

Soalr Street Light Installation in Our Parking Area, Bsiet

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ABSTRACT – solar energy and solar panel is an clean energy and prospective resource which can provide daily demand energy to contribute safe and Eco friend energy. The solar panel is made up of photovoltaic cell which is a specialised semiconductor diode that directly convert sunlight rays into electricity (Dc) using photovoltaic effect. The construction of the solar panel is very complex because of there are so many cells in one line of panel. The solar panel is used in various sector like industrial, commercial and residential. The main advantage of solar energy generation is it is pollution free in this solar energy generation there is no any combustion of coal. In this article we have discussed how we can run any application on solar panel like – street light, water pumps, used in agriculture for irrigation and etc. In this article, we have reviewed about the solar energy from sunlight and discussed about their future trends and aspects.

Keywords: - Renewable energy, solar street light, photovoltaic cell, solar panel efficiency, green technology, smart grid integration, hybrid energy systems

LITERATURE REVIEW

The rapid development of solar energy application is increasing day by day. This can help city the to be covered into smart city including the advanced infrastructure and technology.

This proposed system help to reduce less coal emission and reduce the manual operation by using advanced devices like timer switch, smart inverter, efficient solar panel and batteries.

Automation and smart features like the automatic on/off using light sensors, motion sensors to reduce energy consumption and IoT based monitoring system for remote control. This has high initial cost but it also have low operating and maintenance cost. The smart solar street lighting system with automation sensors and GSM communication improves fault detection,

The integrated converter based designs reduce the system complexity and improve performance under dynamic conditions intelligent solar LED street light system use battery management and dimming techniques to optimize energy usage. The literature review shows that solar street light system are reliable, eco-friendly and cost-effective solution for outdoor lighting continuous advancements in technology are improving their performance and making them more suitable for widespread adoption.

INTRODUCTION

The rapid depletion of fossil fuels, which accounts for nearly 80% of global energy consumption, demands an urgent need for researched aimed at finding sustainable and renewable energy alternatives. One of the alternative energy sources that can be used in industrial and commercial energy systems sector The solar energy can provide Eco-friendly, free, economical solutions. This is unlimited energy source which is available at no cost . In this project named as solar street light installation in our parking area, bsiet we have runed 4 LED panels of 30 watts with the help of solar panel rating of 150 watt and 18volts we required various components like – Led, solar panel, battery, pole, LDR, service wire etc. The main objective of this project to promote the use of solar based application, to promote use of green energy, to promote pollution free energy and does not needed to grid connection A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting structure. The main advantage of solar panel is to reduce electricity bill, low maintenance cost, longer life span , useful in remote areas, silent operation etc .There are 3 types of solar panel first one is Monocrystalline solar panels second one is polycrystalline solar panels Third one is thin-film solar panels the monocrystalline panels is mainly used in homes with limited space the polycrystalline panels are Budget – friendly installations and the thin-film are best for large scale or flexible applications etc .

BLOCK DIAGRAM EXPLANATION

1) Solar panel :-

- The solar panel is the main power generating unit of the system it is made up of photovoltaic cell
- The Solar panels generates DC current
- The

2) Charge Controller :-

- The charge controller is an important part of the system
- It prevents overcharging , Deep Discharge and controls the voltage and current
- It improves the life of the battery

3) Battery :-

- The battery is an important part of the system
- The battery provide supply at night
- The battery stabilizes the voltage

4) Timer switch :-

- The timer switch is an important part of the system
- It is a device that controls the on and off operation of electrical equipment
- The common application is street light , battery charging system and water pump control

5) LED :-

- The LED is an important part of the system
- The LED has longer life compare to other lights
- The LED consumes less power than others

THE TECHNICAL DETAILS OF COMPONENTS OF SYSTEM

Solar panel



This solar panel we have used in our proposed system . The solar panel is monocrystalline type of solar panel . The build quality of panel strong and it is durable . The specification of solar panel are as follow : -

- 1) Wattage of panel – 150w
- 2) Voltage at max power – 18 v to 19v
- 3) Current at max power – 7A to 8A
- 4) Open circuit voltage test – 22v to 23v
- 5) Short circuit current test – 8A to 9A

Battery



This battery we have in our proposed system . This battery is an lead acid type of battery It is designed for high starting power and typically prycal batteries use a negative calcium and positive low-antimony alloy , making them low-maintenance . The specifications of battery are as follows :-

- 1) Model Number – PN 600 R
- 2) Nominal voltage – 12v
- 3) Battery type – lead acid
- 4) Nominal current- 60 ah

Street light MS pole



This pole we have used in our proposed system . This is MS type of street light pole . This pole height is 12foot and 2 inch gauge . we have used 2 poles in our proposed system

SMALL INVERTER



This inverter we have used in our proposed system . This is 200 watt 12volt DC to AC inverter mostly used for home , car , boat , LED panel and solar panel . This will convert Dc supply generated from solar panel into AC supply for LEDs so that the LED can run efficiently .



