THE DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING SPEAKER SERIES

PRESENTS

Architectures, Topologies and Components for High-Frequency, High-Density Power Conversion

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LECTURE ABSTRACT

Magnetic components, including inductors and transformers, are often the largest contributors to the size and loss of power converters, and can be a key limiting factor in achieving improved performance. This talk describes emerging approaches in the design of power electronics that seek to address the twin challenges of miniaturization and performance. Improved energy-storage components are one key approach to advancing the performance of power electronic systems. Likewise, architectures and topologies that minimize magnetic energy storage and/or utilize it more flexibly can overcome magnetic component limitations, leading to smaller, and higher-performance systems. Designs operating at greatly increased frequencies can also facilitate miniaturization and improved bandwidth, and can enable new applications of power electronics. This talk will outline opportunities provided by such approaches and provide examples of their use to achieve higher-performance power electronic systems.

SPEAKER BIOSKETCH

Dr. David Perreault received the B.S. degree from Boston University and the S.M. and Ph.D. degrees from MIT, all in EE. He is presently the Ford Professor of Engineering at MIT. His research interests include design, manufacturing, and control techniques for power electronic systems and components, and their use in a wide range of applications. Dr. Perreault is a Member of the National Academy of Engineering, a Fellow of the IEEE, and is the recipient of numerous awards including the IEEE R. David Middlebrook Achievement Award and the IEEE William E. Newell Award for his work in power electronics. He is co-author of 16 IEEE prize papers in the area, and of the 2nd edition of the textbook "Principles of Power Electronics," by Cambridge University Press in 2023. He also co-founded startup companies Eta Devices (acquired by Nokia in 2016) and Eta Wireless (acquired by Murata in 2021).