Analysis of Multi Level Inverter

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Abstract— Renewable energy systems, such as solar energy conversion and wind power generation, are playing a more important role in energy production. However, the output power of PV and WPG are strongly fluctuate due to the randomness and intermittence of solar and wind energy, when the system works in stand-alone mode, it requires a large capacity of energy storage to satisfy the load demand and when the system works in grid-connected mode the results is strong impact on the utility grid. In this system going to utilize that two combined generation using mppt concept. Using mppt technique charging and discharging the battery based on power generation and typical load demand conditions respectively. And more over based on load condition relays are switched on for adding additional power source (solar or wind turbine) in order to compensate the load demand. Here switching is carried on wise fully based on maximum power derived from additional source.

Key words: Photovoltaic, Wind Power Generation, SoC

I. INTRODUCTION

Increasing industrializing growing population and the man kinds craving for more and comfort have resulted in a consistent rise in the demand for electricity. To meet this escalating demand, the number of conventional power generating stations has increased drastically, causing enormous stress on the existing infrastructure. This has led to a rapid depletion of conventional fuel reserves.

On the other hand, growing concerns about the harmful effects of conventional fuels on the environment have further complicated the issue and have forced man kind's attention toward renewable energy sources, such as solar photovoltaic(PV), wind, fuel cell stack, biomass, tidal energy, etc., to supplement the growing need of electric energy. our source for power protection has been detoriating, still our expectation for power has been growing. By using our project we can improve the efficiency of the protection of electricity through renewable resources.

II. LITERATURE SURVEY

The following literature surveys for the current report consist of various papers on hybrid system published in the IEEE conferences and the journals.

E. Muljadi, C.P. Butterfied presented a paper about that how wind variable speed operation with pitch control. They also discussed about control the maximum energy by minimizing the loads and the medium speed generator are control the wind turbine speed at high speed the wind turbine control the power production. Two method can be used to control the power first is pitch control and second is generator control load. It show that wind turbine operated to optimizing energy capturing and used to control the various wind speed.

Mohammed Zakir Hossain and A.K.M. sadrul Islam presented a paper about PV-wind hybrid system modelling for remote rural application. A PV-wind hybrid model has been developed to simulate a stand-alone power system with battery storage. The model has been applied to a typical consumer peak load of one KW at a remote community in Bangladesh. Using the model, different parameters are evaluated for one-year of full operation of the system.

Jose Rodriguez, Jin-sheng Lai and fang zhang presented paper about inverter is a power electronic device which converts dc power into ac power at required voltage and frequency. In power demand satisfaction, two-level inverter topology is difficult to fulfilled requirement of medium voltage in industries. To overcome this multilevel inverter have been introduced and for high-power and medium-voltage energy control. Multilevel inverter is also used to decrease the harmonic distortion in the output waveform without decreasing the inverter power output.

A. Existing System

Electricity generation from wind energy and its integration with power grid is a well-established technology. Wind farms with doubly fed induction generators (DFIGs) are time-tested systems for widely varying wind velocity-based variable speed turbine systems. Various control schemes have been developed to enhance the performance of wind-sourced DFIG systems, including those for distorted grid conditions, weak area electric power system. In contrast with the DFIG integrated wind energy source, the inverter driven, inertia less PV-grid interfaces result in complex penetration issues such as poor line voltage profile, reduced dynamic stability, voltage fluctuations, and large injected power variations.

III. PROPOSED SYSTEM

Renewable energy systems, such as photovoltaic (PV) and wind power generation (WPG), are playing a more and more important role in energy production. However, the output power of PV and WPG are usually strongly fluctuant due to the randomness and intermittence of solar and wind energy, which requires a large capacity of energy storage to satisfy the load demand when the system works in stand-alone mode, and results in a strong impact on the utility grid when the system works in grid-connected mode. Here we are going to utilize that two combined generation very wisely using mppt concept; and there by using mppt technique we are charging and discharging the battery based on power generation& typical load conditions respectively.

A. Block Diagram

The block diagram of proposed system is shown in below figure. Renewable energy systems, such as photovoltaic (PV) and wind power generation (WPG), are playing a more and more important role in energy production. However, the output power of PV and WPG are usually strongly fluctuant due to the randomness and intermittence of solar and wind energy, which requires a large capacity of energy storage to

satisfy the load demand when the system works in stand-alone mode.

