AUTOMATIC SOLAR TRACKER WITH MPPT CHARGER AND INVERTER

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ABSTRACT – As modernization increases in India, solar energy saves consumers demand and light. This paper based on MPPT charger and focuses on how to maximize usage using inverter. Due to the use of automatic solar tracker there is no interruption in solar energy and the use of Arduino in this increases the demand for this project. Since the solar panel is automatic, it rotates from south to north and from north to south and helps in providing continous power supply.

1. INTRODUCTION

Over the past few years, The use of solar energy has been continuously inceasing due to the increasing demand of electricity for households, industries, vehicles, satellite system, Solar updraft towers, fuel products and water pumping systems etc. The use of incident solar rays the form of heat is used to generate electrical energy. Photovoltic conversion is a process used to convert the sun's energy directly.

When solar energy falls on the active surface of PV cells, it turns on absorbing heat. But when automatic tracker are installed on this plate, This trackers track the direction from which the solar energy is maximum. Solar technology is one of the most useful and popular low budget technologies as it does not require industrial as well as additional resources like water, fuel, transportation.

The major advantage of a solar power plant is that requires low operating and maintenance costs, but it has high initial costs. So MPPT charger is used to get maximum power in low budget. And this energy is generated by inverter.

2. LITERATURE SURVEY

Title: Design of Photovoltaic System with Different Power Point Tracking Techniques for on-Grid

Authors: Shaik Rafi Kiran,Thirupataiah N., M.V Bramhanada Reddy.

Year: March 2020

Details: In this paper solar power is calculated monthly and yearly and efficiency is evaluated experimentally. It include components like tansformer, inverter, and cables.

Title: Automatic Solar Tracking System using MPPT with Mirror Booster.

Authors: Monika Mohan , Kanish Mathew, Rinosh Thomas, Author Swathi V.U, Biju K.

Year: April 2016

Details: In this paper they have used MPPT and mirror booster for control solar tracking system. This paper presenting new technology of solar tracking system. It consist of two motors to drive a solar plate and mirror which is controlled by a microcontroller (PIC16F877A).

Title: Designing and Implementation of Maximum Power Point Tracking (MPPT) Solar Charge Controller

Authors: Mihir Pathare, Diptarka Datta, Rajeev Valunjkar.

Year: May 2018.

Details: In this paper cost effective solar PV power generation is done. This system is less costly used for small DC loads. The proteus software is used for designing this prototype.

Title: Dual-Axis Solar Tracking System for Maximum Power Production in PV Systems.

Authors: Muhd.Ikram Mohd. Rashid, M.F.Akorede, L.Z.Chao, Nik Fadhil Nik Mohammed.

Year: Dec 2015.

Details: According to this paper they developed

a user friendly dual axis solar tracker system.The angle of sun mathematically calculated on the basice each day of the year This system is tested whith solar plate and resultant output was compared with fixed plate.
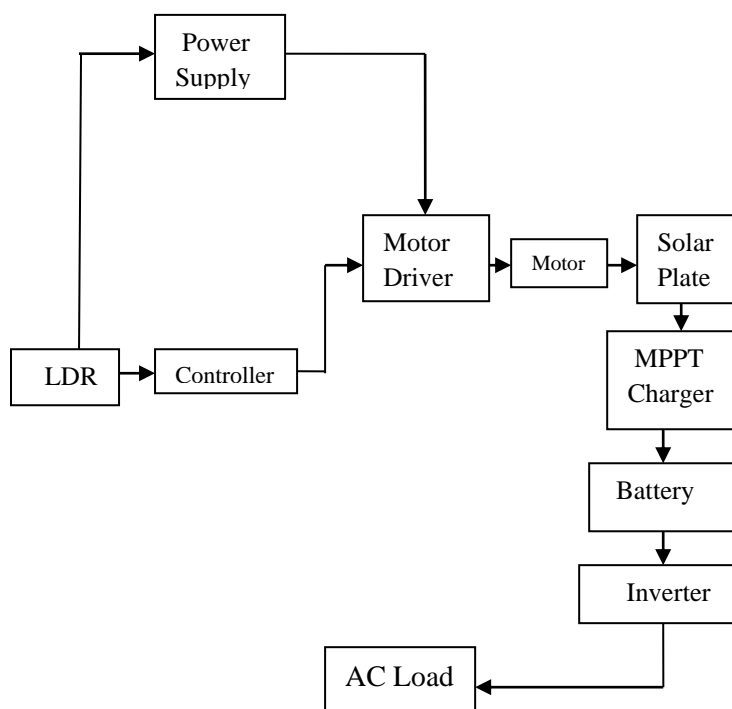
Title: Solar Tracking System Using Stepper Motor

Authors: Ankit Anuraj, Rahul Gandhi.

