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Article

Solar Charge Controller (Mppt) and Solar Tracker

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A B S T R A C T

The amount of energy received from the sun in India is 5 trillion MWh. So we can harvest the energy in the form of electricity by using solar panels. Solar energy can provide up to 7% of the total need of the energy consumed in India. The need for renewable energy sources is on the rise because of the acute energy crisis in the world today. India plans to produce 20 Giga watts Solar power by the year 2020, whereas we have only realized less than half a Giga watt of our potential as of March 2010. Solar energy is a vital untapped resource in a tropical country like occurs. The main obstacle for the penetration and reach of solar PV systems is their low efficiency and high capital cost. In this thesis, we examine a schematic to extract maximum obtain able solar power from a PV module and use the energy for a DC application. This paper investigates in detail the concept of Maximum Power Point Tracking (MPPT) which significantly increases the efficiency of the solar photo-voltaic system.

Keywords: Fuzzy Logic, Maximum Power Point Tracking, Batteries, Arrays, Photovoltaic Cells, DC-DC Power Converters, Perturbation Techniques, P&O Tracking Technique, Buck Converter

Introduction

All electrical and electronic components require electric current to perform operation. There are different ways to generate electric power. The Sun's radiant light and heat is harnessed to make available solar energy. Solar machineries are confidential into two categories as active solar and passive solar. There are two types of Charge Controller; MPPT and PWM.

In this paper, we are briefing that how solar energy is tracked at maximum power point, than converting this energy into electrical form, afford it to different appliances and simultaneously storing the leftover power into battery for further use.

Description

Figure no. 1 is the block diagram which consists of different blocks: the solar panel; that yields electric power using solar energy; a pair of photodiode to sense the position of sun; LCD to display predefined parameters; motor to rotate the panel; a load switch to connect or disconnect the load; battery for storing energy.

LDR

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply phot

Solar Panel

A solar panel is really an assortment of solar(or phoyovolatic) cells, which can be utilized to produce power through photovolatic impact. These cells are orchestrated in a lattice like example on the outside of sun powered panels.Thus , it

might likewise be portrayed as a lot of photovolatic modules mounted on a structure supporting in. A photovolatic (PV) module is a bundle and associated get together of 6*10 sun oriented cells. With regards to wear-and-tear,these board are tough. Sunlight based boards are destroy amazingly moderate.

Establishment of sun based board in fighting the destructive emanation of ozone depleting substances and in this way lessens an unnatural weather change. Sunlight based boards don't prompt any type of decline our dependence on petroleum derivatives (which are restricted) and customary force sources. nowadays, sun oriented boards are utilized in wide-running electronic hardware resembles number crunchers, which function as long a daylight is accessible. Anyway the main significant disadvantage of sunlight based boards is that they are very expensive. Likewise, sun oriented boards are introduced outside as they need daylight to get charged.

MPPT checks yield of PV module, thinks about it to battery voltage at that point fixes what is the best force that PV module can deliver to charge the battery and changes over it to the best voltage to get most extreme current into battery. In the event that the working voltage of the PV cluster is bothered in a provided guidance and if the force drawn from the PV exhibit expands, this implies the working point has moved towards the MPP and, thusly, the working voltage must be additionally annoyed a similar way. Something else, if the force drawn from the PV cluster diminishes, the working point has moved away from the MPP and, in this manner, the bearing of the working voltage bother must be switched. In the event that expanding the voltage to a board builds the force yield of the board, the framework keeps expanding the working voltage until the force yield starts to diminish. When this occurs, the voltage diminishes to return to most extreme force point. Hence the force yield wavers around a greatest force point.

The fundamental calculation utilizes a fixed advance to increment or lessening voltage. The size of the progression decides the size of the deviation while wavering about the MPP. Having a littler advance will help diminish the wavering, yet will hinder following, while at the same time having a greater advance will help reach MPP quicker, however will build power misfortune when it wavers. The DC-DC converter is answerable for streamlining the yield voltage of the board to coordinate the necessary voltage level of battery. The DC-DC converter utilized is the Buck converter.

Battery Charging-At the greatest force point the battery is charged. The battery voltage is checked by the microcontroller. On the off chance that the battery is completely energized for example in the event that the voltage over its terminals becomes 13.5 volts the charging procedure is cut off and the battery is kept at 13.5 V by keeping steady voltage over the terminals. At the point when the battery goes beneath 13.5 volts it is again charged at most extreme force point. Sunlight based Tracking-To follow the situation of the sun we utilize a two photodiodes as a sensor. At the point when shadow of the separator put between them falls on one of the diodes, the microcontroller faculties this as a distinction in position of the sun. What's more, the microcontroller gives relating yield to engine driver. It brings about the engine to turn proper way and the board again gets opposite to the sun.

