IEEE COMPEL 2025

IEEE WORKSHOP
CONTROL AND MODELING OF POWER ELECTRONICS

JUNE 22–26, 2025 | KNOXVILLE, TENNESSEE, USA

CURENT

IEEE

Texas Instruments

Typhoon HIL

Oak Ridge National Laboratory

pels IEEE POWER ELECTRONICS SOCIETY

The University of Tennessee Knoxville

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WELCOME

On behalf of the COMPEL 2025 Organizing Committee and the University of Tennessee, Knoxville, we are delighted to welcome you to the 26th IEEE Workshop on Control and Modeling for Power Electronics (COMPEL 2025), hosted in Knoxville, Tennessee.

As the flagship conference for the IEEE Power Electronics Society's Technical Committee on Control and Modeling of Power Electronics (TC1), COMPEL has a distinguished history of bringing together leading researchers and practitioners to share the latest groundbreaking advances in power electronics.

The University of Tennessee, Knoxville (UTK), with its strong heritage in engineering innovation, and Oak Ridge National Laboratory (ORNL), a global leader in scientific discovery and energy research, are proud to host this esteemed event. East Tennessee is a hub for cutting-edge research, and the close collaboration between UTK and ORNL creates a unique and dynamic environment for advancing power electronics technology.

This year's program is packed with exciting content. We received 147 digests from authors in 20 countries, and after a rigorous review process, 100 have been selected by our dedicated Technical Program Committee for presentation. The technical sessions cover a comprehensive range of topics, including advanced modeling techniques, innovative control strategies, and the design and optimization of power converters, components, and systems. The program also features two insightful tutorials and inspiring keynote presentations from two distinguished visionaries in academia, who will share their perspectives on the future of power electronics. True to COMPEL tradition, our single-track format ensures you can engage with every presentation and discussion throughout the technical program.

Beyond the strong technical program, COMPEL 2025 offers several opportunities for networking and experiencing Knoxville. We invite you to join us for our Young Professionals networking reception, and at our Women in Engineering panel discussion for insightful discussion and networking opportunities. We also look forward to seeing you in Neyland Stadium for the welcome reception, and in the iconic Knoxville Sunsphere for our social event dinner. We are excited to host tours of both ORNL and the CURENT laboratories.

We extend our sincere gratitude to the IEEE Power Electronics Society and TC1 for their continued sponsorship and support. A special thank you goes to our Technical Program Committee and reviewers for their invaluable contributions to shaping an excellent program. We also thank our industrial sponsors, Texas Instruments and Typhoon HIL, and are grateful for IEEE PELS support from the Women in Engineering, Young Professionals, and PELS Day committees. Most importantly, thank you–the authors, speakers, and attendees–for your participation. Your contributions are what make COMPEL a success.

We look forward to a stimulating and engaging conference, filled with insightful discussions, new connections, and memorable experiences here in Knoxville. Welcome to COMPEL 2025!

Daniel Costinett, University of Tennessee, Knoxville
COMPEL 2025 Chair

Burak Ozpineci, Oak Ridge National Laboratory
COMPEL 2025 Chair

THE UNIVERSITY OF TENNESSEE KNOXVILLE

OAK RIDGE National Laboratory

GENERAL INFORMATION

WORKSHOP THEMES

Modeling and Simulation for Power Electronics Converters

Advanced modeling and simulation techniques for power electronics converters, systems and components; hardware-in-the-loop testing systems; virtual prototyping tools and techniques, and software solutions for reliability, diagnostics, and EMI assessment.

Control of Power Converters

Advanced control and power management solutions for AC-DC, DC-DC and DC-AC power converters and systems, including analog or digital implementations.

Intelligent Design and Optimization Techniques for Power Electronics

Design analysis and verification tools, design and control techniques for advanced topologies, new designs, novel components, or miniaturized/integrated converters.

Power Electronics for Electric Vehicles and Renewable Energy

Grid-interactive and microgrid converters, electrified transportation including naval and aviation, wireless power transfer.

Education

Laboratories and equipment for teaching power electronic; innovative teaching methodologies, multimedia tools, interactive and virtual laboratories; techniques and approaches to expand access to power electronics education.

REGISTRATION DESK HOURS

Monday, June 23 Strong Hall Atrium	8:30 AM–4:20 PM
Tuesday, June 24 Student Union 2nd Floor	8:00 AM–2:00 PM
Wednesday, June 25 Strong Hall Atrium	8:00 AM–2:25 PM
Thursday, June 26 Strong Hall Atrium	8:00 AM–12:00 PM

BADGES

Badges must be worn at all times. Badges will be used to determine entry at social events and workshop sessions.

INTERNET/WIFI

Eduroam is available throughout campus. Sponsored guest WiFi is available using the ut-open WiFi network and credentials

username: COMPEL2025
password: COMPEL2025

COFFEE BREAKS/LUNCHES

Coffee breaks and lunches will be served to registered participants wearing their badges.

PERSONS WITH SPECIAL NEEDS

Every effort has been made to cater to participants with special needs. Should you require any specific assistance, please let us know.

DIETARY RESTRICTIONS

Buffet meals include vegan, vegetarian, and halal options. During meals without sufficient buffet items for your dietary needs, separate meals will be provided. If you have questions about specific food items, contact Vol Catering at 865-974-2406

The Wednesday night social event includes a plated dinner. Separate meals will be served to those with dietary restrictions. Talk to your server if you encounter any issues.

CERTIFICATE OF ATTENDANCE

After the workshop, participants can request a certificate of attendance by emailing compel2025@utk.edu.

PAPER DIGITAL ACCESS

All papers presented at the conference are available from https://2025.ieee-compel.org/fullProgram.php. Find the paper (🖹) logo to download individual papers. All papers are password protected. Use the e-mail and confirmation number from your registration confirmation (sent by compelreg@ieee.org) to access the papers.

PARKING

Paid public parking is available for all days of the conference in the Volunteer Hall Garage for a rate of $2 per hour.

AUTHOR INFORMATION

ORAL PRESENTATION INFORMATION

Oral presentations will last 25 minutes. This should include no more than 20 minutes of presentation, to allow for ample discussion. Please use the widescreen format (i.e., an aspect ratio of 16:9) for your slides to best utilize the projection screen. Only PowerPoint (.ppt, .pptx) and .pdf files will be supported.

Before the conference, you can submit your slides and author bio through easychair. Using the "author" role, navigate to your submission, then use the "Add or update files" link to upload slides and an author bio. These files will be downloaded on Friday, June 20. After this, you can update the presentation files at the conference by coming to the room the morning of your presentation, before the first session of the day. You will not be able to alter your slides during your session.

Presenters should have a copy of their presentation on a flash drive that is compatible with PCs. All presenters will be utilizing a conference laptop, which is a PC. Individual laptops will not be accommodated.

POSTER PRESENTATION INFORMATION

The total time allocated to each poster session is 90 minutes. Please use 4-feet wide and 3-feet high landscape format for your posters. We will provide poster boards that can accommodate posters up to this size. You are responsible for bringing a printed copy of your poster to the poster session. Posters should be hung during coffee break or lunch so they are ready for viewing during the appropriate session. Local poster printing services for conference participants are available from UT, Knoxville UCopy and FedEx Office.

AWARDS INFORMATION

BEST PAPER AWARDS

Three papers will be selected by the conference Awards Committee. Among the criteria include impact, innovation, technical merit, and presentation. The awardees will be announced at the awards dinner.

STUDENT TRAVEL GRANT AWARDS

The COMPEL Student Travel Grant is sponsored by the IEEE Power Electronics Society's TC1: Technical Committee on Control and Modeling of Power Electronics. The travel grant helps broaden student participation at COMPEL. The Student Travel Grant Committee for COMPEL 2025 will award grants between $100 and $1,000 to several students. A total of $8,000 will be awarded.

