

ITEC2020

FINAL PROGRAM

ONLINE
STARTING JUNE 23

ITEC SPONSORS:



WELCOME

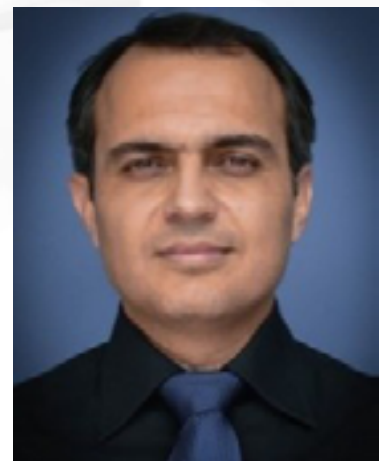
It is with great pleasure that I welcome you to the IEEE Transportation Electrification Conference and Exhibition (ITEC 2020). ITEC aims to help the industry to electrify transportation systems. The conference focuses on the latest trends in components, subsystems, systems, grid and smart grid interface, smart mobility and energy conversion standards for all types of electrified transportation including electric, hybrid electric, off-road and heavy-duty vehicles, aircraft, ships and rail vehicles.

In the unusual circumstances of this year's pandemic of COVID-19, the ITEC 2020 Organizing Committee has worked hard to build a tremendous conference. I express my sincere gratitude for their commitment. Also, the unwavering support of the IEEE Power Electronics Society, Industry Applications Society and Power & Energy Society, ITEC 2020 was able to meet the challenge of a virtual conference. This allows ITEC to continue its rise to become the world's leading technical event for transportation electrification.

This year, the technical program is particularly attractive for those who are interested in transportation electrification. Indeed, participants from industry and government agencies, academic researchers, students and the general public will benefit from a wide range of technical session choices. We have eight world-class keynotes that cover the current state and future trends in transportation electrification. There are also nine educational tutorial sessions, offered by internationally renowned experts, covering a wide range of topics from components, powertrain and chargers to the grid and smart grid interaction with electrified vehicles. The program also includes over 200 presentations of high-quality technical papers. And all this on a virtual platform with live Q&A sessions and the possibility of on-demand videos available for three weeks to all attendees.

I hope your experience with virtual ITEC will be memorable. I welcome you to ITEC 2020 and to the transportation electrification community if this is your first participation. We need everyone's effort to ensure ITEC's continued success and to meet the challenges of a green recovery of the transportation industry after the pandemic. All in all, you are the ones who built ITEC's success!

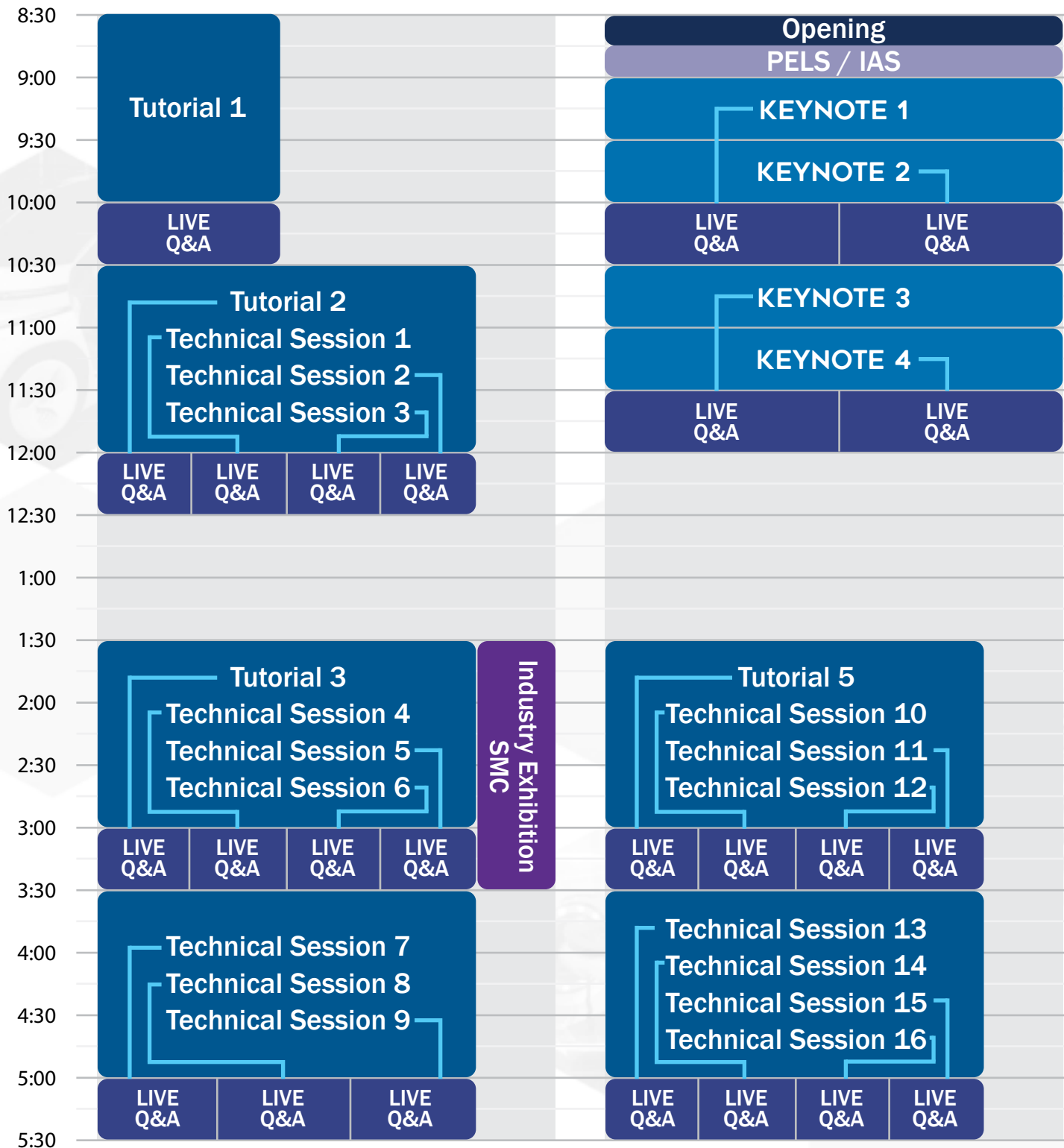
Babak Nahid-Mobarakeh
ITEC 2020 General Chair



PROGRAM-AT-A-GLANCE

TUESDAY JUNE 23, 2020

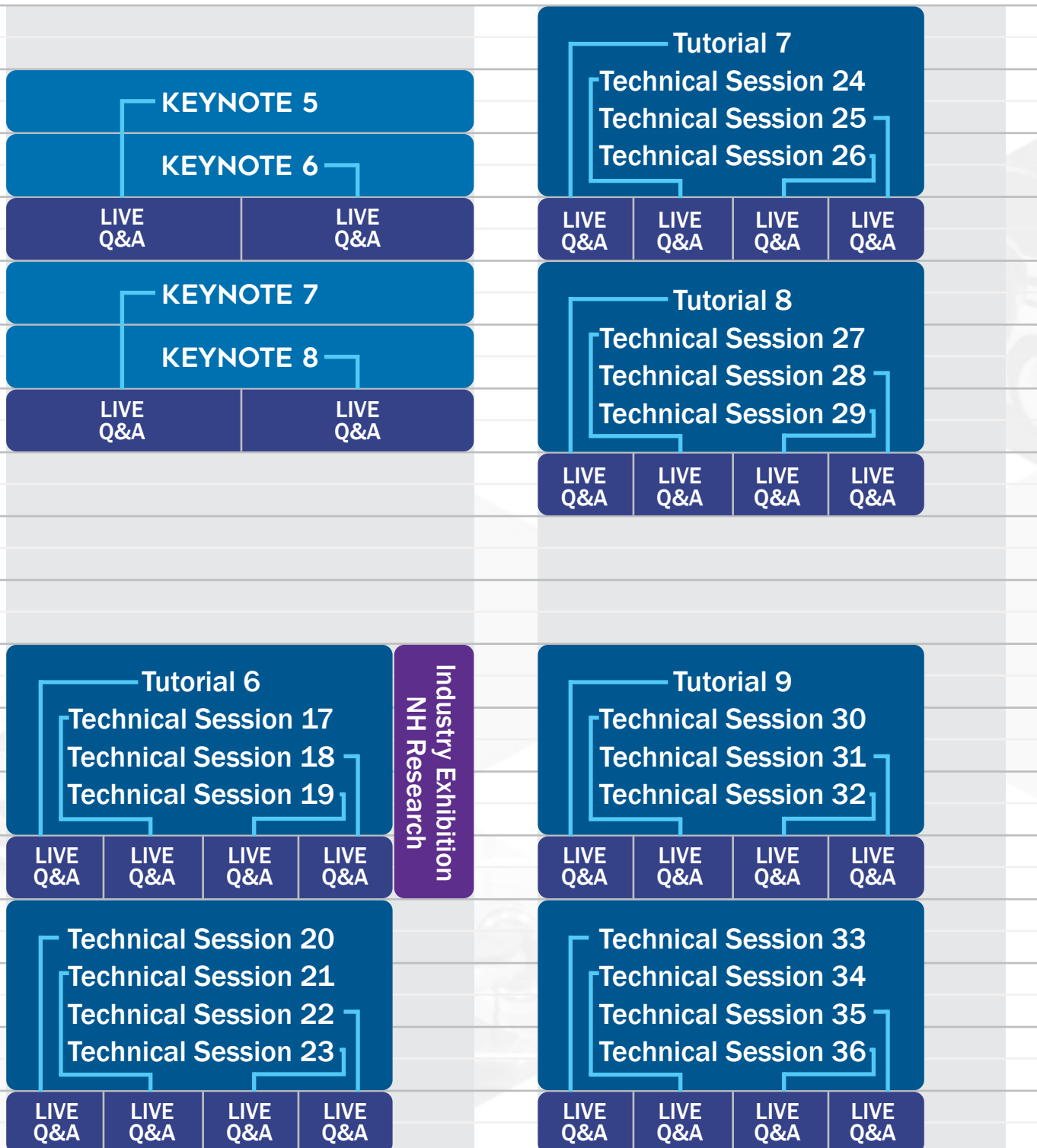
WEDNESDAY JUNE 24, 2020



PROGRAM-AT-A-GLANCE

THURSDAY
JUNE 25, 2020

FRIDAY
JUNE 26, 2020



CONFERENCE SCHEDULE

TUESDAY, JUNE 23 - MAIN SESSION

8:30 AM - 10:00 AM	TUTORIAL 1	On24
10:30 AM - 12:00 PM	TUTORIAL 2	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 1	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 2	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 3	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 4	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 5	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 6	On24
1:30 PM - 3:00 PM	TUTORIAL 3	On24
1:30 PM - 3:00 PM	INDUSTRY EXHIBITION (SMC)	Virtual Room A
3:30 PM - 5:30 PM	TECHNICAL SESSION 7	On24
3:30 PM - 5:30 PM	TECHNICAL SESSION 8	On24
3:30 PM - 5:30 PM	TECHNICAL SESSION 9	On24

TUESDAY, JUNE 23 - LIVE Q&A

10:00 AM - 10:30 AM	TUTORIAL 1: Q&A	Virtual Room B
12:00 PM - 12:30 PM	TUTORIAL 2: Q&A	Virtual Room B
12:00 PM - 12:30 PM	TECHNICAL SESSION 1: Q&A	Virtual Room C
12:00 PM - 12:30 PM	TECHNICAL SESSION 2: Q&A	Virtual Room D
12:00 PM - 12:30 PM	TECHNICAL SESSION 3: Q&A	Virtual Room E
3:00 PM - 3:30 PM	TECHNICAL SESSION 4: Q&A	Virtual Room B
3:00 PM - 3:30 PM	TECHNICAL SESSION 5: Q&A	Virtual Room C
3:00 PM - 3:30 PM	TECHNICAL SESSION 6: Q&A	Virtual Room D
3:00 PM - 3:30 PM	TUTORIAL 3: Q&A	Virtual Room E
5:00 PM - 5:30 PM	TECHNICAL SESSION 7: Q&A	Virtual Room B
5:00 PM - 5:30 PM	TECHNICAL SESSION 8: Q&A	Virtual Room C
5:00 PM - 5:30 PM	TECHNICAL SESSION 9: Q&A	Virtual Room D

