BATTERYLESS POWER SUPPLY USING PV CELLS AND MPPT

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ABSTRACT

The main objective of our project is to enhance power from renewable sources (solar). A photovoltaic silicon cells are embedded in a lamination sheet consisting of 40 solar modules, heat generating a voltage of 1.2v DC for continuous power generation all the modules are connected in series to generate a voltage of 63v DC. The voltage is amplified by means of buck boost converter which compresses 63v to 20v DC. The circuit amplifies the current of 500mamps to generate a proper load, solar is abundant in nature. The motto of our project is to give the load directly without the means of battery. We conclude that our project gives an output of 12v-50w output. The energy consumed by the load and the balance energy will be transmitted to electrical DB to store the energy. A display driver is implemented to monitor the voltage current power import and export. To see the exact values generated and displayed through LCD. A voltage and current sensors are connected as input to the display driver the power supply of 5v is given to the input of display driver. This electronic circuits is only meant for monitoring the values generated from our PV cells.

Keyword -*Current sensors, Display driver, Electrical DB, Power generation, Photovoltaic silicon cells, Renewable sources.*

1. INTRODUCTION

Sun is the primary source of Energy. The earth receives 16 x 10^{18} units of energy from the sun annually, which is 20,000 times the requirement of mankind on the Earth. Some of the Solar Energy causes evaporation of water, leading to rains and creation of rivers etc. Some of it is utilized in photosynthesis which is essential for sustenance of life on earth. Man has tried from time immemorial to harness this infinite source of energy. But has been able to tap only a negligibly fraction of this energy till today.

The broad categories of possible large scale applications of solar power are the heating and cooling of residential and commercial buildings.

A. The chemical and Biological conversion of organic material to liquid solid and gaseous fuels.
B. Conversion of solar energy to Electricity.
In this project we use the solar energy for the generation of electrical energy, by using solar cells.

The solar cell receives the solar energy. The solar cells operate on the principle of photovoltaic effect, by using solar cells. Basically the cells are placed in an open and fixed manner.

2. RELATED WORK

In this section we review the various concepts and approaches that are dealt in this system to get the clear perspective view of methods of generating energy from the PV cells.

2.1 Solar powered dc to dc buck-boost converter with MPPT control

This paper discusses the solar powered dc to dc buck boost converter which can work in both buck mode and in boost mode according to the requirement. It requires only two switches and by properly controlling the switches, buck or boost mode can be achieved. The dc to dc converter model is programmed in MPPT mode using optimal duty ratio to achieve maximum output. The performance of the complete system model under varying isolation levels of solar panel is discussed.

2.2 Wireless power transmission compare and contrast with the form of resonance frequency, mutual inductance and solar energy

The topic of the thesis is about the wireless power transmission. The details of wireless power, its several elements, their application and working principles are described here. There are also details description of mutual inductance, resonance frequency and solar energy. As a result of an increase in consumer demand for electronic devices, many researchers have begin to develop technology that could power these electronic devices without the use of wires. Even today's most technologically advanced innovations are bound by a relatively short battery life. Through magnetism, resonance, or microwaves many different avenues exist for research and development in regard to wireless power. We will use our paper as an opportunity to investigate different technologies and review them based on their merits. Consumer devices need to accomplish a task not only cheaply but also safely. This paper will allow a better understanding of the exact science behind wireless power transmission. Also it will show how this science relates to products and their environment.

2.3 Conversion Efficiency and Power Output:

The maximum energy in radiation that is capable of producing free electrons and holes in silicon is only about 45%. The maximum practical efficiency for conversion of solar energy into electrical energy in a silicon solar cell is estimated to be about 10%

$$\text{Conversion Efficiency} = \frac{\text{Amount of electricity produced}}{\text{Total input of solar energy radiation}} \quad (1)$$

The power output of any generator of electricity, including a photovoltaic cell is equal to the product of the voltage and current is expressed in equation 1.