SCHEDULE AT A GLANCE

SUNDAY, JUNE 22, 2025

6:00 PM	**Young Professionals Reception**

DAY 1: MONDAY, JUNE 23, 2025

9:00 AM	**Tutorial 1**
10:20 AM	Coffee Break
10:40 AM	**Tutorial 1 (cont.)**
12:00 PM	Lunch
1:00 PM	**Tutorial 2**
2:20 PM	Coffee Break
2:40 PM	**Tutorial 2 (cont.)**
4:20 PM	**T1: EV Applications**
5:35 PM	End of Day 1

DAY 2: TUESDAY, JUNE 24, 2025

8:15 AM	Welcome
8:40 AM	**Plenary 1:**
9:20 AM	**Plenary 2:**
10:00 AM	Coffee Break
10:20 AM	**T2: Amplifiers**
12:00 PM	Lunch
1:00 PM	**T3: Control**
2:15 PM	**ORNL/UTK Tour**
6:00 PM	**Welcome Reception**
8:00 PM	End of Day 2

DAY 3: WEDNESDAY, JUNE 25, 2025

8:30 AM	**T4: Piezoelectric Devices and Circuits**
10:35 AM	Coffee Break
11:00 AM	**T5: Passive Components**
12:15 PM	Lunch
1:10 PM	**T6: Light Applications**
2:25 PM	**P1: Control and Modeling 1**
4:00 PM	**T7: Grid Applications**
6:00 PM	Sunsphere Dinner
9:00 PM	End of Day 3

DAY 4: THURSDAY, JUNE 26, 2025

8:30 AM	**T8: FCML Analysis and Control**
10:10 AM	Coffee Break
11:00 AM	**T9: Control and Modeling**
12:10 PM	Lunch
1:10 PM	**T10: Extremum Seeking Control**
2:25 PM	**P2: Control and Modeling II**
4:00 PM	**T11: High Power Converters and Components**
6:00 PM	Awards Dinner
8:00 PM	End of Day 4

SOCIAL EVENTS

YOUNG PROFESSIONALS RECEPTION

1 Ancient Lore Village
Sunday, June 22, 2025
6:00–8:00 PM

Come visit a fantasy-inspired village for an evening of networking. Light hors d'oeuvres will be offered together with a cash bar and social activities. Vans will pick up participants from the Cumberland House Knoxville 5:45 p.m. Limited seating will be available. Participants arriving late will be responsible for their own transportation. This event is sponsored by the IEEE PELS Young Professionals Commitee, and the IEE PELS Day committee.

Photo of Ancient Lore Village. Credit visitknoxville.com

WOMEN IN ENGINEERING LUNCH PANEL

3 Strong Hall
Wednesday, June 25, 2025
12:15–1:10 PM

Join us for a panel discussion entitled "Equal Opportunity: From Bias to Balance." Hear from our esteemed panel of guests. Bring your perspective and share your story.

This event is sponsored by PELS Women in Engineering and the IEE PELS Day committee.

Women in Engineering event at COMPEL 2024. Credit UT, Knoxville

WELCOME RECEPTION

2 Neyland Stadium Lauricella Center
Tuesday, June 24, 2025
6:00–8:00 PM

See the eighth largest stadium in the world. Neyland Stadium was constructed in 1921 and now has a peak capacity of 104,079. Light hors d'oeuvres will be offered, along with two drink tickets per guest. Drink tickets will be handed out at the event. Guests will enter though Gate 21A on the northwest side of the stadium.

Neyland Stadium at UT, Knoxville. Credit ORNL

KNOXVILLE SUNSPHERE DINNER

4 Knoxville Sunsphere
Wednesday, June 25, 2025
6:00–9:00 PM

Join a dinner with great views and better company atop the Knoxville Sunsphere. Built for the 1982 World's Fair, the Sunsphere overlooks downtown Knoxville, World's Fair Park, and the eastern edge of the University of Tennessee Knoxville campus. Doors open at 5:45 p.m. A cocktail hour begins at 6:00 p.m. on the 8th floor with a plated dinner at 7:00 p.m. on the 6th floor.

Knoxville Sunsphere and Knoxville Convention Center. Credit visitknoxville.com

• Numbers by Social Event locations coorespond with the locations on Venue Map on next page

AWARDS DINNER

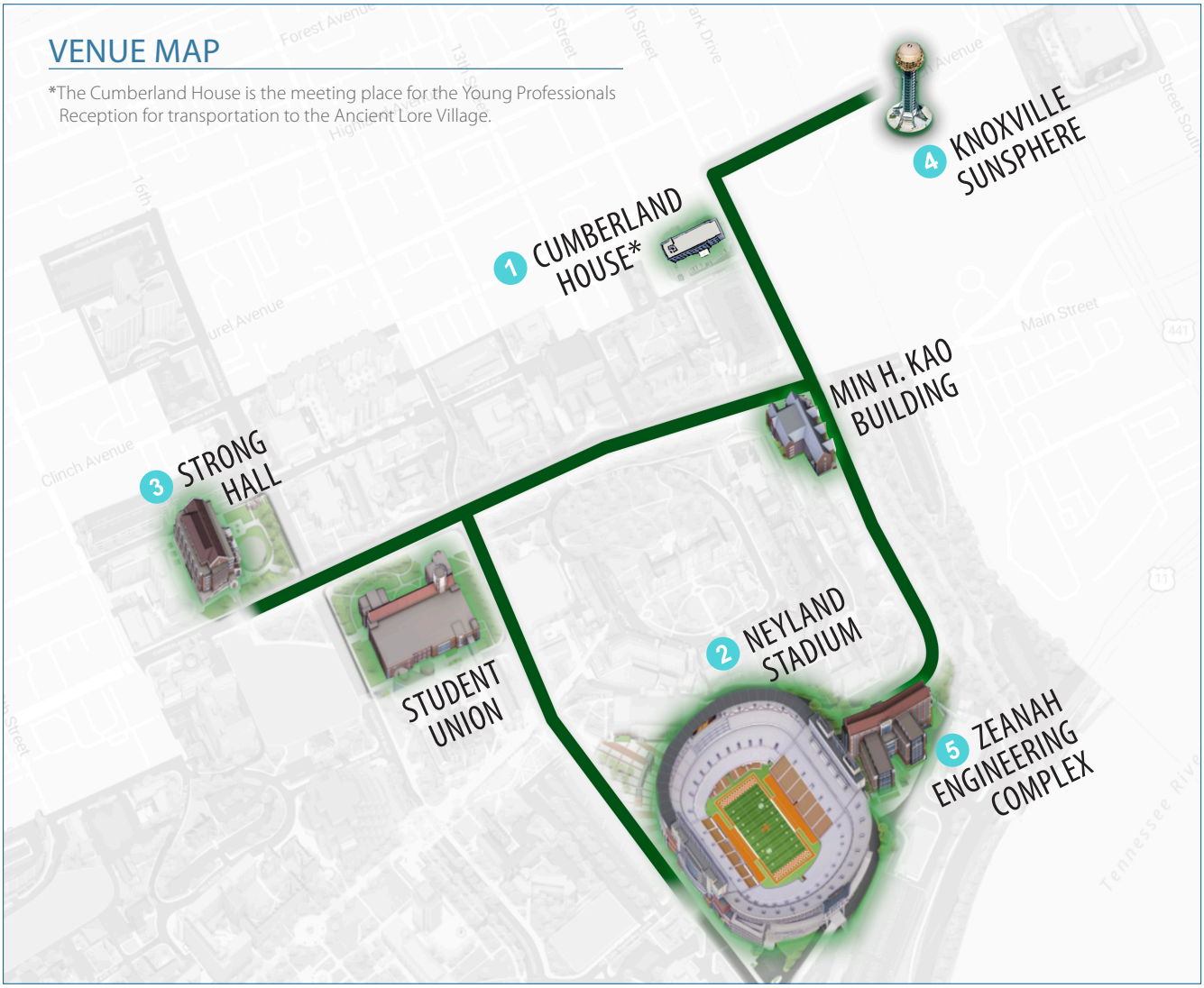
5 Zeanah Engineering Complex
Thursday, June 26, 2025
6:00–8:00 PM

Dine in style as COMPEL winds down and awards are distributed to Student Travel Grant Awardees and Best Paper Recipients. The dinner will be held in the new Zeanah Engineering Complex, the largest academic building on campus. The Min H. and Yu Fan Kao Innovation and Collaboration Studio is the premier maker space for the UT, Knoxville campus. It gives all levels of the student community access to modern, commercial-grade equipment that enables them to create industrial-quality solutions for projects and clients and helps to better prepare them to enter the workforce.