Year: Nov 2015.

Details: In This paper solar tracking is done using stepper motor. 12 v solar panel is used for analysis of small card board which is rotated in this system. This system has microcontroller(ATMEGA16) which require 5 v regulated power supply.

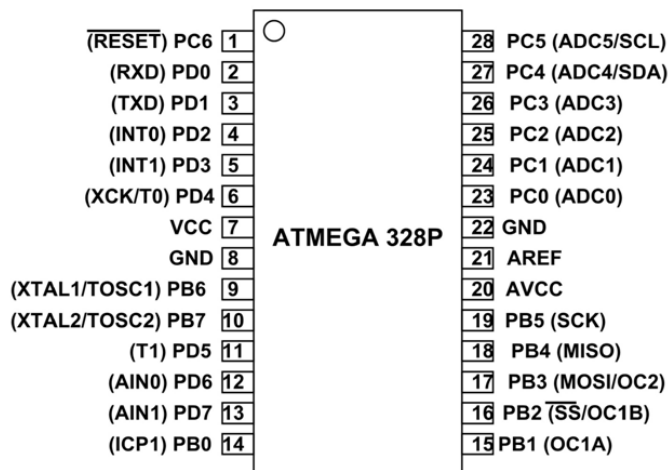### 3. BlOCK DIAGRAM

Working of the project:

According to this block diagram, The solar panel is fixed towards the sun since the solar tracker is built into it, it goes in direction of maximum energy. The solar plate is mounted 15W and the power from solar panel is stored in the MPPT charger and supplied to the battery. 12v battery is sent to 12v charge supply transformer, 12v power supply uses step-up transformer and converts into 230v. Then this 230v DC power supply is converted through Inverter into 230v AC and this 230v AC supply is fed to the AC load. As shown in this diagram, The solar plate is operated by motor mounted for maximum power point tracking and to keep it movable, so the motor driver operates the motor. This motor requires power supply to operate. We get the power supply according to the voltage.

So if there is a 15W plate then we get 14-15 v and we get,

$$P*V=I$$

The power supply is connected to the LDR (Light Dependent Register) controller and motor driver and Arduino Board controller works to operate to system. Due to the installation of LDR in this systrm the instructions given from this controller are indicated.

CONTROLLER: ATMEGA 328P

Features:

- ❖ **Memory:**

- AVR CPU at up to 16 MHz

- Flash Memory- 32kb

- SRAM- 2kb

- EEPROM- 1kb

- ❖ **Security:**

- (POR) Power On Reset

- (BOD) Brown Out Detection

CONCLUSIONS

In this paper we have improved solar tracking system by using MPPT charger and inverter. PV have cells very large attraction because they generate electrical energy through free source.

The sun uses no moving parts, consumes no fuel and produce energy. No pollution or greenhouse gases are produced during power generation. Features such as microcontroller have a means of controlling things like sun tracking, solar cells are used to increase the output by installing solar tracks by substracting the MPP of maximum incident light. This project is the development of the tracking the direction of the sun. A lot of solar power tracking with multiple types of meters controlled by a microcontroller is needed to charge the battery as well.

By accumulating only solar energy, the implementation of solar panel production has greatly increased. Maximum solar power tracking is very useful in hilly area. Sunlight is less in winter, so it can be used in places where there is a quick energy response, as well as on top of houses in hilly areas with high population

density. And that maximum energy can be stored and it is used for household appliances by using inverter.

APPLICATION

- ➢ Solar Tracking System is more efficient for pumping water and other applications of agriculture.
- ➢ Renewable Energy Sources : Wind Power Turbines and Small Water Turbines.
- ➢ For Domestic Purpose
- ➢ Solar Tracking System can be use for small to medium scale power generations.

FUTURE SCOPE

At the present the MPPT facility is compatible with only one solar panel. If we store the energy we get use that energy by increasing the voltage through the stepup transformer and using it through the inverter. By converting DC to AC, we can use this supply for any type of device. MPP cannot work independently of each panel so energy is lost. Also, there is a trend of green revolutions nowadays, so there are many discoveries on solar. And various other green energy ideas. Due to which this project has a lot of advantages as it will be done in less budget and get maximum benefits in the future.

REFERENCES

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Anlit Anuraj, Rahul Gandhi "Solar Tracking System Using Stepper Motor"