CONFERENCE SCHEDULE

WEDNESDAY, JUNE 24 - MAIN SESSION

8:30 AM - 8:45 AM	OPENING ADDRESS	Virtual Room A
8:45 AM - 9:00 AM	PELS / IAS	
9:00 AM - 9:30 AM	KEYNOTE 1	On24
9:30 AM - 10:00 AM	KEYNOTE 2	On24
10:30 AM - 11:00 AM	KEYNOTE 3	On24
11:00 AM - 11:30 AM	KEYNOTE 4	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 10	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 11	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 12	On24
1:30 PM - 3:00 PM	TUTORIAL 5	On24
1:30 PM - 3:00 PM	INDUSTRY EXHIBITION 5	Virtual Room A
3:30 PM - 5:00 PM	TECHNICAL SESSION 13	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 14	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 15	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 16	On24

WEDNESDAY, JUNE 24 - LIVE Q&A

10:00 AM - 10:30 AM	KEYNOTE 1&2: Q&A	Virtual Room A
11:30 AM - 12:00 PM	KEYNOTE 3&4: Q&A	Virtual Room A
3:00 PM - 3:30PM	TECHNICAL SESSION 10: Q&A	Virtual Room B
3:00 PM - 3:30PM	TECHNICAL SESSION 11: Q&A	Virtual Room C
3:00 PM - 3:30PM	TECHNICAL SESSION 12: Q&A	Virtual Room D
3:00 PM - 3:30PM	TUTORIAL 5: Q&A	Virtual Room E
5:00 PM - 5:30 PM	TECHNICAL SESSION 13: Q&A	Virtual Room B
5:00 PM - 5:30 PM	TECHNICAL SESSION 14: Q&A	Virtual Room C
5:00 PM - 5:30 PM	TECHNICAL SESSION 15: Q&A	Virtual Room D
5:00 PM - 5:30 PM	TECHNICAL SESSION 16: Q&A	Virtual Room E

CONFERENCE SCHEDULE

THURSDAY, JUNE 25 - MAIN SESSION

9:00 AM - 9:30 AM	KEYNOTE 5	On24
9:30 AM - 10:00 AM	KEYNOTE 6	On24
10:30 AM - 11:00 AM	KEYNOTE 7	On24
11:00 AM - 11:30 AM	KEYNOTE 8	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 17	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 18	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 19	On24
1:30 PM - 3:00 PM	TUTORIAL 6	On24
1:30 PM - 3:30 PM	INDUSTRY EXHIBITION (NH RESEARCH)	Virtual Room A
3:30 PM - 5:00 PM	TECHNICAL SESSION 20	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 21	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 22	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 23	On24

THURSDAY, JUNE 25 - LIVE Q&A

10:00 AM - 10:30 AM	KEYNOTE 5&6: Q&A	Virtual Room A
11:30 AM - 12:00 PM	KEYNOTE 7&8: Q&A	Virtual Room A
3:00 PM - 3:30PM	TECHNICAL SESSION 17: Q&A	Virtual Room B
3:00 PM - 3:30PM	TECHNICAL SESSION 18: Q&A	Virtual Room C
3:00 PM - 3:30PM	TECHNICAL SESSION 19: Q&A	Virtual Room D
3:00 PM - 3:30PM	TUTORIAL 6: Q&A	Virtual Room E
5:00 PM - 5:30 PM	TECHNICAL SESSION 20: Q&A	Virtual Room B
5:00 PM - 5:30 PM	TECHNICAL SESSION 21: Q&A	Virtual Room C
5:00 PM - 5:30 PM	TECHNICAL SESSION 22: Q&A	Virtual Room D
5:00 PM - 5:30 PM	TECHNICAL SESSION 23: Q&A	Virtual Room E

CONFERENCE SCHEDULE

FRIDAY, JUNE 26 - MAIN SESSION

8:30 AM - 10:00 AM	TUTORIAL 7	On24
8:30 AM - 10:00 AM	TECHNICAL SESSION 24	On24
8:30 AM - 10:00 AM	TECHNICAL SESSION 25	On24
8:30 AM - 10:00 AM	TECHNICAL SESSION 26	On24
10:30 AM - 12:00 PM	TUTORIAL 8	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 27	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 28	On24
10:30 AM - 12:00 PM	TECHNICAL SESSION 29	On24
10:30 AM - 12:00 PM	INDUSTRY EXHIBITION 10	Virtual Room A
1:30 PM - 3:00 PM	TUTORIAL 9	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 30	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 31	On24
1:30 PM - 3:00 PM	TECHNICAL SESSION 32	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 33	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 34	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 35	On24
3:30 PM - 5:00 PM	TECHNICAL SESSION 36	On24

CONFERENCE SCHEDULE

FRIDAY, JUNE 26 - LIVE Q&A

10:00 AM - 10:30 AM	TUTORIAL 7: Q&A	Virtual Room B
10:00 AM - 10:30 AM	TECHNICAL SESSION 24: Q&A	Virtual Room C
10:00 AM - 10:30 AM	TECHNICAL SESSION 25: Q&A	Virtual Room D
10:00 AM - 10:30 AM	TECHNICAL SESSION 26: Q&A	Virtual Room E
12:00 PM - 12:30 PM	TUTORIAL 8: Q&A	Virtual Room B
12:00 PM - 12:30 PM	TECHNICAL SESSION 27: Q&A	Virtual Room C
12:00 PM - 12:30 PM	TECHNICAL SESSION 28: Q&A	Virtual Room D
12:00 PM - 12:30 PM	TECHNICAL SESSION 29: Q&A	Virtual Room E
3:00 PM - 3:30 PM	TUTORIAL 9: Q&A	Virtual Room B
3:00 PM - 3:30 PM	TECHNICAL SESSION 30: Q&A	Virtual Room C
3:00 PM - 3:30 PM	TECHNICAL SESSION 31: Q&A	Virtual Room D
3:00 PM - 3:30 PM	TECHNICAL SESSION 32: Q&A	Virtual Room E
5:00 PM - 5:30 PM	TECHNICAL SESSION 33: Q&A	Virtual Room B
5:00 PM - 5:30 PM	TECHNICAL SESSION 34: Q&A	Virtual Room C
5:00 PM - 5:30 PM	TECHNICAL SESSION 35: Q&A	Virtual Room D
5:00 PM - 5:30 PM	TECHNICAL SESSION 36: Q&A	Virtual Room E

TUTORIAL 1:

REAL-TIME SIMULATION OF STATIC CONVERTERS FOR CONTROL DESIGN

**SCHEDULE:**

8:30AM to 10:00AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room B

SPEAKER:

Edwin Fonkwe

Director at GaN Systems

BIOGRAPHY:

Dr. Edwin Fonkwe is a Principal Engineer with Typhoon HIL Inc. working from their Somerville, Massachusetts office. He graduated with a PhD in Electrical Engineering & Computer Science from the Massachusetts Institute of Technology in 2019. He is interested in controls, power electronics, and their applications in microgrids.

TUTORIAL 2:

RELIABILITY ASSESSMENT AND CONDITION MONITORING OF SIC MOSFETS

**SCHEDULE:**

10:30AM to 12:00PM at On24

LIVE Q&A:

12:00PM to 12:30PM at
Virtual Room B

SPEAKER:

Bilal Akin

*Professor
University of Texas at Dallas*

BIOGRAPHY:

Bilal Akin received the Ph.D. degree in electrical

engineering from the Texas A&M University, College Station, TX, USA, in 2007. He was an R&D Engineer with Toshiba Industrial Division, Houston, TX, USA, from 2005 to 2008. From 2008 to 2012, he worked as an R&D Engineer at C2000 DSP Systems, Texas Instruments Incorporated. Since 2012, he has been with University of Texas at Dallas as faculty.

Dr. Akin is recipient of NSF CAREER '15 award, IEEE IAS Transactions 1st Place Prize Paper Award and Top Editors Recognition Award from IEEE TVT Society, Jonsson School Faculty Research Award, Jonsson School Faculty Teaching Award. He is an Associate Editor of IEEE Transactions on Industry Applications and IEEE Transactions on Vehicular Technology. His research interests include design, control and diagnosis of electric motors & drives, digital power control and management, fault diagnosis & condition monitoring of power electronics components and ac motors.

**SPEAKER:**

Fei Yang

*PhD Student
University of Texas at Dallas*

BIOGRAPHY:

Fei Yang received the B.S. degree from Northwestern Polytechnical University, Xi'an, China, in 2011, the M.S. degree from the Center for Ultra-Wide-Area Resilient

Electric Energy Transmission Networks (CURENT), The University of Tennessee, Knoxville, TN, USA, in 2017, and the Ph. D. degree from the University of Texas at Dallas, Richardson, TX, USA, in 2020, all in electrical engineering.

He is currently a System Engineer at Texas Instruments, Dallas, TX, USA. From 2012 to 2014, he was working as a researcher at Kettering University, Flint, MI, USA. He has published more than 30 papers in the most prestigious journals and conference proceedings, and filed four patent applications with two licensed. His research interests include wide bandgap semiconductor device's reliability and application, power module packaging and integration, and motor drive system design.

TUTORIAL 3:

FUNCTIONAL TESTING OF ELECTRIC VEHICLE COMPONENTS & SYSTEMS



SCHEDULE:

1:30PM to 3:00PM at On24

LIVE Q&A:

3:00PM to 3:30PM at
Virtual Room E

SPEAKER:

Ben Jackson

*Senior Applications Engineer,
NH Research (NHR)*

BIOGRAPHY:

Ben Jackson has over 10 years of electrical engineering experience across a wide range of industrial applications. Ben's expertise is especially focused on the Electric Vehicle industry including automotive and aerospace applications. As the Senior Applications Engineer at NH Research (NHR), Ben provides consultation for designing hardware and software test solutions for battery, fuel cell and powertrain test systems from 100W to over 2MW in size. Test applications range from individual components such as battery R&D and power electronics, to entire propulsion systems and fast chargers. Ben received his bachelors in Electrical Engineering from Cal State Fullerton. Previously, he worked at NASA Jet Propulsion Laboratory as a System Engineer.

TECHNICAL SESSION 1:

10:30AM - 12:00PM

CODES, STANDARDS, POLICIES, AND REGULATIONS FOR TRANSPORTATION ELECTRIFICATION

A Realistic and Non-linear Charging Process Model for Parking Lot's Decision on Electric Vehicles Recharging Schedule

Hao Wu¹, Grantham Pang², Xia Li¹ - (1) Shenzhen University, (2) The University of Hong Kong

The Uncertainty of Autonomous Unmanned Aerial Vehicles' Energy Consumption: The Impact of Airspace Regulations

Mohamed Elsayed, Moataz Mohamed - McMaster University

Barriers of Growth Analysis for Electric Vehicles by Non-linear Polarized Scale Method

Ashwini Uthirakumar¹, Ilaval Manickam² - (1) San Francisco State University, (2) NIO USA Inc

A Short Review Study - Safety Effects of Wireless Power Transfer (WPT) and Reduction of Intermediate Frequency (IF) Electromagnetic Field (EMF) for Electric Vehicle (EV) Charger Systems

Erdem Asa, Omer C. Onar - Oak Ridge National Laboratory

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 2:

10:30AM - 12:00PM

DESIGN OF POWER ELECTRONIC DEVICES FOR BATTERY CHARGERS

Electro-Thermal Co-Design of a Cooling System-Integrated High-Frequency Transformer

Yongwan Park¹, Sevket Yuruker¹, Shiladri Chakraborty¹, Alireza Khaligh¹, Raphael Mandel¹, Patrick McCluskey¹, Michael Ohadi¹, Lauren Boteler², Miguel Hinojosa² - (1) University of Maryland at College Park, (2) U.S. Army Research Laboratory

Design of Soft-switching Interleaved Buck Converter with Integrated Inductors for DC Charging Application

Xiaohang Yu¹, Geng Niu¹, Lixin Tang¹, Huanqing Wang¹, Liang Qian², Qingguo Song³, Mingyou Yu³, Zhongni Zhu³ - (1) Karma Automotive LLC, (2) Wuhan University of Technology, (3) Wuchang Shouyi University

An Improved Power Quality Based Charger for Electric Vehicle with Cuk PFC Converter

Jitendra Gupta, Radha Kushwaha, Bhim Singh - Indian Institute of Technology Delhi

A Novel High Efficiency Three-phase Rectifier for Off-board DC Fast Charging Applications

Liang Qian¹, Xiaohang Yu², Geng Niu², Lixin Tang², Qingguo Song³, Mingyou Yu³, Zhongni Zhu³ - (1) Wuhan University of Technology, (2) Karma Automotive LLC, (3) Wuchang Shouyi University

A Bare-Die SiC-based Isolated Bidirectional DC-DC Converter for Electric Vehicle On-Board Chargers

Yongwan Park, Shiladri Chakraborty, Alireza Khaligh - University of Maryland

A Methodology to Select the Number of Cascaded Cells for a Medium Voltage Multilevel AC-DC Solid State Transformer

Vishnu Mahadeva Iyer, Shrivatsal Sharma, Subhashish Bhattacharya - FREEDM Systems Center

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 3:

