

IEEE-PEAL Chapter Technical Talk



IEEE Power Electronics Society Distinguished Lecturer: Wide Bandgap (WBG) Power Electronics Systems for Heavy-Duty Vehicles

Who: Dr. Brij N. Singh, John Deere Inc., USA

Date: Friday, August 13 , 2021

When: 2:00 pm EDT (GMT-4)

Place: Zoom — meeting info far below

RSVP: Please reply through the PEAL website (<http://sites.ieee.org/dayton-peal/rsvp/>) Questions should be directed to Dong Cao (dcao02@udayton.edu) or Kevin.J.Yost@ieee.org

Abstract: This presentation will cover publicly known information on the 200 kW 1050 VDC silicon carbide (SiC) inverter technology development project in John Deere. The SiC inverter converts vehicle engine power into electrical power needed for the permanent-magnet-motor based electric powertrain used in heavy-duty construction and mining vehicles. The presentation will cover design, development, and test verification of WBG technology deployed in the successful realization of a power-dense (43 kW/Liter) high-temperature (suitable for 115°C coolant) high-efficiency (> 98% over entire range of coolant) SiC dual-inverter.

Keywords: SiC, Motor Drive, Inverter, high temperature

Speaker's Bio:



Dr. **Brij N. Singh** is a Technical Fellow - Power Electronics Engineering in John Deere Inc., USA. He has earned BE degree in Electrical Engineering from Madan Mohan Malviya Technical University, Gorakhpur, ME degree from Indian Institute of Technology Roorkee, and Ph.D. degree from Indian Institute of Technology, New Delhi, India.

In 1996, Dr. Singh joined the École de Technologie Supérieure, Université du Québec, Montreal, QC, Canada, as a Post-Doctoral Fellow. In 1999, he joined Concordia University, Montreal, QC, Canada as a Research Fellow. In 2000, he joined the Department of Electrical Engineering and Computer Science, Tulane University, New Orleans, Louisiana, as an Assistant Professor.

In 2007, Dr. Singh has joined John Deere Inc., USA as a power electronics staff engineer, where he has led and supported power electronics technology development projects for 644 and 944 hybrid loaders' electrification. In 2011, he joined John Deere Advanced Technology Department and has executed R&D projects related to high-temperature power-dense high-efficiency power electronics systems including wide bandgap (WBG) power conversion technologies.

In September 2020, Dr. Singh was named as the John Deere Region 4 Public Funding Manager with job title as R4 Manager External Relationships. As the R4 Manager External Relationships, Dr. Singh is tasked to lead John Deere Emerging Technology projects including successful execution of government and non-government funded projects in collaboration with universities, government labs, non-Deere industries. Emerging Technology projects led by Dr. Singh are likely to be applicable to John Deere Tech Stack, Production Systems, Product Lifecycle Systems, Construction and Road Building. Various projects led by Dr. Singh are destined to reduce greenhouse gas emission and carbon footprint reduction, resulting in a sustainable environment for the society.

Dr. Singh has published over 90 research papers in various Journals including IEEE Transactions and IET Journals. He has 28 approved US patents, one trade secret, and over a dozen pending patents.

In Tulane, Dr. Singh received four IEEE/Eta Kapa Nu teaching awards for outstanding instructions in electrical engineering. In John Deere, he has received three innovation and one collaboration awards for product and technology development works. Dr. Singh is the winner of the 2020 IEEE Power Electronics Emerging Technology Award. In Feb 2020, Dr. Singh was awarded the "Title of John Deere Fellow" for exemplary contributions to the power electronics engineering. He is a senior member of the IEEE and lives with his family in West Fargo, North Dakota, USA.

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