MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

(Autonomous Institution-UGC, Govt. of India)

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FACULTY PUBLICATIONS FOR THE ACADEMIC YEAR 2023-2024

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2	Dr S Vijaya Madhavi	Sensorless Fractional Order Control Of PMSM based on Synergetic And Sliding Mode Controllers	International Journal of Pure and Applied Science & Technology	July 2023	UGC ISSN :2229-6107 Vol 13 Issuse 3.	UGC
3	Dr S Vijaya Madhavi	A New Topology of Single-Phase Common Ground Buck-Boost Inverter with Component Voltage Rating Reduction	Mukt Shabd Journal	January, 2024	ISSN NO : 2347-3150 Volume XIII, Issue I	UGC
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9	Dr Madhusudhana Reddy	Design and Control of Magnetic Levitation System by Optimizing Fractional Order PID Controller Using Ant Colony Optimization Algorithm	Journal of Inter disciplinary Cycle Research	October 2023	ISSN NO: 0022-1945 Volume XV, Issue X	UGC
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11	Dr B Madhusudhana Reddy	Hybrid Power Supply System with Fuzzy Logic Controller: Power Control Algorithm, Main Properties, and Applications	Journal of Interdisciplinary Cycle Research	January, 2024	ISSN NO: 0022-1945 Volume XVI, Issue I	UGC
12	Mr. V Naresh	On-board Single-Phase Integrated Electric Vehicle Charger with V2G Functionality	The International journal of analytical and experimental modal analysis	October 2023	ISSN NO: 0886-9367 Volume XV, Issue X	UGC
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Conference Publications:

S. No	Name of the Faculty	Title of the Paper	Conference Name	Month & Year of Publication	Vol. No., Issue No., and Page Nos.	SCI/ SCOPUS/ UGC
1	Dr. T Sarada Devi	System Modification Process to reduce calculation complexity in Backward Forward sweep Algorithm	Proceedings of Fifth International Conference on Computer and Communication Technologies	Feb 2024	Lecture Notes in Networks and Systems, Vol 897. Springer	Scopus
2	Dr. T Sarada Devi	Methodology to Prevent Voltage Collapse During On Load Tap Changing Transformer Operation Under Network Contingencies	IEEE 8th International Conference on Recent Advances and Innovations in Engineering (ICRAIE)	Dec- 2023	10.1109/ICRAIE59459.2023.10468436	Scopus
3	Mr. V Brahmam	Opposition Crow Search-based Optimal Feature Selection for Defect Classification by SVM in Semiconductor Wafer	International Conference on Distributed Computing and Optimization Techniques (ICDCOT)	May, 2024	979-8-3503-8295-2/24/2024 IEEE, pp. 1-4, ISBN:979-8-3503-8295-2	Scopus
4	Dr.Bolla Madhusudhana Reddy	Optimal Placement of DG and Minimization of Power Loss using Naked Mole Rat Algorithm	2023 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)	Dec-2023	10.1109/ICT-PEP60152.2023.10351150	Scopus
5	Mr. V Naresh	Customer Churn Prediction using Tunicate Swarm Optimization based Hybrid Machine Learning Algorithms	International Conference on Distributed Computing and Optimization Techniques (ICDCOT)	May-2024	pp. 1-4, ISBN:979-8-3503-8295-2	Scopus

Performance improvement of hybrid renewable energy sources connected to the grid using artificial neural network and sliding mode control

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ABSTRACT:

The main purpose of this paper to compare and analyze three types of controllers in the three phases DC–AC inverters in hybrid renewable energy source (HRES) systems. To achieve this, two modern controllers are developed and compared based on sliding mode control (SMC) and artifcial neural network techniques. The HRESs comprise photovoltaic (PV), wind turbines, battery storage systems, and transmission lines connected to infnite bus bars via a step-up transformer. The developed controllers at the inverter side utilize both voltage control and current regulation. A DC–DC boost converter is employed to set up a voltage demand at the point of common coupling (PCC). Then, the formulation of an HRES with the developed controllers is presented. The developed controllers are considered to operate under various solar radiations, temperatures, and wind speed loading conditions.

INTRODUCTION:

Most people throughout the world are interested in switching from diesel to renewable energy. Clean energy, which is what we call renewable energy, does not contribute to environmental degradation. Since the usage of fossil fuels for energy has resulted in a steady decline in air quality throughout the world, it is imperative that the world transition to renewable energy sources. [1]. Numerous studies in various fields rely heavily on controllers. Using this method, researchers may acquire the necessary feedback from a variety of controller kinds. Three distinct inverter controller architectures have emerged as the norm in recent studies. PI control is a common sort of traditional control used in manufacturing and other fields where automatic process regulation is required. Sliding mode control (SMC) is a type of discontinuous control that is referred to as adaptive control. It is a robust control method SMC is composed of equivalent control, and it maintains trajectories on the sliding surface and variable structure .SMC was used to improve convergence performance by designing suitable parameters for the traditional SMC Traditional SMC has been widely applied in nonlinear systems due to its ease of implementation, fast response, and robustness to disturbances and uncertainties ANN is a cutting-edge

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SENSORLESS FRACTIONAL ORDER CONTROL OF PMSM BASED ON SYNERGETIC AND SLIDING MODE CONTROLLERS

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ABSTRACT: The field oriented control (FOC) strategy of the permanent magnet synchronous motor (PMSM) includes all the advantages deriving from the simplicity of using PI-type controllers, but inherently the control performances are limited due to the nonlinear model of the PMSM, the need for wide-range and high-dynamics speed and load torque control, but also due to the parametric uncertainties which occur especially as a result of the variation of the combined rotor-load moment of inertia, and of the load resistance. Based on the fractional calculus for the integration and differentiation operators, this article presents a number of fractional order (FO) controllers for the PMSM rotor speed control loops, and id and iq current control loops in the FOC-type control strategy. The main contribution consists of proposing a PMSM control structure, where the controller of the outer rotor speed control loop is of FO-sliding mode control (FO-SMC) type, and the controllers for the inner control loops of id and iq currents are of FO-synergetic type. Superior performances are obtained by using the control system proposed, even in the case of parametric variations. The performances of the proposed control system are validated both by numerical simulations and experimentally, through the real-time implementation in embedded systems.

Keywords: permanent magnet synchronous motor; fractional order control; synergetic control; sliding mode control

INTRODUCTION

The permanent magnet synchronous motor (PMSM) is widely used in industrial applications, the aerospace industry, electric vehicles, robotics, electric drives and computer peripherals. The popularity of using the PMSM for a very wide range of applications is due to a set of advantages such as efficiency, small size, high power and high torque density.

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A New Topology of Single-Phase Common Ground Buck-Boost Inverter with Component Voltage Rating Reduction

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Abstract:

The combination of conventional front-end DC-DC converter and H-bridge inverter has been proposed with common-ground (CG) characteristic and voltage booting capability. However, it has drawback of low modulation index utilization which causes high component voltage rating and small conversion efficiency. In this paper, a new topology of a single-phase common-ground buck-boost inverter (1P-CGBBI) is presented to overcome existing drawbacks of conventional CG inverters. The proposed 1P-CG-BBI uses one more active-switch and one more diode than traditional CG inverter. Note that the proposed inverter still shares the same ground for DC input source and AC output voltage, which completely eliminates the leakage current. A hybrid pulse width modulation (PWM) technique is introduced to control the buck-boost stage. Accordingly, the buck-boost stage of the 1P-CG-BBI operates similar to a conventional DC-DC boost converter in the positive half cycle. In the negative half cycle, this stage behaves as a traditional inverting DC-DC buck-boost converter. Accordingly, the DC-DC operation and DC-AC operation can be controlled, independently.

INTRODUCTION

Currently, renewable energies, such as photovoltaic (PV) arrays and fuel cells, have attracted the attention of many researchers worldwide because of the increasing global warming problem. Accordingly, the development of inverter-based PV/fuel cell grid connection has played an integral role in civil/industrial applications. Generally, a string of PV panels or fuel cells are connected in series to supply a high DC input voltage feed to a voltage source inverter (VSI). Typically, a low-frequency transformer is installed between the output of the inverter and AC grid to isolate grid to power circuit. The use of a line transformer increases system size and cost, and reduces conversion efficiency. Moreover, the conventional VSI only behaves like a buck DC-AC converter, where the peak-value of the output voltage is smaller than the DC input source. In some operation conditions, such as cloudy days or when some PV panels/fuel cells are faulty, the DC input source is significantly reduced, and it is insufficient to ensure grid-connected operation.

In this case, the system is forced to stop. To deal with these problems, a front-end DC-DC boost converter is typically installed before the VSI to boost the DC input source [9], [10]. It makes the system flexible to be controlled with wide range of input DC voltage. Moreover, a high-frequency transformer is integrated into the DC-DC converter to achieve the isolation characteristic. However, the DC-DC converter with the isolated transformer is complicated to control. Furthermore, the system efficiency decreases when using a high-frequency transformer.

Development of an adaptive neuron-fuzzy inference system–based equivalent consumption minimization strategy to improve fuel economy in hybrid electric vehicles

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ABSTRACT;

The most viable option to achieve the goals of saving energy and protecting the environment is to replace conventional vehicles with hybrid electric vehicles (HEVs). In HEVs, the operational characteristics of an internal combustion engine (ICE) and an electric motor (EM) are different from each other and thus require an adaptive control strategy to achieve higher fuel economy along with smooth operation and better performance of the vehicle. The proposed non-linear controller has also been tested for real-time behaviour using a field-programmable gate array–based MicroLabBox hardware controller to compare its performance against existing controllers. The authors compared the fuel economy obtained using the proposed method with several other methods available in the literature. The comparison clearly reveals that the proposed ANFIS-based method results in better optimization of energy and hence offers better fuel economy.

