Editorial

Renu Sharma* and Manohar Mishra

Department of Electrical Engineering,
Institute of Technical Education and Research,
Siksha 'O' Anusandhan University,
Bhubaneswar, Odisha, 751030, India
Email: renusharma@soa.ac.in
Email: manohar2006mishra@gmail.com
*Corresponding author

Akshay Kumar Rathore

Department of Electrical and Computer Engineering,
Concordia University,
Montréal, QC H3G 1M8, Canada
Email: akshay.rathore@concordia.ca

Janmenjoy Nayak

Department of Computer Science and Engineering,
Aditya Institute of Technology and Management,
Tekkali, K Kotturu, Andhra Pradesh, 532201, India
Email: mailforjnayak@gmail.com

Bignaraj Naik

Department of Computer Application,
Veer Surendra Sai University of Technology,
Burla, Sambalpur, Odisha, 768018, India
Email: mailtobnaik@gmail.com

Biographical notes: Renu Sharma is working as a Professor and the Head of the Department of Electrical Engineering under the FET, SOA University, and Bhubaneswar. She received her PhD in Electrical Engineering from SOA University in 2014. She has around 20 years of leading impactful teaching and research experience. She has published more than 90 research papers in various reputed peer-reviewed international journals, conferences, and book chapters. She is a life member IE (India), member IET, SM IEEE, Chair WIE IEEE Bhubaneswar Sub-Section, LM-ISTE, LM-ISSE. Her research areas are smart grid, soft computing and solar photovoltaic, power system scheduling, evolutionary algorithms, and WSN.

Manohar Mishra is an Associate Professor in the Department of EEE under the FET, SOA University, Bhubaneswar. He received his PhD in Electrical Engineering in 2017. He has published more than 50 research papers in various reputed peer-reviewed international journals, conferences, and book chapters.

Copyright © 2022 Inderscience Enterprises Ltd.

He has served as a reviewer for various reputed international journals. At present, he has more than ten years of teaching experience in the field of electrical engineering. He is a senior member of IEEE. His areas of interest include power system analysis, power system protection, signal processing, power quality, distribution generation system, and micro-grid.

Akshay Kumar Rathore received his MTech in Electrical Machines and Drives from the Indian Institute of Technology (BHU) Varanasi, India in 2003, and PhD in Power Electronics from the University of Victoria, BC, Canada in 2008. He had two subsequent postdoctoral research appointments with the University of Wuppertal, Wuppertal, Germany, and the University of Illinois at Chicago, Chicago, IL, USA. From November 2010 to February 2016, he was an Assistant Professor with the Department of Electrical and Computer Engineering, National University of Singapore, Singapore. He is currently an Associate Professor with the Department of Electrical and Computer Engineering, Concordia University, Montreal, QC, Canada.

Janmenjoy Nayak is working as an Associate Professor, Aditya Institute of Technology and Management (AITAM), (an autonomous institution) Tekkali, K Kotturu, AP-532201, India. He has published more than 150 research papers in various reputed peer reviewed refereed journals, international conferences and book chapters. Being a two-time gold medallist in computer science in his career, he has been awarded with INSPIRE Research Fellowship from DST, Government of India and Best Researcher Award from JNTU, Kakinada, AP. He has edited 19 books and ten special issues in various topics including data science, machine learning, and soft computing with reputed international publishers.

Bignaraj Naik is an Assistant Professor in the Department of Computer Application, VSSUT, Odisha, India. He received his PhD in Computer Science and Engineering in 2016. He has published more than 110 research papers in various reputed peer-reviewed international journals, conferences, and book chapters. He has edited four books from various international publishers. At present, he has more than ten years of teaching experience in the fields of computer science and IT. His areas of interest include data mining, computational intelligence, soft computing, and its applications. He has been serving as a guest editor of various journal special issues.

Power electronics (PE) is a critical enabling technology for efficient power conditioning in a controlled way. The application of power electronics technology (PET) covers a wide range from a few watts to megawatts. In this modern era, PET undergoes a hasty growth, owing to the rapid development of power semiconductors devices, embedded digital control systems, and intelligent control action using computational intelligence techniques such as artificial intelligence (AI), fuzzy logic (FL), artificial neural network (ANN), evolutionary computation, etc. A few examples of PET applications include wind energy conversation systems (WEC), solar photovoltaic (SPV), LED lighting, energy storage devices, high-efficiency electrical drives, electric vehicles, high-voltage DC transmissions, etc. The extensive application of PE converters in distributed energy resources (DER) enables microgrids to control and manage the power/energy flows efficiently. The PE converters-based microgrid system can be classified into AC microgrid (high-frequency or low-frequency), DC microgrid, and hybrid AC and DC coupled microgrid. The control and power management of PE-based microgrids cope with a number of issues compared to low voltage distribution networks without DER