3. PROPOSED SYSTEM

SYSTEM ARCHITECTURE

SOLAR PANEL

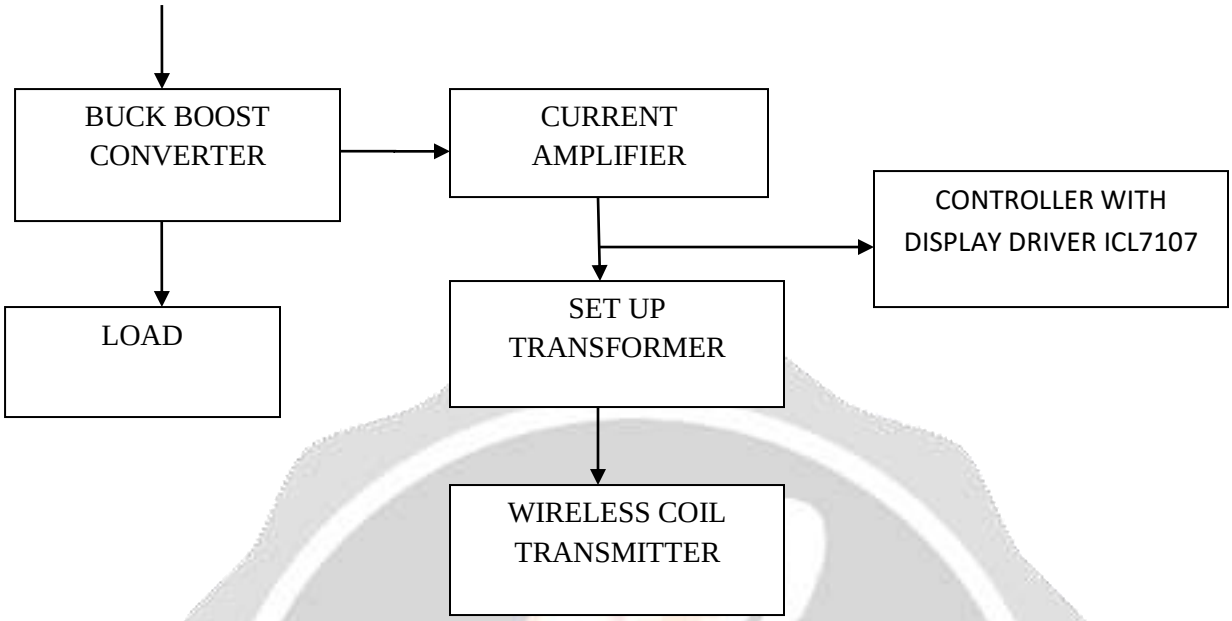

FIG 1:System architecture

ELECTRIC DB SECTION

FIG 2:Transformation process

3.1 SOLAR PANNEL

A photovoltaic silicon cells are embedded in a lamination sheet consisting of 40 solar modules, heat generating a voltage of 1.2v DC for continuous power generation all the modules are connected in series to generate a voltage of 63v DC. The voltage is amplified by means of buck boost converter which compresses 63v to 20v DC. The circuit amplifies the current of 500mamps to generate a proper load. It is represented in Fig1.

3.2 BUCK BOOST CONVERTER

The solar produces the voltage of 63v DC cannot be fed directly to the output. So we have to include BBC (Buck Boost Converter) for buck and boost of the solar voltage for eg.The solar power is 60v it bucks the voltage to 13.5v to keep the voltage level constant simultaneously the current is also amplified to 500mamps.

The voltage level decreases below 12v it amplifies (boost) the voltage to 13.5v. this will happen only when battery is connected to the output.

3.3 CURRENT AMPLIFIER

The voltage which generates through the pv cells. Is amplified using current amplifier to amplify the voltage to current for instance. The voltage is amplified by means of buck boost converter which compresses 63v to 20v DC. The circuit amplifies the current of 500mamps to generate a proper load.

3.4 WIRELESS COIL TRANSMITTER

Input voltage to the wireless coil is 12v DC. This DC voltage is stepped by means of a step up transformer with a power booster to eliminate the unwanted spikes. A optocoupler is implemented to transmit the voltage without any distortion. The output of the step up transformer downs to DC 12v. where the power is also amplified and transmit the value to the receiving end has 12v DC. Its been represented in Fig2.

3.5 CONTROLLER WITH DISPLAY DRIVER ICL7107

The ICL7107 is a seven segment display driver to display the voltage generated by the solar. It comprises of a voltage comparator a negative regulator and a variable potentiometer. Which is calibrated according to the input level. This IC is a common emitter follower.

4. EXPERIMENTAL EVALUATION

The main motto of our project is to generate energy from the renewable resources which was given to the load (household connection). Excess energy which was not used was transferred to the electric DB. And based on analysis , it's been found that this system is accurate for 85% process.

5. CONCLUSION

This project which was enhanced with the scope of conserving the conventional fuels is successfully completed. The main objective, to increase the usage of renewable energy source for power generation is perfectly implemented. Taking into consideration the future energy scenario in the world, solar energy would be a major energy source. The project would be a mini encyclopedia for those who want to implement the above system.

6. REFERENCE

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