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Design and Construction of Solar PV LEDs Lighting System

Satyendra Kumar Mahto[1], Neha Tiwari[2]

[1]M. Tech (Dual Degree) Electrical +Energy Engineering, Suresh Gyan Vihar University, Jaipur-302025, Rajasthan, India

[2]Suresh Gyan Vihar University, Jaipur-302025, Rajasthan, India

Abstract: ***Increasing the energy demand from Asian countries and increasing the consumption of energy due to lighting for industrial, commercial, residential and street lighting system etc than solar PV LEDs Street lighting system and solar LEDs lighting for other purpose is best choice to use it and it can reduce power consumption because it does not take more power and it is free and it save more energy.In this paper the design and construction of solar PV LEDs lighting system are presented the solar PV LEDs lighting system is better than other lighting sources because we can be used this system for home appliance, residential and commercial process with some switching devises and with some controlling equipment, the power performance of this system is good because it does not take more power compared to other lighting equipment and solar PV LEDs street lighting system are better than the other lighting sources because it is automatically ON/OFF due to some switching and electronics equipment in the nights with movements of any objects on the roads so, it does not take more power than other conventional street lighting system.***

Keywords: solar PV module, LEDs lighting, IR sensor, Microcontroller, other electronic equipment etc.

1. Introduction

Recently mass production of electricity and generation of electricity is increasing by solar photovoltaic system due to first one is it does not produce any pollution like CO_2,CO,HC,NO2 etc and second one is it does not require fossil fuels. The most important of solar photovoltaic module and system, it is renewable energy .the solar photovoltaic cell or module is directly converted sun's radiation into electrical energy and the conversion process of solar photovoltaic cell or module depends upon photovoltaic effect. the efficiency of solar photovoltaic system depends upon its materials like mono crystalline, poly crystalline, amorphous solar cell materials and the efficiency of mono crystalline silicon solar cell laboratory about 24% and commercial mono crystalline silicon solar cell has the efficiency 15%, the efficiency of polycrystalline silicon solar cell has 12% and the efficiency of the amorphous solar cell has 5%.

The most important aim of this investigate is to analyze the cost and effectiveness of a PV LED lighting system. This study also aims to appreciate PV LED lighting systems enhanced through design and manufacture estimation. One more important goal of this research is to recognize the compensation and boundaries of photovoltaic DC systems. Solid state lighting equipment has been one of the greatest rising lighting sources in the recent LEDs lighting markets. The forecast is that building operators, occupants and owners are gradually more conscious of these new equipment within the subsequently ten years LEDs will increase attractiveness within the lighting manufacturing for universal lighting applications. With the help of green building and the LEDs ranking system for building receiving fashionable and the requirements for enhanced energy efficient lighting source, which is money-making and that which insert to the aesthetics of the breathing space is growing. Individual of the most important challenge to light emitting diodes (LEDs) and however, has to keep up with the rate of this forever growing equipment. Everything connected to this equipment that was established an only some years ago and has now befall outmoded. With researcher and scientist running in the direction of in enhanced and improving this technology and that is not extensive waiting we make out a superior and new cost-effective markets utilize LEDs for marketable applications. LEDs are multipart of semiconductor a device that converts electricity into lights. A number of the main compensation of LED's are that they most recent an extremely extensive time when compared to their normally used counterpart and the HID light sources or even the fluorescent lamp and incandescent lamp the light outputs of LED's though, degrade more time and hence reduce the helpful life span of LED's. It is also supposed that even though the lumens for each watt of an LEDs might be superior for the flake itself, but when it is every one packaged in somebody's company as a luminary and lumens for each watt can reduce due to high temperature increase. In several case that the extensive lifetime of a LEDs luminary; contribute to very little maintenance more than an extensive interlude of time. Therefore, abbreviation some of the solution features in utilize LEDs are; a extensive duration, exceptionally slight maintenance, low energy consumption and that they effort fine in an outer surface atmosphere since LEDs can work fine during colder temperatures. Abridgment several of the majority common disadvantage of using LEDs in most widespread application are high initial costs, underprivileged paint representation and low lumens/watts (efficiency) for white LEDs and that they obtain extremely warm. Therefore a high-quality heat go under is a necessary module of LEDs luminaries. LEDs are regularly recognized to activate fine in colder temperature. The most important cause of LEDs lumen downgrading is the heat generated at the LED's joint. Not including sufficient heat reducing or exposure to air, the piece of equipment hotness will increase consequential in inferior light amount produced and dreadful conditions of its piece over its existence. Therefore, a high temperature go