Photo of Zeanah Engineering Complex. Credit UT, Knoxville

VENUE MAP

*The Cumberland House is the meeting place for the Young Professionals Reception for transportation to the Ancient Lore Village.



Overlooking downtown Knoxville and the University of Tennessee. Credit ORNL

TOURS

During the afternoon of Tuesday, June 24, conference attendees will have the option to tour ***either*** Oak Ridge National Laboratory or the Power Electronics Labs at the University of Tennessee, Knoxville/CURENT.

Spaces are limited for the Oak Ridge National Laboratory tour. Per Department of Energy (DOE) regulations foreign nationals will have to be processed through the Oak Ridge National Laboratory (ORNL) access system. Attendees who wish to join the tour must register before the early bird deadline and select their intention to attend the tour to initiate this processing.

ORNL TOUR

ORNL Hardin Valley Campus
Tuesday, June 24, 2025
2:15–5:00 PM

Attendees joining the ORNL lab tour will take a bus to the Hardin Valley Campus of ORNL. There, the tour will split into three groups to visit each of the following:

A. National Transportation Research Center (NTRC)
B. Grid Research Innovation and Development Center (GRID-C)
C. Manufacturing Demonstration Facility (MDF)

For those attendees approved for the ORNL tour, buses will pick up from the UTK Student Union at 2:30 p.m. and will return to Neyland Stadium for the Welcome Reception at 5:30 p.m.

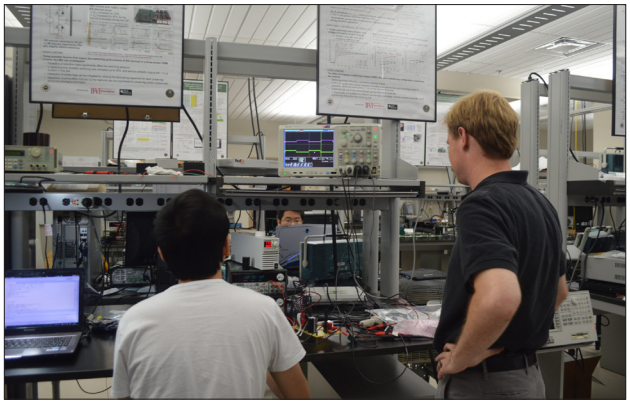
UT, KNOXVILLE TOUR

Min H. Kao Electrical Engineering and Computer Science Building
Tuesday, June 24, 2025
2:15–5:00 PM

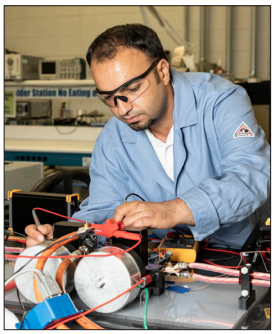
Attendees joining the UT, Knoxville tour will head to the Min H. Kao Electrical Engineering and Computer Science Building to see the lab facilities for CURENT, including the Hardware Testbed, Visualization Studio, FNET, Power Electronics, and High Power Labs.

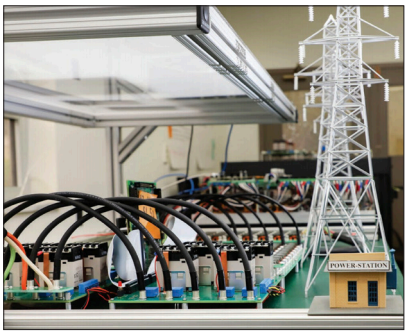
The tour will include demonstrations of the CURENT engineered systems–the Hardware Testbed and Large Scale Testbed, as well as discussion with researchers.

ORNL's Hardin Valley Campus showing NTRC, GRID-C, and the MDF. Credit ORNL



The power electronics simulation laboratory at UT, Knoxville. Credit UT, Knoxville





ORNL Harden Valley Campus laboratories. Credit ORNL

ORNL TOUR LOCATIONS—(HARDIN VALLEY CAMPUS)

NATIONAL TRANSPORTATION RESEARCH CENTER

The National Transportation Research Center (NTRC), established in 2000, is the Department of Energy's only designated user facility focused on performing early-stage research and development in transportation technologies. Research focuses on advanced energy storage and electric drive systems, including fast wired and wireless charging; lightweight materials and multi-material structures for harsh environments; advanced combustion engines and alternative biofuels; data science, analysis, and vehicle cybersecurity; vehicle systems integration; and intelligent mobility systems.

The NTRC comprises a 65,000 sq. ft. facility that integrates a uniquely broad and comprehensive set of capabilities, from novel diagnostics to component and vehicle evaluation to data analytics and cybersecurity. The facility is dedicated to accelerating the pace of research and development for new materials in next-generation systems, providing decision-making tools for sustainable transportation systems, and creating economic opportunity by improving the energy efficiency of vehicles to support a robust transportation system for people and commerce.

GRID RESEARCH INNOVATION AND DEVELOPMENT CENTER

The Grid Research Innovation and Development Center (GRID-C) at Oak Ridge National Laboratory combines multiple electrification research activities across the utility, buildings, and vehicle space into one 52,000 sq. ft. facility. The combination of innovative research and development in power and energy systems, vehicle and buildings science, power electronics, energy storage, sensors and controls, data science and modeling, and cybersecurity enables breakthroughs to support a resilient and secure power grid from the first instant of electricity generation to end use.

ORNL's mission at GRID-C is to develop technological solutions to advance the dynamic and efficient interaction of the electric delivery system, buildings, and vehicles.

The unique, multipurpose research environment at GRID-C is available to industry, academic, and government partners who wish to access its state-of-the-art capabilities and world-class expertise to mutually develop innovative technologies for grid security, resilience, and reliability.

MANUFACTURING DEMONSTRATION FACILITY

The Manufacturing Demonstration Facility (MDF), established in 2012, is the Department of Energy's only designated user facility focused on performing early-stage research and development to improve the energy and material efficiency, productivity, and competitiveness of American manufacturers. Research focuses on manufacturing analysis and simulation, composites and polymer systems, metal powder systems, metrology and characterization, machine tooling, large-scale metal systems, and robotics and automation.

The MDF comprises a 110,000 sq. ft. facility housing integrated capabilities that drive the development of new materials, software, and systems for advanced manufacturing. From binder jetting to 3D tomography to in situ monitoring, the MDF leverages a range of equipment and expertise designed to deliver results that generate energy efficiency improvements in the manufacturing sector, efficiently utilize abundant and available domestic energy resources, and support the production of clean energy products with benefits extending across the nation's economy.

Min H. Kao Department of Electrical Engineering and Computer Science Visualization Studio. Credit University of Tennessee, Knoxville

UT, KNOXVILLE TOUR LOCATIONS

MIN H. KAO DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

Electrical Engineering and Computer Science (EECS) is the largest department in the Tickle College of Engineering with 62 full-time faculty members who are respected, world-class leaders in their fields and are dedicated to teaching students and aiding them in developing the technical and communication skills necessary to have successful careers.

EECS houses three academic programs: computer science, computer engineering, and electrical engineering, with BS, MS, and PhD degrees offered in each. A rigorous curriculum prepares students to be successful in their future profession and offers them the flexibility to choose courses that match their interest areas.

EECS is a diverse department with varied research interests, including artificial intelligence, bioinformatics, embedded systems, electronics, high-performance computing, power and energy, visualization and image processing, and wireless and sensor networks.

The department is located in the 150,000 sq. ft. Min H. Kao Electrical Engineering and Computer Science Building and houses state-of-the-art instructional facilities, including teaching laboratories with the latest electrical and electronic equipment, computers, and software.

CENTER FOR ULTRA-WIDE-AREA RESILIENT ENERGY TRANSMISSION NETWORKS (CURENT)

CURENT, Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks, is a graduated National Science Foundation (NSF) Engineering Research Center that was jointly supported by NSF and the Department of Energy for 10 years before becoming self-sustaining. A collaboration between academia, industry, and national laboratories, CURENT is led by the University of Tennessee, Knoxville. Partner institutions include Northeastern University, Rensselaer Polytechnic Institute, and Tuskegee University.