INTRODUCTION:

The world's biggest problems revolve around preserving the environment and reducing energy use. Limiting transportation activities, enacting emission restrictions, increasing vehicle economy by decreasing fuel consumption, and creating and deploying green cars are only some of the proposed solutions to the energy crisis and vehicle-related pollution [1]. One of the most hopeful and tangible alternatives is the proliferation of green automobiles. Many automakers are working on developing battery-powered, hybrid, and fuel cell electric motor vehicles (BEVs, HEVs, FCEVs) for this reason. [2]. BEVs and FCEVs are considered to be green, clean and sustainable because they are independent of fossil fuel for generating energy, but the expansion of BEVs and FCEVs depends on battery and fuel cell technology, respectively. Limitations associated with them, such as safety, a short life, a high price, and energy or power density of their batteries, has hampered their production. HEVs are composed of an electric motor (EM) and an internal combustion engine (ICE), where the EM is powered by an energy storage system (ESS) and a downsized ICE is powered by gasoline. HEVs are assumed to be an intermediate product for the transition from conventional vehicles to future clean and green

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MODEL PREDICTIVE CONTROL OF SMART GREENHOUSES AS THE PATH TOWARDS NEAR ZERO ENERGY CONSUMPTION

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ABSTRACT:
As we know the fact that, India is the second largest population country in the world and majority of people in India have agriculture as their occupation. Farmers are growing same crops repeatedly without trying new verity of crops and they are applying fertilizers in random quantity without knowing the deficient content and quantity. So, this is directly affecting on crop yield and also causes the soil acidification and damages the top layer. So, we have designed the system using machine learning algorithms for betterment of farmers. Our system will suggest the best suitable crop for particular land based on content and weather parameters. And also, the system provides information about the required content and quantity of fertilizers, required seeds for cultivation. Hence by utilizing our system farmers can cultivate a new variety of crop, may increase in profit margin and can avoid soil pollution.

KEYWORDS :Machine Learning, Crop prediction, Decision tree, SVM, Rainfall prediction, Crop recommendation;

I. INTRODUCTION :

Agriculture is one of the important occupation practiced in India. It is the broadest economic sector and plays a most important role in the overall development of the country. More than 60% of the land in the country is used for agriculture in order to suffice the needs of 1.3 billion people Thus adopting new agriculture technologies is very important. This will be leads the farmers of our country towards profit [1]. Prior crop prediction and yield prediction was performed on the basis of farmers experience on a particular location. They will prefer the prior or neighborhood or more trend crop in the surrounding region only for their land and they don't have enough of knowledge about soil nutrients content such as nitrogen, phosphorus, potassium in the land. Being this as the current situation without the rotation of the crop and apply an inadequate amount of nutrients to soil it leads to reduce in the yield and soil pollution (soil acidification) and damages the top layer. Considering all these problems takes into the account we designed the

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A Novel Support Vector Machine based Improved Aquila Optimizer-based Text Mining Mechanism for the Healthcare Applications

Abstract: - Social media acts as one of the biggest contributions in every field. In healthcare applications it helps to estimate the quality of the services provided by different hospitals and doctors. Using the text mining technique, the services are analyzed. Several text mining techniques were performed in recent times. However, the effectiveness of text mining in the healthcare field is still a complicated task. Hence, we propose a novel Support Vector Machine (SVM) based Improved Aquilla Optimizer (IAO) algorithm to enhance the text mining from the reviews in the social media. Using this patient can easily evaluate the quality and services of particular clinics and doctors. The work includes the preprocessing of the dataset collected and then discriminative least square regression (DLSR) for the extraction of features from the preprocessed data. Experimental analysis is conducted to analyze the performance of the proposed work. The results are compared with state-of-art works with different performance metrics. Thus, our proposed work can be used to mine the text for the healthcare applications.

Keywords: Aquila, SVM, text mining, healthcare, reviews, DLSR.

1. Introduction

Text mining is also mentioned as text data mining [1]. It is the process of extricating fundamental data from text-based data [2]. It is a part of lines, documents, and so on which be part of a group to a set of classes. An analytics method that qualifies the text based on similar features. The applications of text mining are Risk management, Business Intelligence,customer care, social media. First, we are going to discuss Risk Management [3]. It is a process of analyzing and identifying risk in an organization. In-text mining can reduce risk more effectively. The information is connected toa large amount of data. It can relate the data at a required time. Secondly, it plays an important role in Business Intelligencewith the help of Text mining the quality is compared with another firm. Third, natural language processing finds the consequence of methods in text mining with customer care support.The feedbackis given in text format and is analyzed by the organization.Fourth, in social media, a lot of emails, news, and so on are given to monitor for investigation. It can interact by replying to the comments. The performance is calculated by the followers [4]. The advantages of Text mining are the quality of research is increased. It is efficient and has good accuracy. It enhances the customer relationship. The security and privacy lacking in data are the disadvantages [5].

Moreover, Machine learning is a part of human life. It is a focus point in the field of Artificial Intelligence. Machine learning solves and reducesthe problems without any code. The common applications are web search, self-driving, speech recognition, and so on. The performance is improved and it automatically performs certain tasks. It is a bilateral process and reliable in the frameworkand calculating the consequences [6]. Deep learning applies the neural network and rectifies the issues by the decision-making process.It is divided into three supervised, unsupervised and semi-supervised. It works like neurons in neural networks [7]. It has numerous

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A Generalized High Gain Multilevel Inverter for Small Scale Solar Photovoltaic Applications

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ABSTRACT

The contribution of renewable energy, especially small-scale solar photovoltaics (PV), is increasing exponentially in the energy sector. In general, high gain DC-DC converters are used as front-end converters to increase the low voltage of PV panels; further, the DC-AC converter (multilevel inverters) is used for standalone AC loads or grid integration. To avoid the front-end converter and achieve both objectives, this paper proposes a nine-level quadruple boost inverter topology for small-scale solar PV applications. The proposed topology operates on a switched capacitor technique to boost the voltage, and has self-voltage balancing of capacitors. This paper presents the detailed operation of the proposed nine-level inverter, voltage stress calculations, loss analysis, and designing of circuit parameters. In addition, a high-gain generalized multilevel inverter (MLI) topology is also reported. Furthermore, the proposed MLI is compared with competitive inverters available in the recent literature. The proposed MLI topology has advantages such as a minimum total standing voltage and a reduced component count; it can also produce bipolar voltage inherently. The performance of the proposed MLI topology is validated through the MATLAB-based simulations and an experimental prototype. Further, the experimental results are presented by considering load variations, modulation index variations, and output frequency variations.

INTRODUCTION

The energy consumption of the world is continuously increasing day-to-day. To meet the increased load demand, largescale renewable sources, especially solar photovoltaic, are integrated into conventional power generation. Generation of photovoltaic energy at a single location in large amounts and transmission of its power to long distances reduce the efficiency of the system. Recently, distributed generation has been introduced to overcome this problem and increase the efficiency of the system

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RESEARCH ARTICLE

Performance and Analysis of Hybrid Electric Vehicle by using ANFIS Controller

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ABSTRACT

In this study, multiple methods are used to examine coordinated plug-in hybrid electric vehicle (PHEV) charging in a grid and effective battery charge controllers. Since the transportation sector is a significant user of fossil fuel and produces a significant amount of pollution, the PHEV has gained popularity due to its lower gasoline emissions and lower fuel costs. Electric energy stored in batteries of PHEVs that could go up to 60 miles on a single charge might reduce CO2 emissions by 50% and petroleum use by over 75%. The PHEV's ability to plug into the grid and use grid electricity to charge the battery pack is the major feature that sets it apart from Hybrid Electric Vehicles (HEV). When the PHEV motor acts as a generator, a high power bidirectional DC-DC converter is added to charge the battery. An efficient battery charge controller may shorten the time needed for charging, which lowers the PHEV demand on the grid. Effective battery charging reduces the burden on the grid, which is examined using a variety of controllers, including fuzzy logic controllers, adaptive neuro fuzzy inference systems, and a newly proposed Intelligent Controller based on Self-Computational Emotional Learning.

Keywords: SCELIC, HEV, Converters.

INTRODUCTION

A two-way power transfer from the AC to the plug-in electric car (PEV) the Vehicle to Grid (V2G) and Grid to Vehicle (G2V) functions require the electrical grid. Different power converters and controllers act as crucial mediators throughout these procedures between the electric grid and PEV. Several studies have shown how to use

Design and Control of Magnetic Levitation System by Optimizing Fractional Order PID Controller Using Ant Colony Optimization Algorithm

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ABSTARCT:

This project presents the stability control of a levitating object in a magnetic levitation plant using Fractional order PID (FOPID) controller. Fractional calculus, which is used to design the FOPID controller, has been a subject of great interest over the last few decades. FOPID controller has five tunning parameters including two fractional-order parameters (λ and μ). The mathematical model of the Maglev plant is obtained by using first principle modeling and the laboratory model (CE152). Maglev plant and FOPID controller both have been designed in MATLAB-Simulink. The designed model of the Maglev system can be further used in the process of controller design for other applications. The stability of the proposed system is determined via the Routh Hurwitz stability criterion. Ant Colony Optimization (ACO) algorithm and Ziegler Nichols method has been used to fine-tune the parameters of FOPID controller. FOPID controller output results are compared with the traditional IOPID controller for comparative analysis. FOPID controller, due to its extra tuned parameters, has shown extremely efficient results in comparison to the traditional IOPID controller.

INTRODUCTION:

Magnetic levitation (Maglev) is the theoretical concept of suspending a ferromagnetic mass in free space using an electromagnetic field to counteract the pull of gravity. Magnetic lift, super-efficient platforms, and magnetic trains travelling at high speeds are only some of the current uses that take advantage of this concept. One of the main benefits is that heat is not lost as much as it would be otherwise owing to mechanical frictional pulls acting on the soaring item. The notion of frictionless trains has been around for more than a century; it was originally proposed by the American scientists Robert Goddard and Emile Bachelet. The amount of current flowing through the coil's magnetic field is adjusted by the designed controllers based on the object's actual and intended location in free space in order to provide the appropriate force required to elevate it at what is wanted.

The applications of Maglev systems in the field of engineering science can be summarized and categorized as follows [3]:

• aerospace engineering (rocket, spacecraft, etc),

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A DEEP REINFORCEMENT LEARNING APPROACH TO ENERGY MANAGEMENT CONTROL WITH CONNECTED INFORMATION FOR HYBRID ELECTRIC VEHICLES

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ABSTRACT

Considering the importance of the energy management strategy for hybrid electric vehicles, this paper is aiming at addressing the energy optimization control issue using reinforcement learning algorithms. Firstly, this paper establishes a hybrid electric vehicle power system model. Secondly, a hierarchical energy optimization control architecture based on networked information is designed, and a traffic signal timing model is used for vehicle target speed range planning in the upper system. More specifically, the optimal vehicle speed is optimized by a model predictive control algorithm. Thirdly, a mathematical model of vehicle speed variation in connected and unconnected states is established to analyze the effect of vehicle speed planning on fuel economy. Finally, three learning-based energy optimization control strategies, namely q-learning, deep q network (dqn), and deep deterministic policy gradient (ddpg) algorithms, are designed under the hierarchical energy optimization control architecture. It is shown that the q-learning algorithm is able to optimize energy control; however, the agent will meet the “dimension disaster” once it faces a high-dimensional state space issue. Then, a dqn control strategy is introduced to address the problem. Due to the limitation of the discrete output of dqn, the ddpg algorithm is put forward to achieve continuous action control. In the simulation, the superiority of the ddpg algorithm over q-learning and dqn algorithms in hybrid electric vehicles is illustrated in terms of its robustness and faster convergence for better energy management purposes.