units. Therefore, the research on the development of smart intelligent control systems is highly essential to ensure the smooth operation of microgrids. The main intent of this special issue is to cover both the theory and applications of various computational intelligence techniques applied to the smart-grid operation, control and protection. The issue will be helpful to promote original research articles on theoretical, experimental, and practical aspects of innovative and improved computational techniques applications in PE and smart-grid systems. In this special issue, eight numbers of research articles are selected for publication through a rigorous double-blind peer-review system. The title of these eight research articles is as: 'A modified type-2 neuro-fuzzy SVM-based inverter fed IM drive', 'Genetic algorithm and anti-predatory swarm optimisation-based solutions for selective harmonic elimination in multilevel inverters', 'Battery and super capacitor powered energy management scheme for EV/HEV using fuzzy logic controller and PID controller', 'Application of artificial intelligence techniques in the operation of neutral-point clamped rectifier under perturbed conditions', 'Virtual inertia support in the microgrid, its research challenges and its technology potentials in recent years', 'Performance assessment of PV integrated model predictive controller-based hybrid filter for power quality improvement', 'Analysis of tilt integral derivative controller-based automatic load frequency control of multi-area multi-source system', and 'Implementation of energy management in hybrid renewable energy island systems using soft computing techniques'.

Srinivas and Sukumar presented a neuro-fuzzy type-2 (NFT2) space vector modulation (SVM) technique for inverter control of an induction motor drive. Performance comparison of the inverter is also carried out with conventional SVM and neuro-fuzzy type-1(NFT1) system using MATLAB simulation and experimental validation.

Gopal et al. presented the application of genetic algorithm (GA) and anti-predatory particle swarm optimisation (APSO) in order to minimise harmonics in multilevel inverters, which is a complex optimisation problem involving nonlinear transcendental equation. Switching angles are calculated for different modulation indices by proposed algorithms considering minimum THD and best optimum results are taken for controlling the operation of MLIs.

Tiwari et al. proposed a novel scheme for the internal and external energy management of the electric vehicle (EV)/hybrid electric vehicle (EHV). They have also analysed the performance of the EV/HEV in terms of speed tracking and output power. This paper is focused on achieving the maximum efficiency with the minimum cost so their proposed different types of DC-DC converter with their different controlled technique.

Sharma worked on the applicability of the neural network (NN) algorithm for solving power quality problems in a three-phase neutral-point clamped converter. Here, he has proposed a NN algorithm for the better performance of the converter under disturbed conditions. The experimental results show an excellent performance of the converter in terms of unity power factor, better THD at the source side with minimum switching losses.

Michael and Hasan reviewed various aspects of virtual inertia using energy storage systems for satisfactory regulation against uncertain frequency and voltage fluctuations. They also addressed different types of virtual inertia topologies, application with

renewable energy sources, evaluation for ancillary services, potential opportunities, risks posed, and future research directions.

Das at al. proposed a novel fuzzy logic controller (FLC) for maximum power point tracking (MPPT) in a photovoltaic (PV) system integrated with a series hybrid filter (SEHF). Moreover, a model predictive controller with robust extended complex Kalman filter (MPC-RECKF) technique is applied for calculating the fundamental components from the distorted value in SEHF. The results obtained using the proposed MPC-RECKF are compared and analysed with traditional controllers in MATLAB/Simulink environment.

Boddepalli and Navuri presented a novel tilt integral derivative (TID) controller for a multi-area multi-source power system. The parameters of the TID controller are optimised using a firefly algorithm (FA) and it is employed with integral time multiplied absolute error (ITAE) as an objective function. The effectiveness of the proposed controller is examined by doing robust analysis under varied system parameters.

Srishti and Gaur designed a microgrid-based energy management system (EMS) and implemented it in this paper to manage the energy balance between renewable resources and the load, i.e., supply-demand balance of energy. It is then integrated with enhanced cuckoo search algorithm (CSA), ANN, FLC, conventional P&O, and other MPPT-based control algorithms. The working of the proposed EMS for a hybrid PV-wind-battery system is verified through simulation results and compared with using various control algorithms.

Our heartfelt thanks go to the Editor-in-Chief (Dr. Dinesh Kumar) of the *International Journal of Power Electronics*, members of the editorial board, and reviewers who had reviewed the papers to print this special issue on the scheduled date within the time limit.