10:30AM - 12:00PM

RAPID PROTOTYPING, REAL-TIME SIMULATION, HIL AND SIL FOR TRANSPORTATION ELECTRIFICATION

Real-time Simulation of Electric Vehicle Powertrain: Hardware-in-the-Loop (HIL) Testbed for Cyber-Physical Security

Bowen Yang, Lulu Guo, Jin Ye - College of Engineering, University of Georgia

Modelling of a Shipboard Electric Power System for Hardware-in-the-Loop Testing

Florian Perabo - Norwegian University of Science and Technology

FPGA Based Hardware In The Loop Inverter Loss and Thermal Model for Electric Vehicles

Edward Gu¹, Daniel Berry^{1,2} - (1) Oakland University, (2) General Motors

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 4:

1:30PM - 3:00PM

PERMANENT-MAGNET MOTOR DRIVES

PMASynRM System-Level NVH Model With Eccentricity

Sebastian Ciceo^{1,2,3}, Fabien Chauvicourt¹, Johan Gyselinck², Claudia Martis³ - (1) Engineering Services RTD, Siemens Industry Software NV, (2) BEAMS Department, Electrical Energy Group, Universite Libre de Bruxelles, (3) Department of Electrical Machines and Drives, Technical University of Cluj-Napoca

Robust Adaptive Neural-Network Super-Twisting Sliding-Mode Control for PMSM-Driven Linear Stage with Uncertain Nonlinear Dynamics

Fayez El-Sousy¹, Mahmoud Amin², Ghada Ahmed³, Osama Mohammed⁴ - (1) Prince Sattam bin Abdulaziz University, (2) Manhattan College, (3) Electronics Research Institute, (4) Florida International University

Flux-Weakening Control of Interior Permanent Magnet Synchronous Motor with Extended DC-Link Voltage Utilization and Improved Tracking Performance

Yihui Li, Zekun Xia, Ali Emadi - McMaster University

Position Sensor Offset Quantification in PMSM Drives via Current Estimation

Sandun Kuruppu, Yu Zou - Saginaw Valley State University

Parameter Independent Position Sensorless Control of Permanent Magnet Synchronous Motors

Richard Spießberger, Mario Nikowitz, Manfred Schrödl - Technische Universität Wien

A Simple and Robust Controller Design for High-Frequency WBG-Based Current-Source-Inverter-Fed AC Motor Drive

Renato Amorim Torres, Hang Dai, Woongkul Lee, Thomas Jahns, Bulent Sarlioglu - University of Wisconsin-Madison

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 5:

1:30PM - 3:00PM

POWERTRAIN: DESIGN, THERMAL MANAGEMENT, PACKAGING, AND OPTIMIZATION

Transient Performance Study of High-Specific-Power Motor Integrated with Phase Change Material for Transportation Electrification

Xuan Yi, Kiruba Haran - University of Illinois at Urbana - Champaign

Modeling of an Integrated Drive Unit in an Electric Vehicle

Xiaohui Li, Meng Yao, Qin Yang, Meng Wang, Bozhi Yang - GAC R&D Center Silicon Valley

Optimized Highly Efficient SSCB Using Organic Substrate Packaging for Electric Vehicle Applications

Utkarsh Mehrotra, Bahji Ballard, Tzu-Hsuan Cheng, Jayant Baliga, Subhashish Bhattacharya, Douglas C Hopkins - North Carolina State University

Optimal Power Module Design for High Power Density Traction Drive System

Lee Rashkin, Jason Neely, Lee Gill, Jack Flicker, Rachid Darbali-Zamora - Sandia National Laboratories

Cost Reduction of Electric Powertrains by Platform-Based Design Optimization

Dominik Lechleitner, Martin Hofstetter, Mario Hirz - Graz University of Technology

**An Interactive Tool For Propeller Selection According To Electric Motor Exploration:
An Electric Boat Design Case Study**

Santiago Gómez-Oviedo, Ricardo Mejía-Gutiérrez - Universidad EAFIT

LIVE Q&A: 3:00PM - 3:30PM

TUESDAY, JUNE 23

TECHNICAL SESSION 6:

1:30PM - 3:00PM

LITHIUM-ION BATTERY AND ULTRACAPACITOR MODELING AND DATA MANAGEMENT

Battery Data Management and Analytics Platform Using Blockchain Technology

Indrasena Aenugu¹, Gomanth Bere¹, Justin Ochoa¹, Taesic Kim¹, Chungu Lee², Joung-hu Park² - (1) Texas A&M University-Kingsville, (2) Soongsil University

Physics-Based Reduced-Order Model Of Supercapacitor Dynamics

John Marts, Gregory Plett, M Trimboli - University of Colorado Colorado Springs

Lightweight Parameter Estimation for the Third-Order Lithium-Ion Battery Model Based on Non-Iterative Algorithm

Feng Xie, Olaf Czogalla - IFAK (Institute of Automation and Communication e.V. Magdeburg)

Electrical Circuit Modeling an 18650 Lithium-ion Cell for Charging Protocol Testing for Electrification Transportation

Vinicius Albanas Marcis, Apoorva Kelkar, Sheldon Williamson - Ontario Tech University - Faculty of Engineering and Applied Science (FEAS)

Differential Hysteresis Models for a Silicon-Anode Li-ion Battery Cell

Carles Pregonas, Gregory Plett, M Trimboli - University of Colorado Colorado Springs

Continued...

(Continued)

A Hybrid Machine Learning Model for Battery Cycle Life Prediction with Early Cycle Data

Sheng Shen, Venkat Pavan Nemani, Jinqiang Liu, Chao Hu, Zhaoyu Wang - Iowa State University

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 7:

3:30PM - 5:00PM

CONTROL OF MOTOR DRIVES FOR ELECTRIFIED TRANSPORTATION SYSTEMS

Optimized Switching Angle-based Torque Control of Switched Reluctance Machines for Electric Vehicles

Gaoliang Fang, Jennifer Bauman - McMaster University

Comprehensive Online Parameters Identification of Wound Rotor Synchronous Machine (WRSM) by Proposing Two New Parameters and Using Kalman Observer

Peyman Haghgooei¹, Saeid Aghaei Hashjin¹, Nouredine Takorabet¹, Davood Arab Khaburi², Babak Nahid-Mobarakeh¹ - (1) Universite de Lorraine, (2) Iran University of Science Technology (IUST)

Comparison of Current Control Strategies for Low and High Power Switched Reluctance Motor Drives

Joshua Taylor, Diego Valencia, Berker Bilgin, Mehdi Narimani, Ali Emadi - Department of Electrical and Computer Engineering, McMaster University

Analysis of Different Operating Modes of PMSM During Regeneration with Uncontrolled Rectifier

Nithin Kolli¹, Prerit Pramod², Subhashish Bhattacharya¹ - (1) North Carolina State University, (2) Norwegian University of Science and Technology

Fault-Tolerant Operation of Asymmetrical Six-Phase Motor Drives in EV Applications

Ahmed Salem, Mehdi Narimani - McMaster University

Current Source Inverter Based Large Constant Power Speed Ratio SPM Machine Drive for Traction Applications

Feida Chen, Hao Ding, Sangwha Lee, Wenda Feng, Thomas Jahns, Bulent Sarioglu - Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 8:

3:30PM - 5:00PM

**ENERGY STORAGE SYSTEM DESIGN: THERMAL, STRUCTURAL,
AND ELECTRICAL CONSIDERATIONS**

A Review of Structural Batteries: Materials, Fabrication, and Applications

Steven Lukow, Hengzhao Yang - New Mexico Institute of Mining and Technology

**Analysis and Estimation of the Maximum Circulating Current during the Parallel Operation
of Reconfigurable Battery Systems**

Weiji Han, Anton Kersten - Chalmers University of Technology

**Efficient Motion Control of a PMSM and Design of a Mechanic Energy Storage for a Four Stroke
Free-Piston Engine**

Andreas Gerlach¹, Sebastian Benecke¹, Hermann Rottengruber², Roberto Leidhold¹ -

(1) Otto-von-Guericke University Magdeburg - Chair Electrical Drive Systems, (2) Otto-von-Guericke University Magdeburg - Chair Energy Conversion Systems for Mobile Applications

Temperature Distribution on Lithium-ion Polymer Battery: From 12V Module to 48V Pack

Yiqun Liu, Y. Gene Liao, Ming-Chia Lai - College of Engineering, Wayne State University

Thermal Management of Lithium Ion Cells at High Discharge Rate Using Submerged-Cell Cooling Strategy

Gautam Pulugundla, Prahit Dubey, AK Srouji, Zenan Wu, Qian Wang - Romeo Power Technology

A Novel Loop Heat Pipe Based Cooling System for Battery Packs in Electric Vehicles

Marco Bernagozzi¹, Anastasios Georgoulas¹, Nicolas Miché¹, Cedric Rouaud², Marco Marengo¹ -

(1) Advanced Engineering Centre, University of Brighton, (2) Ricardo

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 9:

3:30PM - 5:00PM

CONNECTED AND AUTONOMOUS VEHICLES, SMART MOBILITY, AND VEHICLE FUNCTIONAL SECURITY

Determination Foreign Object Detection Area in Electric Vehicle Wireless Charging System Based on Thermal Temperature Rise Characteristic

Kai Song, Chunbo Zhu, Peng He, Chaoye Fu, Guo Wei, Ying Sun - Harbin Institute of Technology

Blockchain-Based Firmware Security Check and Recovery for Battery Management Systems

Gomanth Bere, Justin Ochoa, Taesic Kim, Indrasena Aenugu - Texas A&M University-Kingsville

A CNN-based Path Trajectory Prediction Approach with Safety Constraints

Mostafa Zaman, Nasibeh Zohrabi, Sherif Abdelwahed - Virginia Commonwealth University

Modeling and Simulation of Hybrid Reversible Substation and Wayside Energy Storage System for Electric Rail Transit System

Mahdiyeh Khodaparastan, Ahmed Mohamed - CUNY-City College

Comparison of Dead-Time Effects in a WPT System Inverter for Different Fixed-Frequency Modulation Techniques

*Utkarsh Kavimandan¹, Veda Galigekere², Burak Ozpineci², Omer Onar¹, Satish Mahajan¹ -
(1) Tennessee Technological University, (2) Oak Ridge National Laboratory*

Sensitivity Analysis of Compensation Topologies for Dynamic Wireless Power Transfer System

*Josiah Haruna¹, Utkarsh Kavimandan¹, Veda Galigekere², Omer Onar², Jason Pries² -
(1) Tennessee Technological University, (2) Oak Ridge National Laboratory*

LIVE Q&A: 5:00PM - 5:30PM

KEYNOTE PRESENTATION 1:

**SCHEDULE:**

9:00AM to 9:30AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room A

SPEAKER:

Phil Weicker
CANOO

BIOGRAPHY:

Phil Weicker is In Charge of Propulsion & Electronics at Canoo, an LA-based company building electric vehicles for membership only. He has spent more than 15 years advancing battery technology and automotive electrification. He has served in engineering & battery directorships for companies like EnergyCS (focused on integration and controls for high-energy, large-format batteries) QuantumScape (a venture capital-backed startup working on advanced energy storage technologies), as well as EVs startups Coda & Faraday Future. Phil has more than 40 patents to his name and is also the author of 'A Systems Approach to Lithium Ion Battery Management'. He holds a Bachelor's degree in Engineering from McMaster University and a Masters in Computational Electromagnetics from McGill University in Montreal.

KEYNOTE PRESENTATION 2:

INSIGHTS FROM DOE'S SMART MOBILITY RESEARCH PROGRAM

**SCHEDULE:**

9:30AM to 10:00AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room A

SPEAKER:

Ann M. Schlenker
Director, Center for Transportation Research, Argonne National Laboratory

BIOGRAPHY:

Ms. Ann Schlenker is the Director for the Center for Transportation Research at Argonne National Laboratory. Ms. Schlenker's applied research area is actively seeking to improve efficiency at a component, vehicle and transportation system level, while preserving transportation consumer choice, affordability and domestic economic growth. Her responsibilities include evaluating the energy and environmental impacts of advanced technologies and new transportation fuels. Her portfolio includes early stage fundamental and applied Light and Heavy Duty vehicle research with an emphasis on low carbon solutions. She directs the transportation system energy modelling for Smart Communities with enhanced mobility offerings. In addition, Ms. Schlenker has responsibility for the DOE Student Vehicle Competitions for advanced powertrain technologies and connected and automated vehicles. Her research is informed by collaborative partnerships which ensure relevance and impact. Schlenker spent more than 30 years with Chrysler Engineering in Product Development, serving in a variety of executive positions.

