Solar Based Uninterruptible Power Supply by using MPPT

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***Abstract*-In this paper we implement the MPPT algorithm in the solar UPS . Photo voltaic cells which is helps to converts heat energy into electric energy. MPPT is an algorithm which is extract maximum available power from the solar module so that increasing efficiency of the system and give an liner output .There are several limitations in solar power consuming and energy storage As a solution to this problem, SCC with MPPT is needed to extract maximum energy from the solar module and ups provides backup power when your regular power source fails. So that we implement society without polluted and consuming high efficient energy.**

***IndexTerms*- solar, photovoltaic, PWM, MPPT**

I Introduction

Now a day's demand of electricity is increasing and also we use major sources for generating electricity such as petrol, diesel are also create an pollution, costly and also that's are depleting source. So we need an alternative solution that which give an linear at the same time give an efficient energy output. Renewable energy is an best replacement for the kind of issue but the major drawback of renewable source it's an low energy consumption source and efficiency also low compared to petrol and diesel .In this paper give an brief idea about high efficient energy consumption. MPPT is an algorithm which is used in a renewable energy source such as solar, wind to extract maximum power from the solar module under certain conditions. Normally many type controllers in the market but they are give low efficiency and non-linear output and that are efficiently work in normal radiation so that output lowers than the solar panel output .In our project we implement MPPT based solar ups .The MPPT applied a buck converter and Pulse Width Modulation (PWM) signal to keep the load from the module and the load balanced, so the module's output power reaches the maximum efficiency. MPPT which extract maximum available power from solar module increase voltage compare to battery voltage converts voltage into amps store the energy inform of DC in battery inverter circuit which helps to convert DC into AC and connected to load. UPS system store the energy in battery for the future purpose as backup whenever power failure .MPPT system can increase efficiency above 90%of the system and consume 25-35% energy in irradiance level .It give linear output whatever the weather condition may be.

II Existing system

In existing .power loss is very high . Output voltage is not stable it cause device damage .Low efficient in output voltage .Energy storage, harmonics due to low level of converters. Old solar panels are not too smart enough to understand the battery conditions. Non-linear output of solar panels due to the weather conditions. They need to be operated at a particular voltage to harvest maximum available power from module. Their output varies through the day. There is no any prevention for overcharging and reverse current protection .Circuit that cannot cope with a range of input voltages. The conversion efficiency PWM is relatively 30% lower with compared to MPPT.

III Proposed System

In our proposed system we implement MPPT algorithm. Over load, short circuit and reverse power flow protection by using buck converters .Harmonics are reduced by level up converter. Easy to use both hardware and software Linear outputs and high efficiency by MPPT. Utilizing high energy from sun radiation Generate more electricity due to increased direct exposure solar rays. Increases the current to the battery by approximately 25% to 35%. It is equipped with various protections to protect the circuitry from abnormal conditions. It steps the higher solar panel voltage down to the charging voltage of the battery. The Arduino tries to maximize the watts input from the solar panel.

IV Working Principle

The major principle of MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage (MPPT checks output of PV module, compares it to battery voltage then fixes what is the best

power that PV module can produce to charge the battery and converts it to the best voltage to get maximum current into battery. It can also supply power to a DC load, which is connected directly to the battery

V BLOCKDIAGRAM

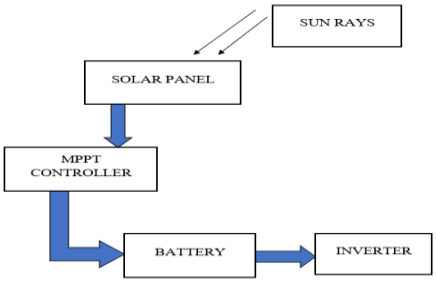

Fig.1 Block diagram of MPPT based solar ups

Above figure shows the block diagram of mppt charge controller system using solar power. This block diagram includes following blocks.

SUN RAYS

The sun is a major source of ultraviolet rays. Though the sun emits all of the different kinds of electromagnetic radiation, 99% of its rays are in the form of visible light, ultraviolet rays, and infrared rays(also known as heat).

SOLAR PANEL

Solar panels are those devices which are used to absorb the sun's rays and convert them into electric city or heat. A solar panel is actually a collection of solar(or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect .

MPPT CHARGE CONTROLLER

The maximum power point tracking (MPPT) is a higher efficient DC-DC converter technology compared to "shunt controller "and" pulse width modulation (PWM)" technologies. Using an on-MPPT charge controller is like connecting the battery directly to the solar module. A traditional charge controller may charge a battery with the voltage that is dictated by the battery. By nature, the voltage of a fully-charged battery is higher than that of a discharged-battery. Consequently, the power drawn by an empty battery is usually lower than that of a full battery.

Fig 2 Hard ware MPPT

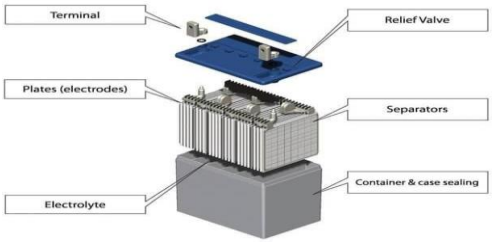

Fig 3 Battery

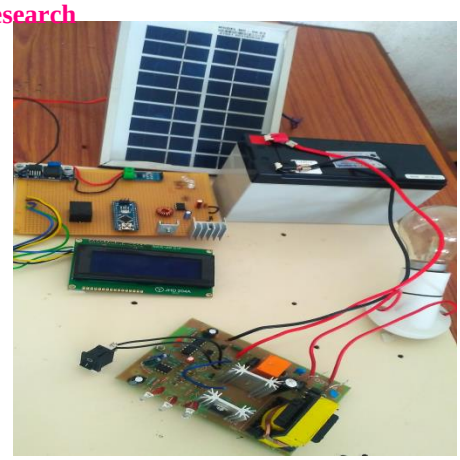

Fig.4 Hardware Model (Prototype)

INVERTER

An inverter converts the DC electricity from sources such as batteries or fuel cells to AC electricity. The electricity can be at any required voltage; in particular it can operate AC equipment designed for mains operation, or rectified to produce DC at any desired voltage. An inverter is an electronic device that changes direct current (DC) into alternating current(AC).

VI Conclusion

The work that has been carried out to the DC-DC converter is limited only by considering high switching frequency. But the output voltage THD values are not improved much so that the research should be carried out in this area ;a filter circuits configuration should be improved. For the inverter circuits, the grid tied inverters are having the problem that if the grid fails, the customer will not get any supply even though there is power generation. This method presented here control lead acid battery charging faster and efficiently. The control algorithm method allow module to operate at maximum power point according to solar irradiation, and match load with the source impedance to provide maximum power. This MPPT model is more suitable because of less cost, easier circuit design. Efficiency of the circuit is increased by MPPT solar charge controller compare to a circuit without MPPT. And also saved the extra energy required in mechanical tracking. As Arduino based controlling is used, it maintained constant 12Vat the output terminal i.e.at the battery terminal.

Reference

1. A. Mathew and A. Immanuel Selvakumar, “MPPT based stand-alone water pumping system,”IEEE International Conference on Computer,CommunicationandElectricalTechnology(ICCCET'11),pp.455–460,TamilNadu, India, March 2011.
2. R.Farandaand S.Leva,“Energy comparison of MPPT techniques for PV systems,” WSEAS Transactions on Power Systems, vol. 3, no. 6, pp.446–455,2008.
3. C. Liu, B. Wu, and R. Cheung, “Advanced algorithm for MPPT control of photovoltaic systems,”in Proceedings of the Canadian Solar Building Conference, Montreal, Canada, 2004.
4. C. Nagarajan and M. Madhswaran, "Analysis and simulation of LCL series resonant full bridge converter using PWM technique with load independent operation", IET-UK International Conference on Information and Communication Technology in Electrical Sciences (ICTES 2007), Proc. IEEE Inf. Commun. Technol. Electr. Sci., pp. 190-195, 2007.
5. S.Sathish Kumar and C.Nagarajan “Performance - Economic and Energy Loss analysis of 80 KWp Grid Connected Roof Top Transformer less Photovoltaic power Plant” in Circuits and Systems Journal, Scientific Research Publication, Vol.7 (6) pp.662-679 May 2016.
6. C.Nagarajan and M.Madheswaran - ‘Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter’ - Journal of Electrical Engineering, Vol.63 (6), pp.365-372, Dec.2012.