INTRODUCTION

Under growing demand for energy and stricter emission standards, developing new energy vehicles is considered a primary strategic measure to ease the global energy crisis and environmental pollution problems (ding and li, 2021, dai et al., 2021, mei et al., 2022b).

Hybrid Power Supply System with Fuzzy Logic Controller: Power Control Algorithm, Main Properties, and Applications

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Abstract

This paper presents a novel power supply system based on the use of fuzzy inference logic to improve the power control of renewable energy sources. The system comprises renewable solar and wind sources, and an accumulator battery is used as an additional power source. The procedure for the parallel connection of multiple energy sources provides a stable power supply and optimal charging of the accumulative element. Renewable energy sources are connected in parallel using two serial converters and controlled by the controller based on the fuzzy logic. The reference voltage control of the serial converter enables an optimal use of available energy sources. The accumulative element is connected in parallel to compensate for the shortage of solar and wind energies, whereas if the avail- able renewable energy exceeds the needs of the consumers, the surplus energy is accumulated in the battery.

I. INTRODUCTION

THE power supply sources are vital for the telecommunication and information systems. Regardless of the problems related to voltage variations, over-voltage, under-voltage, interruptions in the operation of power sources, thunder strikes, and meteorological turbulences, the power sources need to work reliably. European Union Agency for Network and Information Security (ENISA) annual incident report shows that a significant number of power outages, leading to a serious disturbance of services, will not lead to severe consequences if the protection measures function properly. The report also states that power outages are identified as among the first five causes of incidents and service termination in different systems. To increase the reliability of the power supply, a principle of the parallel operation of renewable energy sources has been introduced, which includes three forms. 1) Parallel operation of different energy sources. Consuers are powered by

On-board Single-Phase Integrated Electric Vehicle Charger with V2G Functionality

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Abstract

Mass adoption of electric vehicles (EVs) is contingent on the availability of charging infrastructure. One solution to this issue is the introduction of on-board fast chargers, but such solutions typically require the installation of additional magnetic components that increase EV mass. An alternative approach is the dynamic re-deployment of drivetrain components for charging when the vehicle is stationary. This work proposes an on-board single-phase charger that re-uses the traction inverter and motor. The system consists of a dual-inverter drivetrain, which affords higher voltage charging compared to conventional systems. In addition, the system is able to operate bidirectionally and operate at any power factor for grid support services with real and reactive power exchange without subjecting the motor to low frequency harmonic currents. Experimental tests demonstrated operation at 19.2kW using a 110kW EV motor and a full-scale, state-of-the-art, dual-inverter drive prototype. Measured peak efficiencies of over 97% demonstrate the viability of integrated charging in a real-world scenario resulting in lower harmonics and dv dt stresses. A complication of dual inverter drive systems is the need to charge two separate batteries. To charge from an ac grid, solutions such as, shown in Fig. 3(a), use a separate on-board charger that charges the first battery while the dual inverters are used to charge the second battery. This implies that the high voltage

Dual inverter drives are of interest due to their ability to drive a higher voltage motor using two conventional lower voltage traction inverters, not only increasing efficiency, but also improving grid voltage compatibility in integrated charging applications. Specifically, the dual inverter drive functions as a single multilevel drive,

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BALL BEARING'S FAULT DETECTION WITH MACHINE LEARNING OF VIBRATION SIGNALS

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ABSTRACT

Ball bearings faults are one of the main causes of breakdown of rotating machines. Thus, detection and diagnosis of mechanical faults in ball bearings is very crucial for the reliable operation. This study is focused on fault diagnosis of ball bearings using artificial neural network (ANN) and support vector machine (SVM). A test rig of high speed rotor supported on rolling bearings is used. The vibration response are obtained and analyzed for the various defects of ball bearings. The specific defects are considered as crack in outer race, inner race with rough surface and corrosion pitting in balls. Statistical methods are used to extract features and to reduce the dimensionality of original vibration features. A comparative experimental study of the effectiveness of ANN and SVM is carried out. The results show that the machine learning algorithms mentioned above can be used for automated diagnosis of bearing faults. It is also observed that the severe (chaotic) vibrations occur under bearings with rough inner race surface and ball with corrosion pitting

INTRODUCTION

Condition monitoring of rotating machinery helps in early detection of faults and anticipation of problems in time, so as to prevent complete failure. Bearing vibration can generate noise and degrade the quality of a product line. Severe vibrations of bearings can even cause the entire system to function incorrectly and that results in downtime for the system and economic loss to the customer. Rolling bearings defects may be categorized as point or local defects and distributed defects. The vibrations are generated by geometrical imperfections on the individual bearing components and these imperfections are caused by irregularities during the manufacturing process as well as wear and tear.

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Trinary Hybrid Cascaded H-Bridge Multilevel Inverter-Based Grid-Connected Solar Power Transfer System Supporting Critical Load

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Abstract

Higher power rating solar photovoltaic systems are emerging in the power system owing to the reduction in the cost of photovoltaic arrays and environmental concerns of the conventional power generation systems. Multilevel inverters are reported at high power levels due to reduced switching frequency and increased efficiency. Cascaded H-bridge (CHB) multilevel inverters have been reported in the literature due to its redundant structure compared to other multilevel topologies. When CHBs with dc sources are in the ratio of 1:3, it is named as a trinary hybrid multilevel inverter, and it generates a maximum number of equal output voltage levels. In this article, a trinary CHB multilevel inverter-based grid-connected solar power transfer system using modified second-order generalized integral control is proposed. A two-stage solar PV system consists of a single-input–multiple output single-ended primary inductance converter and two CHB structures per phase used to verify the proposed system. Modified second-order generalized integral control is presented for active power control and grid synchronization.

I. INTRODUCTION

Renewable energy-based electricity generation is the modern trend in the power system, and it is widely expanding due to the awareness about harmful effects of fossil fuel- based energy conversion in the environment. The grid integrated solar power transfer system (SPTS) has more growth than isolated load applications in the last few decades. The grid-connected SPTS delivers maximum power from the PV panels and provides reliable energy production. The nonlinear characteristics of photovoltaic (PV) output power with voltage (*P–V*), affects the power transfer efficiency from the PV panels. Thus, a maximum power point tracking (MPPT) methodology is unavoidable. Either a dc–dc converter or a voltage source converter

Identification of Faults in Microgrid Using Artificial Neural Networks

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Abstract:

This paper presents Artificial Neural Networks (ANN)-based method to identify faults in a microgrid. The microgrid model considered has a wind generator, a solar photovoltaic system, and a diesel generator. Normal operation and fault conditions are simulated for the microgrid in Simulink. The simulated fault conditions represent faults experienced by a distribution line. The fault voltages and currents are used for training the ANN. The feedforward neural network in MATLAB trained well using Levenberg-Marquardt method. The trained ANN is then tested using simulated data to detect various faults.

Introduction:

High infrastructural and developmental costs have caused the already overloaded conventional electric power grid struggle with operational constraints, low energy transmission efficiencies, environmental degradation, system faults, and other issues. To ease the burden on the conventional grid, increased regulation and functional changes in the electric utilities have forced researchers to explore alternative approaches for meeting the increased power demand. One approach of easing the burden is intertwining it with emerging technologies of distributed resources consisting of renewable energy sources such as solar Photovoltaic (PV) and wind by creating microgrids. Microgrids enable this integration by utilizing power electronics, control and protection devices. One of the concerns with the implementation of microgrids is designing a reliable protection system. Current literature has demonstrated

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SUPPLIER SIDE OPTIMAL BIDDING STRATEGY FOR ELECTRICITY MARKET USING BACTERIAL FORAGING OPTIMIZATION ALGORITHM

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ABSTRACT

This paper proposed and demonstrated, Optimal bidding strategy is one of the important functions in the electricity market along with forecasting of the electricity price and the profit based unit commitment. The prime objective of generating company (Genco) is to maximize their profit when they participate in the bidding process. The BFO algorithm has been used to maximize the probability density function (pdf). In the second stage the BFO algorithm is again applied to maximize the profit of the suppliers. The proposed algorithm is developed in MATLAB (Version, 2019) and tested on standard test case available in the literature. Also, the simulation results are presented and compared. It is noticed that the proposed method yields the best results in terms of profit

INTRODUCTION:

Electrical power is one of the most important infrastructure components for the economic growth and welfare of the developed countries. The demand for electrical power has increased rapidly due to several reasons. In order to meet the increasing power demand, massive addition to the installed generating capacity is required. Due to the unique characteristics of the electricity, independent system operator (ISO) and regional transmission organization (RTO) are responsible to balance the power generation and demand. In real- time power system operation, ISO forecasts and schedules generation to assure that the sufficient generation and back-up power is available to meet unexpected demand or generation loss. It must be a non-commercial organization, neutral and independent of commercial players. Currently, Nine ISO/RTO are responsible for the operation in the electricity markets.In the deregulated power markets, the bids are submitted by the Genco's to the power exchange (PX) to buy and sell of the electric power. They gradually build their offers strategically to intensify their profits. This process is called bidding strategy. The electricity market has been ruled by the bidding strategies. These strategies also grab the bidder's attention with the advantage of increasing profits. Flow of information in the electricity market is given in Figure.

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Interval Type-II Fuzzy Logic Controlled Shunt Converter Coupled Novel High-Quality Charging Scheme for Electric Vehicles

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Abstract –

The deployment of electric vehicle charging stations degrades the quality of power in the distribution grid. This paper proposed an interval type2 fuzzy logic-controlled shunt converter coupled novel high-quality charging scheme for electric vehicles. This system includes three-phase bidirectional front-end AC-DC pulse width modulation converter, back-end DC-DC PWM converter and three-phase three-wire distribution static compensator. The bidirectional converters help to perform both grid to vehicle and vehicle to grid mode of operations. The combination of DC-link voltage with decoupled current control technique is exploited for AC-DC converter. A multi-step constant current control technique is proposed for the DC-DC converter to charge and discharge the battery. A fuzzy logic controller based instantaneous reactive power theory control method is proposed for shunt converter. The performance of type1, interval type2 and real coded genetic algorithm optimized fuzzy logic controllers are evaluated by the shunt converter DC-link voltage and the total harmonic distortion of the source current. Lithium-ion batteries are utilized as an energy storage device for electric vehicles in the proposed system.