KEYNOTE PRESENTATION 3:

TRANSPORTATION ELECTRIFICATION AND THE GRID - CHALLENGES & OPPORTUNITIES



SCHEDULE:

10:30AM to 11:00 AM
at On24

LIVE Q&A:

11:30AM to 12:00PM at
Virtual Room A

SPEAKER:

Dr. Deepak Divan

*Professor, John E Pippin
Chair and GRA Eminent*

*Scholar Director, GT Center for Distributed Energy
School of Electrical and Computer Engineering Georgia
Institute of Technology, Atlanta, GA*

BIOGRAPHY:

Dr. Deepak Divan is Professor, John E Pippin Chair, GRA Eminent Scholar and Director of the Center for Distributed Energy at the Georgia Institute of Technology in Atlanta, GA. His field of research is in the areas of power electronics, power systems, smart grids and distributed control of power systems. He works closely with utilities, industry and is actively involved in research, teaching, entrepreneurship and starting new ventures.

Dr. Divan has started several companies, including Varentec in Santa Clara, CA, where he served as Founder, President and CTO from 2011-14, and as Chief Scientist for several years after. He led the company as it developed its suite of innovative distributed real-time grid control technologies. Varentec is funded by leading green-tech Venture Capital firm Khosla Ventures and renowned investor Bill Gates. He has founded or seeded several new ventures including Soft Switching Technologies, Innovolt, Varentec and Smart Wires, which together have raised >\$160M in venture funding.

Dr. Divan is an elected Member of the US National Academy of Engineering, member of the National Academies Board on Energy and Environmental Systems, Committee on the Future Grid and Committee on Deep Decarbonization. He is a Fellow of the IEEE,

past President of the IEEE Power Electronics Society, is a recipient of the IEEE William E Newell Field Medal and is International Steering Committee Chair of the IEEE Empower a Billion Lives global competition to crowdsource scalable energy access solutions. He has 40 years of academic and industrial experience, 70 issued and pending patents, and over 400 refereed publications. He received his B. Tech from IIT Kanpur, and his MS and PhD degrees from the University of Calgary, Canada.

KEYNOTE PRESENTATION 4:

THE HYPERLOOP LEVITATION SYSTEM



SCHEDULE:

11:00AM to 11:30 AM at On24

LIVE Q&A:

11:30AM to 12:00PM at
Virtual Room A

SPEAKER:

Tim Lambert

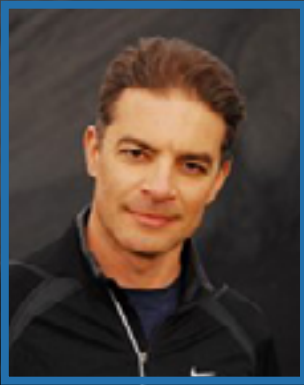
*Lead Electromagnetic Design
Engineer for Levitation
and Guidance Systems,
Virgin Hyperloop One*

BIOGRAPHY:

Tim Lambert is the Lead Electromagnetic Design Engineer for the levitation and guidance systems at Virgin Hyperloop One. He has 6 years of experience designing electric machines, and several granted patents. Before joining Hyperloop One in 2017, he worked on a variety of electric vehicle technologies including controls, materials, and switched-reluctance motors.

TUTORIAL 5:

BATTERY MANAGEMENT SYSTEMS



SCHEDULE:

1:30PM to 3:00PM at On24

LIVE Q&A:

3:00PM to 3:30PM at
Virtual Room E

SPEAKER:

Javier Gazzarri
MathWorks

BIOGRAPHY:

Dr. Javier Gazzarri is a Principal Application Engineer at MathWorks in Novi, Michigan, specializing in modeling and simulation of battery systems as part of Model Based Design. His work focuses on physical modeling, from cell-level to system-level, parameter estimation for model correlation, battery management system design, thermal management, aging diagnosis, and state-of-charge estimation algorithm development. Before joining MathWorks, Javier worked on fuel cell modeling at the National Research Council of Canada in Vancouver, British Columbia. He received a Mechanical Engineering Bachelor's degree from the University of Buenos Aires (Argentina), a Master's degree (Inverse Problems for sensor design), and a PhD degree (Solid Oxide Fuel Cell degradation diagnosis) both from the University of British Columbia (Canada).

TECHNICAL SESSION 10:

1:30PM - 3:00PM

PWM TECHNIQUES FOR POWER ELECTRONIC CONVERTERS

Hybrid PWM and PFM Control Strategy for LLC Resonant Converter with Hold-up Time Operation Requirement
Yuqi Wei¹, Haider Mhiesan¹, Quanming Luo², Alan Mantooth¹ - (1) University of Arkansas, (2) Chongqing University

Output Voltage Synthesis of a Modular Battery System Based on a Cascaded H-Bridge Multilevel Inverter Topology for Vehicle Propulsion
Anton Kersten, Lukas Baum, Weiji Han, Torbjörn Thiringer, Massimo Bongiorno - Chalmers University of Technology

New Modulation Technique for Three-level Interleaved Voltage Source Inverters for Switching Loss Reduction
Dereje Woldegiorgis, Yuqi Wei, Haider Mhiesan, Alan Mantooth - University of Arkansas

Power Loss Comparison Between Three-Level T-type and NPC Converters with SVPWM and MPCC Modulation Schemes in Electric Vehicles
Dianxun Xiao, Jennifer Bauman - McMaster University

A Flexible Step-up Modular Multilevel Converter for High-power Drive Application
Saleh Farzamkia¹, Arash Khoshkbar-Sadigh¹, Hossein Iman-Eini², Seyed Hossein Hosseini³ - (1) Penn State University, (2) University of Tehran, (3) Ferdowsi University of Mashhad

A ZVS Series Resonant Current-Fed PWM Controlled DC-DC Converter
Swati Tandon¹, Akshay Rathore¹, B. L. Narasimharaju² - (1) Concordia University, (2) National Institute of Technology, Warangal

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 11:

1:30PM - 3:00PM

SYNCHRONOUS RELUCTANCE MACHINES DESIGN AND PERFORMANCE ANALYSIS

Design And Experimental Verification Of Low Cost Ferrite PM-Assisted Synchronous Reluctance Motor
Zhiwei Zhang - Department of Electrical and Computer Engineering, The Ohio State University

Investigation of Permanent Magnet Assisted Synchronous Reluctance Machines for Traction Drives in High Power Flux Weakening Operation
Matthias Hofer, Manfred Schrödl - Technische Universität Wien

A Hybrid Computational Tool to Analyze the Performance of Electric Machines with Reduced Content of Permanent Magnet
Ram Kumar R M^{1,2}, Muhammad Raza Khowja¹, Gaurang Vakil¹, David Gerada¹, Chris Gerada¹, Krzysztof Paciura¹, Baylon Fernandes^{1,2} - (1) University of Nottingham, (2) IIT Bombay

Study of Synch-Rel Machine for HEV/EV Traction Using Super Inductive Electric Steel
Chun Tang, Leyi Zhu - Ford Motor Company

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Hybrid Magnet Configuration to Reduce Content of Rare Earth Elements in a PM-SynRel Machine

Ram Kumar R M^{1,2}, Gaurang Vakil¹, David Gerada¹, Chris Gerada¹, Krzysztof Paciura¹, B.G. Fernandes², Liang Yan¹ -
(1) University of Nottingham, (2) IIT Bombay

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 12:

1:30PM - 3:00PM

CHARGING SOLUTIONS FOR ELECTRIC, HYBRID ELECTRIC AND PLUG-IN HYBRID ELECTRIC VEHICLES

A Power Factor Corrected Resonant EV Charger Using Reduced Sensor Based Bridgeless Boost PFC Converter

Rahul Pandey, Bhim Singh - Indian Institute of Technology, Delhi

Study of the Feasibility of Using Microwave Power Transfer for Dynamic Wireless Electric Vehicle Charging

Ibtihal Ahmed, Eiman ElGhanam, Mohamed Hassan Ahmed Osman - American University of Sharjah

Vehicle-to-Vehicle In-Route Wireless Charging System

Omar Nezamuddin, Euzeli dos Santos, Jr. - Indiana University Purdue University-Indianapolis

Analysis of Energy Consumption at Public Charging Stations: A Nebraska Case Study

Ahmad Almaghrebi, Fares Aljuheshi, Jarod Nekl, Kevin James, Mahmoud Alahmad - University of Nebraska-Lincoln

Development of A Demand Side Management Device for Electric Vehicle Charging in Developing Countries

Chris Meetoo, Sanjay Bahadoorsingh, Chandrabhan Sharma - The University of the West Indies

Design and Modeling of Wireless Inductive Electric Vehicle Charging Coils for LCC-LCC Compensated WPT Systems using Misalignment Performance Analysis

Eiman Elghanam, Mohamed Hassan, Ahmed Osman - American University of Sharjah

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 13:

3:30PM - 5:00PM

POWER ELECTRONIC CONVERTER DESIGN

Design and Implementation of Power Converters to Emulate Motor Regeneration Power

Tsai-Fu Wu, Chang-chih Chan, Nagaraj Acharya, Lujia Xie, Li-chiun Lin - National Tsing Hua University

Transformer Design Optimization for Power Electronic Converters in Electric Aircraft

M. Ibrahim Hassan¹, Lea Dorn-Gomba², Alan Callegaro², Mehdi Narimani¹, Ali Emadi¹ -

(1) Dept. of Electrical and Computer Eng., (2) McMaster Automotive Resource Centre

Continued...

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Intrinsically-Safe Modular Power Converters for Electric Transportation

Aniruddh Marellapudi, Mickael Mauger, Prasad Kandula, Deepak Divan -
Center for Distributed Energy, School of Electrical and Computer Engineering, Georgia Institute of Technology

Closed-Loop dv/dt Control of SiC MOSFETs Yielding Minimal Losses and Machine Degradation

Michael Laumen, Robert Kragl, Christoph Lüdecke, Rik W. De Doncker -
Institute for Power Electronics and Electrical Drives - RWTH Aachen University

Calculation of Active and Passive Component Stress of Multiphase Inverters With Single Frequency Output

Matthias Ippisch, Dieter Gerling - Chair of Electrical Drives and Actuators, Bundeswehr University Munich

Characteristics Analysis of LLC and LCL-T Resonant Tank

Yuqi Wei¹, Quanming Luo², Dereje Woldegiorgis¹, Haider Mhiesan¹, Alan Mantooth¹ -
(1) University of Arkansas, (2) Chongqing University

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 14:

3:30PM - 5:00PM

PERMANENT MAGNET MACHINE DESIGN AND PERFORMANCE ANALYSIS

Magnetic Circuit Analysis of Interior Magnet Synchronous Motors

Mohammadreza Mostafavi Ghahfarokhi¹, Aliakbar Damaki Aliabad¹, Samad Taghipour Boroujeni², Ebrahim Amiri³,
Vahid Zamani Faradonbeh² - (1) Yazd University, (2) Shahrekord University, (3) University of New Orleans

Torque Ripple Reduction of Interior Permanent Magnet Machine Using Asymmetric Q-Axis Rotor

Md Sariful Islam, Iqbal Husain, Adeeb Ahmed - North Carolina State University

Topology Optimization Empowers the Design of Interior Permanent Magnet Motors

Sainan Xue, Vedanadam Acharya - Powersys Solutions

Acoustic Noise Analysis of Interior Permanent Magnet Synchronous Machine for Electric Vehicle Application

Jianning Dong, Changbum Son, Pavol Bauer - Delft University of Technology

Design of a 100 kW Surface Permanent Magnet Machine with Wide Constant Power Speed Ratio for Traction Applications

Wenda Feng, Hao Ding, Sangwha Lee, Feida Chen, Bulent Sarlioglu - Wisconsin Electric Machine and Power Electronics Consortium

Dual Stator Dual Rotor Interior Permanent Magnet Synchronous Motor for Hybrid Electric Vehicles

Mbika Muteba - University of Johannesburg

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 15:

3:30PM - 5:00PM

BALANCING AND CONTROL FOR BATTERY, ULTRACAPACITOR, AND FUEL CELL SYSTEMS

Design Methodology for Passive Balancing Circuit including Real Battery Operating Conditions

Francesco Porpora¹, Matilde D'Arpino², Giuseppe Tomasso¹, Mauro Di Monaco¹, Ciro Attaianesi³ - (1) University of Cassino and Southern Lazio, (2) The Ohio State University - Center for Automotive Research, (3) University of Naples Federico II

Automatic Measured-Voltage-Distortion Compensation for Improved State Estimation Accuracy in Battery Management Systems with Continuous Cell Balancing

Zhe Gong, Kshitij Gupta, Carlos da Silva, Cristina Amon, Olivier Trescases - Faculty of Applied Science and Engineering, University of Toronto

An Active Current-Controlled Battery Pack Balancing Technique for Online Operation

Ahmed Oteafy, Habib Farooq - Joint Smart Grids and Electric Vehicles R&D Center, Alfaisal University

Novel Bank-Switching of Supercapacitors with Enhanced Energy Utilization for Electric Vehicular Applications

