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TUTORIAL

Microgrids

Integration of Distributed Energy Resources

Presented by

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Synopsis

Worldwide electrical grids are expecting to become flexible in the next future. In this sense, there is an increasing interest in microgrids able to operate in island or connected to the grid. A microgrid can be defined as a part of the grid with elements of prime energy movers, power electronics converters, distributed energy storage systems and local loads, that can operate autonomously but also interacting with main grid. The functionalities expected for these small grids are: black start operation, frequency and voltage stability, active and reactive power flow. In this presentation, a review of the droop control method and beyond applied to flexible microgrids will be introduced. Examples of real microgrids in the world will be presented and analyzed. Finally, the hierarchical control and the energy management of flexible microgrids will be discussed.

About the Speaker

Josep M. Guerrero received the B.S. degree in telecommunications engineering, the M.S. degree in electronics engineering, and the Ph.D. degree in power electronics from the Technical University of Catalonia, Barcelona, Spain. He is an Associate Professor with the Department of Automatic Control Systems and Computer Engineering, Technical University of Catalonia, Barcelona, where he currently teaches courses on digital signal processing, FPGAs, microprocessors, and renewable energy. Since 2004, he has been responsible for the Renewable Energy Laboratory, Escola Industrial de Barcelona. His research interests include photovoltaics, wind energy conversion, uninterruptible power supplies, storage energy systems, and microgrids. Dr. Guerrero is the Editor-in-Chief of the International Journal of Integrated Energy Systems, an Associate Editor for the IEEE Trans. Ind. Electron, the IEEE Trans. Power Electron. He is member of the IES AdCom and currently chairs the Technical Committee of Renewable Energy Systems.