I. INTRODUCTION

Recent years, the numbers of electric vehicles charging stations (EVCS) are rapidly increasing to adopt the electric vehicles (EVs) by replacing the internal combustion engines due to the fossil fuel scarcity and environmental pollution. According to the international energy agency report of a global electric vehicle outlook 2018, the number of charging stations in 2010 and 2017 is 4,054 and 4,30,151, respectively.The different power electronic converters are utilized to implement the EVCS. So, it brings more challenges to the distribution system such as voltage instability, harmonics, neutral current, power loss, etc.

New Topology of Asymmetrical Multilevel Inverter with Reduced Switch Count for Electric Drive Applications

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ABSTRCAT:

This project proposes an asymmetrical H-bridge based multilevel inverter with a reduced switch count. This circuit has seventeen level output with eight IGBT switches, two bidirectional switches, and four unequal voltage sources. The total harmonic distortion (THD) is similar compared to reported topologies and has reduced device count. This topology has an inherent H-bridge to invert the levels at the fundamental frequency. The phase disposition pulse width modulation (PDPWM) is used to generate the switching pulses. This topology is suitable for both R and RL loads and could be used to drive applications.

INTRODUCTIONS:

When it comes to harnessing renewable energy and injecting active electricity into the grid, multilevel inverters (MLI) have emerged as a leading technology. Motor driving applications such water pumps, compressor motors, etc. make use of MLIs that are rated for RL loads. Since their inception in the 1980s, the multilevel topologies have progressed in response to changes in the applications they serve, the voltage stresses they can withstand, their ride-through capabilities, their dv/dt profiles, etc. Due to problems with capacitor voltage balancing and the need for additional components like clamping diodes or capacitors, neutral point clamped (NPC) MLIs and flying capacitor MLIs are rarely employed. The cascaded H-bridge architecture is preferred because of the

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SOLAR PHOTOVOLTAIC POWER OUTPUT FORECASTING USING MACHINE LEARNING TECHNIQUE

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ABSTRACT:
Photovoltaic (PV) systems are used around the world to generate solar power. Solar power sources are irregular in nature due to the output power of PV systems being intermittent and depending greatly on environmental factors. These factors include, but are not limited to, irradiance, humidity, PV surface temperature, speed of the wind. Due to uncertainties in the photovoltaic generation, it is critical to precisely envisage the solar power generation. Solar power forecasting is necessary for supply and demand planning in an electric grid. This prediction is highly complex and challenging as solar power generation is weather-dependent and uncontrollable. This paper describes the effects of various environmental parameters on the PV system output. Prediction models based on Artificial Neural Networks (ANN) and regression models are evaluated for selective factors. The selection is done by using the correlation-based feature selection (CSF) and ReliefF techniques. The ANN model outperforms all other techniques that were discussed.

INTRODUCTION:

The global economic policy, climate conditions and security issues of energy are highly affected by the current situation of global warming and the energy crisis over the past few decades due to the excessive consumption of fossil fuels. This situation has been the motivation for the development and use of clean and sustainable energy sources, which can serve as alternatives to the present energy production [1]. The use of solar power energy is rapidly growing, as it is a renewable form of energy. This energy is environmentally friendly because it does not produce pollution. A study done by the European Photovoltaic Industry Association (EPIA) showed that, in 2014, the total in-progress solar power capacity was 177 GW, which demonstrates its rising popularity [2].

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Cascaded Multilevel Inverter Based Power and Signal Multiplex Transmission for Electric Vehicles

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Abstract

The project presents Power & signal multiplex transmission (P&SMT) is a technique that uses power electronic circuits for communication signal transmission. In this paper, a three-phase cascaded multilevel inverter-based P&S MT system is proposed. The proposed method can transmit communication signals without using a Controller Area Network bus, thereby reducing the wiring cost of the conventional electric vehicle (EV) communication system. The designed system can achieve motor speed regulation and battery balance discharging for EVs. With the combined pulse width modulation scheme and frequency shift keying method, both power and communication signals are transmitted successfully in a simulation model implemented in Matlab/Simulink. By evaluating the bit error rate of the transmitted signal, the maximum signal rate of the proposed system is determined as 600 bit/s.

INTRODUCTION

The challenges posed by climate change are spurring experts and researchers to investigate the alternatives for fossil fuels to achieve carbon dioxide emissions reduction. Nowadays, the application of electric vehicles provides a feasible solution for energy saving and emission reduction in the automotive industry. Compared to the traditional internal combustion engine cars, electric vehicles (EVs) not only produce fewer air pollutants such as CO and NOx, but also generate less noise [1], [2]. Furthermore, if the battery of EV is charged at night, it can avoid the peak of power consumption, which is beneficial to the grid to balance the load and reduce the cost [3]. Since various subsystems such as the motor control unit (MCU) and the battery management system (BMS) in an EV require communication with the transmission control unit (TCU), it is

An Efficient Inductive Power Transfer Topology for Electric Vehicle Battery Charging

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Abstract

This project presents Recently available high-frequency power converter topologies for inductive power transfer (IPT) system utilize either zero voltage switching (ZVS) or zero current switching (ZCS) based power electronic converters while maintaining a near sinusoidal current for limited power transfer range. However, achieving ZVS or ZCS for all power switches simultaneously is still a challenging task in IPT systems. In this article, an improved zero-voltage zero-current switching (ZVZCS) IPT topology and its switching pattern are proposed. ZVS is achieved by optimizing the classical series compensation and additionally, an auxiliary network is employed to achieve ZCS.

I. INTRODUCTION

The success of EVs in the past was hindered by issues with battery technology (BT) and power shaping devices. However, in the past few decades, BT has evolved to have a high energy density, lower weight, and greater efficiency. Using an effective energy storage device in conjunction with a good power shaping circuit also boosts overall performance. Researchers and businesses alike have been putting a premium on a dc-dc power conditioning design with low power losses, long life, consistent energy transfer, and many charging/discharging cycles.

Short driving ranges that raise safety issues are now met with efficient, rapid charging. Today, inductive power transfer (IPT)-based typologies are used for EV stationary and dynamic mode battery charging (BC) since they are more secure. In order to increase the converter's efficiency as a whole, compensation networks are used to stifle the circuit's impedance. Complexity, on the other hand, is proportional to the number of active and passive circuit parts used.

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ELECTRICITY PRICE FORECASTING IN DEREGULATED MARKETS USING WAVELET- ANFIS-KHA

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ABSTRACT

This article presents a hybrid method by combining Wavelet-ANFIS-KHA for forecasting the prices of electricity in the power markets under deregulation. Electricity prices in the power market exhibits highly non-linear and non-stationary that makes forecasting the electricity prices very difficult. Three major stages are involved in the proposed algorithms to forecast the electricity prices. In stage I, discrete wavelet transform (db4, level 3) is applied for decomposing the prices of electricity data to a set of constitutive for reducing the variation in the prices data. In stage II, ANFIS is used to forecast the electricity prices. KHA has been adopted in Updating the various weights in the ANFIS to get better accuracy. The code of the hybrid algorithm has been developed in MATLAB. The proposed Wavelet-KHAANFIS has been tested on the real time system. The simulation results in terms of MAPE, MRSE and APE have been presented. It has been found that the proposed algorithm provides best accuracy in with the existing algorithms

INTRODUCTION

Major power markets around the world have transformed power generation and distribution to deregulation. Electricity price forecasting (EPFC) has become one of the key tools for suppliers and customers in the deregulation. The suppliers and consumers use forecasting can information. Accurate EPFC plays a significant role in modern power system operation. However, accurate EPFC model is a complex task because electricity prices have different features. Several researchers proposed various method in forecasting the electricity prices in the past 2 decades. The comprehensive literature survey is provided here. In their analysis of research in time series forecasting, covering the period 1982–2005 and summarizing over 940 papers, De Gooijer and Hyndman conclude that the use of prediction intervals and densities, or probabilistic forecasting, has become much more common over the years, as ‘practitioners have come to understand the limitations of point forecasts’. Nevertheless, back in 2013, when Weron started writing his review, this did not seem to be the case for electricity price forecasting (EPF).

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Design and simulation of the PV/PEM fuel cell-based hybrid energy system using MATLAB/ Simulink for greenhouse application

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Abstract

In this study, design and optimization of the hybrid renewable energy system consisting of Photovoltaic (PV)/Electrolyzer/Proton Exchange Membrane Fuel Cell (PEMFC) was investigated to provide electricity and heat for Greenhouse in S, anlıurfa (Turkey). The coupling of a photovoltaic system with PEMFC was preferred to supply continuous production of electric energy throughout the year. Additionally, produced heat from PEMFC was used to heating of the greenhouse by micro cogeneration application. The MATLAB/Simulink was applied to the design and optimization of the proposed hybrid system. In the designed system, solar energy was selected to produce the Hydrogen (H2) required to run the electrolyzer. In cases where the solar energy is not sufficient and cannot meet the electricity requirement for the electrolyzer; the H2 requirement for the operation of the PEMFC was met from the H2 storage tanks and energy continuity was ensured. The electrolyzer was designed for H2 demand of the 3 kW PEMFC which were met the greenhouse energy requirement. PEMFC based hybrid system has 48% electrical and 45% thermal efficiencies. According to optimization results obtained for the proposed hybrid system, the levelized cost of energy was found 0.117 $/kWh. The obtained results show the proposed PV/Electrolyzer/PEMFC hybrid power system provides an applicable option for powering stand-alone application in a self-sustainable expedient.

Introduction

The most important challenges of 21st century are energy storage and environmental pollution. Today, the energy need, which has increased in recent years due to the rapidly increasing technological developments and population, is still met mostly by fossil fuels. However, due to the rapid depletion of fossil fuel reserves and

Power optimization scheme of induction motor using FLC for electric vehicle

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Abstract:

In electric vehicles (EVs) and hybrid EVs, energy efficiency is essential where the energy storage is limited. Adding to its high stability and low cost, the induction motor efficiency improves with loss minimization. Also, it can consume more power than the actual need to perform its working when it is operating in less than full load condition. This study proposes a control strategy based on the fuzzy logic control (FLC) for EV applications. FLC controller can improve the starting current amplitude and saves more power. Through the MATLAB/SIMULINK software package, the performance of this control was verified through simulation. As compared with the conventional proportional integral derivative controller, the simulation schemes show good, high-performance results in time-domain response and rapid rejection of system-affected disturbance. Therefore, the core losses of the induction motor are greatly reduced, and in this way improves the efficiency of the driving system. Finally, the suggested control system is validated by the experimental results obtained in the authors' laboratory, which are in good agreement with the simulation results.