under that helps disperse temperature off the LED is an imperative characteristic of the LEDs luminaries.

2. Objective

The main objectives of this paper is described in below

- To recognize the performance during design and construction of a solar PV
- LEDs lighting system
- To recognize the performance and output solar PV LEDs lighting system with PWM technology
- To recognize the overall cost involved with solar PV module LEDs lighting system or
- Design and construction
- To learning about the payback of a solar PV LEDs street lighting system against a predictable Grid LEDs street lighting system

3. How Does System

We have made this system with solar street lighting system for road with automatically by microcontroller and solar LED lighting system for home with manually. In this home appliance LEDs lighting system can be controlled intensity by manually. Because, we know that in the night; higher power losses in the street lights today so this solar LEDs lighting system can be controlled the these power losses with the controlling some equipment like microcontroller, IR sensors for ON/OFF street lights system due to movements of any objects on the roads in night time because we can set the timing of only for night automatically with real time clocker. In this street lights system we have used light emitting diodes (LEDs) because it takes less power not more than other lighting source. These street lights are glowing and taking power from solar PV system with battery bank and we have also used solar PV system for the charging of battery and it is a renewable energy sources and it does not produce any pollution and the block diagram of this system shown in below.

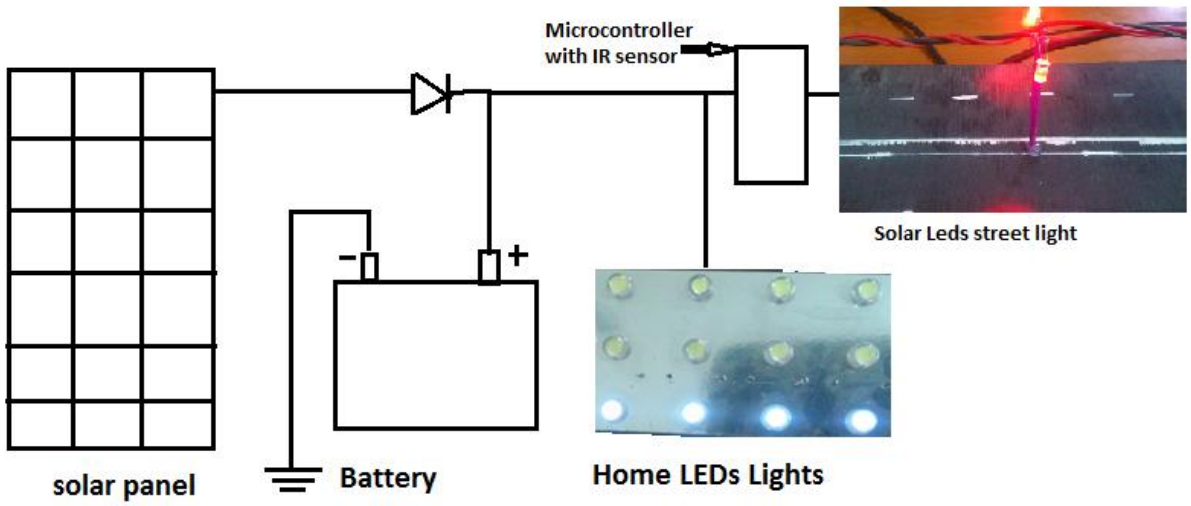

Figure 1: Block diagram of solar PV LEDs lighting system

4. Results and Analysis

Output Graph of Leds Lighting with PWM Technology

This chapter provides the result and analysis of solar PV LEDs lighting system and also provides the duty cycle graph which was taken from the CRO with pulse- with-modulation PWM technique. First, we have taken graph between the voltages vs. time in second from PWM switching device to controlling voltages; battery through LEDs lighting system. We have taken the graph of solar PV LEDs lighting system with duty cycle in square wave from between the voltages vs. time and this graph show the variation intensity of LEDs, which is depending on the variation of voltage with the PWM technology and we can varies the intensity by manually of LEDs lighting system with the help of switching devices.

If LEDs are glowing with more intensity then higher the duty cycle and if LEDs are glowing with less intensity then lower duty cycle of PWM technology. Figure 6.1 show the LEDs are taken more power with high intensity because it depends upon the duty cycle. In this graph the duty cycle very high so, LEDs are taking more power with high intensity.

For the variation of LEDs lighting system has different conditions and different cases, which is describe in this chapter.

Condition 1: Duty cycle very high

In this figure 6.1 the duty cycle is very high like +99.64 to 0.49 so, duty cycle is showing the LEDs taken more power and glowing with full intensity, which is showing in the CRO's graph.

Condition 2: Duty cycle high

Figure 6.2 show the duty cycle is high but not than condition1 like +64.36 to -15.70 so, duty cycles showing the LEDs taken more power but less than duty cycle very high power and LEDs are glowing the full intensity but less than condition1.

Condition 3: Duty cycle medium

Figure 6.3 show the duty cycle is medium like +48.76 to -51.36 so, duty cycles showing the LEDs taken medium power with medium intensity

Condition 4: Duty cycle less

Figure 6.4 show the duty cycle is less like +5.76 to -94.36 so, duty cycles showing the LEDs
Taken less power with less intensity

