
Electrical & Computer Engineering
S E M I N A R
Louisiana State University

**Self-healing and Intelligent Power Electronics:
Diagnostics, Prognostics, and Reconfiguration**

Ali Bazzi

University of Connecticut

Abstract—This seminar will introduce the concepts of self-healing and intelligence in power electronic systems for safety-critical, mission-critical, and resilient energy systems. The talk will then focus on how diagnostic, prognostic, and reconfiguration methods are applied to multi-level converter topologies that are characterized by inherent redundancy. Modeling of the converters' behavior under healthy, faulty, and reconfigured conditions will be presented. Logic-based time-domain methods, data-driven machine learning methods, along with necessary signal processing and switched control methods are introduced to demonstrate how those and other methods contribute to intelligent power electronics. Approaches to achieve self-healing and intelligence at the device-, converter-, and system-level are introduced. Various application domains that would benefit from intelligent power electronics are introduced. Those domains include electrified transportation, defense, grid integration, manufacturing, autonomous systems, and others. Relevant curriculum and research synergies will also be introduced.

Bio—Prof. Ali Bazzi is the Charles H. Knapp Associate Professor in Electrical Engineering at the University of Connecticut (UConn), and has been at UConn since 2012. He is the founder and director of the Power Electronics and Drives Advanced Research Laboratory (PEARL) at UConn. He is the co-founder and VP for Energy Conversion and Propulsion of Valcon Labs, a deep-tech start-up company that provides energy storage and energy conversion solutions for aerospace and autonomous vehicle applications. He briefly worked at Delphi Corporation and Bitrode Corporation before joining UConn. He received his PhD in 2010 from the University of Illinois at Urbana-Champaign, and his ME and BE degrees from the American University of Beirut, Lebanon, in 2007 and 2006, respectively. His research interests are in the control, design, diagnostics, and reconfiguration of power electronic systems, with focus on self-healing, intelligence, and fault-tolerance goals. He has over 130 peer-reviewed journal, magazine, and conference articles (mostly in IEEE), and 10 issued US patents. He has led or participated in over \$10.5M in sponsored research funding from US Federal, State, and industry sponsors, and received the NSF CAREER Award in 2018. He was recently selected as a member of the Connecticut Academy of Science and Engineering. He received the Teaching Achievement Award and the Research Achievement Award from the UConn ECE Department in 2014 and 2023, respectively. He is an IEEE Senior Member and has served in many leadership and editorial positions in the IEEE Power Electronics Society and its various conference and publications committees.

When: Thursday, 7 March 2024, 10:30 - 11:30
Where: Room 3316E Patrick F. Taylor Hall
Info: <https://www.lsu.edu/eng/ece/seminar>

