

ECE Seminar Series

IEEE PELS/CSS/PES Distinguished Lecture on Synchronized and Democratized Smart Grids --- Next-Generation Smart Grids (Supported by the Department of Electrical and Computer Engineering @ IIT)

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Friday, November 3, 2017 11:00 am to 12:00 pm, SH 118 (Siegel Hall)

Abstract

Power systems are going through a paradigm change. The centralized large facilities are being replaced by millions of widely dispersed non-synchronous relatively small renewable or alternative power plants, plug-in EVs, and energy storage units. Moreover, the majority of loads are expected to actively take part in the grid regulation in the same way as suppliers do. In this lecture, the grid architecture, together with a technical route, to enable this paradigm change will be presented. It will be shown that the synchronization mechanism of conventional synchronous machines, which has underpinned the power systems for over 100 years, can continue playing its fundamental role in power systems. It will empower all power electronics-interfaced suppliers and loads to behave like virtual synchronous machines so that they can take part in the regulation of system frequency and voltage in a synchronized and democratized (SYNDEM) manner. This will unify and harmonize the integration and interaction of all players with the grid. It will also release the communication infrastructure from low-level control and open up the prospect of achieving autonomous operation for power systems. This holistic solution could considerably enhance the stability, scalability, operability, security, reliability and resiliency of the next-generation smart grid. Recently, Midwest Energy News reported this as a promising game changer for grid and IEEE Spectrum featured this as the vision for harmonious grid.

Biography

Prof. Qing-Chang Zhong is a world-leading multidisciplinary expert in control, power electronics and power systems. Before joining Illinois Institute of Technology, he was the Chair Professor in Control and Systems Engineering at The University of Sheffield, UK, where he built up a \$5M+ research lab dedicated to the control of energy and power systems and attracted the support of Rolls-Royce, National Instruments, Texas Instruments, Siemens, ALSTOM, Turbo Power Systems, Chroma, and other organizations. He has co-authored three research monographs, including *Robust Control of Time-delay Systems* (Springer, 2006) and *Control of Power Inverters in Renewable Energy and Smart Grid Integration* (Wiley-IEEE Press, 2013). His fourth book entitled *Power Electronics-Enabled Autonomous Power Systems: Next Generation Smart Grids*, which presents the architecture and technical routes of next-generation smart grids based on the synchronization mechanism of synchronous machines, will be published by Wiley-IEEE Press. His current research focuses on addressing fundamental challenges in energy and power systems through seamless integration of advanced control/systems theory and power electronics.

Note: This seminar is open to everyone. For more information regarding this seminar, please contact Dr. Mahesh Krishnamurthy in ECE, IIT. Phone: 7-7232, Email: kmahesh@ece.iit.edu