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OFF GRID POWER SUPPLY BY USING MAXIMUM POWER POINT TRACKING

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ABSTRACT: This project OFF GRID POWER SUPPLY BY USING MAXIMUM POWER POINT TRACKING is developed to provide maximum power supply and increase efficiency and pv system.
One technology to generate electricity from renewable resources is to use solar cells to convert solar irradiance into electricity. Currently, photovoltaic (PV) energy generation has a great commercial and academic interest. Recent studies indicate that in the medium to longer term PV generation may become technically and commercially worldwide feasible to be implemented for electricity generation.
The main purpose of this report is to supply power in off grid condition by using maximum power point tracking in pv solar system. The grid connected PV system converts sunlight directly into ac electricity to supply local loads and inject the excess energy to the public grid. The main purpose of the system is to reduce the electrical energy imported from the electric network. The dc output of the PV array is converted into ac and injected into the grid through an interfacing inverter. The controller of this system implements all the main regulation and protection functions such as:- Maximum Power Point Tracking (MPPT), protection relay.
New opportunities exist for deploying switched power electronic circuits with fresh thinking
About the role and use of energy storage components During the course of this research, we have explored the application of new power electronic approaches for cell level processing,
And for array configuration and MPPT tracking This report presents some of the results from
This work

INTRODUCTION

Maximum Power Point Tracking (MPPT) is used in photovoltaic systems to maximize the photovoltaic array output power, irrespective of the temperature, irradiation conditions and electrical characteristics of the load .To increase the efficiency of PV systems, maximum power point tracking of the solar arrays is needed.**MPPT** or **Maximum Power Point Tracking** is algorithm that included in charge controllers used for extracting maximum available power from PV module under certain conditions. The voltage at which PV module can produce maximum power is called 'maximum power point' (or peak power voltage).
The main difference between the method used in the MPPT system and other techniques used in the past is that the PV array output power is used to directly control the DC to DC converter, thus reducing the complexity of the system.
Maximum Power Point Tracking is electronic tracking - usually digital. The charge controller looks at the output of the panels, and compares it to the battery voltage. It then figures out what is the best power that the panel can put out to charge the battery. It takes this and converts it to best voltage to get maximum AMPS into the battery. (Remember, it is Amps into the battery that counts). Most modern MPPT's are around 93-97% efficient in the conversion. You typically get a

20 to 45% power gain in winter and 10-15% in summer. Actual gain can vary widely depending weather, temperature, battery state of charge, and other factors.

MAXIMUM POWER POINT TRACKING DESCRIPTION

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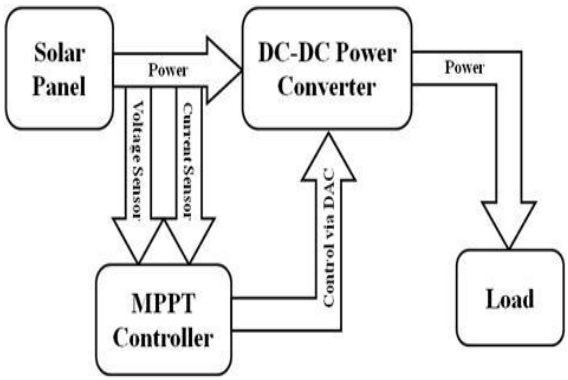
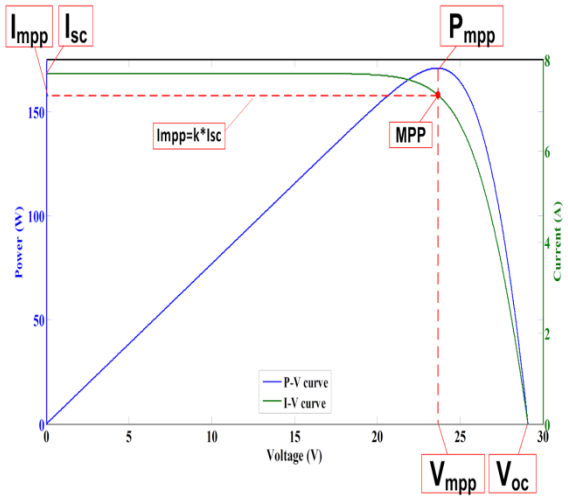
BLOCK DIAGRAM



PERTUBE AND OBSERVE

In this method the controller adjusts the voltage by a small amount from the array and measures power; if the power increases, further adjustments in that direction are tried until power no longer increases. This is called the perturb and observe method and is most common, although this method can result in oscillations of power output. Itis referred to as a hill climbing method, because it depends on the rise of the curve of power against voltage below the maximum power point, and the fall above that point. Perturb and observe is the most commonly used MPPT method due to its ease of implementation. Perturb and observe method may result in top-level efficiency, provided that a proper predictive and adaptive hill climbing strategy is adopted.

