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Research Article

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A performance assessment of nine-stage ternary DC source mli through various PWM topologies

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ABSTRACT

In modern days, MLIs comprise a lot of concentrations in academia and industry. As they are altering interest in a feasible technology in supporting frequent applications of renewable energy conversion systems and drives, these huge power and medium/higher voltage applications and MLIs are extensively used as one of the sophisticated powers converter topography. The MLIs are divided into two types

such as asymmetric and symmetric. MLIs of the asymmetric kind have more amount of output AC voltage stage with fewer DC input source voltage and

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An improved BAS MPPT algorithm in DC–DC converter for grid connected SPVS with PQ enhancement

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Abstract. In this paper, an improved Beetle Antenna Search (BAS) algorithm is developed for Maximal Power Point Tracking (MPPT) in a double-stage three-phase solar grid-integrated system. The behavior of the beetle foraging approach yields maximal power from photovoltaic string with the sustained duty cycle through an optimal BAS MPPT controller. The BAS algorithm succeeds in the purpose of achieving the optimum duty cycle of the DC–DC boost converter for the Solar Photovoltaic System. The intended controller is achieved in step and ramp varying irradiation environment at the specified temperature. The outcome of BAS MPPT has maximal power and better tracking speed with less fluctuation than the P&O controller. Also, the BAS algorithm affords the effortless function of load stabilizing and harmonics decrement in grid performance. The proposed controller has better improvement than the conventional algorithm by reducing training data time, decreasing the sample size, and retaining the selected permissive data. Simulation illustrations prove the quick response time, and acceptable behavior in step and ramp irradiation conditions. Further, an illustration shows the ability to enhance the stability of power in the grid with reduced oscillation and distortion factors. The harmonic distortion of voltage and current is obtained within the control limit of universal standards. The simulated results are validated in MATLAB/Simulink environments.

Keywords. Solar photovoltaic; MPPT; beetle antenna search; THD; power quality; DC–DC converter.

1. Introduction

The growth of population and the development of industries increase the electricity demand. The impact of carbon dioxide emission and the decrement of fossil coal give way for Renewable Energy Sources (RES) to reach the electricity demands. As of 2022, the Indian Brand Equity Foundation (IBEF) analysis of the Indian power sector reports that the India is the third largest consumer electricity producer with 404.13 GW as an installed power capacity. Beside this, solar energy contributes 57.97 GW, followed by 40.86 GW by wind energy, 46.85 GW by hydro energy, and 10.86 GW power from Biomass. The leading implementation of RES is the Solar Photovoltaic System (SPVS) with its benefits such as fuel-free generation, simple maintenance, unpolluted, and noise-free generation. The series and parallel combination of solar cells or photovoltaic cells make an array in SPVS modules for the generation of electric power demands. The power generation of SPVS modules is depending on the fast varying atmospheric conditions, solar irradiation, and temperature. The characteristics curve of SPVS power is a non-linear curve. To achieve better power from SPVS modules Maximal Power Point (MPP) is essential. The tracking of MPP is called Maximal Power Point Tracking (MPPT). In general, MPPT is a single optimal point on the non-linear curve which is taken out from photovoltaic cells through the DC–DC boost converter of the SPVS.

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Tetra Optimization Based Hybrid Parameters for OFDM Modulated Wireless Sensor Network

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ABSTRACT

Orthogonal frequency-division multiplexing [OFDM] is an information transfer technique in which a single data flow is divided between several closely spaced narrowband subchannel frequency range rather than a single Wideband channel frequency. The information is sent to the relay node there is a delay and some data is lost in the relay node is the major issue in the existing system. To overcome these challenges, The objective of this study is to minimize the overall energy consumption and to maximize the network lifetime. In this paper, a novel Five Input Hybrid Optimization Relay Node Selection and Energy Efficient Routing (FIHORNSEER) technique has been proposed for choosing the best relay based on noises. Ant Lion Optimization (ALO) is initially utilized to select the relay node's elite position. Secondly, the Crow Search Optimization (CSO) Algorithm is used for the phenomenon of position and memory of each relay. Finally, the Memetic Algorithm (MA) was generated by integrating the Ant Lion and Crow search optimization algorithm for the best relay node selection. The proposed framework is compared with previous techniques like FRNSEER, LMMSE, and HABO-OFDM Methods in terms of performance analysis, such as average utility, Energy Consumption, and Network Life Time. The result shows that the proposed FIHORNSEER improves the energy consumption better than 22.01%, 16.4%, and 12.2% FRNSEER, LMMSE, and HABO-OFDM respectively.

KEYWORDS

Ant lion optimization; crow search optimization; memetic algorithm and relay; orthogonal frequency division multiplexing

1. INTRODUCTION

Wireless sensor networks (WSNs) are made up of several collaborating sensor nodes that are geographically dispersed [1]. Sensor nodes in WSN measure different environmental characteristics and send the information you gather to one or more sinks using hop by hop communication [2,3]. A sink processes and transmits sensed data to the users after receiving it. A sensor device with these features can be used for a plethora of appealing applications [4]. These usage areas can be shortly summarized by: military, meteorological, biomedical, security, space exploration, monitoring, environmental, and home applications [5,6].

Relay networks are used in WSN to transport data between two devices that are too far apart to communicate directly with one another, such as a server and a computer [7]. This device's primary purpose is to establish or break contact utilizing a signal without requiring human input to turn it on or off [8]. Its main purpose is to employ a low-power signal to manage a high-power circuit. Signals that cross each other are said to be orthogonal to one another [9,10]. One of its important features is the absence of signal interference between orthogonal signals [11,12].

The flexibility of OFDM to withstand challenging channel circumstances without the use of sophisticated equalization filters is its fundamental benefit over single-carrier methods [13,14]. It has improved long-distance communication quality by eliminating inter symbol interference (ISI) and increasing signal-to-noise ratio (SNR) [15]. Frequency selective fading is less likely to influence the signal modulation method known as OFDM since it divides a high data rate stream that is modulated into several narrowband, widely separated subcarriers [16,17].

Noise ratio, collision, unreliable data link, and data loss are all common problems in OFDM channels [18–20]. However, data loss is very important in this paper. The above-mentioned situations may result in serious errors at the receiving end. To overcome these issues, we proposed Energy efficient OFDM Modulated WSN using Deep learning based Relay node Utilization. As a result, the completeness and accuracy of scientific data are