Introduction:

Recent decades have seen a dramatic increase in the heavy use of fossil fuels, which has contributed to a rise in atmospheric CO2 levels. Concerns about climate change and rising sea levels as a result of global warming have prompted a pressing need for coordinated international action to cut carbon dioxide emissions. About 20% of all carbon dioxide emissions come from the transportation sector, thus a major increase in fuel economy is crucial. Electric vehicles (EVs) have several advantages because they are more efficient, more environmentally friendly, quiet, and commonly reduce the energy dependence. The effectiveness and price of the drive are significantly impacted by the electric machine selected. But electric machines, like those that may be included into EVs and hybrid EVs, are crucial to any drive. The most common machines used in EVs are synchronous motors and induction motors (IMs) [9]. The electric vehicle's driving

DESIGN AND ANALYSIS OF MULTILEVEL CURRENT CHARGINGFOR ELECTRIC VEHICLES

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Abstract

Development of Electric Vehicles (EV) in recent year's lithium batteries becomes as the principal energy source due to the peak value of energy density, better power density and, long lifespan. Fast and proficient charging of batteries is a must for battery propelled automobiles. However, it takes a few minutes to fuel the petrol-powered vehicles but an EV takes 4-6 hours to complete the charging depends on C-rate. This paper presents the modeling and simulation of a multi current charging method for a two-wheeled electric vehicle. The proposed method uses a closed-loop control to derive the charging current through a buck converter power conditioning circuit. To validate the proposed charging method, the circuit is simulated in MATLAB/ Simulink environment and the results are compared with that of the constant current charging (CC) method and Constant Current-Constant Voltage (CC-CV) charging method.

INTRODUCTION

A huge volume of fossil fuel-powered vehicles in use around the world has been rooted in serious ecological and human life problems. Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs), and Fuel Cell powered Electric Vehicles (FCEVs) have to be utilized as a replacement of conventional vehicles and the Lithium-Ion (Li) battery is the main energy source for driving them. So, it's necessary to establish the charging stations in certain and reachable locations to enhance the use of electric vehicles. The most common EV charging hub comprises an AC–DC converter. with required power quality standards and trailed by an isolated / Non-isolated DC-DC converter. Picking the most favorable power conditioning circuit and minimization of switching losses in controlled semiconductor devices are key points in the prototype development of these EV charging stations.

Batteries can be charged at different C-rates depending on the requirement. Typical levels are [3] Slow Charge, in which charging happens at 0.1C to 0.5C and takes overnight or 14-16 hours to complete charging. Quick Charge is one where 0.5C to 1C is used for charging and takes around 3 to 6 hours. Fast Charge is one where charging is completed within an hour with a charging rate greater than 1C. There are different battery charging methods are followed in practice.

Literature survey

various charging techniques for Lithium-Ion (Li-Ion) batteries will be discussed. The theory of the methods along with their fundamental principles, mathematical model, block diagrams, and methods of implementation will be

Optimal PV Array Configuration for Extracting Maximum Power Under Partial Shading Conditions by Mitigating Mismatching Power Losses

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Abstract:

The grid-connected or standalone PV central inverter architecture is comprised of several PV modules which are connected in different ways to form the PV array. The power generation capability of the PV array is primarily affected by partial shading conditions (PSC). Due to PSCs, the power output of the PV array is dramatically reduced, and mismatching losses are induced in the PV modules. Based on the extent of these problems, multiple peaks also appear in the power-voltage (P-V) curve, which makes it very difficult to track the global maximum power point (GMPP). The main objective of this research paper is to model and simulate the series (S), series-parallel (SP), bridge-link (BL), honey-comb (HC), total-cross-tied (TCT) and proposed triple-tied (TT) solar PV array configurations under various partial shading scenarios. The performance of all PV configurations is evaluated under a uniform approach, considering eight different shading scenarios. The performance of the considered PV configurations is analyzed in terms of their mismatching power losses, fill factors, efficiency, global maximum power points (GMPPs), local maximum power points (LMPPs), voltages and currents at GMPPs, open circuit voltage and short circuit currents. The above-mentioned PV configurations are modeled and simulated in a Matlab/Simulink environment by considering the KC-200GT module parameters.

INTRODUCTION

THE extensive use of fossil fuels for electrical power generation requires that more attention be given to the environmental concerns. To overcome the problems caused by the usage of fossil fuels and meet the ever-growing demand, renewable energy sources represent the best possible solutions [1]. Photo voltaic (PV) power generation offers the most promising renewable energy source due to the following advantages: pollution free, less maintenance, greater abundan and consumers are being encouraged by governments through attractive incentives and subsidies. But the PV modules have

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RENEWABLE ENERGY MANAGEMENT IN SMART HOME ENVIRONMENT VIA FORECAST EMBEDDED SCHEDULING BASED ON RECURRENT TREND PREDICTIVE NEURAL NETWORK

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ABSTRACT Smart home energy management systems help the distribution grid operate more efficiently and reliably, and enable effective penetration of distributed renewable energy sources. These systems rely on robust forecasting, optimization, and control/scheduling algorithms that can handle the uncertain nature of demand and renewable generation. This paper proposes an advanced ML algorithm, called Recurrent Trend Predictive Neural Network based Forecast Embedded Scheduling (rTPNN-FES), to provide efficient residential demand control. rTPNN-FES is a novel neural network architecture that simultaneously forecasts renewable energy generation and schedules household appliances. By its embedded structure, rTPNN-FES eliminates the utilization of separate algorithms for forecasting and scheduling and generates a schedule that is robust against forecasting errors. This paper also evaluates the performance of the proposed algorithm for an IoT-enabled smart home. The evaluation results reveal that rTPNN-FES provides near-optimal scheduling 37.5 times faster than the optimization while outperforming state-of-the-art forecasting techniques.

Keywords: energy management, forecasting, scheduling, neural networks, recurrent trend predictive neural network

INTRODUCTION Residential loads account for a significant portion of the demand on the power system. Therefore, intelligent control and scheduling of these loads enable a more flexible, robust, and economical power system operation. Moreover, the distributed nature of the local residential load controllers increases system scalability. On the distribution level, the smart grid benefits from the increased adoption of residential demand and generation control systems, because they improve system flexibility, help to achieve a better demand-supply balance, and enable increased penetration of renewable energy sources.

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Grid Synchronization of WEC-PV-BES Based Distributed Generation System using Robust Control Strategy

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Abstract:

In this paper, a renewable (Solar and Wind) energy sources based distributed generation system (DGS) is controlled to operate in the grid connected mode and an islanded mode using the robust and fast IAPV (Improved Affine Projection Versoria) and proportional resonant (PR) based control strategy. Due to the use of IAPV based control in the grid connected mode, the grid current becomes immune to the DC offset and the other non-fundamental harmonics during an unbalanced load, which significantly improves the grid current quality. It also presents the flexible operation of DGS in the grid connected mode using the variable and constant power injection into the grid, which ensures the grid stability during large and fast wind and solar power variations. Moreover, a MSOS-FLL (Modified Second Order Sequence Frequency Locked Loop) is used to improve the synchronization and seamless mode switching (islanded to grid connected and vice versa) performance by quickly and accurately estimating the phase angle and frequency at distorted and unbalanced grid voltages. Simulation and test results validate the microgrid operation and robustness of the microgrid control.

Introduction:

In light of the widespread availability of RESs in recent years there has been a rise in interest in DGSs that are powered by renewable energy sources. Increases in RES-based DGS are being driven by environmental concerns as a result of the retirement of fossil fuel power facilities. However, the unpredictable character of RES like solar and wind presents difficulties for the RES based DGS, especially with voltage and frequency changes in an islanded mode. In order for the RES-based DGS to function in the island mode of operation, a storage battery must be included. As a result, RES-based DGSs can provide reliable electricity to local loads. Despite its many useful characteristics, DGS is not yet a fully developed technology. Extensive

Dynamic Voltage Support for Low-Voltage Ride-Through Operation in Single-Phase Grid-Connected Photovoltaic Systems

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Abstract

This article presents a dynamic voltage support (DVS) scheme for achieving low-voltage ride-through (LVRT) with a grid-connected photovoltaic (PV) inverter during the voltage sag fault. The DVS scheme is achieved by formulating an additional reactive active current control mode which is developed from a conventional reactive current control approach. This provides stable operation of the system and achieves higher effectiveness due to the lower X/R ratio at the point of common coupling in low-voltage networks. Further, the performance of the proposed controller is assessed by simulating a 4 kW system for voltage sag faults. Further, the proposed controller tested with the real-time simulations and experimental setup for voltage sag conditions. The results presented demonstrate that the active and reactive power is regulated in concordance with grid code requirements. The controller achieves LVRT within the time limits of grid standard during symmetrical faults, which makes it appropriate for fast transient events. This operates the PV system under its nominal capacity, avoiding unwanted grid disconnection events.

INTRODUCTION

With the increase in grid integration of renewable energy over the years, power saturation has been an issue with the grid. The emergence of photovoltaic (PV) power and its intermittent nature is considered to be a major contribution to this issue [1]. Further, the integration of smaller PV generations into the grid brings different challenges affecting the grid stability that need to be tackled, especially at the distribution level [2]. Most impacts of grid integrated PV systems are related to unintentional islanding, overloading of feeders, and power quality issues due to unbalanced voltage, dc injection, and flickering [2]. Based on these PV impacts, a set of regulations has been created to keep the operation within safe operating limits, to maintain system stability, and to

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SELF DRIVING AND OVERSPEED CAPTURED CARS USING MACHINE LEARNING

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ABSTRACT In accordance with information from a video source that has been recorded, this project estimates the speed of a vehicle. The number of accidents rises as the number of vehicles does as well. Thus, it's crucial to set speed limits for cars in specific zones or locations. Thus, a better method of determining the speed of moving vehicles is required. The vehicles' video streaming might be used for this instead of spending money on pricy sensors like radarsIn addition to placing significant strain on road capacity, the steadily growing number of on-road cars has made traffic management challenging and given rise to issues including congestion, crashes, and air pollution, among others. Our daily lives are significantly impacted by these issues. To lessen the impact, a robust, healthy, and effective traffic management system is required. In addition to these issues with vehicle traffic, it is also possible to study statistical factors that can help with highway management, such as the typical number of vehicles on the road at any given moment and the level of congestion

INTRODUCTION In the recent years we can see there is a vast increase in the number of vehicles all around the globe. Along with the increase in number of vehicles increases the number of accidents. Therefore, it is important to limit the speed of the vehicles at certain zones or areas. Radar speed measurement tools are commonly used for this purpose which can be inaccurate in certain cases such as in sensing smaller vehicles with weaker echoes. Also, it is difficult for these tools to detect vehicles changing in speeds too often or fast. Therefore, there is a need for a better technique to detect the speed of the moving vehicles. Instead than spending a fortune on expensive sensors like radars, this may be accomplished by leveraging the vehicle's video streaming. As an input, the moving vehicle's video stream is provided, after which it is passed through a filter to determine its speed.

