Berkeley Power and Energy Center

Annual Research Review Meeting

Wednesday, April 23, 2025

Clark Kerr Campus

University of California, Berkeley

08:00 AM – 09:00 AM	**Breakfast and Registration**
09:00 AM – 09:30 AM	**Welcome Address** Prof. Robert Pilawa
09:30 AM – 10:30 AM	**Lecture Session #1: Piezoelectric-Based Power Conversion** **Session Chair: Dr. Mustapha Touhami**
09:30 AM – 09:50 AM	**A Piezoelectric-Resonator-Based "Active Inductor"** Tucker Skinner
09:50 AM – 10:10 AM	**Overtone Piezoelectric Resonators for Power Conversion** Wentao Xu
10:10 AM – 10:30 AM	**High-Efficiency Isolated Piezoelectric Transformers for Magnetic-Less DC-DC Power Conversion** Sourav Naval
10:30 AM – 11:00 AM	**Coffee Break and Group Photo**
11:00 AM – 12:00 PM	**Lecture Session #2: Electric Transportation** **Session Chair: Sahana Krishnan**
11:00 AM – 11:20 AM	**Design and Optimization of a High-Performance 3D-Stacked Flying Capacitor Multilevel Inverter for Electric Drivetrains** Logan Horowitz
11:20 AM – 11:40 AM	**A Variable Frequency Technique for EMI and Efficiency Improvements in High-Level Count Flying Capacitor Multilevel Converters** Francesca Giardine
11:40 AM – 12:00 PM	**Analysis and Implementation of Minimum-Sensor Capacitor Voltage Estimators for Flying Capacitor Multilevel Converters** Tahmid Mahbub
12:00 PM – 01:00 PM	**Lunch**
01:00 PM – 02:00 PM	*** Poster Session** * Poster titles listed on page 4.

02:00 PM – 03:30 PM	**Lecture Session #3: Data Center Power Delivery** **Session Chair: Nagesh Patle**
02:00 PM – 02:20 PM	**An Input Inductor Flying Capacitor Multilevel Converter Utilizing a Combined Power Factor Correcting and Active Voltage Balancing Control Technique for Buck-Type AC/DC Grid-Tied Applications** Rod Bayliss
02:20 PM – 02:40 PM	**An Adaptive Zero Current Switching Control Technique for Multi-Resonant Switched-Capacitor Converters** Haifah Sambo
02:40 PM – 03:00 PM	**A 48-V-to-1-V Gallium Nitride Switching Bus Converter for Processor Vertical Power Delivery with 2.7 mm Thickness and 3048 W/in^3 Power Density** Jiarui Zou
03:00 PM – 03:30 PM	**Design-Oriented Modeling and Multi-Objective Optimization of Two-Phase Coupled Inductors in Multiphase PWM Converters** Dr. Yicheng Zhu
03:30 PM – 03:45 PM	**Coffee Break**
03:45 PM – 04:15 PM	**BPEC Educational Activities Update**
04:15 PM – 04:45 PM	**Member Panel for Undergrads**
04:45 PM – 05:00 PM	**Concluding Remarks** Prof. Robert Pilawa
06:00 PM	*** Industry Advisory Board (IAB) Dinner** * For IAB representatives only.

Poster Session – Details

- **Unified Framework for the Passive Volume Comparison of Power Converter Topologies**
  Logan Horowitz
- **Modeling and Control of the Flying Capacitor Multilevel Converter**
  Rahul Iyer
- **On the Scaling of Common-Mode EMI in the Flying Capacitor Multilevel Converter**
  Francesca Giardine
- **The Switching Bus Converter: Towards Direct 48 V to Point-of-Load Vertical Power Delivery for Data Center Applications**
  Dr. Yicheng Zhu
- **A Merged ZCS/ZVS Control Technique for Resonant Switched-Capacitor Converters**
  Haifah Sambo
- **One Split is Enough: Restoring 50% Input Current Duty in a 48-to-6 V Dickson Converter While Preserving Soft-Charging**
  Nagesh Patle
- **Flexible, Scalable, Affordable Thermal Test Vehicle Design For Data Center Cooling Solutions**
  Logan Horowitz, Tahmid Mahbub, Jiarui Zou
- **Phase-Overlapping Constant-On-Time Control for Improving Transient Performance of Series-Capacitor Buck Converters**
  Shuyu Zhang
- **Modeling of Resonant Switched-Capacitor Converters**
  Emmi Wyttenbach
- **Design and Analysis of a High Step-Down Ratio Capacitively-Isolated Flying Capacitor Multilevel Resonant Converter**
  Rod Bayliss
- **Analysis of Steady-State Balancing in the Flying Capacitor Multilevel Converter Considering Capacitor Voltage Ripple**
  Elisa Krause
- **Current-Programmed Modulation of FCML Converters with Smooth Bin Transitions and Improved Natural Balancing**
  Nathan Biesterfeld
- **An EMI-Compliant and Automotive-Rated 48 V-to-PoL Dickson-Based Hybrid Switched-Capacitor DC-DC Converter**
  Sahana Krishnan
- **Design and Control of a High-Power-Density 6-Level FCML Totem-Pole PFC**
  Yayun Zhao
- **Design and Characterization of a High Slew Rate Electronic Load for Data Center Power Converter Validation**
  Marrin Nerenberg
- **Ultra Light-Weight Bidirectional DC-DC Converters for Electric Aircrafts**
  Dennis Woo

Parking and Location – Details

Clark Kerr Campus (Sessions and Presentations)

Parking Lot: Southwest Lot, Venue: Krutch Auditorium

- Upon arrival at Clark Kerr Campus, please park in the Southwest Lot (marked by the indigo “P” pin).
- Enter the Southwest Lot via Warring St as shown by the red arrow.
- The Southwest Lot is located near the Krutch Auditorium (marked by the red pin) where registration and events will take place.
- To access the Krutch Auditorium from the Southwest Lot, follow the dotted red line.