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- Mohsen Rahimian, University of Kashan
- Pedro Ribeiro, Oak Ridge National Laboratory
- Soham Roy, University of Texas at Austin
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TUTORIALS AND KEYNOTE SPEAKERS

E1: TUTORIAL 1

An Introduction to Piezoelectric Passive Components for Power Electronics Designers

Power electronics are the lifeblood of many exciting emerging technologies in transportation, energy systems, manufacturing, health care, information technology, and more. These applications demand power electronics with ever-increasing efficiency and performance with ever-decreasing size and cost. While major advances along these dimensions have been enabled by wide-bandgap semiconductor devices and digital control, further advancement is now significantly bottlenecked by passive components, particularly magnetics (i.e., inductors and transformers). Magnetics have long been integral to power electronics, but they pose fundamental size and performance challenges at small scales that impede miniaturization.

This tutorial will introduce how we can leverage an alternative passive component technology—piezoelectric components—to unlock a new era of scalability for power electronics. Piezoelectrics offer numerous potential size, performance, and manufacturability advantages, but realizing these requires fundamental re-evaluation of both power electronic circuits and piezoelectric components themselves. Accordingly, this tutorial is intended to equip power electronics researchers and engineers with the basic understanding of piezoelectric components needed to leverage them in future power converter designs. Key concepts on piezoelectric materials, components, packaging, and how they may be utilized in power electronics will be covered.

JESSICA BOLES

Jessica Boles is an Assistant Professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley, and Codirector of the Berkeley Power and Energy Center. She received her BS and MS degrees from the University of Tennessee, Knoxville and her PhD from the Massachusetts Institute of Technology, all in electrical engineering. Her research interests span power electronic components, circuits, control, and applications. She is currently pursuing a new class of power electronics based on piezoelectric passive components to enable major advances in the performance, size, and cost of power conversion.

Boles has received the ARPA-E IGNIITE Award, the NASA Early Career Faculty Award, and the UC Berkeley Presidential Chair Fellowship. Her work has been recognized with two IEEE prize paper awards, the IEEE PELS PhD Thesis Talk Award, and multiple prize presentation awards. She is a past recipient of the NSF Graduate Research Fellowship, the MIT Collamore-Rogers Fellowship, the UT Knoxville Bodenheimer Fellowship, the MIT EECS Department Head Special Recognition Award, and the UT, Knoxville Chancellor's Citation for Professional Promise.

E2: TUTORIAL 2

Modeling and Analysis of AC-DC Converters with Practical Simulation Tips

Accurate modeling and analysis are essential for understanding and designing AC-DC power converters, but their small-signal frequency response analysis can be challenging to understand and measure. This tutorial provides a structured approach to modeling and analyzing AC-DC converters, emphasizing practical simulation examples.

The first part of the tutorial will introduce the fundamentals of small-signal modeling for switch-mode power converters, starting with DC-DC converters before expanding to AC-DC systems. We will discuss the key frequency response measurements for power converters and the added complexities that arise when moving from DC-DC to AC-DC analysis. The second part of the tutorial will focus on the detailed modeling and control analysis of power factor correction (PFC) boost converters. Based on the mathematical framework and findings from recent research, we demonstrate that for control loop and output impedance analysis, a DC source set to the AC source's RMS value can be used to accurately find the frequency response, significantly reducing simulation time. We will demonstrate how to implement this method using SIMPLIS and discuss the simulation speed advantages it provides compared with the advantages of traditional AC sweep methods. By the end of this tutorial, attendees should have a solid foundation in modeling AC-DC converters and gain practical insights into using simulation tools more efficiently.

KATHERINE KIM

Katherine A. Kim is a Professor of Electrical Engineering at the National Taiwan University, Taipei, Taiwan. She received her BS degree from Franklin W. Olin College of Engineering in 2007 and her MS and PhD degrees from the University of Illinois at Urbana-Champaign in 2011 and 2014, respectively. Her research focuses on power electronics and control for solar photovoltaic applications. Beyond research, she is passionate about making engineering education more engaging and interactive. She has been recognized for her contributions to power electronics education, receiving the IEEE Power Electronics Society (PELS) Award for Achievements in Power Electronics Education in 2022 and the IEEE Education Society's Mac Van Valkenburg Early Career Teaching Award in 2024.

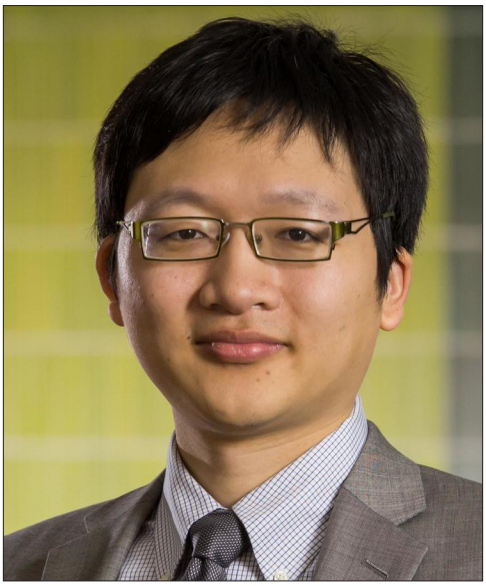
Prof. Kim is also active in IEEE PELS, currently serving as the Vice President of Global Relations (2024–2025). Previously, she served as PELS Member-at-Large (2016–2018), Women in Engineering Chair (2018–2020), and Constitution and Bylaws Chair (2021–2023). She hopes to break down complex power electronics concepts into interactive, practical, and fun learning experiences in this tutorial.

K1: KEYNOTE 1

Systematically Managing Complexity in Power Electronics Modeling and Design

Power electronics is a foundational technology that drives a wide range of important and emerging applications including cloud computing, wireless communications, robotics, and smart energy systems. By systematically managing the increased complexity in materials, circuits, and systems, new opportunities are created to greatly advance the functionality and performance of power electronics systems.

This speech provides a few examples to illustrate the potential of managed complexity in power electronics design. These include: 1) artificial intelligence and machine learning for managed complexity in passive component modeling; 2) modular and scalable architecture for managed complexity in high performance circuits; and 3) integrated electrical-mechanical codesign for managed complexity in robotics and metamaterials. This managed complexity approach addresses key challenges in emerging applications by overcoming traditional design barriers from new angles and redefining how power electronics are conceived and implemented in complex systems.



MINJIE CHEN

Minjie Chen is an Associate Professor of Electrical and Computer Engineering and the Associated Director for Research in the Andlinger Center for Energy and the Environment at Princeton University. He received his PhD in EECS from MIT and his BS in Electrical Engineering from Tsinghua University. He is a recipient of the IEEE PELS Richard M. Bass Outstanding Young Engineer Award, Princeton SEAS Junior Faculty Award, the NSF CAREER Award, the Princeton Innovation Award, and more than 13 prize papers from top-tier IEEE journals and conferences. He is a PELS Distinguished Lecturer and was listed four times on the Princeton Engineering Commendation List for Outstanding Teaching.

K2: KEYNOTE 2

The Future of Electrified Transportation—Power Electronics to the Rescue!

Vehicles drive our national economy. In the US alone, they transport more than 11 billion tons of freight and travel over 3 trillion miles per year. A decade ago, electrification was a hope and a promise to reduce the cost of moving people and goods and to improve air quality in major urban areas. As recently as last year, infrastructure investments were skyrocketing, and full electrification seemed inevitable. Today, with competition on the grid from energy demands of AI and data centers and shifts in federal policy and support, the best path forward is under question.

In this keynote, we will highlight the current status and challenges ahead for transportation electrification in the US. We will further consider where technology advances in power electronics could have significant impact. Examples of recent advancements and status of public-scale pilot projects will be provided, including medium-voltage grid-tied solid-state transformers, DC distribution at multi-megawatt charging hubs, distribution-level grid management algorithms, megawatt scale wireless charging for heavy-duty trucks, and high-power in-road wireless charging for all vehicle classes.

