Review Paper On Solar Smart Inverter By Using The Solar Tracking, Multilevel Inverter With Pulse Width Modulation And MPPT

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Abstract- *In this era of smart operation of electronic devices has indeed a reactive phenomenal. Improvement in our lives.In this time and age there is a stage of natural resources and hence the shortage of the power supply through this power grid. The solar multilevel smart inverter which is extremely usefull for the domestic life of the usase gose unpretebed and help him interest with inverter in a smart and every way which is blending of the multilevel inverter solar charging and solar tracking .The inverter are predominantely classified in two ways like single level inverter and multilevel inverter has the measure advantages over the single level inverter which is reduced the harmonic distortion RFI generation.*

The multilevel inverter operate on the various voltage level it has usefull for the domastic applionces or multipurase appliences like such as active power filters machine drive for sinusoidal trapezoidal current application by using the pulse width modulation (PWM) we can control the gain of the inverter effectively .In this paper we are designing a solar smart multilevel pulsewidth modulation inverter using Arduino ,MPPT and cascaded H-bridge topology which is increase the efficiency and reliability of the system .The solar tracking done with the help of the stepper motor which is control by the Arduino .The efficiency of solar panel increase by using this type of system which is start automatically when sun rise and tracking the sun by step which is fixed angle by Arduino signal of time delay till the sun set and that solar panel come back to its original position automatically with help of time delay

Keywords- Arduino uno , Multilevel inverter , pulse width moduletiom (PWM) , Stepper motor , H-bridge, MPPT, Solar plate , Battery.

I. INTRODUCTION

The project smart inverter is an inverter system with uninterrupted power supply with basically controls the load that is drawn from the backup battery that is used in the inverter system .A smart inverter must be capable and adaptive to send and reactive message quickly as well as share granular data with the utility and other stakeholder. In this scenario this paper emphasis on solar smart inverter which is blending of smart inverter solar tracking ,(MPPT) maximum power point tracking and solar charging .The solar power system has less power generation efficiency up to 25% to 30% .The main challenge in this project to increase the efficiency of energy generation and energy economic and utility system integration .The energy economic highlights improve the solar power forecasting , reliability and energy harvest of the inverter

In this multilevel inverter we have used H-bridge topology (hybrid bridge topology) , flying capacitor , clamp diode . Here we are using H-bridge topology where switching control is done by the PWM (pulse width modulation) along with the solar tracking ,solar charging and maximum power point tracking of solar smart inverter .The smart inverter gives us an idea of the future and the solution to all above problem we try to the look of usage of smart grids in many parts of the world and the user to get a real time experience of how the inverter works and control the household system

II. PROBLEM STATEMENT

The world demand for electric energy is constantly increasing. And the conventional energy resources are diminishing and are threatened to be depleted. Also the prices are rising and pollution is increasing day by day. And due to the increasing efficiencies and decreasing cost of photovoltaic cells and improvement in switching technology used for power conversion our goal is to design an inverter powered by PV panels and that could supply stand alone AC loads.

III. METHODOLOGY

The basic methodology of the smart inverter system is based upon the Arduino uno , MPPT and PWM technique .The Arduino uno is the open source microcontroller based on the microchip AT mega 328P microcontroller and developed by Arduino .which is decide the operation on working of the smart inverter system .We have explain in detail below

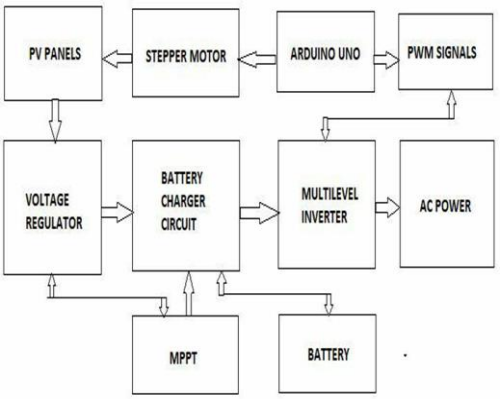

Fig 1. Proposed solar smart inverter.

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Solar tracking:-

The project is designed using simple dual axis solar tracker system. In order to maximize energy generation from sun, it is necessary to introduce solar tracking systems into solar power systems. A dual-axis tracker can increase energy by tracking sun rays from switching solar panel in various directions. This solar panel can rotate in all directions.. This system is powered by Arduino, consists of stepper motor, temperature and humidity sensor.

MPPT (Maximum power point tracker) :-

An MPPT is electronic DC to DC converter that optimizes the match between solar array means the photovoltaic panels and the battery bank. To put it simply they convert

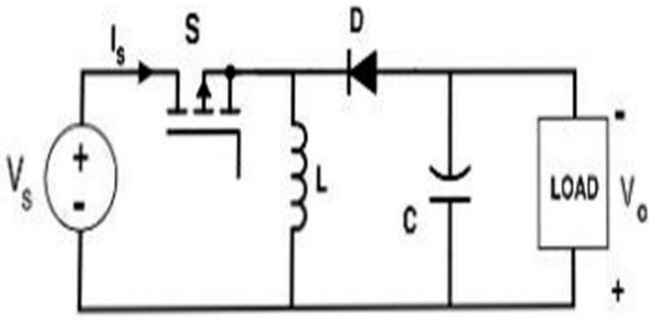

Fig 2. Buck – Boost converter

higher voltage DC output from the solar panels down to the lower voltage needed to charge the battery

