An Efficient KY Converter with ANN Controller for DC Applications

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ABSTRACT

In this project, an Efficient KY Converter with ANN Controller for DC Applications. AKY converter is implemented for increasing the PV system's low DC output voltage and an ANN Controller is employed to control the converter's operation for generating a controlled output. Subsequently the output of the solar PV system is influenced by the accessibility of temperature, sunlight and climatic conditions, a suitable storage battery is necessary to store the excess electricity generated. After the verification of the proposed method using MATLAB simulation, improved results are obtained.

Keywords: Solar PV Panel, DC-DC KY Converter, ANN Controller, PWM Generator.

1 Introduction

Every country's energy usage rises in line with its expanding economy and population. Countries must increasingly rely on utilizing energy from renewable resources, such as tidal, wind, biomass and solar to mention a few, due to the exhaustion of fossil fuels and their harmful effects on the atmosphere. Utilizing solar energy has become much simpler and more available than other techniques. Therefore, solar photovoltaic (PV) technology has a huge, proven potential. Quantified semiconductor diodes are used in PV cells to convert solar light openly into direct current (DC) voltage. PV technologies are used in both off-grid linked and grid-connected applications because they are reasonable, humble to install. In utility-scale PV technology applications, PV cells are more exactly coupled in series-parallel configurations to make PV modules, which when assembled together to form a PV array, are capable of supplying the requisite quantity of power to necessary loads. The solar panel design is the most critical aspect of the PV application. The laboratory investigations use a complete mathematical model of solar panels. By altering the PV system's temperature and solar insolation factors, the panel model is put to the test.

2 Solar Panel

An assemblage of photovoltaic cells mounted on a framework for installation is referred to as photo-voltaic (PV) module, solar cell panel and solar electric panel. Direct current power is produced by solar panels by harnessing solar energy. Solar panels capture sunlight and use it to create power. Inverter, charge and battery controller selection all affect solar panel performance. As an illustration, we must utilize a 12V battery, if we select a 12V PV panel respectively. With a 24V solar panel, a 24V battery be used. One significant thing to keep in mind is that, even if a 24V battery is not yet commercially obtainable, then it will be manufacture one by sequentially relating two 12V batteries. It runs in buck mode during the night because when load power is higher than output power. The battery obtains power from the load because there is no irradiation, which causes the S1 switch to turn off and the battery side boost circuit to turn ON. So the load could get electricity from both battery and the PV panel, the bidirectional converter operated as intended.

3 Dc-Dc KY Converter

To make the KY converter, a KY converter was coupled to a boost converter. One output capacitor Co, diode D, Li1, Li2 two input inductors, one output inductor Lo and a support capacitor Cs are used to construct a dual KY converter. There are also M1, M2, M3, M4 are four switches. The KY converter has support from the depository capacitor Cs, which stands between it and the boost converter was resolved concurrently by the conventional. At the yield, the DC voltage with multiple inputs is 12V and 110V. The switches for M4 and M1 are off, however M3 and M2 are turned on. Due to forward bias, Cs is released when the diode D conducts. However, the voltage across Lo is Vo minus VCs, demagnetizing Lo as a result. In this case, the voltage across Li1 is V1, charging Li1. Furthermore the current going via Co is also equal to ILo less the current passing over RL.

4 Ann Controller

To obtain the required switching signals, the approach called ANN is introduced. It has the potential of providing an enhanced methodology for deriving nonlinear models. It possesses the self-adapting capability, which is suitable for handling the parameter variations, uncertainties and nonlinearities. Because of the ability of generalization and learning, it is generally utilized for identification. The ANN controller is utilized for rapid estimation and generation of reference voltage.

5 PWM Generator

The switch in the Landsman converter receives the pulse width modulated signal from the PWM generator. Essentially, a PWM generator divides the average power reduction into separate components. The load side's average voltage and current figures are delivered when the switch is left on for longer than it is off. The power delivered will be more because of this extended ON duration. To achieve high peak power levels, the PWM generator is fed by an MPPT controller based on FLC. The PWM generator's principal job is to create pulse width modulated gate pulse signals, which are then sent to the switch inside the Landsman Converter.