REGAN ZANE

Dr. Regan Zane is the founding Director of the Center for Advancing Self-sufficiency through Powered Infrastructure for Roadway Electrification (ASPIRE). Headquartered at Utah State University (USU), ASPIRE is a National Science Foundation Engineering Research Center involving 10 universities, 4 national labs, more than 85 faculty and staff, more than 300 students, and more than 60 industry and innovation partners. He holds the David G. and Diann L. Sant Endowed Professor position at Utah State University in the Department of Electrical and Computer Engineering. Before joining USU, he was Assistant and Associate Professor with the University of Colorado-Boulder, Colorado Power Electronics Center, and a Research Engineer with GE Global Research Center, Niskayuna, NY, USA. He has co-authored more than 200 peer-reviewed publications and the textbook *Digital Control of High-Frequency Switched-Mode Power Converters* (New York, NY, USA: Wiley, 2015), and he is named on more than 35 issued patents. He has recent and ongoing research programs in power electronics for electric vehicle charging infrastructure, including extreme fast charging and static and dynamic wireless charging, battery management systems, DC microgrids, grid-tied and grid-interactive converters, and grid integration of energy storage and renewable energy.

Dr. Zane was recipient of the National Science Foundation Career Award in 2004, the 2005 IEEE Microwave Best Paper Prize, the 2007 and 2009 IEEE Power Electronics Society Transactions Prize Letter Awards, and the 2008 IEEE Power Electronics Society Richard M. Bass Outstanding Young Power Electronics Engineer Award. He was also recipient of the 2006 Inventor of the Year, 2006 Provost Faculty Achievement, 2008 John and Mercedes Peebles Innovation in Teaching, and the 2011 Holland Teaching Awards from the University of Colorado, and the 2021 Researcher of the Year Award from Utah State University. He is a Fellow of the IEEE.

SCHEDULE OF EVENTS

DAY 1 SUNDAY, JUNE 22, 2025

6:00–9:00 PM	Young Professionals Reception* Ancient Lore Village

*YOUNG PROFESSIONALS NETWORKING RECEPTION

Sunday Evening, June 22

Join us for an exciting Young Professionals Networking Reception taking place in the evening during the first day of COMPEL! This special event is designed to connect early-career engineers, researchers, and students with seasoned professionals and senior members of the society in a relaxed, social setting. Whether you're looking to expand your professional network, explore new career paths, or simply share ideas and experiences, this reception offers a unique opportunity to build meaningful connections that can shape your future in the field. Enjoy light refreshments, take in the beautiful village grounds, participate in group activities, and build lasting professional relationships in a truly unforgettable environment. Don't miss this unique opportunity to network, learn, and be inspired!

Sponsors:

IEEE young professionals
POWER ELECTRONICS SOCIETY

IEEE pels DAY
JUNE 20
POWERING A SUSTAINABLE FUTURE

DAY 2 MONDAY, JUNE 23, 2025

E1: TUTORIAL 1		**STRONG HALL B1**
9:00 AM	An Introduction to Piezoelectric Passive Components for Power Electronics Designers (Part 1) Jessica Boles (University of California, Berkeley)	
10:20–10:40 AM	**Coffee Break**	
10:40 AM	An Introduction to Piezoelectric Passive Components for Power Electronics Designers (Part 2) Jessica Boles (University of California, Berkeley)	
12:00–1:00 PM	**LUNCH**	**STRONG HALL**
E2: TUTORIAL 2		**STRONG HALL B1**
1:00 PM	Modeling and Analysis of AC-DC Converters with Practical Simulation Tips (Part 1) Katherine Kim (National Taiwan University)	
2:20–2:40 PM	**Coffee Break**	
2:40 PM	Modeling and Analysis of AC-DC Converters with Practical Simulation Tips (Part 2) Katherine Kim (National Taiwan University)	
4:00–4:20 PM	**Coffee Break**	
T1: EV APPLICATIONS		**STRONG HALL B1**
4:20 PM	Circuit Modeling, Simulation, and Experimental Validation of a 100-kW Polyphase Wireless Power Transfer System for EV Applications Authors: Omer Onar, Emrullah Aydin, Mostak Mohammad, Subho Mukherjee, Jon Wilkins, Larry Seiber, Cliff White (Oak Ridge National Laboratory)	
4:45 PM	Crosstalk Mitigation and Switching Speed Enhancement of GaN HEMT with Adaptive Gate Resistance Under Wide Temperature Variation Xianchao Liu, Yicheng Zhang, Anwesha Mukhopadhyay, Shiyuan Fan, Daniel Costinett, Leon Tolbert (University of Tennessee, Knoxville)	
5:10 PM	Enhancing EV Charging Station Resilience with Multifunctional Converter Leg Integration Authors: Joao Pereira Pinto, Aswad Adib, Michael Starke, Renata Rezende da Costa Reis Kimpara, Madhu Chinthavali (Oak Ridge National Laboratory)	

DAY 3

TUESDAY, JUNE 24, 2025

8:15–8:40 AM	**WELCOME**	**STUDENT UNION BALLROOM 272**
8:15 AM	Welcome from the Chairs Daniel Costinett (University of Tennessee, Knoxville); Burak Ozpineci (Oak Ridge National Laboratory)	
8:30 AM	Dean's Welcome Matthew Mench (University of Tennessee, Knoxville)	
K1: PLENARY 1		**STUDENT UNION BALLROOM 272**
8:40 AM	Systematically Managing Complexity in Power Electronics Modeling and Design Minjie Chen (Princeton University)	
K2: PLENARY 2		**STUDENT UNION BALLROOM 272**
9:20 AM	The Future of Electrified Transportation—Power Electronics to the Rescue! Regan Zane (Utah State University)	
10:00–10:20 AM	**Coffee Break**	
T2: AMPLIFIERS		**STUDENT UNION ROOM 262**
10:20 AM	Modeling, Analysis, and Design of Three-Phase Current-Mode Power Amplifiers Authors: Junshan Liu, Xin Zan (University of Maryland)	
10:45 AM	Full-Wave Phase-Switched Impedance Modulation Actuator for Tunable Matching Networks Author: Alexander Jurkov (MKS Instruments Inc.)	
11:10 AM	On the Design of Switched-Mode Broadband High Frequency Inverters Authors: Zhechi Ye, Katherine Liang, and Juan Rivas (Stanford University)	
11:35 AM	An Energy-Efficient Pulsed Magnet for Magnetic Resonance Imaging Authors: Aobo Yang, Victor Gao, Lei Gu (University of Pennsylvania)	
12:00–1:00 PM	**LUNCH**	**STUDENT UNION BALLROOM 272**
T3: CONTROL		**STUDENT UNION ROOM 262**
1:00 PM	High-Bandwidth Envelope Tracking in Boost Converters Using State-Feedback-Based Mixed-Signal Hysteresis Current Control Authors: Dipayan Chatterjee, Santanu Kapat, and Indra Narayan Kar (Indian Institute of Technology-Delhi, India); Giovanni Bonanno (University of Padova, Italy)	
1:25 PM	Fast-Response Variable-Frequency Multiphase Series-Capacitor Buck VRM Through Integrated Control Approaches Authors: Guanyu Qian, Haoxian Yan, Xiaofan Cui (University of California, Los Angeles)	
1:50 PM	Energy-Based Design of Neural Network Controls for DC-DC Converters Authors: Kamakshi Tatkare, Brian Johnson (University of Texas at Austin)	
2:15–5:30 PM	**TOURS**	**ORNL/UTK***
6:00–8:00 PM	**WELCOME RECEPTION**	**NEYLAND STADIUM**

*ORNL/UTK TOURS

Tuesday, June 24, 2025, 2:15–5:00 PM

- ORNL Tour–ORNL Hardin Valley Campus
- UT Knoxville Tour–Min H. Kao Department of Electrical Engineering and Computer Science Building

*WOMEN IN ENGINEERING EVENT & LUNCH

Lunchtime on Wednesday, June 25

You're invited to a dynamic and engaging lunchtime panel focused on expanding representation and fostering a welcoming environment within the field of power electronics. Featuring professionals from a variety of backgrounds and career stages, this panel will explore personal experiences, challenges, and strategies for building a field that reflects the full range of talent and viewpoints in our community.

Whether you're a student, researcher, or industry professional, this is a valuable opportunity to learn, connect, and be part of the conversation shaping the future of power electronics. Bring your questions and your curiosity—we look forward to seeing you there!

