Editorial
Special Issue on Future of Power Electronics: Components, Circuits, and Systems

Power electronics is continuing its advance at a rapid pace [1], [2]. This is reflected in many emerging and re-emerging fields, such as wide-bandgap devices, device lifetime and reliability, high-density packaging, half-resonance and multilevel power conversion, machine-drive cooptimization, event-driven ultrafast and robust simulations, wireless power transfer, transportation electrification, structured dc, ac, or hybrid microgrids, electronic power grids, autonomous systems, and artificial-intelligence-enabled power systems [3], [4].

IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN POWER ELECTRONICS (JESTPE) has been providing an effective vehicle for all our colleagues to share their most recent progress and address the toughest challenges. JESTPE is celebrating its tenth anniversary in 2023. To observe the anniversary, the JESTPE Editorial Board has organized a Special Issue on the Future of Power Electronics: Components, Circuits and Systems. We provide a special forum for our colleagues to reflect on the progress that we have made in power electronics and contemplating its future, together with its challenges and potential roadblocks.

We have received 146 manuscripts, out of which the editorial review process accepted 42 of them. We organized the accepted papers as in the following eight sections. Section 1 has six invited papers that provide an overview of emerging technological trends and current challenges that we are facing in power electronics. It begins with a review of the SiC power devices, its future trends and the challenges in power application. The second paper provides an overview of upcoming trends in wireless power transfer, predicting a paradigm shift in wireless power transfer and related technologies. The third paper address the powerful extension of the discrete-state event-driven simulation technique for megawatt power system simulation and design with order-of-magnitude faster speed and virtually free of convergence issue, particularly for hardware-in-the-loop prototyping and testing. The fourth paper discusses power supplies for data centers, a hot topic recently. The fifth paper presents an in-depth discussion on the recent trend in ultra-high-power-density that can be obtained with Si switching devices and its ability to remain in switching at a relatively low frequency. The underlying principles of half-resonance technic and typical performance are also discussed. The sixth paper is a tutorial in nature for high-density power module packaging. Typical challenges and effective solutions are discussed in detail.

The rest of the accepted papers are organized into the following sections: 2) wireless power transfer, 3) reliability and diagnostics, 4) power quality and utility applications, 5) renewable energy and grid integration, 6) discrete and integrated semiconductors, 7) power converter applications, and 8) control in power conversion and transportation.

Special thanks must go to all of our reviewers and the guest associate editors. They are Jose Rodriguez, Universidad San Sebastian, Santiago, Chile, Liuchen Chang, University of New Brunswick, Canada, Mark Dehong Xu, Zhejiang University, China, Giovanna Oriti, Naval Postgraduate School, USA, Ron Hui, Nanyang Technological University, Singapore, Zhengming Zhao, Tsinghua University, China, Alex Huang, University of Texas, USA, Udaya Madawala, University of Auckland, New Zealand, and Ayman El-Rafaie, Marquette University, USA. Without their tireless efforts, this Special Issue would not be possible. Special thanks must also go to JESTPE's Editor-in-Chief (EiC) Peter Liang and JESTPE's assistant Jessica Uherek for their always-timely responses and suggestion to better this Special Issue.

TSORNG JUU PETER LIANG, *Editor-in-Chief*
Department of Electrical and Computer Engineering
National Cheng Kung University
Tainan 70101
Taiwan

FREDE BLAABJERG, *Guest Editor*
Department of Energy
Aalborg University
DK-9220 Aalborg East
Denmark

DON TAN, *Guest Editor*
Northrop Grumman Aerospace Systems
Redondo Beach
CA 90278 USA

OLORUNFEMI OJO, *Guest Editor*
Department of Electrical and Computer Engineering
Tennessee Tech University
TN 38505
USA

REFERENCES

[1] D. Tan, "Power electronics: Historical notes, recent advances and contemporary challenges," *SOBRAEP, Brazilian J. Power Electron.*, vol. 12, pp. 1–9, Dec. 2020.

[2] D. Tan, "Emerging system applications and technological trends in power electronics: Power electronics is increasingly cutting across traditional boundaries," *IEEE Power Electron. Mag.*, vol. 2, no. 2, pp. 38–47, Jun. 2015, doi: 10.1109/MPEL.2015.2422051.

[3] F. Blaabjerg, Y. Yang, K. A. Kim, and J. Rodriguez, "Power electronics technology for large-scale renewable energy generation," *Proc. IEEE*, vol. 111, no. 4, pp. 335–355, Apr. 2023, doi: 10.1109/JPROC.2023.3253165.

[4] F. Blaabjerg and K. Ma, "Wind energy systems," *Proc. IEEE*, vol. 105, no. 11, pp. 2116–2131, Nov. 2017, doi: 10.1109/JPROC.2017.2695485.

Digital Object Identifier 10.1109/JESTPE.2023.3275688