PWM (Pulse width modulation):-

This technology is used in inverter to give steady output voltage 230V AC or 110V AC . irrespective of the load the inverter based on the PWM technology are more superior to conventional inverter. And the use of MOSFET at output stage and PWM makes this inverter ideal for all types of load. Although this modulation technique is used to encode the information for transmission. Its main use to allow the control of the power supplied to electrical devices. Especially to inertial loads such as motors. The average value of voltage and current is fed to the load is control by switching between the supply and load. The term duty cycle describe the proportion of ON time to the regular interval,

A low duty cycle corresponds to the low power , because power is OFF for most of the time. The duty cycle expressed in percentage 100% being fully on when switch is OFF othere is practically no current and when ON there will be a power transferred to the load. The main advantage of switching technology is power loss in the switching device is very low.

Arduino UNO board:-

The arduino is microcontroller board based on Atmega328p data. It has 14 digital input and output pins, from which 6 pins used PWM output and 6 pins used analog output. the clock speed is 16MHz. ceramic resonator ,USB connection, power jack, ICSP header and reset button is there.

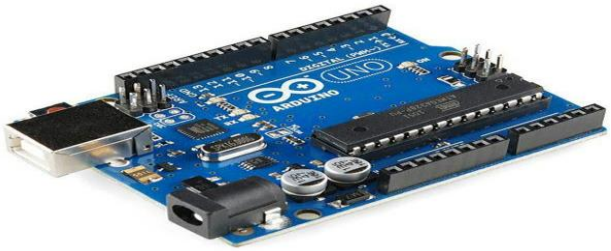

Fig 3. Arduino Uno

- Microcontroller Atmega328p 8-bit AVR family
- Operating voltage ; 5V DC
- Input voltage; 7-10 V DC
- Digital I/O; 14 , 6 PWM
- S RAM ; 2KB
- EE RAM ; 1KB
- Flash memory; 32K

- Clock speed; 16 MHz
- Power (idle); 50mA
- Size ; 2.7”×2.1”

Multilevel inverter:-

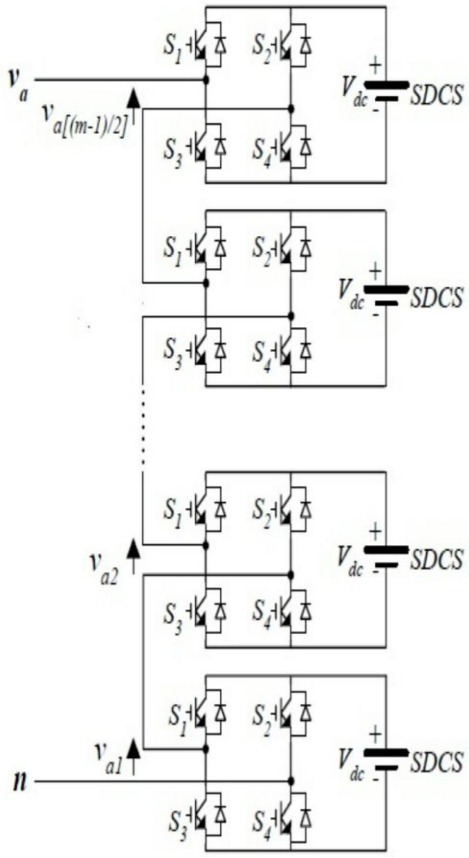

Fig 4. H-bridge topology

Five H-bridge circuit to get eleven five of AC voltage by PWM switching scheme powered by five separate DC source together constitute multilevel inverter. A single-phase structure of an m-level cascaded inverter is illustrated in Figure Each separate dc source (SDCS) is connected to a single-phase full-bridge, or H-bridge, inverter. Each inverter level can generate three different voltage outputs, +V dc, 0, and −V dc by connecting the dc source to the ac output by different combinations of the four switches, S1, S2, S3, and S4. To obtain +V dc, switches S1 and S4 are turned on, whereas -Vdc can be obtained by turning on switches S2 and S3.By turning on S1 and S2 or S3 and S4, the output voltage is 0. The ac outputs of each of the different full-bridge inverter levels are connected in series such that the synthesized voltage waveform is the sum of the inverter output. he number of output phase voltage levels m in a cascade inverter is defined by m = 2s + 1, where s is the number of separate dc sources

Photovoltaic cell:-

Fig 5. Photovoltaic panel

A PV module consist of solar cell circuit sealed in an environmentally protective laminate. And are the fundamental building blocks of the PV system generally sizes from 60W to 170 W usually a number of PV modules are arranged in a series and parallel to meet the energy requirement.

IV. CONCLUSION

In this paper, a new solar smart inverter system is proposed for small scale application which is the latest achievement in the power electronics wing. Solar cell movement system developed will move the panel from 180 degree east to west and returned to initial position after sunset. The common ground problem is eliminated by using separate battery, to charge randomly. The main objective of this paper is to produce sinusoidal wave form with minimum distortion from separate DC source by using multilevel inverter. Solar Smart Inverter has a great significant to energy savings and utility system integration. By using MPPT extracting the maximum power available at PV module under certain conditions making them operate at most efficient voltage.

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