IEEE pels We Women in Engineering

IEEE pels DAY JUNE 20 POWERING A SUSTAINABLE FUTURE

WOMEN IN ENGINEERING PANELISTS

Mercy Chelangat Koech is an electrical engineer and PhD candidate at the University of Texas at Dallas, working as a research assistant at the Renewable Energy and Vehicular Technology Lab, with a focus on sustainability of electrified transportation and energy systems.

Samantha Coday is an Assistant Professor of Electrical Engineering and Computer Sciences at the Massachusetts Institute of Technology and a Principal Investigator in the MIT Research Laboratory of Electronics.

Katherine Huckabay is a Systems Engineer at Texas Instruments, where she supports the development of battery charging solutions. With a strong foundation in modeling, simulation, and system-level validation, Katherine drives the definition and release of new products that enable efficient and reliable energy solutions.

Radha Sree Krishna Moorthy is a Research and Development Staff Member at Oak Ridge National Laboratory in Knoxville, Tennessee. She leads cutting-edge research on solid state power substations and their foundational components, including Smart Universal Power Electronics Regulators and Intelligent Power Stages.

Sadia Binte Sohid is a PhD candidate in Electrical Engineering at the University of Tennessee, Knoxville, and is affiliated with the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks (CURENT).

Leon M. Tolbert received the BS, MS, and PhD degrees in electrical engineering from Georgia Tech. He worked at Oak Ridge National Laboratory from 1991 until 2020 on electric distribution and power quality projects.

DAY 4

WEDNESDAY, JUNE 25, 2025

T4: PIEZOELECTRIC DEVICES AND CIRCUITS — STRONG HALL 101

8:30 AM	Considerations for Mechanical Fixturing and Mass Augmentation of Piezoelectric Resonators in DC-DC Power Converters Authors: Simon Agnew, Huan Zhao, Lukas Song, Kishalay Datta, Jason Stauth, Yan Li, William Scheideler (Dartmouth College)
8:55 AM	Modeling of Multiport Piezoelectric Components for Power Conversion Authors: Wentao Xu, Sourav Naval, Jessica Boles (University of California, Berkeley)
9:20 AM	Piezoelectric Resonator-Based Power Factor Correction Authors: Eric Stolt, Heather Chang, Martin Affolter, and Juan Rivas Davila (Stanford University)
9:45 AM	Isolated Piezoelectric-Based Power Converter Authors: Daniel Brown, Amanda Jackson, Jeffrey Lang, David Perreault (Massachusetts Institute of Technology)
10:10 AM	Overtone Piezoelectric Transformers for Magnetic-less Power Conversion Authors: Sourav Naval, Wentao Xu, Mustapha Touhami, Jessica Boles (University of California, Berkeley)
10:30–11:00 AM	**Coffee Break**

T5: PASSIVE COMPONENTS — STRONG HALL 101

11:00 AM	Unified Time Domain Foundation Models for Passive Component Hysteresis Authors: Shukai Wang, Hyukjae Kwon, Haoran Li, Minjie Chen (Princeton University)
11:25 AM	Material and Dimensional Considerations for Medium-Frequency Transformers Authors: Agon Hoxha, Charles Sullivan (Dartmouth College)
11:50 AM	A General Analysis of Passive Component Sizing for Input Inductor Buck Converters Authors: Qijia Li, Samantha Coday (Massachusetts Institute of Technology)
12:15–1:10 PM	**LUNCH: (WIE EVENT LUNCH)*** — STRONG HALL

T6: LIGHT APPLICATIONS — STRONG HALL 101

1:10 PM	Very-Large-Scale-Interleaving Power Electronics (VLSI-PE): A 400 W, 95.5%, 64× Interleaved 4-Phase, 17-Level, Coupled Inductor GaN-Based Li-Fi Transmitter Authors: Daniel Zhou, Minjie Chen (Princeton University)
1:35 PM	Prospects and Opportunities for mm-Scale Galvanically Isolated Optical Power Transmission Authors: Mariia Klymenko, Khaidar Kairbek, Jiajun Li, Jifeng Liu, Jason Stauth, William Scheideler (Dartmouth College)
2:00 PM	Discrete Demonstration of Heterogenenous Photonic-Electronic Integrated Optical Gate Driver for SiC MOSFETs Authors: Cameron Woo, Anish Mondal, Mertcan Erdil, Aobo Yang, Firooz Aflatouni, Lei Gu (University of Pennsylvania)
2:25–4:00 PM	**P1: CONTROL AND MODELING I** — STRONG HALL

T7: GRID APPLICATIONS — STRONG HALL 101

4:00 PM	Comparing Classical Energy Functions and Circuit-Based Alternatives for Grid-Forming Inverter Large-Signal Stability Assessment Authors: Debjyoti Chatterjee, Brian Johnson (University of Texas at Austin); Nathan Baeckeland, Gab-Su Seo (National Renewable Energy Laboratory); Sairaj Dhople (University of Minnesota)
4:25 PM	A Decentralized Soft-Start Procedure for a Medium Voltage-Level AC-DC Converter Composed of Cascaded H-Bridge and Quad-Active Bridge Converters Authors: Soham Dutta, Brian Johnson (University of Texas at Austin); Gab-Su Seo, Bowen Yang (National Renewable Energy Laboratory); Dragan Maksimovic, Sayan Paul, Luca Corradini (University of Colorado Boulder)
4:50 PM	Side-Channel Noise Intrusion (SNI): A New Phenomenon and Challenge for Cybersecurity of Power] Authors: Sudip Mazumder, Mateo Roig Greidanus, Nanditha Gajanur, Shantanu Gupta, Debotrinya Sur (University of Illinois Chicago)
5:15 PM	Single-Phase to Split-Phase Inverters with Advanced Grid Support Functions for Grid-Interactive Applications Authors: Vikram Roy Chowdhury, Yeongrack Son, Gab-Su Seo, Barry Mather (National Renewable Energy Laboratory)
6:00–10:00 PM	**SOCIAL EVENT** — KNOXVILLE SUNSPHERE

POSTER SESSION 1

P1: CONTROL AND MODELING I

Wednesday, June 25, 2025 **2:25–4:00 PM**
Strong Hall

P1-01 Generalized FFT-Based Steady-State Simulation for Active Switched Wireless Power Transfer Systems
Yihao Wu, Mafu Zhang, Chenmin Deng, Haoyu Wan, Alex Hanson (University of Texas at Austin)

P1-02 Design of a Modular Multiphase Buck Converter with Dynamic Phase Control
Wei Kao, Katherine Kim (National Taiwan University)

P1-03 Isolated, Soft-Switching, Extremely-High Step-Up Hybrid Quasi-Resonant Boost Converter
Kumar Joy Nag, Aleksandar Prodic (University of Toronto)

P1-04 Integral Cycle Mode Control for RF Inverters with Fast Dynamic Response and Wide-Range Soft Switching
Xuanvan Thai, Yeonghoon Sohn, Jin Huh (En2Core Technology)

P1-05 The Design and Analysis of a Capacitively-Isolated Series-Parallel Converter
Jade Sund, Andre Rodriguez, Elizabeth Rabenold, Samantha Coday (Massachusetts Institute of Technology)

P1-06 A Full State Feedback Controller for Dynamic Capacitive Wireless Power Transfer Systems
Benjamin Liao, Dheeraj Etta, Khurram Afridi (Cornell University)

P1-07 Multi-Objective Optimization of a Toroidal Inductor Considering Parasitic Capacitance
Todd Marzec, Brandon Grainger, Paul Ohodnicki, Yang-Duan Su (University of PIttsburgh)

P1-08 Design of Cost-Effective, Lightweight and Low-Profile Charging Pads for Dynamic Capacitive Wireless Charging Systems for Electric Vehicles
Raquel Sarabia-Soto, Dheeraj Etta, Syed Saeed Rashid, Khurram Afridi (Cornell University)

P1-09 Mathematical Analysis and Proof of Existence of the Photovoltaic Exponential Model
Eduardo I. Ortiz Rivera, Jorge López León (University of Puerto Rico Mayagüez); Joshua Stein (Sandia National Laboratories)