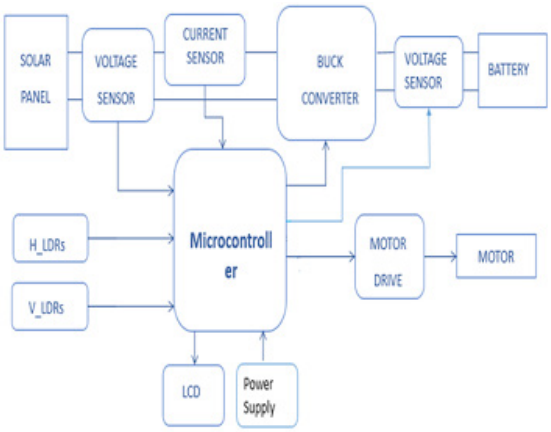

Figure 1.Proposed Block Diagram

Analysis of The Proposed System

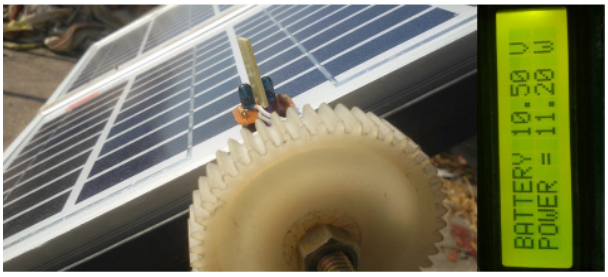

Figure 3.1 Readings observed in morning

In the morning the battery is low and voltage of the battery is 10.50 V. The power generated by the panel is 11.20 W.

Figure 3.2 Readings observed at noon

After some time the battery is charged and voltage becomes 11.40 V while power generated by the panel is 18.30 W.

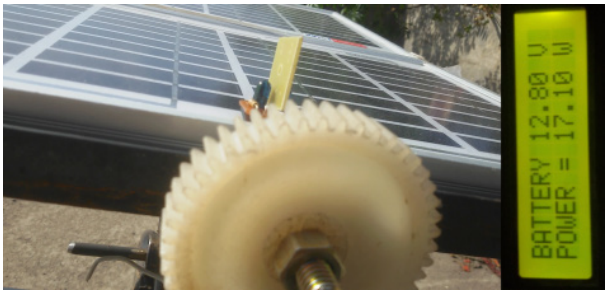

Figure 3.3 Readings observed after-noon

In the midafternoon the battery is still being charged and the voltage across its terminals is 12.80 V. The power generated by the panel is now 17.10 W.

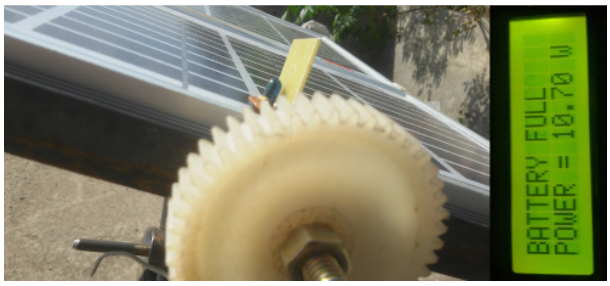

Figure 3.4 Readings observed in evening

In the evening the battery is fully charged and panel is still generating around 10 W.

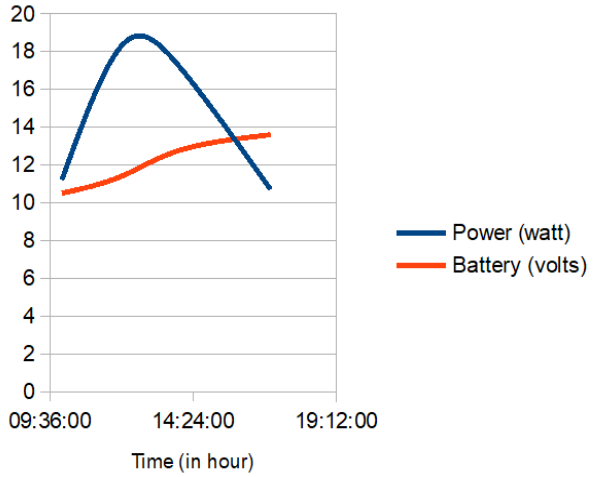

Figure 4. Graph of power and battery storage

Conclusion

Thus, the implementation of hardware is done such that all the aims and objectives are achieved; that is, Calculation of power generated, determining Maximum Power Point and Tracking it, Charging the battery at Maximum Power Point, cut off charging when battery is full, tracking the position of the sun, rotating the motor in suitable direction, displaying various parameters on the LCD.

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Parameters	Previous methods	Proposed method
Methods	PWM, MPPT	MPPT
Algorithm	P & O algorithm	P & O algorithm
Topology	Buck-Boost	Buck
Advance Feature	Not present	Solar Tracker
Efficiency	Up to 80%	Above 90%
Display	Not present	16x2 LCD
Cut-off	Not present	Battery full

Figure 5. Comparison of Existing Methods and Proposed Methods

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