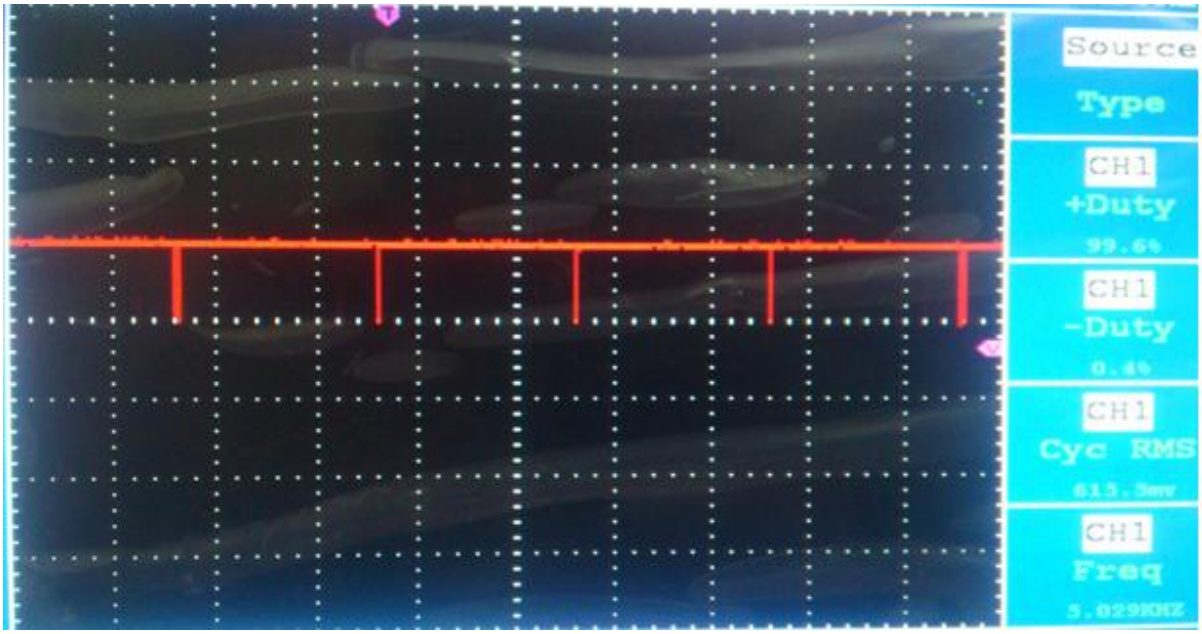

Figure 2 High duty cycle with high intensity

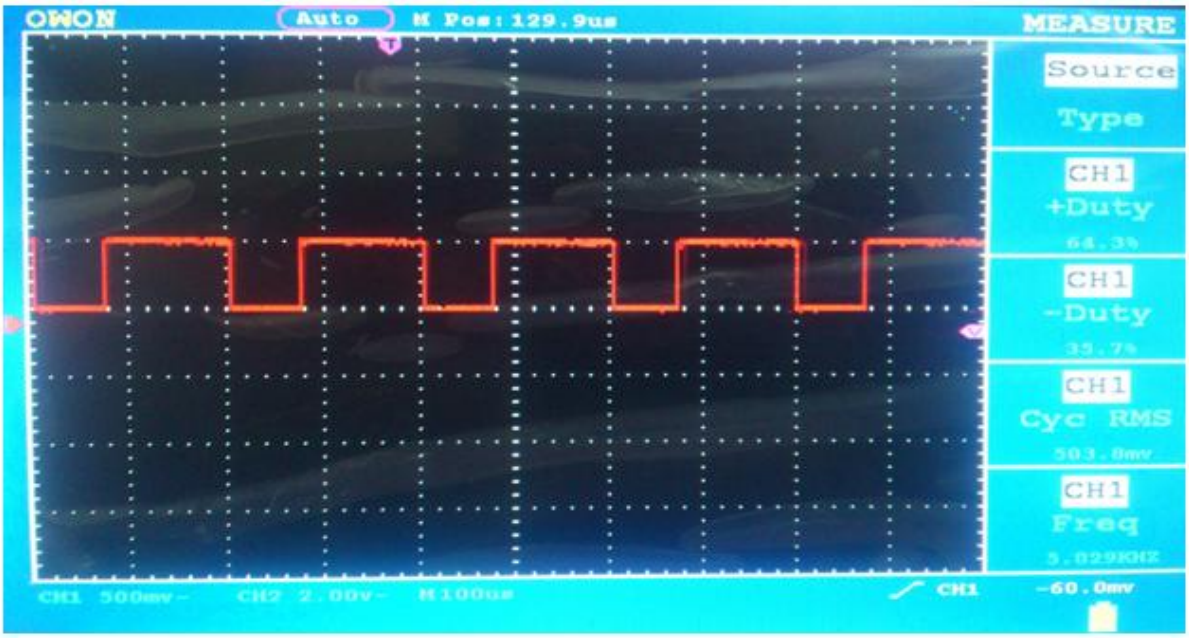

Figure 3 Duty cycle high with high intensity

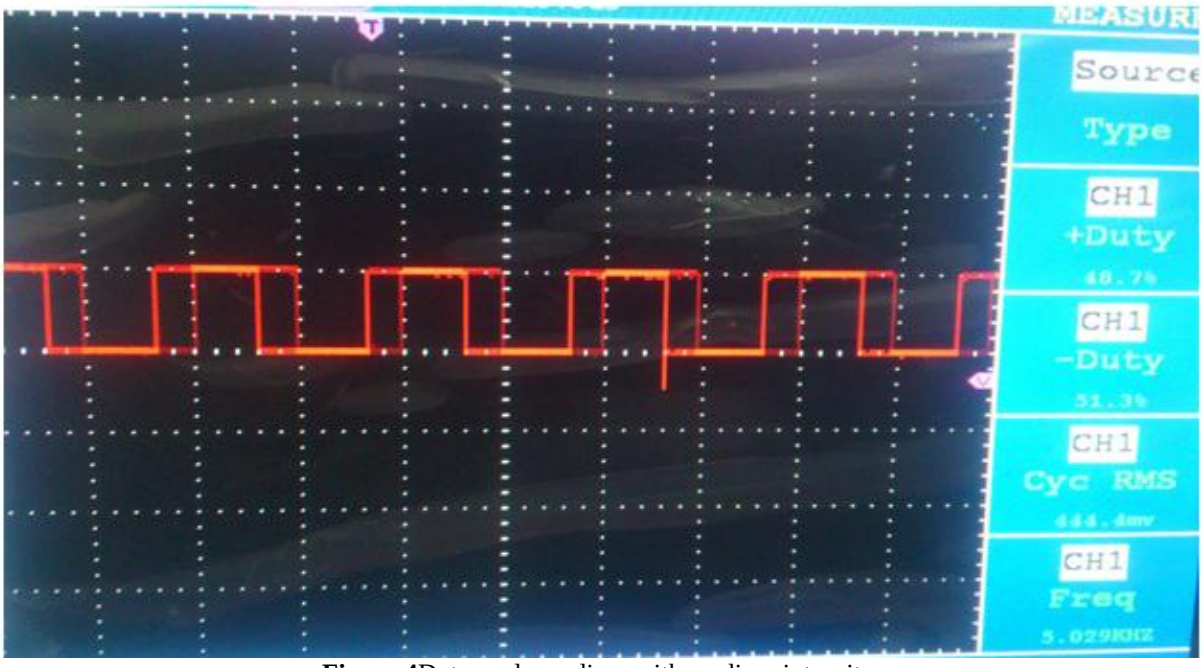

Figure 4 Duty cycle medium with medium intensity

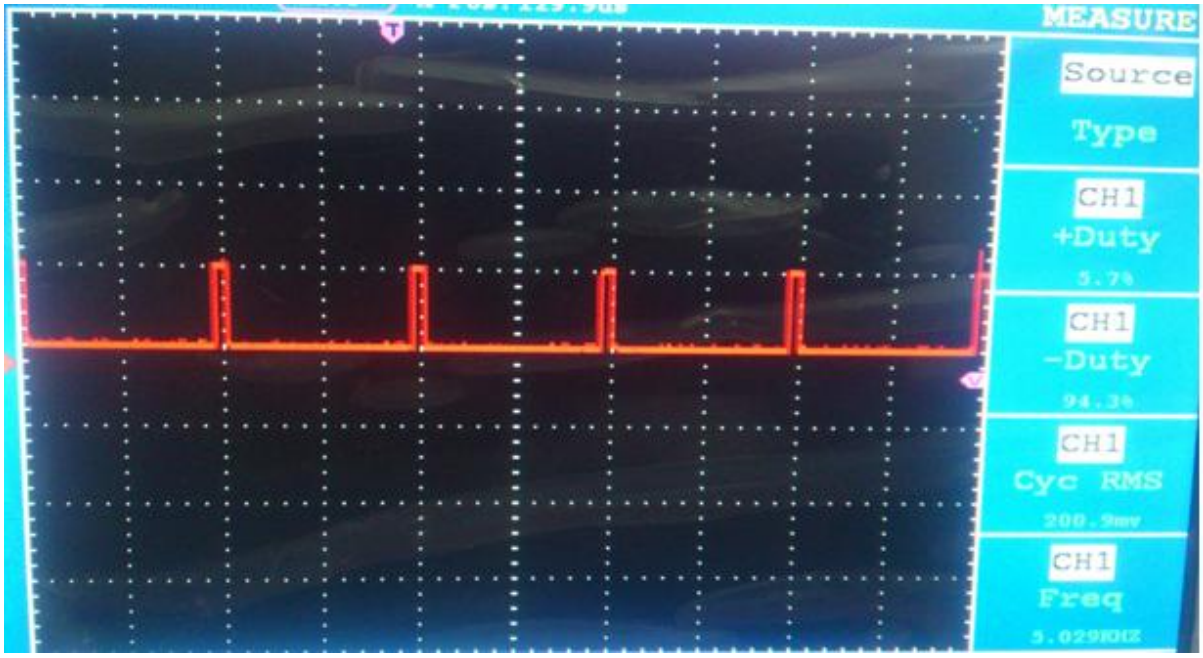

Figure 5 Duty cycles less with less intensity

5. Discussion

5.1 Solar PV system

Manipulative solar PV systems can be a difficult job for an engineer's especially without more experience with incomplete resources existing that focus on the addition of solar PV systems with the relax of the electrical/mechanical system designing. Batteries are also needed high efficient for the backup and during the insufficient of solar radiation fall on the solar PV module. The detailed study of solar PV module described in the chapter 2 as photovoltaic an overview.

5.2 LED technology is comparatively new in the market

LEDs are comparatively new within the lighting markets or industry when compared to most normally available additional light sources as metal halide, incandescent or fluorescent. Discuss about LEDs lighting system in details describe in the chapter 2 as an about LEDs lighting system.

5.3LEDs fixtures are costly

