



(15<sup>th</sup> – 17<sup>th</sup> June 2023)

ICEPE 2023 Special Session on

## Enhancement of Power and Energy Systems' Performance using Machine Learning Techniques

### Introduction

One of the crucial systems that have a significant impact on society and the environment is the power and energy sector. Growing demand for novel and advanced technologies that can boost the efficiency of power and energy systems helps minimize greenhouse gas emissions and also helps in integrating renewable energy sources. In this context, machine learning has emerged as a powerful tool to optimize the operation of power systems. Machine learning is a branch of artificial intelligence that enables computers to learn from data, identify patterns and make predictions without being explicitly programmed. Machine learning algorithms can analyze large amounts of data in real-time and adapt to changing conditions, making them suitable for monitoring, controlling and optimizing power systems. However, the application of machine learning in power and energy systems is challenging. For instance, one of the main challenges is the availability of data for training and evaluating the algorithms performance. Further, data accuracy and the techniques needed to handle missing data and outliers are often issues. Thus, it is essential to address the challenges related to data availability, quality, security and others to fully realize the benefits of machine learning in power and energy systems. Therefore, this special session aims to investigate the use of machine learning techniques to enhance the performance of power and energy systems, focusing on increasing efficiency, reducing costs, and improving reliability.

### Topics of interest (but not limited to)

This special issue aims to explore the application of machine learning for modelling, design, analysis, and control of model energy and power engineering applications from the following list of topics (but not limited to)

1. Predictive maintenance for power generation equipment using machine learning.
2. Optimization of transmission and distribution systems using machine learning.
3. Machine learning-based control of renewable energy systems.
4. Machine learning-based forecasting of energy demand.
5. Machine learning-based fault detection and diagnosis in power systems.
6. Machine learning-based optimal power flow in electric grid systems.
7. Machine learning-based energy storage management systems.

8. Machine learning-based smart grid systems.
9. Machine learning-based microgrid systems and control.
10. Machine learning-based cybersecurity for power and energy systems.

### Special session organizers

#### **1. Dr. Kishore Bingi**

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Kishore Bingi received the B.Tech. Degree in Electrical and Electronics Engineering from Acharya Nagarjuna University, India, in 2012. He received the M.Tech. Degree in Instrumentation and Control Systems from the National Institute of Technology Calicut, India, in 2014, and the Ph.D. degree in Electrical and Electronic Engineering from Universiti Teknologi PETRONAS, Malaysia, in 2019. From 2014 to 2015, he worked as an Assistant Systems Engineer at the TATA Consultancy Services Limited, India. From 2019 to 2020, he worked as Research Scientist and Post-Doctoral Researcher at the Universiti Teknologi PETRONAS, Malaysia. From 2020 to 2022, he served as an Assistant Professor at Process Control Laboratory, School of Electrical Engineering, Vellore Institute of Technology, India. Since 2022 he has been working as a faculty member at the Department of Electrical and Electronic Engineering from Universiti Teknologi PETRONAS, Malaysia. His research area is developing fractional-order neural networks, including fractional-order systems and controllers, chaos prediction and forecasting, and advanced hybrid optimization techniques. He is an IEEE and IET Member and a registered Chartered Engineer (CEng) from Engineering Council UK.



#### **2. Dr. B Rajanarayan Prusty**

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B Rajanarayan Prusty (Senior Member, IEEE) is presently working as an Associate Professor in the Department of Electrical and Electronics Engineering, Alliance University, Bengaluru. He obtained his Ph.D. from the National Institute of Technology Karnataka (NITK), Surathkal. His exceptional research work during his Ph.D. has led him to crown the prestigious POSOCO Power System Awards (PPSA) for 2019 under the doctoral category by Power System Operation Corporation Limited in partnership with FITT, IIT Delhi. In recognition of his research publications from 2017 to 2019, he was awarded the University Foundation Day Research Award 2019 from BPUT, Odisha. He has 20 SCI journal publications and 35 conference publications to his credit. He has authored six book chapters published in CRC Press, Elsevier, and Springer. He has co-authored a textbook entitled “Power System Analysis: Operation and Control” in I. K. International Publishing House Pvt. Ltd. He has also edited a book entitled “Renewable Energy Integration to the Grid: A Probabilistic Perspective,” in CRC Press, Taylor and Francis Books INDIA Pvt. Ltd. He has been an active reviewer since 2015 and has reviewed 350 manuscripts submitted to reputed Journals and Conferences. Presently he is the Associate Editor of “Journal of Electrical Engineering & Technology,” Springer. He is also the Academic Editor for the journals “Mathematical Problems in Engineering,” Hindawi, “International Transactions on Electrical Energy Systems,” Wiley-Hindawi, and “Journal of Electrical and Computer Engineering,” Hindawi. He has handled more than 100 manuscripts in the capacity of Journal Editor. His research interest includes time series preprocessing and forecasting, high-dimensional dependence modeling, and probabilistic power system analysis.