LEDS

This LEDs panel we have in our proposed system . This is JK LED used in system . we have used 4 LED in our system of 30 watt each The LED panel has IP66 rating . The IP rating is essential for LED street light . The 30 watt led can produce 2500 to 3000 lumens .

Timer switch



This timer switch we have used in our proposed system . This is Blackt Electrotech Timer switch . This 250 volt AC Digital LCD Display programmable control counter . we can add 16 programmes per day . The main feature of switch is it has inbuilt rechargeable battery 16 on and 16 off operation , high quality components and built ,user friendly .

RESULTS

The experimental results shows that the proposed solar street light installation can run successfully without any interruption . The polls are fixed properly and stands strongly The battery stores the charge efficiently because of the charge controller . The charge controller gives reading properly and efficiently. The Timer switch works properly at the time The LEDS can run efficiently The overall working of the system is good it works efficiently.

CONCLUSION

The solar street light installation in our parking area , Bsiet is a simple and cost effective solution for others street lights by using the best quality components the system can work properly and efficiently we had run the system neatly and we observed that the system remains stable and reliable

This project demonstrates how solar street lighting can significantly reduce electricity consumption and operational costs for educational institutions. By operating independently of grid electricity, the system ensures reliable illumination even during power failures, thereby improving safety and security in parking areas, walkways, and roads within the campus. The use of energy-efficient LED lamps further enhances system performance by providing high illumination with minimal power consumption.

FUTURE SCOPE

The proposed system can upgrade by using advanced technology. The Advanced technology like Better solar panels, high efficiency LEDS, advanced batteries. The will system has Rural and remote Area development. The system will innovate Designs work in hybrid mode like solar +wide energy and solar +grid backup etc . The solar street light will the part of the smart city infrastructure and It will features like Remote control, motion sensors, Automatic brightness lights etc . This smart systems will reduce the energy use by up to 40%

REFERENCES

- [1] Arvizu, D.; Balaya, P.; Cabeza, L.F.; Hollands, K.G.T.; Jäger-Waldau, A.; Kondo, M.; Konseibo, C.; Meleshko, V.; Stein, W.; Tamaura, Y.; et al. Direct Solar Energy. In *Renewable Energy Sources and Climate Change Mitigation*; Cambridge University Press: Cambridge, UK, 2011; pp. 333–400
- [2] Hayat, M.B.; Ali, D.; Monyake, K.C.; Alagha, L.; Ahmed, N. Solar energy—A look into power generation, challenges, and a solar-powered future. *Int. J. Energy Res.* 2019, 43, 1049–1067.
- [3] Hyvönen, J.; Santasalo-Aarnio, A.; Syri, S.; Lehtonen, M. Feasibility study of energy storage options for photovoltaic electricity generation in detached houses in Nordic climates.
- [4] Amick, J.A.; Ghosh, A.K. Practical Limiting Efficiencies for Crystalline Silicon Solar Cells. *J. Electrochem. Soc.* 1983, 130, 160–164
- [5] Balode, L.; Dolge, K.; Blumberga, D. Sector-Specific Pathways to Sustainability: Unravelling the Most Promising Renewable Energy Options. *Sustainability* 2023, 15, 12636.
- [6] Badran, G.; Dhimish, M. A comparative study of bifacial versus monofacial PV systems at the UK’s largest solar plant. *Clean Energy* 2024, 8, 248–260.
- [7] Shruti Sharma, Kamlesh Kumar Jain, Ashutosh Sharma a review on “Solar Cells: In Research and Applications”, *Materials Sciences and Applications*, 2015, 6, 1145-1155
Published December 2015
- [8] Book of “Wind and Solar Power Plants” by Mukund Patel, CRC Press
- [9] Jacobson MZ, Delucchi MA, Bauer ZAF, Goodman SC, Chapman WE, Cameron MA, et al. 100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World. *Joule*. 2017
- [10] A descriptive analysis of public understanding and attitudes of renewable energy resources towards energy access and development in Nigeria