The IEEE Power Electronics Society Design Methodologies Conference

The IEEE Power Electronics Society is launching the first Design Methodologies Conference bringing together Design Automation, Artificial Intelligence, Machine Learning, and Cyber-Physical Security methodologies for power electronics applications.

The PELS has witnessed a significant and growing interest in advanced Design Methodologies for Power Electronics in recent years, and it has hosted several independent initiatives in the areas of Design Automation, Cybersecurity and Artificial Intelligence/Machine Learning and, consequently, the time has come to make a crucial, decisive step forward and organize a single specialized conference dedicated to this emerging concepts. The Design Methodologies for Power Electronics Conference - DMC will be held on July 14th and 15th 2021 in Bath, UK. For those who cannot travel to Bath virtual participation will be available.

The goal of the conference is to promote new techniques and design methodologies in power electronics. It will give us a possibility to identify the challenges that are awaiting us and to discuss the potential of these new design and analysis paradigms in Power Electronics.
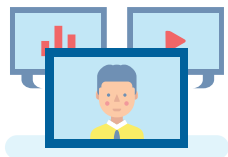
The IEEE DMC will bring together the professionals from industry and research institutions with experience in both Power Electronics, Design Automation, Artificial Intelligence and Cyber Security to present and discuss their opinion, experience, needs and vision of future. They will jointly contribute to the effort to identify methodologies and tools that have been developed and used to resolve the issues during design and optimisation of modern power electronics components and systems, and propose new solutions in these emerging fields.

Through expert discussions, tutorials, technical and poster presentations, the IEEE DMC will help to the power electronics community by:

- clearly identifying the potential, challenges and risks that Design Automation and Artificial Intelligence methodologies bring in the field of Power Electronics
- explaining the importance of the Cyber security in this field, and presenting the latest research results
- helping the power electronics community to understand the limits of the current methodologies and tools and pave the way to the advanced design and analysis approaches
- supporting, encouraging and inspiring the researchers in these emerging power electronics disciplines

The participants will have a great opportunity to learn and exchange ideas through organized virtual and presence based discussions and events during which they will have an opportunity to ask and discuss with the distinguished speakers and industry participants. This new conference provides a unique opportunity to engineers, researchers, students, and other professionals to learn how to leverage design automation techniques to optimize their power electronics system (in efficiency, size, thermal performance etc.), how to identify and understand the design limits imposed by the currently available technology and to learn which tools are suitable for design optimization and automation.

The IEEE DMC in synergy with Design Methodologies for Power Electronics Webinar Series will make an important impact in the future research activity of the Power Electronics Society!

DMC 2021 will provide:

- Presentations of peer-reviewed technical papers covering a wide range of topics
- An exposition where the attendees will be able to see, personally and virtually, the latest industry products and designs
- A venue to network and enjoy the company of fellow power electronics professionals in a beautiful setting.

The organizing committee of the IEEE DMC promises that this conference will be an excellent opportunity for networking, technical learning, and cross pollination of ideas. We will give our best to make this conference a watermark moment for the power electronics society.

Conference topics of interest include, but are not limited to:

DESIGN AUTOMATION:

- Design Space Exploration
- Layout Synthesis
- Automatic Testing and Verification Techniques
- New Device Models
- Model Order Reduction
- Optimization Techniques
- Hardware and Power in the Loop
- Digital Twin
- Magnetics Design Optimization
- Considerations of Lifetime prediction

CYBERSECURITY:

- Firmware compromise detection and integrity verification
- Cyber-physical attacks and approaches for hardware hardening
- Integration of hardware- and software-based hardening solutions
- Seamless Transition to communication-free control of multi converter systems
- Device-level and system-level cybersecurity challenges and solutions
- Cyber-Physical Security of Electric Vehicles and Electric Vehicle Charging Infrastructure
- Steady State and Dynamic Analysis of Power Electronic Systems under Cyber Attacks
- Artificial Intelligence based Cyber-attack detection and classification methods
- Testbeds for investigation of cyber-security incidents and mitigation schemes
- Digital Twins of power electronic systems for surrogate model based detection of Cyber Incidents

ARTIFICIAL INTELLIGENCE/MACHINE LEARNING:

- Artificial Intelligence in the power electronics control
- Estimation and maintenance of power electronics systems
- Condition monitoring, Anomaly Detection and Fault Diagnosis
- Artificial Intelligence for the design of power electronics components and systems
- AI methods (Machine learning, Neural network, fuzzy logic…) and Applications in Power Electronics

Digest Submission: Prospective authors are requested to submit a single column, single spaced digest no longer than five (5) pages summarizing the proposed paper. The digest will address the problem, the major results and its contribution in comparison with previous research works. It should include key equations, figures, tables, and references as appropriate, but no author names or affiliations. Digests not conforming to these requirements will be rejected without review. All digests will go through a double-blind peer review process to ensure a confidential and fair review. The papers presented at the conference will be included in the IEEE Xplore Digital Library. Please refer to the conference website for a detailed list of technical topics and the digest submission method.

The important milestones are as follows:

- Deadline for submissions of digests or abstracts or presentations or papers - Feb 5th 2021
- Notification of acceptance - March 5th 2021
- Deadline for final manuscripts - May 7th 2021
- Dates of the conference - July 14-15th 2021

The IEEE DMC Organizing Committee would like to thank you for your trust, participation, enthusiasm and overall energy that helped to drive us to make this first step towards a prestigious conference of strategic importance for the Power Electronics Society.

To pave the way to the conference a series of web seminars is offered by PELS. Each month a webinar presenting a different topic from the field of design methodologies until we meet at the DMC 2021 in Bath. Webinars are listed at: **https://attend.ieee.org/dmc-2021/seminars**

Additional information for the call for papers is available on the website: **https://attend.ieee.org/dmc-2021/**