MAXIMUM POWER POINT CURVE



WORKING

The major principle of MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage (maximum power point).

MPPT checks output of PV module, compares it to output voltage then fixes what is the best power that PV module can produce to operate the output and converts it to the best voltage to get maximum current into output.

When the MOSFET is ON

When the MOSFET is ON, current flows through the inductor (L) , load (R) and the output capacitor (C). In this condition the diode is reverse biased. So no current flows through it. During the ON state magnetic energy is stored in the inductor and electrical energy is stored in the output capacitor.

When the MOSFET is OFF

When the MOSFET is off, stored Energy in the Inductor is collapsed and current complete its path through the diode (forward biased).When stored energy in the inductor vanishes, stored energy in the capacitor is supplied to load to maintain the current.

A buck converter is a DC - DC converter in which the output voltage is always lower or same as the input voltage.

COMPONENTS

MICROCONTROLLER PIC16F876A

The PIC16F876A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 5 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC architecture into an 28-pin package.

VOLTAGE REGULATOR

We are using IC7805 voltage regulator in sensing circuit.

IC 7805 is a 5V Voltage Regulator that restricts the voltage output to 5V and draws 5V regulated power supply. It comes with provision to add heat sink.

The maximum value for input to the voltage regulator is 35V. It can provide a constant steady voltage flow of 5V for higher voltage input till the threshold limit of 35V. If the voltage is near to

7.5V then it does not produce any heat and hence no need for heat sink. If the voltage input is more, then excess electricity is liberated as heat from 7805.

OPTOCOUPLER

An **opto-isolator**, also called an **Opto coupler**, **photo coupler**, or **optical isolator**, is a component that transfers electrical signals between two isolated circuits by using light. Opto-isolators prevent high voltage from affecting the system receiving the signal.

An opto-isolator contains a source (emitter) of light, almost always a near infred light-emitting diode (LED), that converts electrical input signal into light, a closed optical channel (also called dielectrical channel), and a photo sensor , which detects incoming light and either generates electric enerrgy directly, or modulates electric current flowing from an external power supply. The sensor can be a photoresistor, a photodiode, a phototransistor, a silicon-controlled rectifier (SCR) or a triac. Because LEDs can sense light in addition to emitting it, construction of symmetrical, bidirectional opto-isolators is possible. An opt coupled solid state relay contains a photodiode opto-isolator which drives a power switch, usually a complementary pair of MOSFETs.

OPERATIONAL AMPLIFIER

An **operational amplifier** (often **op-amp** or **op amp**) is a DC-coupled high-gain electronic voltage **amplifier** with a differential input and, usually, a single-ended output.

Operational amplifiers are linear devices that have all the properties required for nearly ideal DC amplification and are therefore used extensively in signal conditioning, filtering or to perform mathematical operations such as add, subtract, integration and differentiation. rental input and, usually, a single-ended output.

BRIDGE RECTIFIER

A **diode bridge** is an arrangement of four (or more) diodes in a bridge circuit configuration that provides the same polarity of output for either polarity of input.

When used in its most common application, for conversion of an alternating current (AC) input into a direct current (DC) output, it is known as a **bridge** rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.

ADVANTAGES AND DISADVANTAGES

Advantages:

1. Improved Efficiency
2. Sustained system, no frequent collapse of PV power.
3. Increased running time.
4. Has played a major role in popularizing solar power.

Disadvantages:

1. Dependency on specialized and accurate sensors (Voltage and/or Current sensors)

CONCLUSION

In this project an electrical solar system was developed to the efficiency of the solar panel and gives desired output. With this project, we can use the MPPT to increase the efficiency of the PV array according to load. Our proposed system helps to give output to load in any weather condition its gives rise to 20-30% of efficiency of solar array by using MPPT.

After the survey on the approaches used in various solar panel based sign institution, road light, home appilnace recognition systems, we can give an opinion about the methodologies and algorithms involved. Most of the times, a combination of different methods and algorithms has to be used to achieve a moderate to acceptable rate of recognition. For . A system which gives maximum efficiency, has low cost, and is an optimal mixture of methods, giving results against low intensity, should be preferred. From a technical point of view, there is a vast scope in future

for research and implementation in this very field. The upcoming years could witness a combinatorial explosion of different methodologies.

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