Yashwanth Dasari, Deepak Ronanki, Sheldon Williamson - University of Ontario Institute of Technology

Intelligent Power Allocation with Load Disturbance Compensator in Fuel Cell/Supercapacitor System for Vehicle Applications

Qian Xun, Yujing Liu, Xiaoliang Huang - Chalmers University of Technology

Improved Iterative Methods of Multi-step ESN for PEMFC Stack Lifespan Prediction

Zhiguang Hua^{1,2}, Zhixue Zheng³, Marie-Cécile Péra^{1,2}, Fei Gao^{1,2} - (1) FEMTO-ST Institute, Univ. Bourgogne Franche-Comté, UTBM, CNRS, (2) FCLAB, Univ. Bourgogne Franche-Comté, UTBM, CNRS, (3) LMOPS lab, University of Lorraine & CentraleSupélec

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 16:

3:30PM - 5:00PM

POWER AND ENERGY MANAGEMENT IN ELECTRIC, HYBRID ELECTRIC AND PLUG-IN HYBRID ELECTRIC VEHICLES

Flatness Based Control Of An HVDC Bus Powered By A Turboshaft With Multiple Generators And Optimization Of Power Sharing

Thomas Barraco^{1,2}, Serge Pierfederici², Babak Nahid-Mobarakheh², Mathieu Weber², Thomas Klonowski¹ - (1) Safran Helicopter Engines, (2) LEMTA

A Component Sizing Oriented On-line Controller for Parallel Hybrid Electric Vehicle Powertrains Based on the Adaptive Equivalent Consumption Minimization Strategy

Alessandro Picchirallo^{1,2}, Pier Anselma^{1,2}, Giovanni Belingardi², Ali Emadi¹ - (1) McMaster Institute for Automotive Research and Technology (MacAUTO), McMaster University, (2) Department of Mechanical and Aerospace Engineering (DIMEAS), Politecnico di Torino

Comparison of Three Real-Time Implementable Energy Management Strategies for Multi-mode Electrified Powertrain

Atriya Biswas¹, Pier Giuseppe Anselma², Aashit Rathore¹, Ali Emadi¹ - (1) McMaster Automotive Resource Centre (MARC), McMaster University, (2) Department of Mechanical and Aerospace Engineering (DIMEAS), Politecnico di Torino

A Fuel Cell Vehicle Power Distribution Strategy based on PEMFC Online Identification and ESS Equivalent Consumption Calculation

Xiang Meng, Qi Li, Xiaofeng Wang, Rui Gan, Guorui Zhang, Weirong Chen - School of Electrical Engineering, Southwest Jiaotong University

Multi-Objective Hybrid Electric Vehicle Control for Maximizing Fuel Economy and Battery Lifetime

Pier Giuseppe Anselma^{1,2,3}, Phillip Kollmeyer¹, Giovanni Belingardi^{2,3}, Ali Emadi¹ - (1) McMaster Institute for Automotive Research and Technology (MacAUTO), McMaster University, (2) Department of Mechanical and Aerospace Engineering (DIMEAS), Politecnico di Torino, (3) Center for Automotive Research and Sustainable Mobility (CARS), Politecnico di Torino

Dynamic Modeling and Real-Time Simulation of a Ship Hybrid Power System Using a Mixed-Modeling Approach

Pramod Ghimire^{1,2}, Namireddy Praveen Reddy², Mehdi Zadeh², Eilif Pedersen², Jarle Thorstensen¹ - (1) Kongsberg Digital, (2) IIT Bombay

LIVE Q&A: 5:00PM - 5:30PM

KEYNOTE PRESENTATION 5:

TESTING POWER ELECTRONICS IN AN EMULATED ENVIRONMENT

**SCHEDULE:**

9:00AM to 9:30AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room A

SPEAKER:

Horst Hammerer

*Managing Director (CEO)
AVL SET HmbH*

BIOGRAPHY:

Horst Hammerer is managing director and shareholder of AVL SET. For more than 30 years he has been involved in aerospace, test systems and power electronics. As an entrepreneur he has founded and co-founded three companies with a strong focus on testing methodology. In 2008 he was granted an innovation award for successfully introducing the Power-HiL test system for the Airbus A380 CPCS computers, resulting in a joint venture between his private enterprise and the AVL List GmbH. He is passionate about enhancing and redefining testing methods to increase efficiency and produce meaningful results. Horst enjoys applying and adjusting the testing methods he learned from experiences in aerospace testing to the e-mobility industry. Over the years, he has successfully introduced his visions and innovations to the automotive market. Today, these methodologies are used by OEMs and Tier 1s worldwide. Horst studied in Germany and the United Kingdom and holds a degree in communications engineering from the University of Applied Sciences Ulm. Together with his wife and children he lives in Southern Germany.

KEYNOTE PRESENTATION 6:

LAST MILE DELIVERY APPLICATIONS: CHALLENGES AND OPPORTUNITIES

**SCHEDULE:**

9:30AM to 10:00AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room A

SPEAKER:

Daniel Benchetrite

*North America Powertrain
New Mobility Director, Valeo*

BIOGRAPHY:

Daniel Benchetrite obtained his PhD in Electrochemistry in 2004 in Amiens University (France), in collaboration with CEA (French Atomic Energy Commission) and in 2005, Daniel was hired by Exide as laboratory manager and participated in the improvement of 12V batteries for Trucks applications. In 2006, Daniel joined Valeo, first as Electrochemical Engineer for designing battery management systems algorithms for micro-hybrid applications and then took the lead of Energy Storage Activities, including 48V batteries evaluations. In 2011, Daniel took the lead of Systems and Integration activities still in Valeo, covering all the systems from 12V to 48V. In 2014, Daniel moved to China as Asia System Engineering Director and developed actively 48V mild-hybrid solutions. Since 2017, Daniel moved to San Mateo (CA) as North America Powertrain New Mobility Director.

KEYNOTE PRESENTATION 7:

THE PATH TO ZERO EMISSIONS AT THE PORT OF LONG BEACH

**SCHEDULE:**

10:30AM to 11:00 AM
at On24

LIVE Q&A:

11:30AM to 12:00PM at
Virtual Room A

SPEAKER:

Heather Tomley

*Acting Managing Director,
Planning & Environmental
Affairs Bureau, Port of Long Beach, California*

BIOGRAPHY:

Heather Tomley is the Acting Manager of the Planning & Environmental Affairs Bureau for the Port of Long Beach. She joined the Port in 2005 and progressively moved into positions of greater responsibility. She was named to her current post as Acting Managing Director in September of 2018 where she oversees the Divisions of Master Planning, Transportation Planning, and Environmental Planning. Throughout her time with the Port she has led the Port's signature environmental programs, such as the 2005 Green Port Policy, and coordinated programs to improve water and soil quality, preserve wildlife habitat, integrate sustainability into Port practices, and improve air quality, including co-writing and implementing the San Pedro Bay Ports Clean Air Action Plan, also known as the CAAP.

KEYNOTE PRESENTATION 8:

ELECTRIC VEHICLES CHARGING - KEY TO ENERGY TRANSITION

**SCHEDULE:**

11:00AM to 11:30 AM
at On24

LIVE Q&A:

11:30AM to 12:00PM at
Virtual Room A

SPEAKER:

Prof. Pavol Bauer

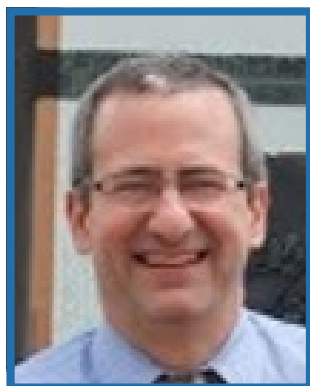
Delft University of Technology

BIOGRAPHY:

Pavol Bauer is currently a full Professor with the Department of Electrical Sustainable Energy of Delft University of Technology and head of DC Systems, Energy Conversion and Storage group. He received Masters in Electrical Engineering at the Technical University of Kosice ('85), Ph.D. from Delft University of Technology ('95) and title prof. from the president of Czech Republic at the Brno University of Technology (2008) and Delft University of Technology (2016). He is also honorary professor at Politehnica University Timisoara in Romania. From 2002 to 2003 he was working partially at KEMA (DNV GL, Arnhem) on different projects. He published over 100 journal and over 350 conference papers in his field, he is an author or co-author of 8 books, holds 6 international patents and organized several tutorials at the international conferences. He has worked on many projects for industry concerning wind and wave energy, power electronic applications for power systems, and he participated in several Leonardo da Vinci and H2020 EU projects as project partner (ELINA, INETELE, E-Pragmatic, Smart Charging, Metrology for Inductive Charging, Trolley 2.0) and coordinator (PEMCWebLab.com-Edipe, SustEner, Eranet DCMICRO). He is a Senior Member of the IEEE ('97), former chairman of Benelux IEEE Joint Industry Applications Society, Power Electronics and Power Engineering Society chapter, chairman of the Power Electronics and Motion Control (PEMC) council, member of the Executive Committee of European Power Electronics Association (EPE) and also member of international steering committee at numerous conferences.

TUTORIAL 6:

ELECTRIC MACHINE DESIGN FOR EV APPLICATIONS

**SCHEDULE:**

1:30PM to 3:00PM at On24

LIVE Q&A:

3:00PM to 3:30PM at
Virtual Room E

SPEAKER:

Mark Christini

*ANSYS Inc. and James
Goss, Motor Design Ltd*

BIOGRAPHY:

Mark Christini (IEEE SM'98) is a Principle Application Engineer for Electromechanical Products at ANSYS. He has over 30 years of industry experience in the electrical and power engineering fields. Mark has worked in design, development, application and manufacturing of electrical devices and systems. He received his BSEE from the Pennsylvania State University and MS in Electric Power Engineering from Rensselaer Polytechnic Institute. Mark is a licensed Professional Engineer Pennsylvania and was an Associate Editor for IEEE Transactions on Power Delivery from 1999-2003.

INDUSTRY EXHIBITION:

NH RESEARCH:

MICRO-GRID & ELECTRIC VEHICLE TEST SOLUTIONS

SCHEDULE:

1:30PM to 3:30PM at Virtual Room A

SPEAKER:

Tom Ribaudo

Central Regional Sales Manager

BIOGRAPHY:

Tom Ribaudo has extensive experience in electrical engineering across automotive, aerospace, energy storage and renewable energy applications. His expertise is focused on power electronics testing in electrification markets including electric vehicles and aircraft, to the microgrid. Tom provides consultation on system design, test equipment selection and test approaches to Fortune 500 companies, SMEs, universities and research labs, nationwide. Test applications range from individual components such as battery R&D and power electronics, to entire propulsion systems, fast chargers and grid-tied technologies. Previously, he worked at Schneider Electric as an applications engineer.

TECHNICAL SESSION 17:

1:30PM - 3:00PM

DC/DC CONVERTERS: CONTROL AND PERFORMANCE ANALYSIS

Comparative Analysis of Sliding Mode Designs for DC-DC Converters

Praroop Joshi, Sridhar Seshagiri - San Diego State University

Drive Cycle Based Reliability Analysis of Composite DC-DC Converters for Electric Vehicles

Aritra Ghosh, Robert Erickson - University of Colorado-Boulder

A Triple Phase-Shift Based Control Method for RMS Current Minimization and Power Sharing Control of Input-Series Output-Parallel Dual Active Bridge Converter

Garry Jean-Pierre, Adel Nasiri - University of Wisconsin-Milwaukee

LQI Control for Dual-input DC-DC Converter

Abbas Hassan¹, Hani Sadek¹, Ali Bazzi², Ali Bazzi¹, Naseem Daher¹ - (1) American University of Beirut, (2) University of Connecticut

A High Voltage Gain DC/DC Converter for PV Application

Yuqi Wei¹, Quanming Luo², Alan Mantooth¹ - (1) University of Arkansas, (2) Chongqing University

A Design Optimization Approach for Dual Active Bridge Converter for Multiple Vehicle Classes with Disparate Input DC Voltages

Suyash Sushilkumar Shah, Subhashish Bhattacharya - North Carolina State University

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 18:

1:30PM - 3:00PM

STATE OF CHARGE AND STATE OF HEALTH ESTIMATION

A Novel Internal Resistance Curve Based State of Health Method to Estimate Battery Capacity Fade and Resistance Rise

Jiucan Zhang¹, Xiaoli Zhang² - (1) GAC Research and Design Center Silicon Valley Inc., (2) Colorado School of Mines

Dual Estimation Strategy for New and Aged Electric Vehicles Batteries

Sara Rahimifard¹, Saeid Habibi¹, Jimi Tjong¹ -

(1) Department of Mechanical Engineering, McMaster University, (2) Ford Motor Company

A Cycle-based Recurrent Neural Network for State-of-Charge Estimation

Mayuresh Savargaonkar¹, Abdallah Chehade¹, Ala Hussein², Zunya Shi¹ -

(1) Department of Industrial and Manufacturing Systems Engineering, University of Michigan - Dearborn,

(2) Department of Electrical and Computer Engineering, University of Central Florida

Battery SoC Estimation from EIS Data using Neural Networks

Marvin Messing^{1,2}, Tina Shoa¹, Ryan Ahmed², Saeid Habibi²,

(1) Cadex Electronics, (2) Department of Mechanical Engineering, McMaster University

Continued...