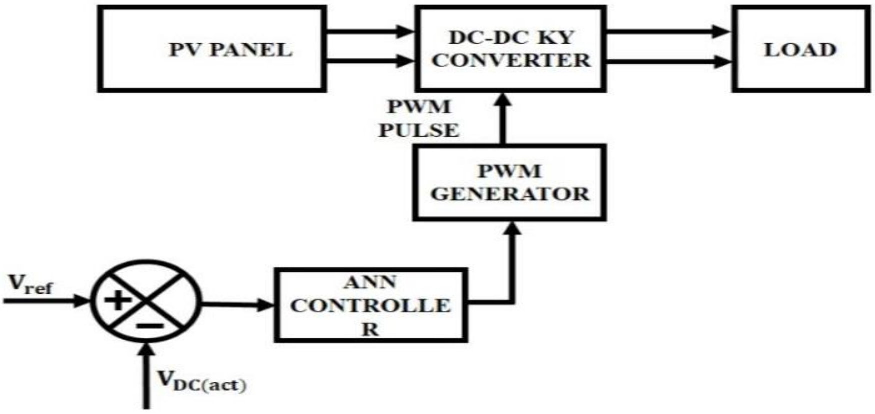

Figure 1: *Block Diagram*

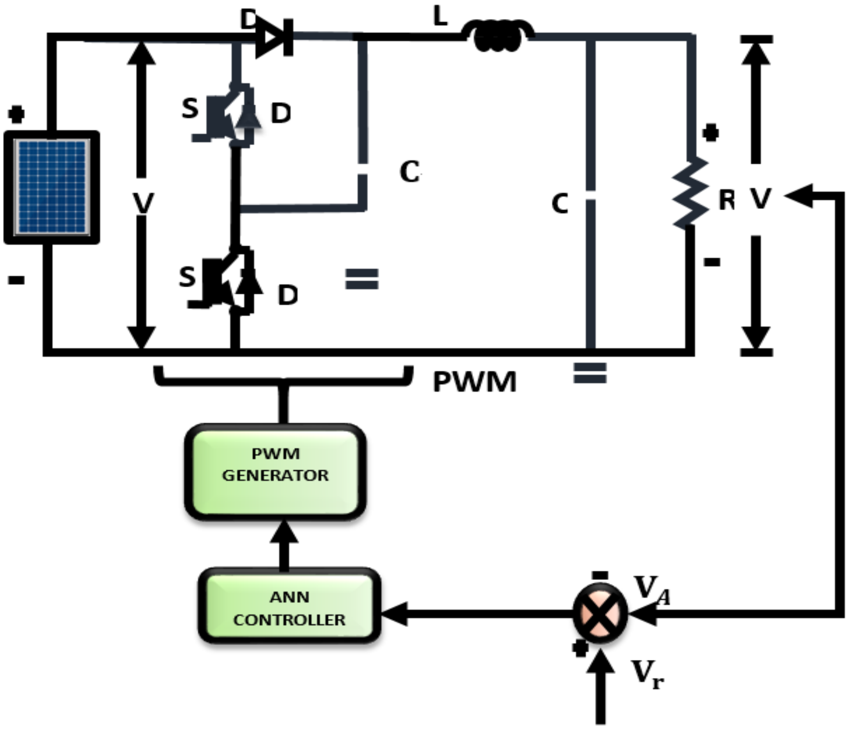

Figure 2: *Circuit Diagram*

6 Experimental Analysis

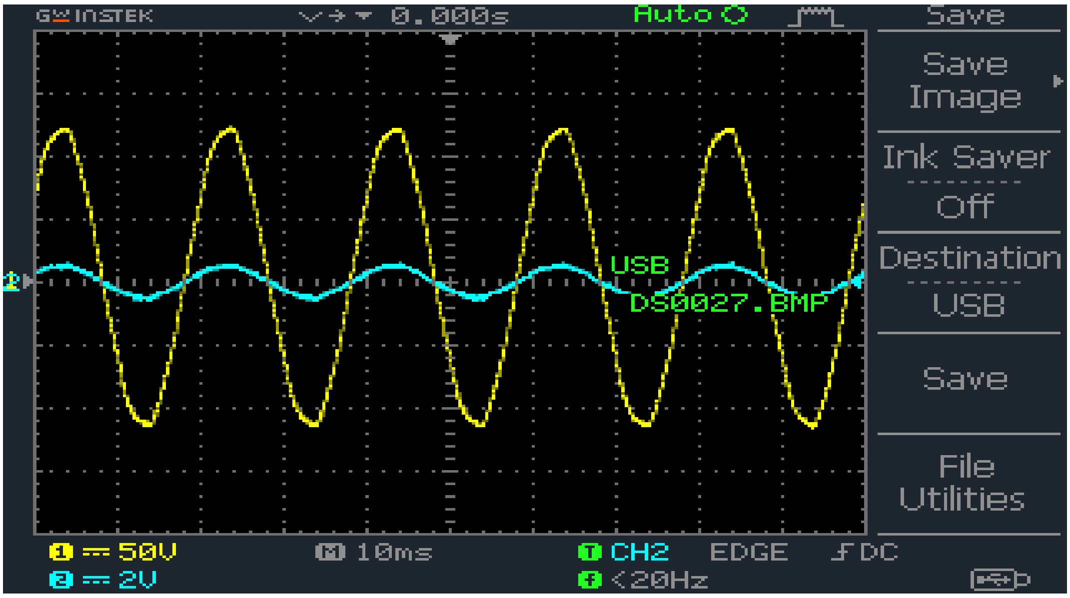

Figure 3: *Input AC supply Waveform*

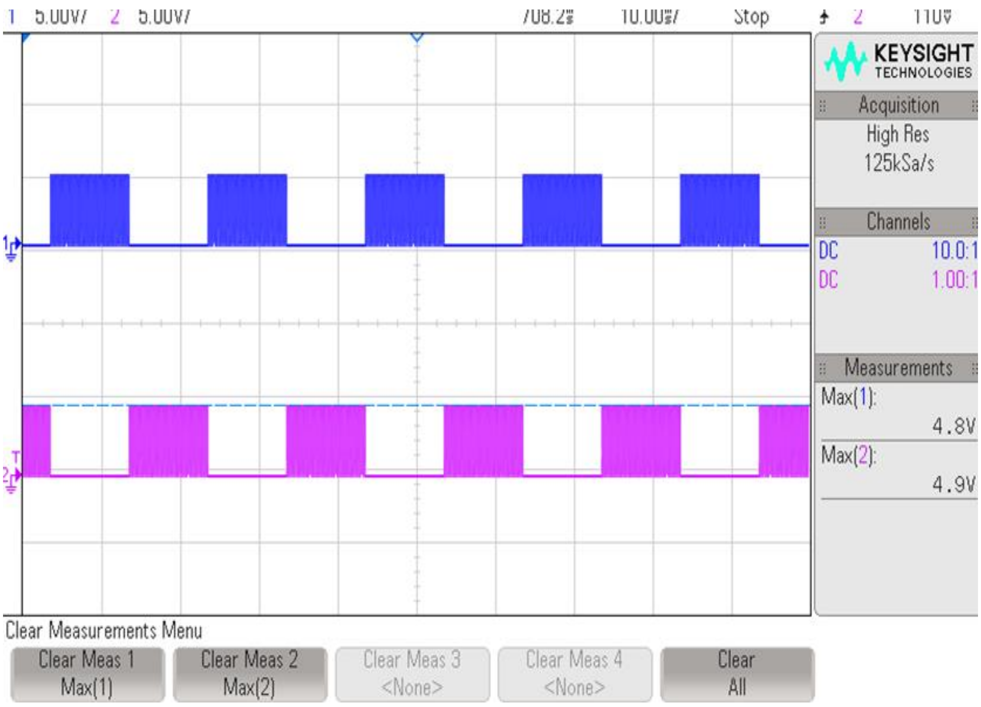

Figure 4: *PWM Pulses to the Converter*

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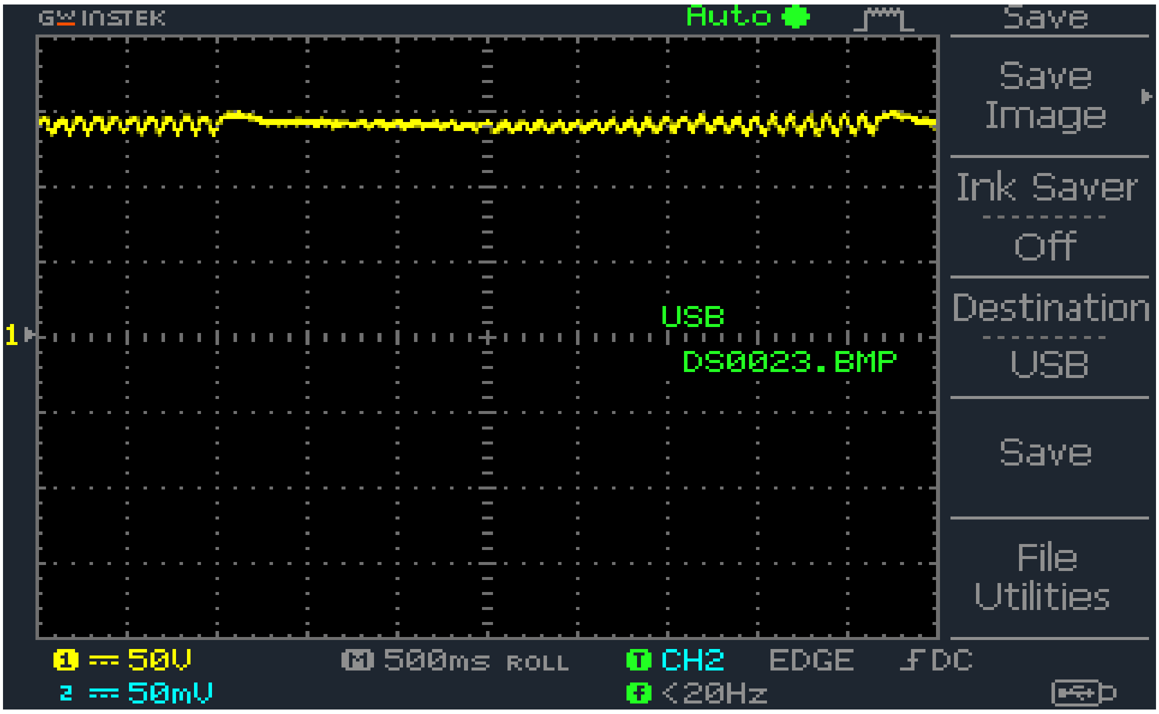
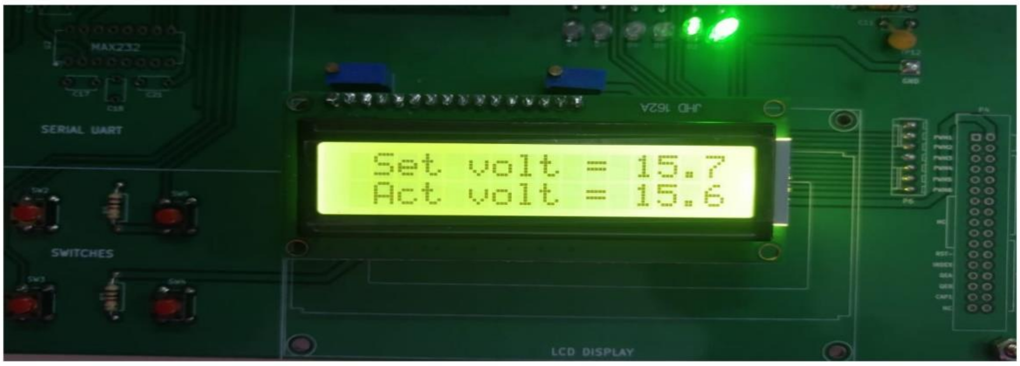