P1-10 Cascaded Control with Inherent Reverse Power Blocking for Wireless Drone Charger
Anwesha Mukhopadhyay, Daniel Costinett (University of Tennessee, Knoxville)

P1-11 Practical Design of Synchronization Control for a Wireless Drone Charger
Arka Basu, Anwesha Mukhopadhyay, Daniel Costinett (University of Tennessee, Knoxville)

P1-12 Comparing Performance of Control Methods for Bidirectional CLLC Converters in Battery-Integrated Photovoltaic Microinverters
Yu-Kai Kenny Liao, Katherine Kim (National Taiwan University)

P1-13 Topology-Oriented Design of Inductively-Coupled-Plasma Generators Without Matching-Networks, Focusing on Negative-Differential-Resistance
Yeonghoon Sohn, Xuanvan Thai, Jin Huh (En2Core Technology)

P1-14 Curvature-Based Ripple Correlation Control for Enhanced MPPT in Photovoltaic Systems
Arpan Laha, Abirami Kalathy, Praveen Jain, Majid Pahlevani (Queen's University)

P1-15 An Efficient Approach for Optimal Control of Power Electronic Converters
Masoud Karimi-Ghartemani (Mississippi State University); Houshang Karimi (York University); Sayed Ali Khajehoddin (University of Alberta); Masoud Davari (Georgia Southern University)

P1: CONTROL AND MODELING I (CONT.)

Wednesday, June 25, 2025 **2:25–4:00 PM**
Strong Hall

P1-16 Automatic Loss Measurement System for MHz Magnetics Using High-Frequency Conditioning Circuits
Haoyu Wang, Alyssa Brown, Yihao Wu, Alex Hanson (University of Texas at Austin)

P1-17 Physics-Based Multi-Domain Core Loss Modeling of Magnetic Materials via Spherical LLG Approach
Sadia Binte Sohid, Daniel Costinett, Gong Gu, Leon M. Tolbert (University of Tennessee, Knoxville)

P1-18 A 2.3 mW 1.2 MHz Digitally Isolated Hysteretic Current Control Circuit with Shunt-Based Current Sense Amplifier
Julius Öhrlein, Ines Bennour, Stefan Mönch (University of Stuttgart, Germany)

P1-19 Phase Winding Configurations for Reduced Output Current Ripple in High-Frequency Multiphase Inverters with Coupled Air-Core Magnetics
Hong En Chew, Katherine Liang, Juan Rivas-Davila (Stanford University)

P1-20 Design of a Load Invariant Class-E Amplifier for an Inductively Heated Fluidized Bed
Rachel Hollett, Calvin Lin, Dillon Jensen, Jonathan Fan, Juan Rivas-Davila (Stanford University)

P1-21 Design and Optimization of a High-Performance 3D-Stacked Flying Capacitor Multilevel Inverter for Electric Drivetrains
Logan Horowitz, Jiarui Zou, Robert Pilawa-Podgurski (University of California, Berkeley)

P1-22 Comparative Analysis of the Dual Path Hybrid Switched-Capacitor DC-DC Converter and the 3-Level Buck Converter
Bahlakoana Mabetha, Kishalay Datta, Jason T. Stauth (Dartmouth College)

P1-23 Generalized Design of Load-Independent Voltage-Fed Resonant Networks
Chenmin Deng, Yihao Wu, Alex Hanson (University of Texas at Austin)

P1-24 A Simple yet Accurate Discrete Time Series Resonant Converter Model for Transient Operation
Thomas Baumgartner, Robert Bauer, Martin Horn (Graz University of Technology)

P1-25 Design of a Compact, Lightweight 25 kV DC Power Supply Using a Parallel Voltage Multiplier for Neutron Generation
James Skelly, Viruni L. Liyanage, Juan Rivas (Stanford University)

P1-26 Design and Analysis of a High Step-Down Ratio Capacitively-Isolated Flying Capacitor Multilevel Resonant Converter
Roderick Bayliss III, Logan Horowitz, Robert Pilawa-Podgurski (University of California, Berkeley)

P1-27 Multiloop Control for Dual Active Bridge Converter-Based on Predictive Voltage and Current Controls with Disturbance Observer
Kabindra Pokharel, Byunghee Moon, Herbert L. Ginn III (University of South Carolina)

P1-28 Synthesis of High-Conversion Ratio Multi-Phase Fibonacci Converter Topologies
Tim Rambousky, Bernhard Wicht (Leibniz University Hannover)

P1-29 Model Reference Adaptive Control for Improved Average Current Regulation and Accurate ZVS in DCM Gried-Tied Inverters
Cheng Huang, Takanori Isobe (Universtiy of Tsukuba)

DAY 5 THURSDAY, JUNE 26, 2025

T8: FCML ANALYSIS AND CONTROL — STRONG HALL B1

8:30 AM	**Analytical Modeling of Capacitor Voltage Imbalance Created by Input Filter Ripple in a Three-Level Flying Capacitor Multilevel Converter** Authors: Noah J. B. Hosein, Peter W. Lehn (University of Toronto)
8:55 AM	**Analysis of Steady-State Balancing in the Flying Capacitor Multilevel Converter Considering Capacitor Voltage Ripple** Authors: Elisa Krause, Nathan Biesterfeld, Francesca Giardine, Robert C. N. Pilawa-Podgurski (University of California, Berkeley)
9:20 AM	**A Current-Programmed Modulator with Smooth Bin Transitions and Inherent Capacitor Voltage Balancing for Flying Capacitor Multilevel Converters** Authors: Nathan Biesterfeld, Khalid Durani, Robert Pilawa-Podgurski (University of California, Berkeley)
9:45 AM	**Fully Digital Current Control Techniques for Active Flying Capacitor Balancing in Three-Level Buck Converters** Authors: Arindam Maulik, Santanu Kapat, Anirban Nanda (Indian Institute of Technology-Kharagpur, India); Giovanni Bonanno, Paolo Mattavelli (University of Padova, Italy)
10:10–10:30 AM	**Coffee Break**

T9: CONTROL AND MODELING — STRONG HALL B1

10:30 AM	**Dynamic Modeling of the Resonant Series-Bridge DCX Converter** Authors: Sanat Poddar, Regan Zane (Utah State University)
10:55 AM	**Modeling and Operation of Resonant Switched-Capacitor DC-DC Converters Regulated by Switch Conductance Under Overdamped Conditions** Authors: Adrian Gehl, Bernhard Wicht (Leibniz University Hannover)
11:20 AM	**Half-Wave Anti-Symmetry and Double-Frequency Sampling Impact on Dynamic Model of Wireless Battery Charger** Authors: Anwesha Mukhopadhyay, Daniel Costinett (University of Tennessee, Knoxville)
11:45 AM	**Chiplet-LEGO: Delivering Multiple Voltage Rails to Chiplets with Chiplet VRMs** Authors: Wenliang Zeng, Gyeong-Gu Kang, Haoran Li, Mian Liao, Minjie Chen (Princeton University); Youssef Elasser (Nvidia Research)
12:10–1:10 PM	**LUNCH** — STRONG HALL

T10: EXTREMUM SEEKING CONTROL — STRONG HALL B1

1:10 PM	**Active Power Decoupling in Bidirectional Single-Phase AC-DC Converters Via Extremum Seeking Control** Authors: Anurag Singh, Sayan Paul, Dragan Maksimovic, Luca Corradini (University of Colorado Boulder)
1:35 PM	**A Simple Sensorless MTPA Control Scheme for PMSM in PV-Fed Water Pumps** Authors: Abirami Kalathy, Arpan Laha, Praveen Jain, Majid Pahlevani (Queen's University)
2:00 PM	**Design and Analysis of an Integral MPPT Control Law for Wave Energy Conversion Systems** Authors: Pranav Chandran, Rahul Mallik, Brian Johnson (University of Texas at Austin); Inyong Kim, Ted Brekken (Oregon State University)
2:25–4:00 PM	**P2: CONTROL AND MODELING II** — STRONG HALL

