International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 6 ǁ 2022 ǁ PP. 1760-1762

Solar Based Inverter Using Microcontroller

Rashmi (3PD18EC059)
Shraddha (3PD18EC076)
Soundarya (3PD18EC090)
Sushma (3PD18EC096)

Prof. Ganesh Manasali
Department of Electronics and Communication Engineering

Poojya Doddappa Appa College of Engineering, Kalaburagi
Department Of Electronics and Communication Engineering

ABSTRACT
Solar based inverter using microcontroller is a project model designed that uses the solar energy. This paper presents the design and the implementation of a microcontroller-based solar inverter. The aim of the project is to convert DC voltage to AC voltage using inverter at high efficiency and low cost. Solar and wind powered electricity generation are being favoured nowadays as the world increasingly focuses on environmental concerns. However, there are many challenges in using the solar energy. In this paper, a framework of how solar based inverter can be used and its applications are represented.
Keywords: *ATmega 328, Servo Motor, Solar Panel.*

Date of Submission: 14-06-2022 Date of acceptance: 29-06-2022

I. INTRODUCTION

Energy is very important for the development of any nation. There are many energy productions that depend on fossil fuels. The resources of the fossil fuels are not infinitely available, which means they are limited.Use of renewable resources for producing electricity is increasing because of the decrease in the non - renewable energy resources.So, now there is increase in the demand for energy from renewable resources like solar, wind, geothermal and biothermal. Among all the renewable energy sources, thesolar energy which is the photovoltaic system is the one that has a greater chance of replacing the conventional energy resources. Solar panels are being used more popularlynow a days.

Solar panel directly converts solar radiation into electrical energy. Solar panel is mainly made from semiconductor materials. The only way to increase the performance of a solar panel is to increase the intensity of light falling on it. The solar panels absorb the energy from the sun and converts this energy into electrical energy. This energy is stored in a battery. This energy is utilized when necessary or can be used as a direct alternative to the grid supply. The position of the sun isnot fixed due to the rotation of the earth with respect to the solar panel. For an efficient usage of the solar energy, as mentioned earlier, the solar panels should absorb energy to a maximum extent. This can be done only if the panels are continuously placed towards the direction of the sun. So, solar panel should continuously rotate in the direction of sun. This paper describes about circuit that rotates solar panel.

PROBLEM DEFINITION

- Energy needs to be conserved to cut the costs and to preserve the resources for longer use.
- Conventional energy sources pollute the environment by emitting harmful gases into the atmosphere.
- Conventional energy sources are limited and might expire one day. We, therefore, have a responsibility to conserve and save energy as much we can to make it available for our futuregenerations and protect our environment from further degradation.
- The effects of greenhousegases and pollution are of a majorconcern and these have led to the new developments using the renewable energy resources such as solar, wind, and geothermal. Therefore, we are using the solar panels that uses solar energy which is therenewable energy source, with a motor for the rotation of the panels.

II. METHODOLOGY

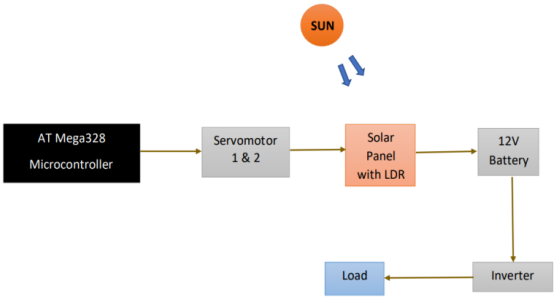

Fig 1 : Block Diagram of Solar based inverter using microcontroller

The diagram in the fig 1shows the block diagram of the solar based inverter using microcontroller. The Atmega328microcontroller is connected to the servomotor 1 and 2. Servomotor 1 acts as a rotor which helps in the rotation of the panels in 360 degree and servomotor 2 is connected to servomotor 1 which rotates the panels in 180 degrees.

We are using 4 solar panels each of wherein each panel is of 6V and carries a current of 100mA.These solar panel helps in the absorption of sunlight.Solar panels are further connected to LDR as shown in fig 2.The Light Dependent Resistors or LDRs are the resistors whose resistance values depend on intensity of the light. The resistance value decreases as the intensity of light falling on the LDR increases.

In dark, LDR will have maximum resistance. Four 10k resistors are connected to the LDRs which restricts the flow of current when maximum power is generated by the solar panels.

These resistors are also connected to the microcontroller pins (A0, A1, A2, A3). The output of the solar panels is connected to a 12V battery as shown in fig 1. A battery is a source of electric power. It has one or more electrochemical cells with external connections for powering electrical devices.