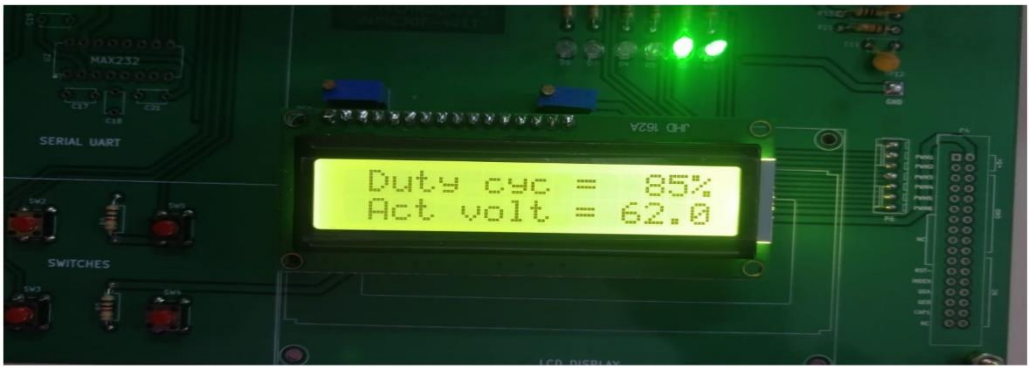


Figure 5: *Converter Output DC Voltage Waveform*

7 Result Discussion





8. Conclusion

Through this paper, for an effective KY converter with PI controller a PV system load is anticipated. Subsequently the PV system's output voltage is inefficient, it is fed into a KY converter, which produces an output voltage that is boosted and has the same polarity as the input voltage. The converter delivers better voltage gain with reduced switching losses while operating without taking into account changes in irradiance level. In order to satisfy the rising energy demand and guarantee a continuous supply. The PV system and wind energy conversion system are combined. As a result, the proposed system offers reduced distortion and increased power quality with grid synchronization.

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