METHODOLOGY The below shown figure (fig 1) demonstrates the block diagram of our vehicle speed detection system. The block diagram below explains that firstly, a video is

Delta-Bar-Delta Neural Network (NN) Based Control Approach for Power Quality Improvement of Solar PV Interfaced Distribution System

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Abstract

This project presents with the increasing integration of solar photovoltaic (PV) energy sources to the utility, particularly in the case of a poor distribution infrastructure; this project raises severe concerns about worsening in power quality. The deployment of a reliable control mechanism is thus essential for enhancing the power quality of the grid-connected solar energy conversion system. This paper discusses a delta-bar-delta NN control for optimal operation, wherein active power is fed to the loads and the remaining power is fed to the grid as a function of distribution static compensator (DSTATCOM) capabilities like reducing harmonics, balancing the load, and increasing the power factor. The control approach enables weights to be adjusted adaptively and independently, which reduces computing time and helps reduce the model complexity most prominent during abnormal grid circumstances. In addition, the combinational neural structure used in the estimate process provides more precision when employing the neural network based control approach. Maximum power point tracking (MPPT) based on incremental conductance (INC) is used to get the most out of a PV array.

I. INTRODUCTION

Solar energy is becoming an increasingly important part of the solution to the world's energy problems. The total price of solar photovoltaic (PV) has dropped in recent years due to a number of variables, including a precipitous drop in the price of silicon (the fundamental resource in solar power generation) and an increase in technical expertise. On the other hand, the characteristics of a solar PV array show that its voltage and current behave in a

Power Quality Enhancement and Power Flow Analysis of a PV Integrated UPQC System in a Distribution Network

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Abstract

Increasing awareness for green energy and sustainable energy management has accelerated the popularity for the incorporation of distributed energy resources and distributed energy storage into the distribution network and microgrid. This has proliferated the use of power electronic-based devices giving rise to a serious issue of deteriorating power quality (PQ) in the distribution system. In this context, this article presents a photovoltaic (PV) integrated unified power quality conditioner (UPQC) operating with an adaptive compensating technique based on variable leaky least mean square (VLLMS) algorithm. It is a soft computing-oriented method that offers quicker convergence to the desired condition in an iterative approach keeping the weight of the updating parameters within the specified limit. The VLLMSbased algorithm eliminates the use of low pass or moving average filter for the extraction of fundamental components from polluted source voltage and load current to generate reference signal for the switching of shunt as well as series voltage source converters (VSC) of the UPQC. Due to the involvement of feed-forward component of

PV in the compensating technique of shunt VSC, it efficiently and smoothly manages power balance between grid, load, and PV besides resolving the PQ issues of current harmonics and poor power factor at PCC. It also ensures the regulation of dc-link voltage. The series converter maintains pure sinusoidal voltage at the load terminal irrespective of sag/swell and harmonics present in the grid voltage. The effectiveness of the proposed system is verified through simulation as well as hardware implementation under different static and dynamic operating conditions.

INTRODUCTION

THE rigorous advancements in semiconductor technology have resulted into elevated penetration of power electronicbased devices into the power distribution system in the form of power electronics converters and non-linear loads. Hence, worsens the quality of power

Combining Electric Vehicle Battery Charging and Battery Cell Equalization in One Circuit

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ABSTRACT:

Electric vehicles (EVs) require an onboard battery charger unit and a battery management system (BMS) unit that balances the voltage levels for each battery cell. So far both units are two completely autarkic power electronics systems. This paper presents a circuit that operates as a battery charger when the EV is connected to the grid and as a voltage balancer when the EV is driving. Thus, the proposed circuit utilises two functions in one and therefore eliminates the need of having two autarkic units reducing complexity and reduction in component count. The proposed circuit operates as a fly back converter and achieves power factor correction during battery charging. The constant-current constant-voltage (CC–CV) charging method is employed to charge the batteries. However, to limit the number of sensors that will be employed as a result of varying cells during charging, the battery current is estimated using a single current transducer and embedding a converter model in the controller. The operation of the circuit is presented in detail and is supported by simulation results. A laboratory prototype is built to verify the effectiveness of the proposed topology. Experiment results show that the proposed method provides an integrated solution of on-board charging and voltage equalisation.

INTRODUCTION:

The rising worldwide push towards the adoption of low carbon cars to lessen the greenhouse effect makes transport electrification a trend that cannot be stopped. In order to cut down on carbon dioxide

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COMPARISON OF DEEP REINFORCEMENT LEARNING AND MODEL PREDICTIVE CONTROL FOR ADAPTIVE CRUISE CONTROL

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ABSTRACT:This study compares Deep Reinforcement Learning (DRL) and Model Predictive Control (MPC) for Adaptive Cruise Control (ACC) design in car-following scenarios. A first-order system is used as the Control-Oriented Model (COM) to approximate the acceleration command dynamics of a vehicle. Based on the equations of the control system and the multi-objective cost function, we train a DRL policy using Deep Deterministic Policy Gradient (DDPG) and solve the MPC problem via InteriorPoint Optimization (IPO). Simulation results for the episode costs show that, when there are no modeling errors and the testing inputs are within the training data range, the DRL solution is equivalent to MPC with a sufficiently long prediction horizon. Particularly, the DRL episode cost is only 5.8% higher than the benchmark solution provided by optimizing the entire episode via IPO. The DRL control performance degrades when the testing inputs are outside the training data range, indicating inadequate generalization. When there are modeling errors due to control delays, disturbances, and/or testing with a High-Fidelity Model (HFM) of the vehicle, the DRL-trained policy performs better with large modeling errors while having similar performance as MPC when the modeling errors are small.

Index Terms—Deep Reinforcement Learning, Model Predictive Control, Adaptive Cruise Control.

INTRODUCTION

Reinforcement learning is a learning-based method for optimal decision making and control [1]. In reinforcement learning, an agent takes an action based on the environment state and consequently receives a reward. Reinforcement learning maximizes cumulative discounted reward by learning an optimal state-action mapping policy through trial and error. The policy is trained via Bellman's principle of optimality, which dictates that the remaining actions constitute an optimal policy with regard to the state resulting from a previous action. Deep reinforcement learning (DRL), which utilizes deep (multi-layer) neural netsas

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A High Gain Multiport DC-DC Converter for Integrating Energy Storage Devices to Dc Microgrid

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ABSTRACT

Interfacing multiple low-voltage energy storage devices with a high-voltage dc bus efficiently has always been a challenge. A high gain multiport dc–dc converter is proposed for low voltage battery-supercapacitor based hybrid energy storage systems. The proposed topology utilizes a current-fed dual active bridge structure, thus providing galvanic isolation of the battery from the dc bus, wide zero voltage switching (ZVS) range of all the switches, and bidirectional power flow between any two ports. The dc bus side bridge uses voltage multipliercells to achieve a high voltage conversion ratio between the supercapacitor (SC) and the dc bus. Moreover, as the proposed topology employs only one two-winding transformer to achieve a three-port interface, the number of control variables are reduced, which decreases control complexities. The operation of the proposed converter is analyzed in detail, including the derivation of ZVS conditions for the switches and transformer power flow equations. A decoupled closed-loop control strategy is implemented for the dc bus voltage control and energy management of the storage devices under different operating conditions.

Keywords:Energy storage devices, Multiport DC-DC converter,Low voltage battery,Supercapacitor,Galvanic isolation,Zero voltage switching (ZVS), Bidirectional power flow

INTRODUCTION

The transition towards renewable energy sources and the growing demand for efficient energy storage solutions have spurred significant advancements in power electronics and grid integration technologies. One of the key challenges in modern energy systems is efficiently interfacing multiple low-voltage energy storage devices with high-voltage DC buses. This task becomes particularly daunting in the context of microgrids, where the integration of diverse energy sources and storage systems is essential for ensuring stability, reliability, and resilience. In recent years, the proliferation of renewable energy generation technologies, such as solar photovoltaics (PV) and wind turbines, has led to the widespread adoption of DC microgrids as an alternative to traditional AC-based grids. DC microgrids offer several advantages, including higher efficiency, reduced losses, and increased compatibility with DC-based loads and renewable energy sources [1]. However, effectively integrating energy storage devices into DC microgrids poses unique technical challenges that require innovative solutions.

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A High Gain Multiport DC-DC Converter for Integrating Energy Storage Devices to Dc Microgrid

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INTRODUCTION

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ANALYSIS OF GRID INTERACTIVE WITH DFIG BASED WECS FOR REGULATED POWER FACTOR

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ABSTRACT

This project presents the sharing of reactive power between two converters of a doubly fed induction generator (DFIG) based wind energy conversion system interacting with the grid. The rotor side converter (RSC) control of DFIG is designed for sharing of reactive power at below rated wind speeds, which essentially reduces the amount of rotor winding copper loss. However, at rated wind speed, the RSC control is designed to maintain the unity power factor at stator terminals and to extract rated power without exceeding its rating. Further, the reduction in rotor winding copper loss due to reactive power distribution is demonstrated with an example. Moreover, the grid side converter (GSC) control is designed to feed regulated power flow to the grid along with reactive power support to DFIG and to the load connected at point of common coupling. Moreover, the GSC control is designed to compensate load unbalance and load harmonics. The battery energy storage connected at DC link of back-to-back converters, is used for maintaining the regulated grid power flow regardless of wind speed variation. The system is modeled and its performance is simulated under change in grid reference active power, varying wind speed, sharing of reactive power and unbalanced nonlinear load using Sim Power Systems toolbox of MATLAB.

