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AUTOMATIC SOLAR TRACKER

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ABSTRACT – As modernization increases in India, solar energy saves consumers demand and light. This paper is based on an MPPT charger and focuses on how to maximize utilization using an inverter. The use of automatic solar tracker does not interfere with solar energy and the use of Arduino in this increases the demand of this project. Since the solar panel is automatic, it rotates from south to north and from north to south and helps in continuous power supply.

INTRODUCTION

For the last few years. Due to the increasing demand of electricity for households, industries, the use of solar energy is continuously increasing. Vehicles, satellite systems, solar updraft towers, fuel products and water pumping systems etc. Solar rays in the form of heat are used to generate electrical energy. Photovoltaic conversion is a process used to directly convert the sun's energy.

When solar energy falls on the active surface of PV cells, it absorbs heat. But when automatic trackers are installed on this plate. These trackers track the direction from which 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 biggest advantage of solar power plant is that it requires low operating and maintenance costs, but its initial cost is high. So MPPT chargers are used to FC maximum power in a low budget. And this energy is generated by an inverter.

1. 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 monthly and yearly calculations of solar energy are performed and efficiency is evaluated experimentally. It includes components like transformers, inverters 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 to control solar tracking system. This paper presents a new technology of solar tracking system. It consists of two motors to drive the solar plate and mirror which are 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 discussed. This system is less expensive for small DC loads. Proteus software is used to create 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 it was developed a user friendly dual axis solar tracker system. The mathematically calculated sun angle on a fundamental basis for each day of the year is checked with the system solar plate and the resulting product is compared with a fixed plate.

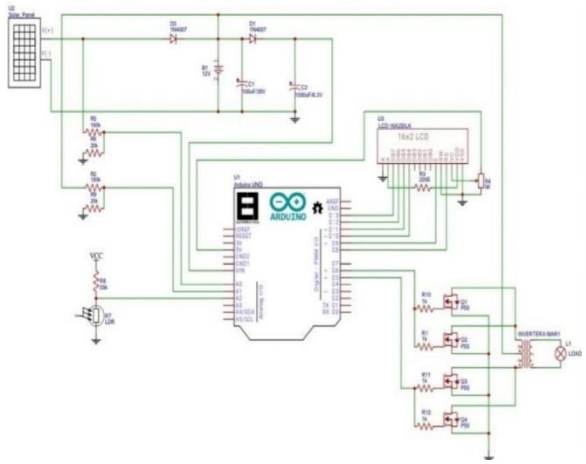
Title: Solar Tracking System Using Stepper Motor

Authors: Ankit Anuraj, Rahul Gandhi.

Year: Nov 2015.

Details: In this paper solar tracking is done using stepper motor. This system uses a 12 v solar panel for the analysis of small pieces of recycled cardboard. The system consists of a microcontroller (ATMEGA16) which requires a 5 v regular power supply.

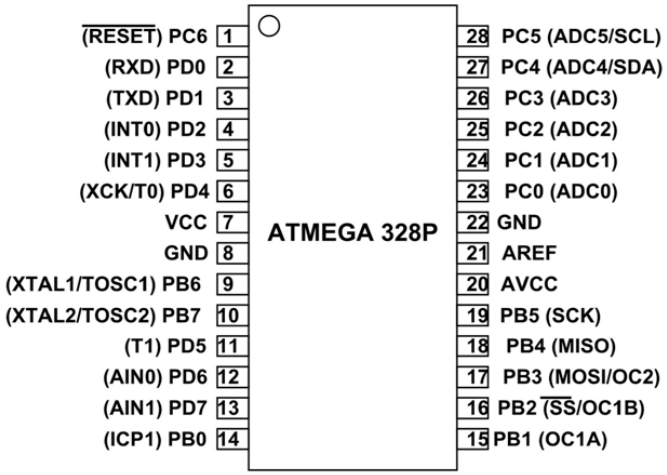
1. CIRCUIT DIAGRAM



Working of the project:

2 diodes and 2 capacitors are used in the circuits. Diodes are used as switching to reverse voltage of solar panel. A capacitor used as a filter of the DC setting pulse in the output section is then connected to the LCD display controller d10 to d13 data pins are used to connect the LCD display to the controller, D8 pin is used as a resistor select pin. Pins D5 and D6 are used as a square wave as the connected MOSFET pair produces this pin output display of the inverter. The mosfet output provides the center tab transformer, providing the 12+12 voltage to the central tab terminal and then receives the secondary approximate voltage from 180v to 230v.

