

**Optimized Design of High-Efficiency Interleaved Boost
Converters for Renewable Energy Systems**

Tuesday, September 10, 2024
2:00 pm – 3:00 pm
Olin 202

Reception to follow in Olin 204
3:00 pm – 3:30 pm



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ABSTRACT: Developing an advanced interleaved boost converter with high voltage gain and a non-inverting output is critical for enhancing the efficiency and performance of renewable energy systems. Renewable energy sources, such as solar panels and wind turbines, often generate electricity at lower voltages, necessitating stepping up these voltages to higher levels without altering the polarity. Achieving high voltage gain, optimizing efficiency, minimizing physical size, and improving thermal management pose significant engineering challenges. The core innovation of this converter design is to deliver substantial performance improvements while ensuring the reliability and consistency essential to renewable energy applications. This research focuses on optimizing energy conversion to maximize the utilization of renewable energy sources while reducing energy losses. Several advanced power electronic converters suitable for integrating low-voltage dc input sources, such as photovoltaic (PV) solar panels, into a high-voltage dc bus in a 200 – 960 V dc distribution system are presented. The proposed converters operate in continuous conduction mode (CCM) and offer desirable features such as low voltage stresses on components, continuous input currents, and the ability to integrate multiple independent dc input sources.

BIOGRAPHY: Ahmad Alzahrani received his bachelor's degree in Electrical Engineering from Umm Al-Qura University, Saudi Arabia, in 2009, and his master's degree in Electrical Engineering from the University of Denver, Denver, CO, USA, in 2013. He earned his Ph.D. in Electrical Engineering from Missouri University of Science and Technology, Rolla, MO, USA, in 2018. He is currently an Associate Professor in the Department of Electrical Engineering at Najran University, Najran, Saudi Arabia, and a Fulbright Visiting Scholar at Marquette University, Milwaukee, WI, USA. His research focuses on power electronic converters, with specific interests in renewable energy applications, electric vehicles, energy harvesting, power management, wireless power systems, and the design and control of power converters.