THURSDAY - JUNE 25, 2020

TECHNICAL SESSIONS

(Continued)

A Novel Long Short-Term Memory Network for On-line State-of-Charge Estimation for Li-ion Battery Cells

Zunya Shi¹, Mayuresh Savargaonkar¹, Ala Hussein², Abdallah Chehade¹ -

(1) Department of Industrial and Manufacturing Systems Engineering, University of Michigan - Dearborn,

(2) Department of Electrical and Computer Engineering, University of Central Florida

A Novel Adaptive Deep Neural Network with Transfer learning for State-of-Charge Estimations of Battery Cells

Mayuresh Savargaonkar, Abdallah Chehade - Department of Industrial and Manufacturing Systems Engineering, University of Michigan - Dearborn

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 19:

1:30PM - 3:00PM

ANALYSIS AND CONTROL OF EV-CHARGING STATIONS INTERACTING WITH SMART AND MICRO GRIDS

Decentralized Volt/Var Control of EV Charging Station Inverters for Voltage Regulation

Shengyi Wang, Liang Du, Yan Li - Temple University

Control of Solar PV and WECS Powered EV Charging Station

Anjeet Verma, Bhim Singh - Indian Institute of Technology Delhi

Optimized System for On-Route Fast Charging of Battery Electric Shuttle Buses

Eric Miller - National Renewable Energy Laboratory

A Learning-based Supervisory Control Architecture for Electric Vehicle Charging System Paired with Energy Storages

Hamed Nademi¹, Bo Zhang² - (1) Rensselaer Polytechnic Institute (RPI), (2) Idaho National Laboratory

An ANN-Based Electricity Price Forecasting Infrastructure for EV Charging Management

Qiyun Dang - McGill University

The Framework of Invariant Electric Vehicle Charging Network for Anomaly Detection

Yu-Wei Chung¹, Mervin Mathew¹, Cole Rodgers¹, Bin Wang², Behnam Khaki³, Chicheng Chu¹, Rajit Gadh¹, (1) University of California, Los Angeles (UCLA), (2) Lawrence Berkeley National Laboratory (LBNL), (3) New York Power Authority

LIVE Q&A: 3:00PM - 3:30PM

THURSDAY, JUNE 25

TECHNICAL SESSION 20:

3:30PM - 5:00PM

INVERTER DESIGN AND CONTROL

A Simple and Effective Compensation Method for Inverter Nonlinearity

Xueqing Wang¹, Shamsuddeen Nalakath¹, Silvio Filho¹, Guanghan Zhao¹, Yingguang Sun², Jason Wiseman², Ali Emadi¹ - (1) McMaster Automotive Resource Center (MARC), McMaster University, (2) BorgWarner Waterloo Inc.

High Energy Density Capacitor for Electric Vehicle Traction Inverter

Shajjad Chowdhury, Emre Gurpinar, Burak Ozpineci - Power Electronics and Electric Machinery Group, Oak Ridge National Laboratory

Soft-Switching Current Source Inverters for Next-Generation Electric Vehicle Drivetrains

Mickael Mauger, Prasad Kandula, Deepak Divan - Georgia Institute of Technology

Study of the Switching Transient and EMI Performance of Balanced Inverter Topology Under the Influence of Printed Circuit Board Power-Loop Stray Inductance

Pengkun Tian, Woongkul Lee, Bulent Sarlioglu - Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)

Analysis of Modulation Schemes for Balanced Inverter

Zhouzhou Wang, Hao Zeng, Bulent Sarlioglu - University of Wisconsin-Madison

Analytical Model of Common-mode Voltage for Various RCMV-PWM in Three-phase Voltage-source Inverters

Yang Huang, Hua Bai - University of Tennessee-Knoxville

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 21:

3:30PM - 5:00PM

DESIGN OF ELECTRIC MACHINES FOR TRANSPORTATION ELECTRIFICATION

Design of A Brushless Doubly-Fed Machine for Aviation Turboelectric Distributed Propulsion

Peng Peng¹, Xiaodan Wang¹, Adam Bruggmann², Lloyd Utt², Eric Kline², Julia Zhang¹, Longya Xu¹ - (1) The Ohio State University, (2) Safran Electrical & Power

Design of PMSM by using Fast and Accurate Stepwise Coupled Analysis Considering Operating Pattern

Jun-Yeol Ryu, Sung-Woo Hwang, Jun-Woo Chin, Young-Hoon Jung, Yong-Suk Hwang, Myung-Seop Lim - Hanyang University

An Innovative Multi-Objective Optimization Approach for the Multiphysics Design of Electrical Machines

Nicolas Riviere, James Goss - Motor Design Ltd.

Investigation on Sensitivity of Optimization Parameters of an Electrically Excited Synchronous Machine

Hagen Spielmann, Institute of Vehicle Concepts (German Aerospace Center (DLR))

Thermal Design of an Integrated Inductor for 45kW Aerospace Starter-Generator

Antonino La Rocca, Muhammad Raza Khawja, Gaurang Vakil, Christopher Gerada, Pat Wheeler, Liang Yan - Power Electronics, Machines and Control (PEMC) Group, The University of Nottingham

PCB-Based Brushless DC Motor for Motor-on-Board Sensor Systems

Haosen Wang¹, Junwei Cui², Haibo Li² - (1) Innovusion, (2) University of Nebraska-Lincoln

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 22:

3:30PM - 5:00PM

MODELING AND CONTROL OF POWER AND ENERGY CONVERSION DEVICES

Parameter Optimization Design Method of the Interleaved Isolated Boost Converter with Coupled Inductors

Ruidi Yao, Zedong Zheng, Yongdong Li - Tsinghua University

An Improved Power Factor Luo Converter Based Electric Vehicle Battery Charger

Radha Kushwaha, Bhim Singh - Department of Electrical Engineering Indian Institute of Technology

Simple Logic-Equations for Active-Voltage Control of Seven-Level Nested Neutral-Point-Piloted (NNPP) Converters

Vahid Dargahi, University of Washington

Logic-Equations-Based Active-Voltage Control of A-NPC Converters

Vahid Dargahi, University of Washington

Power Semiconductor Devices For Solid State Power Controller Used In More Electric Aircraft

Armen Baronian¹, Yash Veer Singh¹, Piranavan Suntharalingam¹, Mikhail Goykhman², Galen Chui², Jianyang Liu² - (1) Eaton Research Labs, (2) Eaton Aerospace

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 23:

3:30PM - 5:00PM

EV CHARGING MANAGEMENT IN SMART AND MICRO GRIDS

Stochastic Modelling of Electric Vehicle's Behaviour in the Parking Lots

Usama Bin Irshad, Sohaib Rafique - Macquarie University

Procurement of Interruptible Load Management in Smart Grids Using Computational Intelligence Tools

Ahmed Mustafa, Mohammed Nassar, Magdy Salama - University of Waterloo, Faculty of Engineering, ECE Department

Demand Response for Industrial Facilities

Sarah Sami Khan, Falak Naz Farooqui, Ambreen Abdul Razaque, Bizzat Hussain Zaidi - Department of Electrical Engineering, DHA Suffa University

Impact of Uncontrolled Charging with Mass Deployment of Electric Vehicles on Low Voltage Distribution Networks

Yunhe Yu¹, Aditya Shekhar¹, Gautham Ram Chandra Mouli¹, Pavol Bauer¹, Nazir Refa², Raoul Bernards³ - (1) DC systems, Energy Conversion and Storage group, Department of Electrical Sustainable Energy, EEMCS faculty, Delft University of Technology, (2) ElaadNL, (3) Enexis Netbeheer B.V

Predictive Management of Electric Vehicles in a Community Microgrid

Bin Wang, Rongxin Yin, Doug Black, Cy Chan - Lawrence Berkeley National Laboratory

Optimization of Aggregated EV Power in Residential Communities with Smart Homes

Huangjie Gong, Dan Ionel - University of Kentucky

LIVE Q&A: 5:00PM - 5:30PM

TUTORIAL 7:

SIC ENABLED MV POWER CONVERSION SYSTEM AND POWER DENSE HIGH EFFICIENCY ENGINE COOLANT CAPABLE 200 KW SIC INVERTER FOR HEAVY DUTY VEHICLES



SCHEDULE:

8:30AM to 10:00AM at On24

LIVE Q&A:

10:00AM to 10:30AM at
Virtual Room B

SPEAKER:

**Dr. Subhashish
Bhattacharya**

*Duke Energy Distinguished
Professor, Electrical and*

Computer Engineering, North Carolina State University

BIOGRAPHY:

Subhashish Bhattacharya received his PhD from the University of Wisconsin-Madison in 2003. He worked in the FACTS (Flexible AC Transmission Systems) and Power Quality group at Westinghouse R&D Center in Pittsburgh, which later became part of Siemens Power Transmission & Distribution, from 1998 to 2005. He joined the Department of Electrical and Computer Engineering at North Carolina State University (NCSU) in August 2005, where he is the Duke Energy Distinguished Professor and a founding faculty member of NSF ERC FREEDM Systems Center, Advanced Transportation Energy Center [ATEC] and the US DOE initiative on WBG based Manufacturing Innovation Institute – PowerAmerica - at NCSU. His research interests are Solid-State Transformers, Integration of renewable energy resources, MV power converters enabled by HV SiC devices, FACTS, Utility applications of power electronics and power quality issues; DC Microgrids, high-frequency magnetics, active filters, and application of new power semiconductor devices such as SiC for converter topologies. His research is funded by several industries, NSF, DoE, ARPA-E, US Navy, ONR. He has over 500 publications and 10 patents with several pending patent applications.



SPEAKER:

Dr. Brij N. Singh

*Senior Staff Engineer -
Advanced Technology
John Deere Electronic
Solutions (JDES)*

BIOGRAPHY:

Brij N. Singh is a senior staff engineer in John Deere Inc., USA and leading the US Department of Energy - PowerAmerica (DOE-

PowerAmerica) funded project to develop a 200 kW SiC inverter for heavy-duty vehicle applications. Brij has earned Ph.D. degree in Electrical Engineering from the Indian Institute of Technology, New Delhi, India, in 1996. In 1996, Brij joined the École de Technologie Supérieure, Université du Québec, Montreal, QC, Canada, as a Post-Doctoral Fellow. In 1999, Brij joined Concordia University, Montreal, QC, Canada as a Research Fellow. In 2000, Brij joined the Department of Electrical Engineering and Computer Science, Tulane University, New Orleans, Louisiana, as an Assistant Professor. In 2007, Brij joined John Deere in Fargo, North Dakota as a power electronics staff engineer. In Tulane, Brij received numerous teaching awards for outstanding instructions in electrical engineering. In John Deere, Brij received numerous awards for product and technology innovations and team collaboration activities. Brij has published over 90 research papers in various Journals including IEEE Transactions and IET Journals. Brij has 27 US patents, one trade secret, and numerous pending patents. Brij is winner of the 2020 IEEE Power Electronics Emerging Technology Award. Brij is a senior member of the IEEE.

TUTORIAL 8:

ELECTRIC VEHICLE IMPACTS ON POWER GRIDS

**SCHEDULE:**

10:30AM to 12:00PM at On24

LIVE Q&A:

12:00PM to 12:30PM at
Virtual Room B

SPEAKER:

Safak Bayram

Lecturer

University of Strathclyde

BIOGRAPHY:

Dr. I Safak Bayram is a Lecturer (Chancellor's Fellow) at the Department of Elec-tronic and Electrical Engineering at the University of Strathclyde. Between 2015 and 2019 he was an Assistant Professor(joint)at the Division of Sustainability at College of Science and Engineering and a Staff Scientist at Qatar Environment and Energy Research Institute both at Hamad Bin Khalifa University. He received a B.S. degree in Electrical and Electronics Engineering from Dokuz Eylul University, Izmir, Turkey in 2007, the M.S. degree in Telecommunications from the University of Pittsburgh in August 2010, and the Ph.D.degree in Electrical and Computer Engineering from North Carolina State University, in 2014. He received the Best Paper Award at the Third IEEE International Conference on Smart Grid Communications and at the First IEEE Workshop on Renewable Energy and Smart Grid in March 2015.His research interests include a variety of interdisciplinary problems arising in societal infrastructures such as power grids and transportation networks.