T11: HIGH POWER CONVERTERS AND COMPONENTS — STRONG HALL B1

4:00 PM	**Investigation of CM Current Propagation in PEBB 6000: A 10 kV SiC MOSFET-Based Power Electronics Building Block** Authors: Ashkan Barzkar, He Song, Tonglei Wang, Rolando Burgos, Dong Dong, Dushan Boroyevich (Virginia Tech)
4:25 PM	**Novel High-Power Isolated-Three-Phase-HF-Link Matrix-Type Three-Phase AC/DC Converter (i3X-Rectifier)** Authors: Daifei Zhang (University of Toronto); Johann Kolar (ETH Zurich); Paolo Sbabo, Davide Biadene, Paolo Mattavelli (University of Padova)
5:50 PM	**Design and Optimization of a Novel GaN-Based High-Power-Density Online Uninterruptible Power Supply** Authors: Syed Saeed Rashid, Xuancen Wu, Abdullah Saboor, Khurram Afridi (Cornell University)
6:15 PM	**Experimental Characterization of Switching Losses in SiC-Based DAB Converters** Authors: Ashwini Kumar Dubey, Sayan Paul, Dragan Maksimovic (University of Colorado Boulder)
6:00–8:00 PM	**AWARDS BANQUET** — ZEANAH DESIGN STUDIO

POSTER SESSION 2

P2: CONTROL AND MODELING II

Thursday, June 26, 2025 **2:25–4:00 PM**
Strong Hall

P2-01 Passive Control for DC Input Stabilization of IPM Motor Drive System Using Feedforward Compensation
Koki Yamada, Toshiji Kato, Kaoru Inoue (Doshisha University)

P2-02 Power Loss Modeling for Bidirectional Switches in a Single-Branch Harmonically Partitioned Power Converter
Jacob Anderson, Mike Ranjram (Arizona State University)

P2-03 Enhanced GFD Control Based on Stable Operating Region for MMC-Based ES-STATCOM for Offshore Wind Integration
Harshit Nath, Sulaiman Alshammari, Dr. Subhashish Bhattacharya (North Carolina State University)

P2-04 Ocean Wave Energy Harvester with Oak Ridge Converter
Erdem Asa, Elizabeth Sutton, Omer Onar (Oak Ridge National Laboratory)

P2-05 Hierarchical Partial Power Processing for Second-Life Battery-Integrated Grid-Connected Multilevel Inverters
Rupeng Duan, Xiaofan Cui (University of California, Los Angeles)

P2-06 Comparison of Modulation Strategies for GaN-Based Quad-Active-Bridge (QAB) DC-DC Converter for Microgrid Systems
Sheikh Aaqib, Xin Gao, Jiangbiao He (University of Tennessee, Knoxville)

P2-07 Bidirectional Single-Stage Isolated MMC Using Anti-Series Connected Half-Bridges for AC-DC Conversion
Philippe Gray (University of Calgary)

P2-08 Low Parasitic Loop Inductance Design and Characterization of a 1200 V, 200 A SiC MOSFET Half-Bridge PCB-Embedded Power Module
Aditya Bhalotia, Soumya Shubhra Nag, Abhrodip Chaudhury, Sumit Pramanick, Anandarup Das (Indian Institute of Technology Delhi); Sorra Ranjit (Lotus Wireless Technologies); Kaushik Mirdoddi (Silicon Austria Labs); K Gopikrishnan (Texas Instruments India); Mike Morianz, Gerald Weis, Thomas Koeck, Johannes Stahr (AT&S, Leoben, Austria)

P2-09 Analytical Model of the AC-AC DAB Converter in the EGAM Framework
Arnold A. Fernandes, Jonathan W. Kimball (Missouri University of Science and Technology); Kartikeya Jayadurga Prasad Veeramraju (Lunar Energy, Mountain View)

P2-10 Estimation of Minimum Dead Time to Counter Resonance Mis-Tuning in DAB-SRC for DCX Operation
Sanat Poddar, Regan Zane (Utah State University)

P2-11 On the Scaling of Common-Mode EMI in the Flying Capacitor Multilevel Converter
Francesca Giardine, Sahana Krishnan, Marrin Nerenberg, Robert Pilawa-Podgurski (University of California, Berkeley)

P2-12 Modeling the Magnetic and Electric Near-field Emission from SiC-Based Half-bridge Converter
Jeet Panchal, Mamoru Sasaki, Tim Thacker, Majid Manteghi, Dong Dong, Rolando Burgos (CPES, Virginia Tech)

P2-14 Switching Scheme Analysis of a Split-Inductor Converter for Differential Power Processing Systems in a Photovoltaic Module
Yun Jen Xu, Katherine Kim (National Taiwan University)

P2-15 Integrated Energy Storage-Based Low-Cost Wave Energy Conversion System for Grid Forming Application
Vikram Roy Chowdhury, Gab-Su Seo, Barry Mather (National Renewable Energy Laboratory)

P2-16 Time and Transfer Constant-Based Hybrid-Modeling Approach for a Pulse-Width-Modulated DC-DC Converter in Continuous Conduction Mode
Wei Zhu, Mingzi Zhang, Valentijn De Smedt (KU Leuven); Arindam Mishra (ICsense Company)

P2: CONTROL AND MODELING II (CONT.)

Thursday, June 26, 2025 **2:25–4:00 PM**
Strong Hall

P2-17 Wide-Range Current-Mode Class-D Power Amplifier
Temiladeola Oladugba, Xin Zan
(University of Maryland, College Park)

P2-18 A Grid-Forming Control Scheme for Inverter-Based PV Generation Featuring Black-start Capabilities
Biqi Wang, Rolando Burgos (CPES, Virginia Tech);
Andrea Pinceti, Ibukunoluwa Korede (Dominion Energy)

P2-19 Optimal Active Cell Balancing for Lithium-Ion Battery Packs: A Two-Stage Strategy to Minimize Losses and Balancing Duration
Shehryaar Ali (Hochschule für Technik und Wirtschaft Berlin)

P2-20 Stealth Attacks on Droop-Controlled DC Microgrids: A Stability and Performance Analysis
Sakshi Sharma (Indian Institute of Technology Delhi)

P2-21 Soft-Switching Multilevel Traction Inverter Leveraging Coupled Inductors
Noah Silverman, Matthias Preindl (Columbia University)

P2-22 Optimized Design for Complete ZVS Operation in Phase-Shift Full-Bridge DC-DC Converter with Series-Connected Transformers
Marco Duca, Giovanni Bonanno, Giorgio Spiazzi
(Università Degli Studi di Padova)

P2-23 Comparison Between the 2N+1 and N+1 Operating Modes of the Single-Phase AC-AC MMC
Daniel Gustavo Castellain, Sergio Vidal Garcia Oliveira
(Universidade do Estado de Santa Catarina)

P2-24 Grid-Forming Control of Two-Stage PV Systems Under Capacity Constraints
Weiqian Cai, Brian Johnson (University of Texas at Austin);
Wen Bo (Delta Electronics)

P2-25 Modeling and Control of an Interleaved Forward Converter with Coupled Inductor for EV Charging
Luan Souza de Oliveira, Sérgio Vidal Garcia Oliveira,
Luiz Carlos Gili (Universidade do Estado de Santa Catarina);
Robson Mayer (Universidade Estadual de Campinas);
Menaouar Berrehil El Kattel (Universidade Federal do Ceará)

P2-26 Voltage Balancing of a Pi-Type Multilevel Converter for Charging Electrocaloric Capacitors
Ines Bennour, Stefan Mönch
(University of Stuttgart, Germany)

P2-27 Improved Inner Loop Model and Deadbeat Voltage Control in Multiloop Deadbeat Control for Voltage Source Converters with LC Filters
Byunghee Moon, and Herbert L. Ginn
(University of South Carolina)

P2-28 Modeling of a 2-MHz GaN-Based Constant-On-Time Virtual-Ripple-Controlled 20A Buck Converter for High-Performance Computing Applications
Zhenda Fu (The University of Texas at Dallas; Analog Devices, Inc.), Fei Zhou (The University of Texas at Dallas)

P2-29 An Average Value Model for the Five-Level Robicon-Type Drive
Mohammad Nair Aalam, Rolando Burgos, Timothy Thacker (Center for Power Electronics Systems, Virginia Tech)

P2-30 Modeling and Analysis of Dual Comparison One Cycle Control for Single Phase Grid Connected Converters
Nimesh Vamanan (Independent Researcher)

NOTES

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