LEDs lights equipment are costly when compared to other light sources such as incandescent, metal halide fluorescent. Simply when the lighting manufacturing is revolutionize with the application of LED's and better efficient LEDs lights equipment are specified in most applications and will the prices go downward.

5.4 Challenges with the DC power

Challenges survive with using DC power for residential and commercial applications such as especially with power sharing in houses and buildings. DC wiring cannot be run for bulky distance and exclusive of significant voltage drop and consequently power loss. For 12VDC system designing and faintly thicker copper wires had to be used i.e. wires had to be upsized to regulate for every wiring losses

5.5 Cost analysis of this system

We have made this system as a prototype of solar PV LED lighting system with all equipments and the predictable cost of this system 10 thousands but if we will use as a home and street lighting system then it will be very high and the predictable cost of home and streets lights like some lakhs with the all equipment.

5.6 Street lighting system

We have made this system with street lights system for road because, we know that in the night more power loss in the street lights today so this system can be controlled the these power losses with the controlling some equipment like microcontroller, IR sensors for ON/OFF street lights system due to movements of any objects on the roads in night time because we can set the timing of only for night automatically with real time clocker. In this street lights system we have used light emitting diodes (LEDs) because it takes less power not more than other lighting source. These street lights are glowing and taking power from solar PV system with battery bank and we have also used solar PV system for the charging of battery and it is a renewable energy sources.

Advantage of solar PV LEDs Street lighting system and compared with the conventional grid street lighting system which is describe in below

- The solar PV LEDs street lighting system consume less power because it has ON/OFF controlling system and the LEDs street lights glowing only night time automatically with any movements on roads in night timing but conventional grid street lighting system take more power not automatically ON/OFF.
- It has long and predictable life time like 10 to 12 years and has lower maintenance cost than the conventional street lighting system.
- Automatically turn OFF/ON with movements
- Some electrical losses

So, all above discussion we have found the results solar PV LEDs lighting system and solar PV LEDs street lighting system are good for new industry, residential, commercial and other application is much better than other lighting sources and we can use solar PV LEDs lighting system for the home appliance, residential, commercial and industrial process because does not takes more power so, it is the best energy efficient lights.

6. Conclusion

Form all above studies we concluded that the solar PV LEDs lighting system is better than other lighting sources because we can be used this system for home appliance, residential and commercial process with some switching devises and with some controlling equipment, the power performance of this system is good because it does not take more power compared to other lighting equipment and solar PV LEDs street lighting system are better than the other lighting sources because it is automatically ON/OFF due to some switching and electronics equipment in the nights with movements of any objects on the roads so, it does not take more power than other conventional street lighting system.

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Author Profile

Satyendra Kumar Mahto, He was born in 1990 in Bihar (India) and he is pursuing M.TECH (Dual Degree) from Energy engineering and received B.Tech degree in 2013 from Electrical engineering from Suresh Gyan Vihar University, Jaipur, and Rajasthan, India.