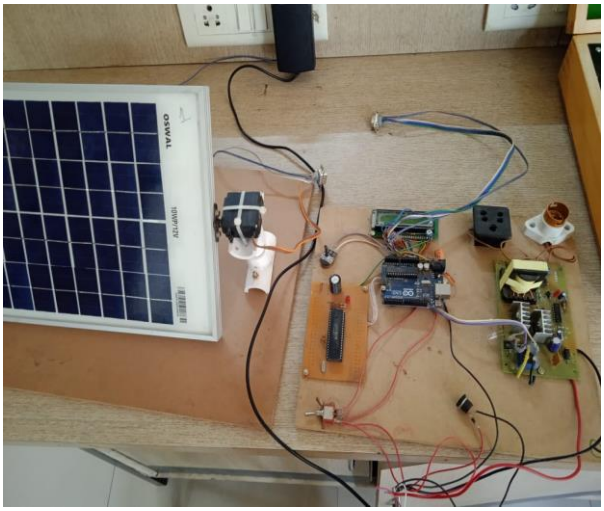
CONTROLLER: ATMEGA 328P

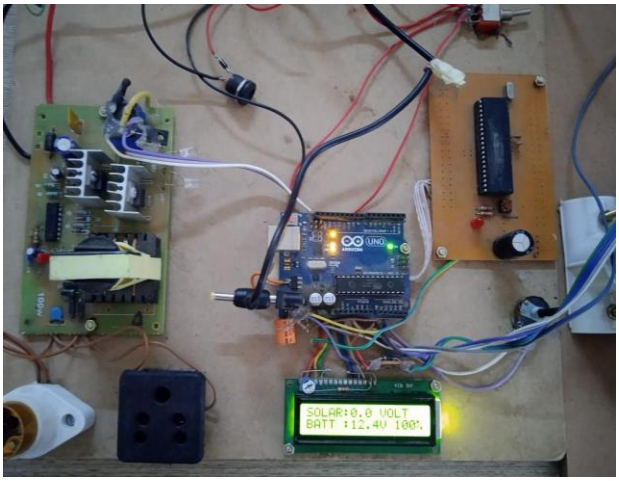


Features:

- **Memory:**
- AVR CPU at up to 16 MHz
- Flash Memory- 32kb
- SRAM- 2kb
- EEPROM- 1kb
- **Security:**
- (POR) Power On Reset
- (BOD) Brown Out Detection

RESULT





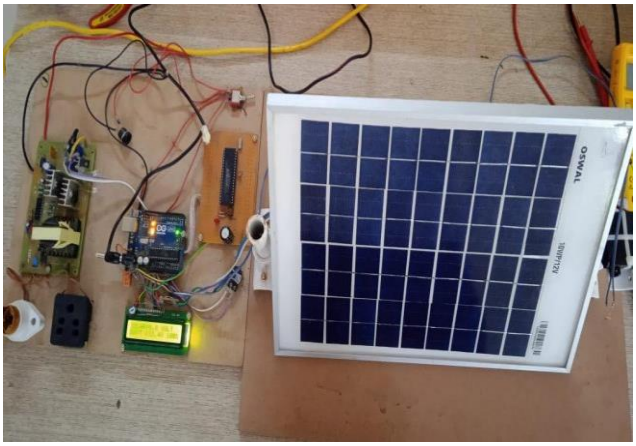


Fig: Experimental Setup of Automatic Solar Tracker

The project results from solar tracking systems and LDRs for fixed position panels. The results were recorded for four days, recorded and tabulated. The output of an LDR depends on the intensity of light falling on its surface. The Arduino has a serial port that communicates with the computer on digital pins 0 and 1, as well as via USB. If these functions are used this way, pins 0 and I can be used for digital input or output.

CONCLUSIONS

In this paper we have improved solar tracking system using MPPT charger and inverter. PV cells have a great attraction because they generate electrical energy through an open source.

The sun uses no moving parts, consumes no fuel, and generates energy. No pollution or greenhouse gases are produced during power generation, features like microcontrollers have a means to control things like sun tracking, solar cells are used to maximize output by establishing a solar track by subtracting the MPP of the maximum incident light. This project is the development of tracking the direction of the sun. Charging the battery requires a lot of solar power tracking with several types of meters controlled by a microcontroller.

By accumulating only solar energy, the implementation of solar panel production has increased greatly. Maximum solar power tracking is very useful in hilly areas. Sunlight is less in winter, so it can be used on top of houses in places where there is a fast energy response, as well as in hilly areas with high population density. And maximum energy can be stored and used for household appliances. Using an inverter

APPLICATION

- Solar tracking system is more efficient for this Pumping water and other applications
- Agriculture
- Renewable energy sources include wind turbines and small water turbines.
- For domestic purpose
- Solar tracking system can be used for small to Moderate power generation.

FUTURE SCOPE

Currently the MPPT facility is compatible with only one solar panel. If we store energy, we get that energy by stepping up the voltage through a step-up transformer and using it through an inverter. By converting DC to AC, we can use this supply for any type of device. MPP cannot work on each panel independently so energy is lost. Also, green revolution is the trend these days, so there are many inventions on solar. And various other green energy ideas. This project has many advantages as it will be done in low budget and will get maximum benefit in future.

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