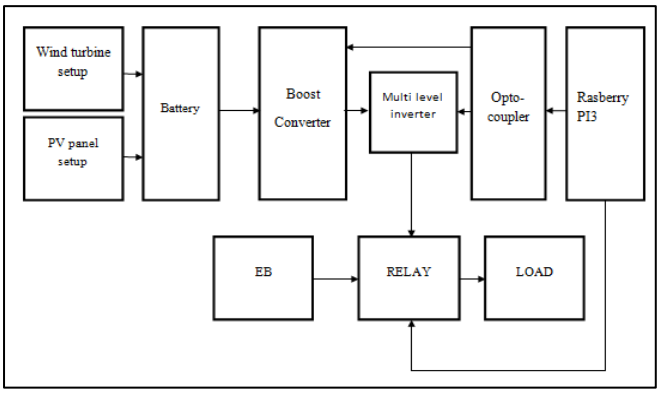

Fig. 3.1: block diagram of the proposed system

Due to which battery life is increased. And amore over based on load condition relays are switched on for adding additional power sources in order to compensate the load demand.

B. Multilevel Inverter

The main objective is to improve the quality output voltage of the multilevel inverter with reduced number of switches. An important issue in multilevel inverter design is that to generate nearly sinusoidal output voltage waveform and to eliminate lower order harmonics. A key concern in the fundamental switching scheme is to determine the switching angles in order to produce the voltage with fundamental frequency.

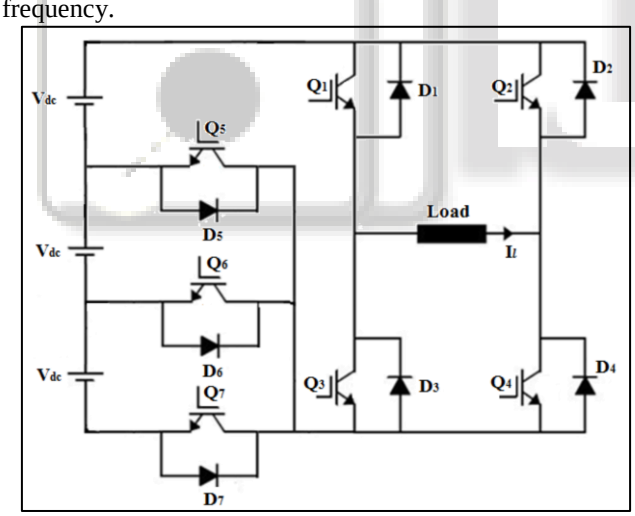

Fig. 3.2: Proposed Power circuit for 7-level inverter

C. Hardware

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support.

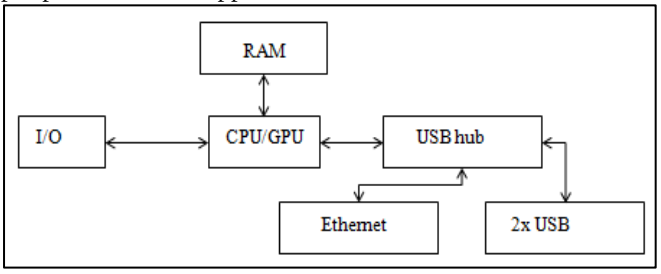

Fig. 3.3: Components of PIC controller

This block diagram depicts Models A, B, A+, and B+. Model A, A+ and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the Pi Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port.

IV. MODELING & SIMULATION

MATLAB has several auxiliary toolboxes distributed by Math works, Inc., which are identification toolbox, the optimizing toolbox and the control system toolbox. These toolboxes are collections of m-files that have been developed for specializing applications. It works with MATLAB to offer modelling, simulating, analysing of dynamical systems under a graphical user interface (GUI) environment .The construction of a model is simplified with click and drag mouse operations. Simulink includes a comprehensive block library of toolboxes for both linear and nonlinear analysis. Models are hierarchical, which allow using both top-down and bottom-up approaches. As simulink is an integral part of MATLAB, it is easy to switch back and forth during the analysis process and thus user may take fill advantages of features offered in both environments.