TUTORIAL 9:

GRID-CHARGING STATIONS INTERACTIONS

**SCHEDULE:**

1:30PM to 3:00 PM at On24

LIVE Q&A:

3:00PM to 3:30PM at
Virtual Room B

SPEAKER:

Jim McDowall

Senior Technical Advisor
Saft

BIOGRAPHY:

Jim McDowall has worked in the battery industry since 1977 and is currently in the position of Senior Technical Advisor with Saft, primarily associated with grid systems. Involved in the energy storage market since 1998, Jim was a Director of the Energy Storage Association for 14 years and is a past Chair of the organization. Jim is an IEEE Fellow and is Standards Coordinator and Past Chair of the IEEE Energy Storage and Stationary Battery Committee, and Chair of three of its working groups. Jim is a frequent speaker at energy storage conferences and related events.

TECHNICAL SESSION 24:

8:30AM - 10:00AM

POWER SYSTEMS FOR SEA, UNDERSEA, AIR, AND SPACE VEHICLES

Dynamic Response Comparison of Dual-Wound and Single-Wound Machines in Multi-Bus Power System Architectures

Lee Rashkin¹, Jason Neely¹, Ronald Matthews¹, Norbert Doerry² -

(1) Sandia National Laboratories, (2) Naval Sea Systems Command (NAVSEA)

Linear Power Flow Characterization of DC Power Distribution Systems for More Electric Aircraft Optimization

Angel Recalde^{1,2}, Serhiy Bozhko¹, Jason Atkin¹ - (1) University of Nottingham, (2) Escuela Superior Politecnica del Litoral

Investigation of a 20 kV Ultra-Fast Resonant DC Circuit Breaker for Medium-Voltage Shipboard Power System Protection

Trevor Arvin, Jiangbiao He, Nathan Weise, Tiefu Zhao - University of Kentucky College of Engineering

Energy Management System for Naval Submarines

Byeongdoo Jeon, Mojdeh Khorsand Hedman - School of Electrical, Computer and Energy Engineering, Arizona State University

A Network Graph Technique for the Design of Electric Aircraft Power Systems

Damien Lawhorn¹, Vandana Rallabandi², Dan Ionel¹ - (1) University of Kentucky, (2) GE Global Research

Constant Power Load Analysis in Droop Controlled Microgrid for More Electric Aircraft

Niloofer Ghanbari, Subhashish Bhattacharya - North Carolina State University

LIVE Q&A: 10:00AM - 10:30AM

TECHNICAL SESSION 25:

8:30AM - 10:00AM

WIRELESS BATTERY CHARGING: ANALYSIS AND DESIGN

A New Configuration and Bypassing Strategy for Dynamic Wireless EV Charging

Ali Ramezani, Mehdi Narimani - Department of Electrical and Computer Engineering, McMaster University

Wide Range Highly Efficient Dynamic Wireless Power Transfer System

Omar Nezamuddin, Euzeli dos Santos Jr, Ahmed Yago - Indiana University Purdue University-Indianapolis

A High Magnetic Field Uniformity Staggered-Series Square Transmitting Coil for Wireless Electric Vehicle Charging Systems

Zhi Bie, Kai Song, Chunbo Zhu - Harbin Institute of Technology

Thermal Analysis of WPT Coils for Dynamic Wireless EV Charging

Jason Pries, Rafal Wojda, Omer Onar, Veda Galigekere - Oak Ridge National Laboratory

A 3.75-kW High-Power-Transfer-Density Capacitive Wireless Charging System for EVs Utilizing Toroidal-Interleaved-Foil Coupled Inductors

Khurram Afridi¹, Ashish Kumar², Sreyam Sinha¹, Brandon Regensburger¹ - (1) Cornell University, (2) University of Colorado Boulder

Concept Design of Active Shielding for Dynamic Wireless Charging of Light-duty EV

Bo Zhang, Richard Carlson, Shawn Salisbury, Charles Dickerson, Timothy Pennington, Lee Walker, Eric Dufek - Idaho National Laboratory

LIVE Q&A: 10:00AM - 10:30AM

TECHNICAL SESSION 26:

8:30AM - 10:00AM

EV-INTERACTING SMART AND MICRO GRIDS

Methodology To Analyze Effect Of Electric Mining Machines On The Mine Grid

Antti Keski-Koukkari¹, Jenni Rekola², Anna Kulmala¹, Raimo Juntunen², Kari Mäki¹, Mikko Valtee² - (1) VTT Technical Research Centre of Finland, (2) Sandvik Mining and Rock Technology

A Novel Model of a Thyristor in Reverse Recovery Process for Current Interruption Test of HVDC Circuit Breakers

Zhonghao Dongye¹, Zhonghao Dongye², Lei Qi¹, Xiang Cui¹, Xianshan Guo¹, Hua Zhang², Sheng Zheng², Fei Lu² - (1) North China Electric Power University, (2) Drexel University

Optimal Bidding of Li-ion BESS in Regulation Markets Considering Capacity Degradation

Jinqiang Liu, Chao Hu, Zhaoyu Wang - Iowa State University

A Novel Phase-Shift Autotransformer with Reduced kVA Capacity in Multi-pulse Rectifier System

Xiaohang Yu¹, Geng Niu¹, Harshith Kulai¹, Liang Qian², Qingguo Song³, Mingyou Yu³, Zhongni Zhu³ - (1) Karma Automotive LLC, (2) Wuhan University of Technology, (3) Wuchang Shouyi University

Suppressing Circulating Currents in Battery Management of Droop-Based DC Microgrids

Nilofar Ghanbari, Subhashish Bhattacharya - North Carolina State University

A Flexible Overvoltage Protection Evaluation Platform for DC Microgrid Systems

Sheng Zheng - Zhejiang University

LIVE Q&A: 10:00AM - 10:30AM

TECHNICAL SESSION 27:

10:30AM - 12:00PM

MOTOR DRIVES FOR TRANSPORTATION ELECTRIFICATION

Current Sensor Fault-Tolerant Control of Induction Motor Driven Electric Vehicle Using Flux-Linkage Observer

Murli Manohar, Sukanta Das - Department of Electrical Engineering, Indian Institute of Technology (ISM) Dhanbad

Predictive Torque Control of Induction Motor for Electric Vehicle

Kousalya V, Rashmi Rai, Bhim Singh - Indian Institute of Technology, Delhi

Stator Winding Temperature Estimation of IPMSM Based on a High-Frequency Voltage Signal Injection

Hwigon Kim, Hyun-Sam Jung, Seung-Ki Sul - Seoul National University

Simple Overmodulation Scheme for Improved Dynamic Performance of IPMSM

Jonghun Yun, Jiwon Yoo, Hyun-Sam Jung, Seung-Ki Sul - Seoul National University

High Loading Distortion Effect on Electric Pulse Sensing in Rotor Position Estimators for Electric Machines

Huayu Li, Chenwei Ma, Frederik De Belie - Ghent University

PCB Embedded Chip-on-Chip Packaging of A 48 kW SiC MOSFET DC-AC Module with Double-Side Cooling Design

Yuhang Yang, Ali Emadi - McMaster Automotive Resource Center (MARC)

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 28:

10:30AM - 12:00PM

ELECTRICAL COMPONENTS FOR SEA, UNDERSEA, AIR, AND SPACE VEHICLES

De-Excitation Characterization for Power Supply Protection in DC Shipboard Power Systems

Seongil Kim¹, Soo-Nam Kim², Drazen Dujic¹ - (1) Ecole Polytechnique Federale de Lausanne (EPFL),
(2) Hyundai Electric & Energy Systems

Fault Diagnosis and Fault-tolerant Operation of Current Source Inverter for Safety-Critical Applications

Majid Fard, Jiangbiao He, Zheng Wang - University of Kentucky College of Engineering

RExMoto - A Range Extender Concept for Light Electric Aircraft

Richard Glasscock¹, Vincenzo Madonna¹, Paolo Giangrande¹, Michael Galea², Michael Galea¹ -
(1) Power Electronics, Machines & Control (PEMC) Group, University of Nottingham, (2) Key Laboratory of More Electric Aircraft Technology of Zhejiang Province

High Current Solid-State Circuit Breaker for Safe, High Efficiency DC Systems in Marine Applications

Pietro Cairoli¹, Rostan Rodrigues¹, Yuzhi Zhang¹, Utkarsh Raheja¹, Luca Raciti², Antonello Antoniazzi² -
(1) ABB Inc. US Corporate Research Center, (2) ABB S.p.A

Direct Calculation of SVPWM Switching Sequence for Reconfigurable Nth-Level Inverter in Propulsion Applications

Jonathan Blake¹, Weiqiang Chen¹, Ali Bazzi^{1,2} - (1) University of Connecticut, (2) American University of Beirut

Design and Control of a Series DC Active Filter (SDAF) for MVDC Marine Applications

Brian Engelhart^{1,2}, Ali Bazzi^{1,3} - (1) University of Connecticut, (2) General Dynamics: Electric Boat,
(3) American University of Beirut

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 29:

10:30AM - 12:00PM

WIRELESS BATTERY CHARGING: EFFICIENCY AND CONTROL

Methods to Synchronize and Control the Secondary Side Active Rectifier in Wireless Power Transfer Systems

Subhajyoti Mukherjee, Omer Onar, Veda Prakash Galigekere - National Transportation Research Center Oak Ridge National Laboratory

Low Loss Online Capacitor Tuning Method for Reactive Power Reduction of Inductive Wireless Power Transfer System Under Lateral Misalignment

IGuangqi Zhu, Robert Lorenz - University Wisconsin - Madison

Wireless Power Transfer System Based on Unity-Gain Frequency Tracking

Wen Cai, Fan Yi, Ling Jiang - The University of Texas at Dallas

Misalignment Correction in Wireless Power Transfer of Electric Vehicles through Angular Compensation

Sima Aznavi¹, Poria Fajri¹, Nima Lotfi² - (1) University of Nevada, Reno, (2) Southern Illinois University Edwardsville

Continued...

(Continued)

Fast Online Foreign Object Detection Method Using Auxiliary Coils in Wireless Charging Systems

Wen Cai, Ling Jiang, Fan Yi - The University of Texas at Dallas

LIVE Q&A: 12:00PM - 12:30PM

TECHNICAL SESSION 30:

1:30PM - 3:00PM

POWER CONVERTERS: COMPONENTS AND PERFORMANCE

Multi-Level Power Controller Design for Dynamic Wireless Electric Vehicle Charging Systems

Hassan Jafari, Maryam Mahmoudi, Arif Satwat - The Department of Electrical and Computer Engineering, Florida International University

Power Inductor Optimization Using Nonlinear Magnetization Characteristics

Jacob Gareau, Berker Bilgin, Ali Emadi - McMaster University

Fixed-Frequency Zero Voltage Switching Current-Fed (L) (LC) Resonant DC-DC Converter

Venkata R Vakacharla, Akshay Rathore, Rajeev Singh, Santanu Mishra - Concordia University

Constant Switching Frequency Hierarchical Deadbeat Predictive Direct Power Control with Dynamic Power Estimator for 3L-ANPC Active-Front-End Rectifier for Electric Vehicle Charger Applications

Mostafa Abarzadeh¹, Nathan Weise¹, Kamal Al-Haddad² - (1) Department of Electrical and Computer Engineering, Marquette University, (2) Department of Electrical Engineering, École de Technologie Supérieure (ÉTS)

A System Level Approach for Online Junction Temperature Measurement of SiC MOSFETs Using Turn-On Delay Time

Fei Yang, Shi Pu, Chi Xu, Bilal Akin - Department of Electrical and Computer Engineering, University of Texas at Dallas

Numerical Modeling of SiC MOSFET Aging Due To Electrical Stress

Mark Ditsworth¹, Morgan Kiani², Babak Fahimi¹, (1) University of Texas at DALLAS, (2) Texas Christian University

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 31:

1:30PM - 3:00PM

MAGNET-FREE ELECTRIC MACHINES FOR TRANSPORTATION ELECTRIFICATION

An Optimization Study for a Switched Reluctance Motor using Magnetic Equivalent Circuit and Space Mapping Techniques

Gayan Wathewaduge, Ehab Sayed, Mohamed Bakr, Ali Emadi, Berker Bilgin - Department of Electrical and Computer Engineering, McMaster University

Continued...

