

INFORMATION AND KNOWLEDGE PRESENCE THROUGH DISTRIBUTED COMPUTING FOR REAL-TIME POWER GRID OPERATIONS

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With the emerging innovations to the electricity infrastructure (referred to as the smart grid), high levels of penetration of renewable energy, and an emphasis on competitive pricing, it will become necessary to optimize the safety margins presently allowed, and use existing equipment as optimally as possible. Maintaining reliable service and implementing emergency defense plans during major unintended disturbances and intended attacks is critical with the growth of the electric power network and its information infrastructure. The development of reliable and scalable intelligent monitoring and control algorithms, and situational intelligence (*beyond situational awareness (SA)*) technologies are needed as synchrophasor measurement devices are deployed for operation sense-making, decision-making and implementing actionable controls. The synchrophasor data can be used in model validation, improving models used in state estimators, and many EMS applications.

The optimization and control systems for a modern power system will require dynamic information and computational capabilities to handle the uncertainties and variability that exist especially with distributed and renewable energy integration. Intelligent technologies needed for distributed modeling, sense-making, situational awareness/intelligence, decision-making, control and optimization in power system control centers will be presented in this talk with emphasis on synchrophasor data.

PRESENTER'S BIOGRAPHY



Ganesh Kumar Venayagamoorthy received his Ph.D. degree in electrical engineering from the University of Natal, Durban, South Africa, in 2002. He is the Duke Energy Distinguished Professor of Electrical and Computer Engineering at Clemson University, Clemson, USA. Prior to that, he was a Professor of Electrical and Computer Engineering at the Missouri University of Science and Technology (Missouri S&T), Rolla, USA. He was a Visiting Researcher with ABB Corporate Research, Sweden, in 2007. Dr. Venayagamoorthy is the Founder and Director of the Real-Time Power and Intelligent Systems Laboratory (<http://rtpis.org>). His research interests are in the development and applications of advanced computational algorithms for smart grid applications, including power system stability and control, optimization, operations, intelligent sensing and monitoring and signal processing. He has published 2 edited books, 8 book chapters, and over 400 refereed journal and conference proceeding papers.

Dr. Venayagamoorthy is a recipient of several awards including a 2008 US National Science Foundation (NSF) Emerging Frontiers in Research and Innovation Award, a 2007 US Office of Naval Research Young Investigator Program Award, a 2004 NSF CAREER Award, the 2010 Innovation Award from St. Louis Academy of Science, the 2010 IEEE Region 5 Outstanding Member Award, and the 2005 SAIEE Young Achievers Award. He is the recipient of the 2012 Institution of Engineering and Technology (IET) Generation, Transmission and Distribution Premier Award for the best research paper published in 2010/2011 for the paper "Wide area control for improving stability of a power system with plug-in electric vehicles".

Dr. Venayagamoorthy is involved in the leadership and organization of many conferences including the Chair of the 2014 Power System Conference (Clemson, SC, USA), AND IEEE Symposium of Computational Intelligence Applications in Smart Grid (CIASG). He is currently the Chair of the IEEE PES Working Group on Intelligent Control Systems, and the Founder and Chair of IEEE Computational Intelligence Society (CIS) Task Force on Smart Grid. He is currently an Editor of the IEEE Transactions on Smart Grid.

Dr. Venayagamoorthy is a Senior Member of the IEEE, and a Fellow of the IET, UK, and the SAIEE.