POLITECNICO DI TORINO

PEIC Power Electronics Innovation Center

SPECIAL SEMINARS:

I) WIDE BANDGAP MEDIUM VOLTAGE POWER ELECTRONICS
II) GRID-TIED POWER ELECTRONICS

Dr. Srdjan Lukic - North Carolina State University

Thursday, June 27, 2019, 9.00 - 13.00 & 28 June, 9.00 - 13.00
Laboratorio Didattico Tommasini **Corso Montevecchio 71, Basement**

I) Wide bandgap medium voltage power electronics - ***Power electronic converters connected directly to the medium voltage (MV) distribution system can provide many benefits to the power grid and to the end user. A couple of interesting examples include back-to-back converters connected to solar farms and wind turbines, solid state transformers and electric vehicle (EV) fast charging stations. The state of the art silicon devices limit the efficiency and the overall performance of these power converters. Silicon carbide devices can replace the Si IGBTs, and can enable the MV power converters that are much more efficient and power dense than their silicon equivalents. In this work, we will review a couple of interesting applications of medium-voltage power electronics converters, and then focus on a few design iterations of MV EV fast chargers that the NCSU team is building, one using 1.2kV and another using 10kV SiC MOSFETs.***

II) Grid-tied power electronics - ***With the wide adoption of inverter-interfaced distributed generation, and with the rise of the "prosumer", a customer that can produce and sell locally generated electricity, the interactions between power converters is poised to offer great benefits, but also major challenges to the system operator, potentially affecting system stability. This talk will cover the components and devices, system architectures and controls, ancillary services and grid support, and customer interactions and benefits in the context of microgrids and networked power electronics based systems. This talk is organized into three parts: Part I provides a review of basic power electronics components in a modern power system; Part II presents system architecture, stability issues, primary and secondary control, grid synchronization techniques, and interconnection standards for DERs; Part III covers enabling communication technologies and advanced secondary control algorithms for microgrid control and mode transitions.***

Speaker's biography - Dr. Srdjan Lukic is a Professor of Electrical Engineering and Computer Science at North Carolina State University and Deputy Director at the National Science Foundation FREEDM (Flexible Renewable Electric Energy Delivery and Management) Engineering Research Center. He conducts research in the design, and control of power electronic converters and electromagnetic energy conversion with application to microgrids, wireless power transfer, energy storage systems, and electric automotive systems. He received his PhD degree from the Illinois Institute of Technology in 2008. He has published over 150 papers, and he is the co-author on five patents. He was involved in several large projects including developing a medium voltage fast charger for Power America Manufacturing Institute and the development of the Olney Town Center Microgrid, funded by the DOE National Energy Technology Laboratory. Currently he leads a project on building and demonstrating a 1MVA medium voltage extreme fast charging station and a project that is building a resilient information architecture platform for smart grid, with Vanderbilt University.