uses LEDs instead of other lamps.

Keywords: Solar LED, Street Light

I. INTRODUCTION

Street lights play a vital role in our environment and also plays a critical role in providing light for safety during night-time travel. In this scenario, when the street lights are in working functionality over the whole night that consumes a lot of energy and reduces the lifetime of the electrical equipment such as electric bulb etc. cities' streetlights, it is a severe power consuming factor and also the most significant. In this regard, an intelligent lighting control system can decrease street lighting costs up to 70% and increase the durability of the equipment. The traditional lighting system has been limited to two options ON and OFF only, and it is not efficient because this kind of operations meant power loss due to continuing working on maximum voltage. Hence, wastage of power from street lights is one of the noticeable power losses, The streets lights which are commonly used in our country are solar day/night detecting street light which uses solar panels for energy production and LDR sensors for regulation of light in day and night.

In this regard, controlling MOTION CONTROL SOLAR LED STREET LIGHT using Light Dependent Resistor (LDR) , IR obstacle detector sensor ,Arduino and solar panels together is a very promising method. Arduino is programmed in such a way that the intensity of the LED becomes 40% when no object is detected by the PIR sensors at night and when the object is detected by the IR sensors then the intensity of LED becomes 100%.

A part from that, the advantages of LED are likely to replace the traditional street lamps such as the incandescent lamp, fluorescent lamp and High Pressure. Sodium Lamp in future but LED technology is an extremely difficult process that requires a combination of advanced production lines, top quality materials and high-precision manufacturing process.

II. PROBLEM STATEMENT:

Statement [1]: Street lights are on in the presence of sun light.

Statement [2]: Street lights are on in the absence of any vehicle and pedestrian.

Disadvantages of Classical Street Light:

- These street lights need a manual switching operation
- It also needs man power.
- These street lights are unnecessarily glowing with its full intensity in the absence of any activities in the street.
- High power consumption and waste of energy.
- Less reliable.
- Manual hectic operation due to change in season and climate.
- To face the various problem mentioned above in the conventional lighting system we need a lighting system that is well equipped with recent inventions and technology.

As it is well known to everyone is that the natural sources to generate power is limited and we are wasting so much of energy meaninglessly. So if we can use automation in this particular case so that all the street lights can be switch on and off automatically when it is really necessary. And if we can use controller circuits to implement a model so that all the street lights can only glow with its maximum intensity when there is activity in its region otherwise it should glow at a minimum given intensity. So that we can save a huge amount of power. With the inventions of light emitting diodes which has a small amount of power consumptions and high efficiency; we should use light emitting diodes instead of all classical fuse bulbs. With the help of all these sensor available in the market; we should have 100% control over the street for the safety and security of lives in the streets along with a flexible transportation system.

III. METHODOLOGY

The Project is working properly in terms of Hardware as well as Software. Due to Motion Control which is IR Sensor we can detect the motion of the objects. On Day time, Through LDR Sensor it detect the light & through the help of Arduino micro controller & its program LED gets OFF. On Night time, LDR detect no light & through the help of Arduino micro controller & its program LED gets ON but its intensity varies according to the output of the IR sensor. When IR sensor detect No Motion of the object then by the help of Arduino the Intensity of the LED gets down upto 60% i.e, the output of the LED is 40%. which is very efficient when there is no motion of the objects. When IR sensor detect Motion of the object then by the help of Arduino the Intensity of the LED gets full i.e, the output of the LED is 100%.

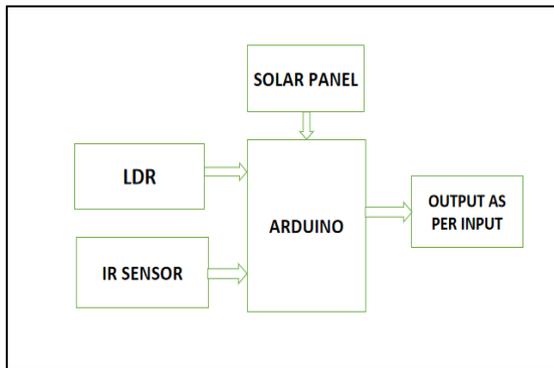


Fig.1 (Block diagram of motion control solar LED light)

Arduino project provides an integrated development environment (IDE) based on the Processing language project. We use LM 358 as a comparator. Lm 358 is a dual op-amp inside but we use one side of op-amp for setting a reference voltage we use variable resistor (preset) with comparator. With the help of this variable resistor we set the setting of infra red detection range. The LM 358 op-amp work as a comparator to sense the interruption from any object. When robot moves towards forward then infra red beam is reflected from the surface and reverse back to the photodiode. Photodiode is connected through the resistor in series. When photodiode sense a reflected light from the infra red then photodiode resistance.

For camera switching we use opto coupler with transistor circuit. When signal from the controller is on then camera output is also on and at this time connected LED is on. The circuit is quite self-explanatory. The LM358 Op-Amp is used in the comparator mode. The IR is used in a potential divider in a reverse bias mode. A threshold voltage is set at the inverting terminal of the Op-Amp using a potentiometer. So when the Infra Red light reflects from a HEATER surface, the resistance of the photodiode would decrease and this in turn when exceeds the threshold voltage will make the output of the Op-Amp go high. Output at pin 7 of comparator saturates transistor BC548 NPN which in turn switch on the has two Op-Amps in its 8 pin package, thus two IR sensors could be built out of IIC become change and current flowing through the photodiode is also change. This change of voltage is compare in the comparator and connected to the microcontroller.

IV. CONCLUSIONS

By using Motion Control Smart Street light, one can save surplus amount of energy which is done by replacing sodium vapor lamps by LED and adding an additional feature for security purposes. It prevents unnecessary wastage of electricity, caused due to manual switching of streetlights when it's not required. It provides an efficient and smart automatic streetlight control system with the help of IR sensors. It can reduce the energy consumption and maintains the cost. The system is versatile, extendable and totally adjustable to user needs.

- The system is now used only for one way traffic in highways.
- Continuous use of LDR and IR sensors even in day time.
- Not switched on before the sunset.

- No manual switching required anymore i.e, Fully Automatic.

The Motion Control Smart light system can be further extended to make the current system in two-way traffic, making the system more flexible in case of rainy days and introduction of ways to control the lights through GSM based service

REFERENCES

- [1] W. Guijuan, W. Zuoxun, Z.Yingchun, et al; "a new intelligent control terminal of solar street light" ; 2011 fourth international conference on intelligent computation technology and automation ; shenzhen, guangdong, china; 28-29 march 2011
- [2] "Smart Street lamp light up when you're near - cnn.com"; edition.cnn.com ; 2015-12-24
- [3] "Intelligent outdoor lighting control system patent - justia patents database". Patents.Justia.com. 2015-12-24