A. Circuit Diagram

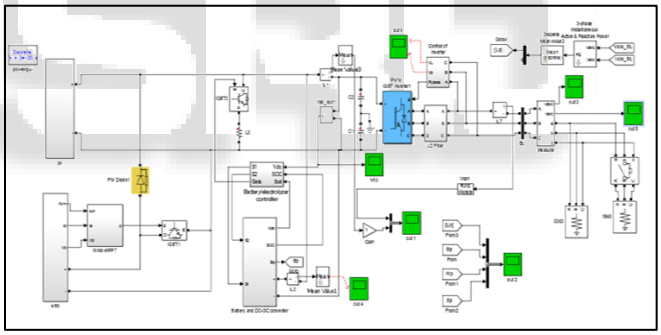

Fig 4.1 Circuit diagram for seven level inverter

B. Output Waveform

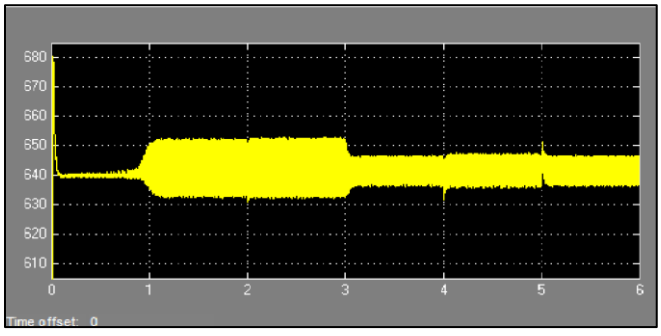

Fig. 4.2: Waveform diagram for Vdc output

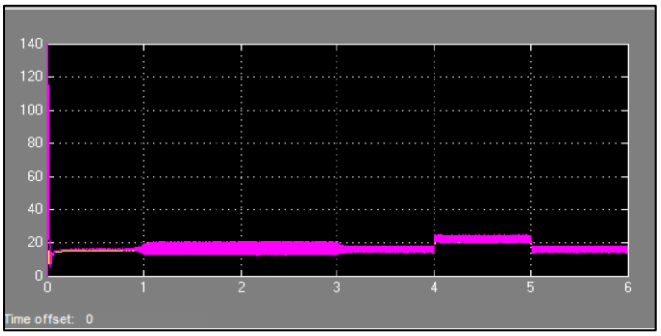

Fig. 4.3: Waveform diagram for out1

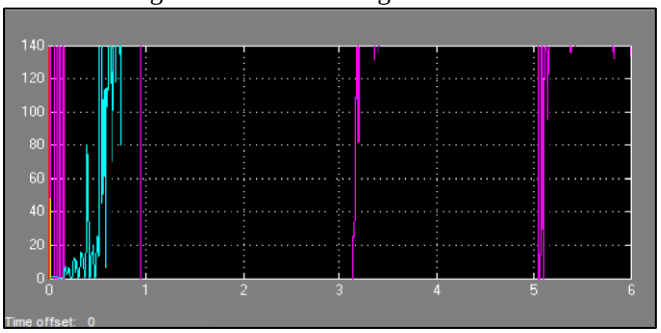

Fig. 4.4: Waveform diagram for out2

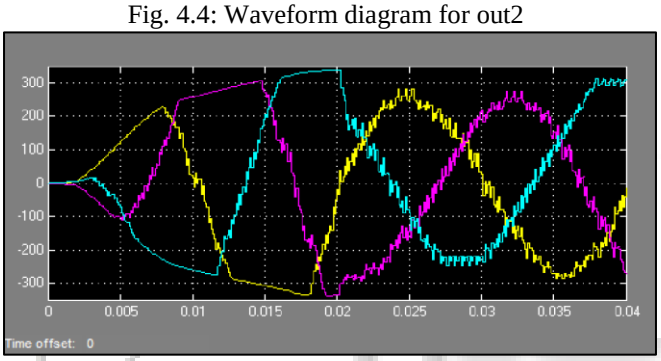

Fig. 4.5: Waveform diagram for out3

V. CONCLUSION

In this conformation, the proposed system confers a grand integration of the wind turbine and solar photovoltaic to draw optimum energy from this two sources of sunlight and wind force. It yields a compact converting system, while incurring decreased cost. The solar photovoltaic generated energy can be routed to the grid using rotor and grid converters of wind-DFIG system, during sub-synchronous operation. It has been proved that unseemlier customary wind system, the circulating power is exactly decreased with solar photovoltaic integration at the dc link. This simulation and experimental results are shown that this system optimally uses the regular available energy from solar and wind sources, making possible utilization of its converters. Due to limited laboratory resources, a small and low power prototype has been used for correction. It is looked for a few benefit of this proposed system will be conclusively for high-power solar photovoltaic-wind farm.

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