Keywords:Reactive power sharing, Doubly fed induction generator (DFIG), Rotor side converter (RSC) control, Grid side converter (GSC) control, Battery energy storage, Unity power factor, Sim Power Systems toolbox

INTRODUCTION

The global energy landscape is undergoing a significant transformation, driven by the increasing adoption of renewable energy sources to meet the growing demand for electricity while mitigating the adverse effects of climate change [1]. Among these renewable energy sources, wind energy has emerged as one of the most promising and rapidly expanding contributors to the power generation mix [2]. In particular, wind energy conversion systems (WECS) based on doubly fed induction generators (DFIGs) have gained widespread popularity due to their high efficiency, reliability, and grid-friendly operation [3].This project focuses on the analysis of grid interaction with DFIG-based WECS, with a specific emphasis on the sharing of reactive power between the system components and its impact on overall performance [4]. Reactive power management is a

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ANALYSIS OF GRID INTERACTIVE WITH DFIG BASED WECS FOR REGULATED POWER FACTOR

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ABSTRACT

This project presents the sharing of reactive power between two converters of a doubly fed induction generator (DFIG) based wind energy conversion system interacting with the grid. The rotor side converter (RSC) control of DFIG is designed for sharing of reactive power at below rated wind speeds, which essentially reduces the amount of rotor winding copper loss. However, at rated wind speed, the RSC control is designed to maintain the unity power factor at stator terminals and to extract rated power without exceeding its rating. Further, the reduction in rotor winding copper loss due to reactive power distribution is demonstrated with an example. Moreover, the grid side converter (GSC) control is designed to feed regulated power flow to the grid along with reactive power support to DFIG and to the load connected at point of common coupling. Moreover, the GSC control is designed to compensate load unbalance and load harmonics. The battery energy storage connected at DC link of back-to-back converters, is used for maintaining the regulated grid power flow regardless of wind speed variation. The system is modeled and its performance is simulated under change in grid reference active power, varying wind speed, sharing of reactive power and unbalanced nonlinear load using Sim Power Systems toolbox of MATLAB.

Keywords:Reactive power sharing, Doubly fed induction generator (DFIG), Rotor side converter (RSC) control, Grid side converter (GSC) control, Battery energy storage, Unity power factor, Sim Power Systems toolbox

INTRODUCTION

The global energy landscape is undergoing a significant transformation, driven by the increasing adoption of renewable energy sources to meet the growing demand for electricity while mitigating the adverse effects of climate change [1]. Among these renewable energy sources, wind energy has emerged as one of the most promising and rapidly expanding contributors to the power generation mix [2]. In particular, wind energy conversion systems (WECS) based on doubly fed induction generators (DFIGs) have gained widespread popularity due to their high efficiency, reliability, and grid-friendly operation [3].This project focuses on the analysis of grid interaction with DFIG-based WECS, with a specific emphasis on the sharing of reactive power between the system components and its impact on overall performance [4]. Reactive power management is a

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Construction and Performance Investigation of Three -Phase Solar PV and Battery Energy Storage System Integrated UPQC

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ABSTRACT

This project focuses on the construction and performance investigation of a Three-Phase Solar PV and Battery Energy Storage System integrated with a Unified Power Quality Conditioner (UPQC). The integration of renewable energy sources, such as solar photovoltaic (PV) systems, with battery energy storage systems (BESS) and UPQC technology aims to address key challenges in modern power systems, including voltage sags, harmonics, and power quality issues. The project involves the design, implementation, and evaluation of the integrated system to optimize its performance in real-world scenarios. Through comprehensive performance investigation and analysis, the project aims to enhance renewable energy integration, improve power quality, increase grid resilience, and optimize system performance.

Keywords: Three-Phase, Solar PV, Battery Energy Storage System, Unified Power Quality Conditioner (UPQC), Renewable Energy Integration, Power Quality Issues, Grid Resilience

INTRODUCTION

The global energy landscape is undergoing a profound transformation, driven by the increasing adoption of renewable energy sources and the growing demand for sustainable energy solutions. In response to the challenges posed by climate change and the depletion of fossil fuel reserves, governments, industries, and communities are increasingly turning to renewable energy technologies to meet their energy needs while reducing carbon emissions and mitigating environmental impacts [1]. Among the various renewable energy sources, solar photovoltaic (PV) systems have emerged as one of the most promising solutions for clean and sustainable power generation [2].

Solar PV systems harness the abundant and freely available energy from the sun to convert sunlight into electricity, offering a reliable and renewable source of power [3]. However, despite their numerous benefits, solar PV systems also present challenges related to intermittency, variability, and grid integration [4]. The intermittent nature of solar energy generation can lead to fluctuations in power output, which may pose challenges for grid stability and reliability [5]. Additionally, solar PV systems are susceptible to environmental factors such as cloud cover and shading, which can further exacerbate variability in power generation [6].To address these challenges and

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INTRODUCTION

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System Modification Process to reduce calculation complexity in Backward Forward sweep Algorithm

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Abstract. In backward forward sweep algorithm, even though forward sweep (FW) to compute bus voltages, backward sweep (BW) is to compute branch currents, junction bus voltage calculation is required as mandatory additional step in backward sweep process. This calculation complexity increases with increase in number of junction buses particularly when loads are also connected to junction buses and consequently execution time is also increases. This paper concentrates on this problem and contributes with System Modification Process (SMP) to reduce Backward Forward (BW-FW) sweep algorithm calculations complexity. In SMP, transfer buses are connected to a given electrical distribution system to avoid calculating junction bus voltage which is a mandatory step in backward sweep process, thus decoupling the voltage and current calculations. Hence in this present work conventional backward forward sweep algorithm is modified as Decoupled Backward Forward Sweep (DBFS) algorithm. The system modification process is demonstrated with a 3-node lateral as numerical example and implement on practical 55 bus three-phase unbalanced distribution system. In Matlab simulation, the efficiency of the DBFS algorithm has been tested with unbalanced radial distribution systems (URDS). The simulation outcomes in terms of number of repetition, execution time obtained, Bus voltages per phase and total computed power per phase with DBFS are compared with conventional BW-FW sweep algorithm results to demonstrate the proposed method efficiency. From the results, the proposed DBFS algorithm not only reduces conventional BW-FW sweep algorithm calculations complexity but also requires less amount of execution time (including SMP) to achieve same results without degrading the efficiency.

Keywords: Backward forward sweep algorithm, System modification process, Decoupled backward forward sweep algorithm.

1. Introduction

The loads connected to the feeders in distribution system are generally multi phase, unbalanced and distributed loads with non uniform load curves. Apart from this, it has feeders with “high R/X ratios, huge number of branches that are radial in structure”. This makes the distribution system into complex and the direct methods

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Methodology to Prevent Voltage Collapse During On Load Tap Changing Transformer Operation Under Network Contingencies

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***Abstract*—The operation of On Load Tap Changing Transformer (OLTC) in a normal state can maintain the desired voltage but can also increase the risk of a voltage collapse under certain operating conditions like network contingencies such as outage of a transmission line. Hence, OLTC operation can be both a boon and a curse in voltage control based on the operating condition of the power system. This paper is investigated the effect of the tap changes in the voltage instability process under network contingencies. For this sake, instability may be obtained as a consequence of a network contingency. This paper also discusses the reverse action that the secondary voltage of a transformer is pulled down when the tap position of OLTC is raised to increase the secondary voltage under network contingencies. The performance of the reversal OLTC with the placement of the FACTS device Static VAR Compensator (SVC) at the critical load bus is also investigated. The proposed methodology has been effectively tested on an EHV 24 bus equivalent southern region of an Indian power system network.**

Keywords—Contingency Analysis; Reversal OLTC; Generator Reactive Power Output.

I. INTRODUCTION

In power system When the load centers experience abnormal operating conditions, the voltage reduction would be reflected in the distribution system. The operation of OLTCs would restore the distribution system's voltage, but each tap would increase the MWs and MVARs, which would eventually cause the system's reactive power to increase. The process eventually may lead to voltage collapse. Thus, the operation of certain OLTCs has a significance influence on voltage instability.

Mohd Zamri Che Wanik et al. [1] discussed the study on minimizing of on-load tap changer operation by considering the reactive power capability of PV inverter in distribution network system. The operation of on-load tap changer had varied in different levels and type of reactive power injection by upon the amount and type of reactive power which either increases or decreases. Sylwester Robak et al. [2] explained the planning contingencies accepted by different transmission network operators worldwide and describes a set of contingency planning proposed. Hiroshi ohtsuki et al. [3] and colleagues discussed the reverse action of a transformer when the tap position is increased to push the secondary voltage. This study shows that when the secondary voltage is lowered, a reverse action is initiated which increases the primary voltage.. Zhu et al. [4] addressed the effects of OLTC operation on voltage collapse from the point of view of how the limit of power transfer from the generation to the load centre can be affected by OLTC operation. Isaias et al. [5] show that blocking the tap changes in the OLTCs may prevent voltage collapse, while maximizing the load recovered. For this sake, blocking time is determined by a tangent vector-based index. The index based on voltage level variation at the bus controlled as a function of tap changes. Costas Vournas et al. [6] discussed the effect of load tap changers on the voltage stability of a power system and, in particular under emergency conditions. In this they discussed how the tap-blocking and tap reversing of bulk power delivery load tap changers can prevent an approaching voltage collapse. Individual tap blocking has been the goal of various analysis. [7 ,8] However, choosing the right voltage level may be a challenge. Vournas et at. [9] This paper presents a method for controlling multiple tap blocking. It uses a sensitivity index and reactive power loads. Duan Jundong and Zhu Shanshan [10] analyses the influence of OLTC on the static voltage stability limit through the maximum transmission power curve and critical voltage curve. In [11], the effect of varying the impedance of a 765/400kV transformer on the steady state (load flow and active power losses) and voltage stability of the cape corridor was investigated. G.Yesuratnam and D.Thukaram [12] presented to identify the critical transformer components that could cause voltage instability under heavy load. This approach is based on optimal reactive power dispatch with three different objective functions. Most of these papers concentrated on the effect of OLTC on voltage instability under heavily loaded conditions. Gyara Mahendar and G.Yesuratnam [13] investigated the effect of the tap changes in the voltage instability process under network contingencies and also This topic discussed the reverse action of the transformer when the OLTC is raised. This action increases the secondary voltage of the system. In this paper this work has been extended with inclusion of FACT device i.e. SVC and investigated the role of SVC on the performance of on load tap changing transformers under network contingencies.

II. APPROACH

The system status is computed from the output of the On-Line State Evaluator. If the system is insecure, then the appropriate control action must be taken based on the observed limit violations. Figure 1 shows a block schematic of a few functions performed in the Energy Control Centre (ECC).If the output is not secure, then the system is considered vulnerable. If it is, then the system undergoes a comprehensive evaluation. After a contingency study if the status of the system indicates that it is insecure operation, then the

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Opposition Crow Search-based Optimal Feature Selection for Defect Classification by SVM in Semiconductor Wafer

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***Abstract*—In semiconductor manufacturing, the classification and detection of wafer defects and taking immediate action to find the root cause of defects are documented in quality management information. The problem statement of existing methods cannot handle camera and light source locations in the segmented process properly, which can lead to a reduction in wafer detection systems. The WM-811K dataset used in the proposed approach contains more data that has been trained and tested. The proposed method is optimal-based feature selection using the Opposition Crow Search (OCS) algorithm and Support Vector Machine (SVM)-based classification to identify wafer defect images. The numerical validation of this approach has an accuracy of 99.23%, precision of 99.39%, recall of 99.54%, and F1-score of 99.68%. By comparing existing methods like Attention-Augment Convolutional Neural Network (A2CNN), Ensemble-CNN (ECNN), Recurrent-CNN (RCNN), and Deep Convolutional Generative Adversarial Network (DCGAN), the proposed method overcomes all the limitations of the existing method.**

Keywords—crow search algorithm, detection, semiconductor, support vector machine, wafer defect.

