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Architectures, Topologies and Control for High-Frequency Power Electronics

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Abstract
Power converters designed for higher frequency operation than conventional designs can be smaller and lighter. However, to gain these benefits and maintain high reliability the converters also need to be more efficient, as smaller converters offer less surface area for heat removal. The development of efficient, small and light weight power converters can benefit from converter architectures that leverage novel topologies and control techniques. Using examples from my group's research on compact and high-efficiency power converters, this talk will highlight the opportunities and challenges at the frontiers of high-frequency power electronics. One focus of the talk will be on new power electronic converter architectures that target high power densities and high efficiencies for wide operating range applications. Another focus of the talk will be on emerging power electronic enabled applications, including wireless power transfer systems suitable for powering in-motion mobile platforms and radio-frequency power amplifiers for compact particle accelerators. The talk will also identify directions for future work in the area of high performance power electronic converters.

Bio
Khurram Afridi is a Professor of Electrical and Computer Engineering at Cornell University, and the Cornell Campus Lead for the NSF ASPIRE Engineering Research Center. He received the BS degree in electrical engineering from Caltech, and SM and PhD degrees in electrical engineering and computer science from MIT. His research interests are in high frequency power electronics and its applications, including wireless power transfer. His experience includes positions at CU Boulder, MIT, LUMS, Techlogix, Schlumberger, Philips, Lutron, and NASA/JPL. He is a distinguished lecturer of the IEEE Vehicular Technology Society and the Vice-Chair of PELS Technical Committee on Power Components, Integration, and Power ICs. He has received Caltech's Carnation Merit Award, BMW Scientific Award, LUMS Werner-von-Siemens Chair, Cornell Engineering Research Excellence Award, Michael Tien '72 Excellence in Teaching Award and the NSF CAREER Award. He holds twenty-nine US patents and is co-author of eight IEEE prize papers.

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