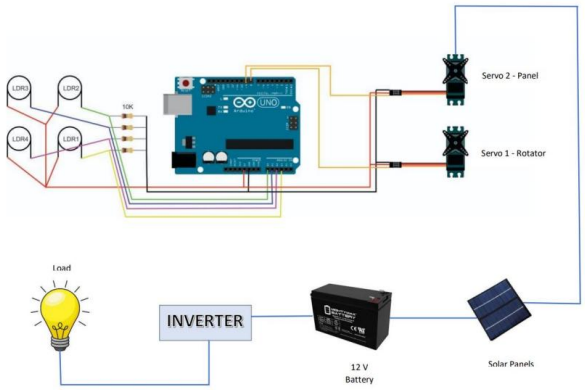

Fig 2 : Circuit Diagram

And the battery is followed by an inverter. Output of the solar panels is DC and home appliances work on AC power, so to generate AC supply inverter circuit is essential.

Further the inverter output is connected to a load. As the sunlight falls on to the solar panels, they absorb solar energy and produce DC output. Now we have a microcontroller here, the controller is used to position the solar panel according to the sun, we use the servo motor for that purpose. The servo motor rotates the solar panels in the directions of the sun so as they absorb the maximum solar energy. How it does is that it checks for the voltage generated at each angle positions the panels at an angle in which the voltage is maximum. This occurs when the panels are perpendicular to the direction of the sun, which is indicated by the LDR. Then the panel is connected to a battery which is of 12V. Battery input is given to the inverter which converts DC to AC as the solar panel gives DC voltage. So, to convert this voltage to AC we need an inverter which helps glow the bulb.

ADVANTAGES AND DISADVANTAGES

Advantages :

- It is one of the methods of renewable generation.
- Constant and uninterrupted supply.
- There is no requirement of electricity and manpower to operate the device.

- It acts as a power back - up solution.
- This is an ecofriendly means of power generation.
- It can be used in distant villages where transmission cost is much high.
- Reduction in consumption from conventional sources of energy.

Disadvantages :

- Initial cost of installation is very high.
- Area required for installation is large.
- It will be less effective in rainy days.
- Protection system installment is very high.
- Cause problems to eye sight because of solar reflectors.

APPLICATIONS

- It can be used to power the traffic lights and streetlights.
- It can be used in home to power theappliances using solar power.
- It can be used in industries as more energy can be saved by rotating the panel**.**

FUTURE SCOPE

- As whole world is facing a problem of global warming and energy crisis, our project will help to reduce these problems by using solar energy to generate electricity.
- Solar energy is an infinite source of energy. Main motto of our project is to promote use of renewable energy sources. The solar inverter made by us is just a prototype for making future projects which incorporate advanced technologies like micro controlled solar tracking, charge control, etc.
- This is to show that solar inverters are very cheap and easy to install so that the energy demands are shifted on using renewable sources of energy.
- There are more advancements pending in this field which will revolutionize the energy stream and solar energy will be playing the most important role of all.

III. CONCLUSION

This paper has promising potentials, ranging from the long run economic to the important environmental benefits. This work is one of the few attempts and contributions where such projects could be implemented successfully,in the field of renewable energy. With the increasing improvements in solar cell technologies and power electronics, such projects would have more value added and should receive more attention and support.

ACKNOWLEDGEMENT

We express our deep sense of gratitude and indebtedness to the esteemed institute "PoojyaDoddappaAppa College of Engineering", Kalaburagi which has provided us with an opportunity to fulfil the most cherished desire to reach our goal.

We express our foremost gratitude to our guide Prof. Ganesh Manasali for constant support and valuable guidance.

We are thankful to Dr. G.S Biradar, Professor and Head of the Department of Electronics and Communication Engineering, for giving permission to carryout this project.

REFERENCES

[1]. Ruchika Thukral, Gulshan Kumar, Ankit Gupta, Nilesh kumar Verma, Shivanchal Asthana, Microcontroller Based Solar Power Inverter. International Journal of Electrical Engineering & Technology, 7(5), 2016, pp. 70– 78.

[2]. INTERNATIONAL JOURNAL OF ELECTRICAL ENGINEERING & TECHNOLOGY (IJEET) ISSN 0976 – 6545(Print) ISSN 0976 – 6553(Online) Volume 4, Issue 1, January- February (2013), pp. 109-114 © IAEME

[3]. A Review on Solar Tracking System and their Classification :PritiDebbarma, B.B. Bhowmik (M.Tech Student), Assistant Professor Department of Electronics and Communication Engineering Tripura University, Suryamaninagar, Agartala, India

[4]. International Journal of Scientific & Engineering Research, Volume 7, Issue 4, April-2016 238 ISSN 2229- 5518 IJSER © 2016

[5]. International Journal of Latest Engineering Science (IJLES) - Implementation of Solar Inverter using Microcontroller : Radha Mahajan, HarshadaLonkar, Prachi Ghormade, RajviKuthe Department of Electrical Engineering, Government College of Engineering Nagpur. Student at Government College of Engineering, Nagpur.