I. Introduction

The fundamental components of semiconductor wafers are quickly advancing in the field of technology and meeting the demand for higher quality standards [1]. The manufacturing process of defect patterns and anomalies improves the production yield at the risk of defects during the gathering process [2]. The need for automation solutions in human expert-based detection shows the limitations in accuracy, and it is more challenging to make detection in single wafers that affect the complexity and frequency. Recognizing the defect pattern in this approach involves cutting out individual wafers [3]. The location and angle of the wafer image are spotted, and scratches in the wafer image command the defect pattern to be observed [4]. The various methods, such as unsupervised neural networks, statical approaches, and feature-based techniques, focus on wafer defect classification. The current methods often require precise wafer segmentation, which demands sophisticated hardware equipment and may introduce errors in segmentation [5]. Instead, the emphasis is placed on matching and registration methods that are more suitable for wafer segmentation. The primary objective is to propose a high-precision and cost-effective wafer segmentation method, paving the way for enhanced defect detection accuracy and streamlined production processes [6]. The primary key contribution towards the proposed method,

- The OCS algorithm ensures an efficient and effective process for selecting optimal features. This enhances the discriminative power of the feature set, allowing the model to focus on the most relevant characteristics for wafer defect identification.
- The incorporation of SVM as the classification algorithm to the model's ability to accurately classify semiconductor wafer defects by handling complex patterns and high-dimensional data, for defect identification.
- The combination of optimal feature selection through OCS and SVM-based classification contributes to a comprehensive approach for semiconductor defect identification.

Following the introduction part, Section 2 consists of a literature review with existing methods, and Section 3 explains the proposed method of optimal feature selection by SVM classification. Section 4 shows the experimental result with a comparison of the proposed method with an existing method and discussion. Finally, Section 5 ends with a conclusion.

II. Literature Review

Jing Yang. *et al.* [7] introduced a method for wafer detection that has two processes: wafer segmentation and defect detection. During the wafer segmentation phase, the spatial feature-guided (AIC-FP) algorithm has a target to segment the wafer image. However, a limitation of this approach associated with hardware implementation is that it is more instability in camera and light source locations. The characteristic of wafers was inherent in the defect detection process with effective and simple algorithm-based machine vision. So, it lacks insights into the variation of challenges in wafer characteristics, and suboptimal results lead to complex segmentation scenarios.

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Optimal Placement of DG and Minimization of Power Loss using Naked Mole Rat Algorithm

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***Abstract* – Electrical energy is necessary for daily operations. The promotion of producing electrical power from renewable energy sources like wind, tidal waves, and solar energy is due to the significant relevance of all potential energy sources from which it may be generated. As a consequence of the recent increase in interest in renewable energy sources, there have been a sizable number of studies on integrating distributed production into the electrical grid. The main objective of adding DG units to the network is to deliver a net amount of energy while reducing power losses. To reduce the distribution system's power losses, it is essential to determine the required ratings and best placements for local generations. Much research has been carried out to establish the best place for DG installation. This research study deals with the new algorithm, called the Naked Mole-Rat Algorithm (NMRA), to evaluate the required ratings and best locations of Distributed Generation (DG) units in a radial distribution system, considering minimum power losses and improvements in the voltage profile. In this work, the placement of DG units is found using a fuzzy method, and the size of DG is estimated using a Naked Mole-Rat algorithm. The proposed approach was developed in MATLAB, and after being evaluated on test systems with 15-bus and 33-bus, the results were provided.**

***Keywords*—naked mole-rat algorithm, distributed generation, optimal placement, voltage profile, fuzzy method**

I. INTRODUCTION

The term distributed generation [1], also known as decentralized energy, distributed energy, embedded energy, or on-site generation refers to small-scale production located at or close to the load centers. For a distributed generation, there are several small-scale power production techniques. A low range energy producing technologies are called Distributed Energy Resources (DER) [2], regardless of whether they are connected to the electrical grid, to enhance the efficiency of the distribution system. Energy storage and management systems can be used in combination with these technologies. Distributed generation is a technology that reduces the amount of loss in the power transmission since power is produced relatively near the load point, often even inside the same structure [3]. Distribution Generations (DGs) are a mix of traditional and renewable systems. DGs provide innovative energy sources for the production of electrical power from fuel cells, solar PV, and wind sources [4]. Utilizing DGs to reduce transmission and distribution losses improves dependability [5].

The placement of the DGs must be close to the load centers to reduce distribution losses and improve the voltage profile [6]. There has been a lot of research done on DG unit locations. Choosing the locations and size of the DGs to minimize power loss is the aim of the DG placement challenge. In order to place DG in a radial distributed system optimally, several numerical and heuristic methods have been proposed. [7] proposed a backtracking search optimization for improving the voltage profile and limiting the system losses. In the distributed network utilizing PSO, the appropriate DG sizes and locations are suggested in [8]. The outcomes of the suggested technique's implementation on two separate test systems were contrasted. In [8–11, 22-24], several heuristic methods were introduced, including the Cuckoo Search Algorithm, Human Opinion Dynamics Algorithm, Pattern search, and Bat algorithm, Smalling area technique, Multi-objective whale optimization, to discover the answer for DG placement by lowering network loss and boosting voltage profile. Distribution system reconfiguration is another method for power loss mitigation, network stability enhancement, and reliability improvement [19]. The voltage profile at power generation side is maintained as constant adding an Automatic Voltage Regulator [20, 21].

Even though the issue of ideal DG placement has been extensively researched, more practical and effective solutions still need to be created [12-13]. The quality of the data collection has a direct impact on how successful they are. Any data that lacks uncertainty is corrected through the use of a fuzzy approach. The benefit of the fuzzy method is that it may add heuristics to the problem of optimum DG placement and reflect engineering decisions. Analyzing the outcomes of a fuzzy approach to determine the optimum DG placements is straightforward. [14] presents a meta-heuristic method called Fuzzy-ACO for the appropriate placement and reconfiguration of PV and D-STATCOM. The main objective is to balance the feeder loads, mitigate system losses, and improve voltage profiles. To determine the ideal locations and DG unit ratings in distributed electrical networks, a novel approach known as MINLP was established [15]. The global optimization approach makes it easier to determine the proper DG sizes. In this article, The Naked Mole-Rat Algorithm is proposed. This algorithm searches for viable solutions to the problem under discussion by using the notion of mating patterns of the workers and breeders naked mole rats with the queen [17]. The Fuzzy technique described in [16] is employed in this research study to choose the ideal DG placements as the initial step. The later step involves determining the optimal DG (Photovoltaic) positions and sizes using the Naked Mole-Rat

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Customer Churn Prediction using Tunicate Swarm Optimization based Hybrid Machine Learning Algorithms

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***Abstract*—The customer churn is referred as number of previous customers who leads to leave the service provider through particular time. The main goal is to predict churn customers as early stage and find the cause for its churn. This paper proposed a Tunicate Swarm Algorithm-Support Vector Machine-Improved Random Forest (TSA-SVM-IRF) for predicting customer churn. The IBM Telco dataset is used in this paper and it is preprocessed by one hot encoding. At this time, the data is converted into numerical form. The TSA is used for feature selection which overcomes dimensionality detection and vanishing gradient issues. Then, the SVM-IRF is used for predicting churn customers at early stage. The f1-score, recall, precision, and accuracy are used to estimate the model performance. TSA-SVM-IRF attains 97.59% f1-score, 98.86% recall, 96.64% precision and 96.82% accuracy when compared to existing techniques like Grey Wolf Optimization and Ensemble Neural Network (GWO-ENN), and Swish Recurrent Neural Network (S-RNN).**

Keywords—one hot encoding, random forest, recurrent neural network, support vector machine, tunicate swarm algorithm.

I. Introduction

In Telecommunication industry (TCI), the customer churn is an important problem dur to service provider revenue is largely dependent on retention of previous customers. The customer churns denote the loss of customers in participant service, end relationship reflection [1, 2]. It enables to recognize the reason for end relationship and assemble an approach which reduces churn rate and enhancing profits [3]. Therefore, customer intention anticipating to end relationship is involved for TCI and taken as inexpensive advantages. It is an unescapable significance when a customer is displeased through TCI services for huge time [4]. Customer contribution of service unable to occur overnight when it comes from customer as vital act because of its gathering of huge-term dissatisfaction [5]. Thus, it is a vital for service provider to recognize and tackle its drawback about customer service and fulfillment for retain customers [6]. The Machine Learning (ML) and Deep Learning (DL) approaches are utilized to predict customer behavior thus marketing policies are enhanced based on results. Nowadays, ML is taken extensively for predicting the churn and training parameters are selected for churn prediction [7]. The contribution is given as follows:

- The preprocessing is done through one hot encoding which converts categorical data into numerical format.
- The TSA is used for feature selection which reduces the dimensionality reduction and overcomes the vanishing gradient issues.
- The SVM-IRF is used for prediction which predicts the customer churn and metrics like f1-score, recall, precision and accuracy are used.

The paper is arranged as follows: section 2 deliberates literature review, section 3 deliberates proposed method, section 4 deliberates experimental result and section 5 deliberates conclusion.

II. Literature Review

Maryam Rahmaty et al. [8] developed a GWO-ENN for predicting customer churn. The developed model was depended on fuzzy entropy selection technique with same classifier for predicting the customer churn. To enhance the usage of neural networks, the CNN is efficient for improving prediction of customer churn. However, the developed model was time consuming which affects performance.

Samah Wael Fujo et al. [9] presented a Deep BP-ANN through feature selection methods such as Lasso Regression and variance thresholding. The Exploratory Data Analysis (EDA) was used to recognize given dataset and transformation into preprocess data. The random oversampling technique was used to handle class imbalance issues in two datasets. However, the presented model needs numerous information for model training.

Somak Saha et al. [10] implemented a DL based improved customer churn prediction named as ChurnNet in telecommunication industry. The ChurnNet is a 1D convolutional (conv) which was incorporated into residual, Squeeze and Excitation (SE) block for enhance the performance which assist to solve gradient issues. Spatial

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