FRIDAY - JUNE 26, 2020

TECHNICAL SESSIONS

(Continued)

Gradient-based Design Optimization of a Switched Reluctance Motor for an HVAC Application

Ehab Sayed, Mohamed Bakr, Berker Bilgin, Ali Emadi - Department of Electrical and Computer Engineering, McMaster University

Anticipative Flux Trajectories for Dynamic Energy Efficient Operation of Induction Machines

Antony Dominic, Gernot Schullerus, Martin Winter - Reutlingen University, Reutlingen Energy Center

A Truncated Fourier Based Analytical Model for SRMs with Higher Number of Rotor Poles

Zichao Jin¹, Yijiang Jia¹, Mohamad Salameh¹, Berker Bilgin², Shuwang Li¹, Mahesh Krishnamurthy¹ -

(1) Illinois Institute of Technology, (2) McMaster University

Modeling of Induction Machines With Switched Stator Windings

Daniel Scharfenstein, Stephan Schüller, Stefan Quabeck, Rik De Doncker - Institute for Power Electronics and Electrical Drives (ISEA) - RWTH Aachen University

Analysis of Pole Phase Modulated Multiphase Induction Motor for EV Applications

Priyanka C P¹, Dr Jagadanand G¹, Dr Mahesh Krishnamurthy² - (1) NIT Calicut, (2) Illinois Institute of Technology

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 32:

1:30PM - 3:00PM

ELECTRIFICATION OF HEAVY-DUTY AND OFF-ROAD VEHICLES

Comparison of Linear and Rotary Electric Machine Topologies for a Hybrid Hydraulic Electric Architecture of Off-Highway Vehicles

Fnu Nishanth, Anvar Khamitov, Eric Severson - Dept of Electrical and Computer Engineering, University of Wisconsin-Madison

Transit Bus Electrification Evaluation from GPS Duty Cycle Data

Andrew Kotz, Eric Miller, Andrea Watson, Kenneth Kelly - National Renewable Energy Laboratory

Model Validation and Demonstration of a Hydrogen Fuel Cell Parcel Delivery Truck

Michael Lewis¹, Xianyong Feng¹, Jason Hanlin², Joseph Ambrosio³ - (1) The University of Texas at Austin - Center for Electromechanics, (2) Center for Transportation and the Environment, (3) Unique Electric Solutions

Investigation of Battery Swapping and Fast Charging Options for Electric Haul Trucks in Underground Mines

Md Ahsanul Hoque Rafi¹, Robert Rennie², Jennifer Bauman¹ - (1) Department of ECE, McMaster University, (2) MEDATECH Engineering

Pulsed Electric Bus Charging Management Considering Charge Redistribution Effect

Kaitlyn Sitch¹, Dongsun Sun¹, Liang Du¹, Hengzhao Yang² - (1) Department of Electrical and Computer Engineering, Temple University, (2) Department of Electrical Engineering, New Mexico Institute of Mining and Technology

A Tradeoff Analysis of Series Parallel Three Phase Converter Topologies for Wireless Extreme Chargers

Erdem Asa, Omer C. Onar - Oak Ridge National Laboratory

LIVE Q&A: 3:00PM - 3:30PM

TECHNICAL SESSION 33:

3:30PM - 5:00PM

POWER ELECTRONICS AND MOTOR DRIVES

An Improved FS-MPC Algorithm for Vienna Rectifier Based EV Chargers

Harish Sudhakaran Nair, N Lakshminarasamma - Department of Electrical Engineering, Indian Institute of Technology Madras

Improved Control for Isolated Cycloconverter-type Dual Active Bridge DC/AC Converter

Jacob Gareau, Lea Dorn-Gomba, Ali Emadi - McMaster University

Flexible Over-Current Protection Scheme for Medium-Voltage WBG Power Modules in DPT Application

Ramona Buckreus, Sergio Jimenez, Mithat Kisacikoglu, Andrew Lemmon, Todd Freeborn - The University of Alabama

Dynamic Performance Analysis of DCAT System for Urban Rail Transit

Menghan Ni, Xiaofeng Yang, Miao Wang, Shixiang Li, Trillion Q. Zheng - School of Electrical Engineering, Beijing Jiaotong University

Voltage Drop and Power Loss Suppression of DCAT System With Dynamic Characteristics

Miao Wang, Xiaofeng Yang, Trillion Zheng, Shixiang Li, Menghan Ni - Beijing Jiaotong University

Co-simulation Based Electric Vehicle Drive for a Variable Flux Machine

Bigyan Basnet, Pragasen Pillay - Concordia University

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 34:

3:30PM - 5:00PM

ELECTRIC MACHINE FAULTS AND LIFETIME

Voltage Propagation in Inverter-Driven Machine Windings Over Wide Operation Range

Yanyan Xie¹, Julia Zhang¹, Franco Leonardi², Alfredo Munoz², Michael Degner², Demba Komma³ - (1) The Ohio State University, (2) Ford Motor Company, (3) University of Michigan

Study on the Effect of Dynamic Eccentricity on Acoustic Noise of an Interior Permanent Magnet Traction Motor

Nathan Emery¹, Sujana Dasara¹, Jianbin Liang¹, Dhafar Al-Ani², Ali Emadi¹, Berker Bilgin¹ - (1) McMaster Automotive Resource Centre (MARC), McMaster University, (2) Fiat Chrysler Automobiles

Thermal Lifetime Evaluation of Electrical Machine Using Neural Network

Gulrukh Turabee¹, Muhammad Raza Khowja², Paolo Giangrande², Vincenzo Madonna², Gaurang Vakil², Chris Gerada², Michael Galea² - (1) Nottingham Trent University, (2) The University of Nottingham

Advantages of a Double Three-Phase Winding Layout for a Dual Rotor E-Bike Motor Considering Third Current Harmonic Injection Technique

Daniele De Gaetano¹, Dmitry Golovanov¹, Giacomo Sala², Alessandro Galassini¹, Michele Degano¹, Hanafy Mahmoud¹, Chris Gerada¹ - (1) The University of Nottingham, (2) The University of Bologna

Continued...

FRIDAY - JUNE 26, 2020

TECHNICAL SESSIONS

(Continued)

Prediction of Failure Path Current for Synchronous Reluctance and Interior Permanent Magnet Synchronous Machines Accounting for Saturation

Pablo Castro Palavicino, Bulent Sarlioglu - University of Wisconsin-Madison

Synchronized Gear Shift Control Using RLS Estimator for Two Speed Gear System

Taeyeon Lee¹, Kwanghee Nam¹, Joohang Kang², Youngchan Ahn² -

(1) Pohang University of Science and Technology (POSTECH), (2) LG Electronics

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 35:

3:30PM - 5:00PM

BATTERY CHARGERS: ARCHITECTURES AND DESIGN

Review and Evaluation of Communication Systems for Control of Electric-Vehicle Inductive Charging Systems

Zaid El-Shair¹, Ella Reimann¹, Samir Rawashdeh¹, Agasthya Ayachit², Mohamad Abdul-Hak² -

(1) University of Michigan - Dearborn, (2) Mercedes-Benz Research and Development North America

A Literature Review on Mobile Charging Station Technology for Electric Vehicles

Shahab Afshar, Pablo Macedo, Farog Mohamed, Vahid Disfani - ConnectSmart Research Laboratory, University of Tennessee at Chattanooga

Automatic Static Charging Of Electric Distribution Vehicles Using ERS Technology

Philip Abrahamsson, David Wenander, Mats Alakula, Francisco Márquez-Fernández, Gabriel Domingues-Olavarria - Lund University

Copper Clad Aluminum Windings as an Alternative Conductor for High Power Electric Vehicle Wireless Charging

Rafal Wojda, Veda Galigekere, Omer Onar, Jason Pries - Oak Ridge National Laboratory

Magnetic Field Emission from Unipolar and Double-D Coil-Based Wireless Charging Systems in EV Application

Mostak Mohammad, Jason Pries, Omer Onar - Oak Ridge National Laboratory

Optimization of "I" Type Shielding for Low Air-Gap Magnetic and Electric Fields Inductive Wireless Power Transfer

Guangqi Zhu, Robert Lorenz - University Wisconsin - Madison

LIVE Q&A: 5:00PM - 5:30PM

TECHNICAL SESSION 36:

3:30PM - 5:00PM

ELECTRIC, HYBRID ELECTRIC & PLUG-IN HYBRID ELECTRIC VEHICLE SYSTEM ARCHITECTURES

Quantifying the GHG Reduction vs Battery Size in Diesel Buses with Electrified HVAC

Zhe Gong, Samantha Chau, Olivier Trescases - Faculty of Applied Science and Engineering

Two-stage vs One-stage Design for a Bidirectional 400V/12V Auxiliary Power Module In Electric Vehicles

Hua Bai - University of Tennessee

Investigation of Power Electronic Architectures in Solar Electric Vehicles

Danial Sadeghpour, Jennifer Bauman - McMaster University

A Comprehensive Comparison of Hybrid Power-train Systems for Fuel Cell Based Elec. Vehicles

Qian Xun¹, Yujing Liu¹, Nan Zhao² - (1) Chalmers University of Technology, (2) University College Dublin

Enhanced Cyber-physical Security of Steering Stability Control System for Four-Wheel Independent Drive Electric Vehicles

Lulu Guo, Bowen Yang, Jin Ye - Intelligent Power Electronics and Electric Machine Laboratory, University of Georgia

Maximizing Harvested Energy through Regenerative Braking Process in Dual-Motor All-Wheel Drive Electric Vehicles

Shoeib Heydari¹, Poria Fajri¹, Reza Sabzehgar² - (1) University of Nevada Reno, (2) San Diego State University

LIVE Q&A: 5:00PM - 5:30PM

Abstract Power Electronics



ABSTRACT POWER ELECTRONICS

<http://abspe.com/>

CONTACT: Joanne Reichard
AbsPEadmin@AbsPE.com

Abstract Power Electronics develops advanced SiC based power converters ranging from under 1 kW to over 1 MW. For over 6 years we have specialized in silicon carbide designs for power quality, transportation, industrial, and military markets. Designs include all types of configurations for high frequency, high level isolation, high power, grid tie, batteries, and high speed motors. Some examples of our technology include a 99% efficient SiC traction drive and a 25 kW SiC very high speed motor drive that is only 58.5 cu in. Variations of these or any other designs are available to customize for OEM specifications and applications. Consulting and other services are available as well. We also offer Primate Power®, a family of flexible, rugged, compact, efficient power sources. They can be used as grid tie systems, or to simulate grids, and to test batteries, solar cells, motors, and more. These standard 19" rack mount based units combine to make various systems and are great for engineering labs. They can also be customized for OEMs that need prototypes or production.

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CONTACT: Shirley Yuen
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Electronic Concepts Inc. is a multinational electronics company which designs and manufactures innovative film capacitors for global industries. We offer a unique combination of resources including: vertically integrated manufacturing, modern and automated production, and broad engineering expertise. It is with these elements that allow us to design film capacitors that set the industry standard. ECI has the flexibility to handle any film capacitor requirement, with a commitment to quality and support. ECI holds qualifications for AS9100, ISO9001 and UL 810 recognized. We are also qualified to military standards and specifications such as MIL-PRF-39022, MIL-PRF-83421, MIL-PRF-55514, MIL-STD-790, QPL, and Z540 calibration.



ENEDYM, INC

<https://enedym.com>

CONTACT: Rachel Lederman
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Enedym Inc. is an early-stage technology start-up company from McMaster University. The company is specializing in electric motors, power electronics, electrified powertrains, vehicle model-based design and optimization, virtual engineering, and advanced controls and software.



LASER TECHNOLOGIES, INC

<https://www.lasertechnologiesinc.com/>

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With over 30 years of experience in the lamination industry, Laser Technologies covers every facet of the lamination production process, from prototyping to production as well as warehousing and distribution. Operating according to lean manufacturing principles and with strict adherence to ASTM standards and quality control, Laser Technologies provides the marketplace with high quality manufactured components, on time, and at a competitive price.



MATHWORKS

<https://www.mathworks.com/>

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MathWorks is the developer of MATLAB and Simulink, the leading software for engineers modeling and developing embedded software for controlling power electronics for renewable energy and power transmission, motor control, and electrified transportation.



NH RESEARCH

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NH Research (NHR), a leading provider of test solutions for the automotive, aerospace, energy storage, and critical-power markets. NHR enables electrification by accelerating innovation, validation and functional test of today's technologies. Backed by over 50 years of experience in power conversion and power supply test systems we provide world class test instruments and systems.

The advanced test solutions being demonstrated include Battery Cyclers, Battery Emulation Systems, Grid-Simulators, and AC/DC Regenerative Loads. Customers look to NHR for superior performance, ease of use, faster slew rates to match today's technology, reduced testing time, improved safety, and energy savings.



SOFTWARE MOTOR COMPANY

<https://softwaremotor.com/>

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Software Motor Company is setting a new standard of efficiency, reliability, and intelligence with the SMC Smart Motor System. SMC combines modern computing and software control with the proven reliability of switched reluctance motor technology to achieve an unprecedented optimal efficiency. The patented SMC Smart Motor System only uses energy when it is needed, thereby significantly reducing space conditioning and refrigeration energy costs. A fully programmable IoT controls package facilitates maintenance savings and easy integration with existing building systems.

