

SPECIAL SESSION (SS16)

Advancements in Solar PV Energy Systems with AI, Machine learning, Block-chain, and IoT Techniques

Organizers:

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The exponential growth of industrialization and economic development increases the demand to energy. The problems such as threat to human health and the environment, shortage of the fossil fuels, variable price, and emissions, which cause climate change and global warming, and this situation is the main driving force behind the use of renewable energy sources. In fact, solar PV source can be defined as clean source of energy that minimizes environmental impacts, produces minimum or zero secondary wastes, and is sustainable based on the energetic, economic, and social needs. The solar PV source is in a constant state of innovation in 2019, with new advances in technology announced constantly. In the past year alone, there have been milestones in conversion efficiency, energy storage, Nanogrid/Microgrid/Smart grid, Artificial Intelligence (AI), Energy Block-chain, IoT etc. The renewable energy research initiative targets to leverage Indian Research and Engineering capabilities to facilitate and enable the achievement of Sustainable Development Goal 7. The primary objective of this special session is to encourage translational research utilizing available lab-scale know-hows to consolidate research outcomes to advance current technologies in the related field to deliver potential solutions to solar sector industrial and societal applications. From this special session, the most important developments and advances in solar PV energy systems were identified, focusing on the activities of the Indian Community.

Topics of Interest include, but are not limited to...

- Recent developments in solar cell material to improve the conversion efficiency
- Applications of Big data analytics in Microgrid/Smart grid

- Application of machine-learning/deep-learning based algorithms in Solar PV systems
- Applications of Block-chain and IoT technology in Nanogrid/Microgrid/Smart grid
- Developments in photovoltaic module failure and fault detection systems using Intelligent techniques
- Smart networks for standalone/grid-tied systems
- Applications of AI technology in solar power forecasting
- Advancements in PV energy storage systems
- Smart and intelligent PV array configuration / reconfiguration techniques
- Development of power converters / inverter and its challenges in solar PV systems
- The inspection of efficient, reliable and effective methodologies for integrating solar PV energy source in smart grid with advanced power conversion and advance control systems, and other allied topics

Biographies of Special Session Organizers:



Dr. M. PREMKUMAR received the B.E. degree in Electrical and Electronics Engineering from Sri Ramakrishna Institute of Technology, Coimbatore, India, in 2004; and the M.E. degree in Applied Electronics from Anna University of Technology, Coimbatore, India, in 2010. He received his Ph.D. degree from Anna University, Chennai, India under ICE department in 2019. He is presently working as an Assistant Professor at GMR Institute of Technology, Rajam, India. He has more than 10 years of experience in teaching and he has published more than 60 papers in various peer-reviewed indexed journals and conferences. He is acting as editorial board member and reviewer in journal such as IEEE access, IET Power Electronics, IET Renewable Power Generation, International Transactions in Electrical Energy Systems, and various other journals. His current research interests include solar PV microinverters, non-isolated and isolated dc-dc converters, solar PV array fault detection, PV array configurations, and solar PV MPPT techniques.



Dr. UMASHANKAR SUBRAMANIAM (M'09– SM'18) has over 15 years of teaching, research, and industrial Research and Development experience. He was an Associate Professor and the Head of VIT Vellore and a Senior Research and Development and Senior Application Engineer in the field of power electronics, renewable energy, and electrical drives. He is currently an Associate Professor with the Renewable Energy Laboratory, College of Engineering, Prince Sultan University, Saudi Arabia. He has published more than 250 research articles in national and international journals and conferences. He has authored/coauthored/contributed 12 books/chapters and 12 technical articles on power electronics applications in renewable energy, and allied areas. He is also involved in collaborative research projects with various international and national-level organizations and research institutions. He is also a member of IACSIT, IDES, and ISTE. He received the Danfoss Innovator Award-Mentor, from

2014 to 2015 and 2017 to 2018, and the Research Award from VIT University, from 2013 to 2018. He also received the INAE Summer Research Fellowship for the year 2014. Under his guidance, 24 P.G. students and more than 25 U.G. students completed the senior design project work, as well as six Ph.D. scholars completed doctoral thesis as a Research Associate. He has taken charge as the Vice Chair of the IEEE Madras Section and the Chair of the IEEE Student Activities, from 2018. He was an Executive Member, from 2014 to 2016, and has been the Vice Chair of the IEEE MAS Young Professional, since 2017, for the IEEE Madras Section. He is also an Editor of Heliyon (Elsevier).



Dr. THANIKANTI SUDHAKAR BABU (Member, IEEE) received the B.Tech. degree from Jawaharlal Nehru Technological University, Ananthapur, India, in 2009, the M.Tech. degree in power electronics and industrial drives from Anna University, Chennai, India, in 2011, and the Ph.D. degree from VIT University, Vellore, India, in 2017. He is currently a Postdoctoral Researcher with the Department of Electrical Power Engineering, Institute of Power Engineering, Universiti Tenaga Nasional (UNITEN), Malaysia. He has published more than 30 research articles in various reputed international journals. His areas of interest include the design and implementation of solar PV systems, renewable energy resources, power management for hybrid energy systems, fuel cell technologies, electric vehicles, and smart grid. He has been acting as an Editorial Board Member and a Reviewer of various reputed journals, such as the IEEE and IEEE ACCESS, IET, Elsevier, and Taylor and Francis.