AGENDA

TUESDAY | JUNE 14
- Registration Opens | Carousel Pre-Function | 4PM
- Welcome Reception | Carousel Ballroom | 6PM-8PM

WEDNESDAY | JUNE 15
- Speaker Ready Room | Caramia | 8AM-6PM
- Plenary Session 1 | Carousel Ballroom | 8AM-12PM
- Poster Session 1 and Buffet Lunch | Anabella Ballroom | 12PM-2PM
- Town Hall Panel 1 | Carousel Ballroom | 2PM-5:30PM
- Tutorial 1 | Gloriana A | 2PM-3:30PM
- Industry Session 1 | Gloriana B | 2PM-3:30PM
- Panel 1 | Gloriana C | 2PM-3:40PM
- Technical Session 1 | Bohemia | 2PM-3:45PM
- Panel 2 | Delicia | 2PM-3:40PM
- Short Course 1 | Doria | 2PM-5:00PM
- Short Course 2 | Sonia | 2PM-5:00PM
- Coffee Break | Anabella Ballroom | 3:30PM - 4:30PM
- Tutorial 2 | Gloriana A | 4PM- 5:30PM
- Panel 3 | Gloriana B | 4PM- 5:40PM
- Panel 4 | Gloriana C | 4PM- 5:40PM
- Industry Session 2 | Delicia | 4PM- 5:30PM
- Technical Session 2 | Bohemia | 4PM- 5:45PM
- VIP Networking Reception | The Fifth | 7PM- 10PM
- YP Networking Reception | Outdoor Lounge | 7PM- 10PM

THURSDAY | JUNE 16
- Eats AIAA EATTC | Delicia | 7AM-8AM
- Speaker Ready Room | Caramia | 7AM-6PM
- Plenary Session 2 | Carousel Ballroom | 8AM-12PM
- Poster Session 2 and Buffet Lunch | Anabella Ballroom | 12PM-2PM
- Town Hall Panel 2 | Carousel Ballroom A | 2PM - 5:30PM
- Town Hall Panel 3 | Carousel Ballroom B | 2PM - 5:30PM
- Panel 5 | Gloriana A | 2PM-3:40PM
- Panel 6 | Gloriana B | 2PM-3:40PM
- Panel 7 | Gloriana C | 2PM-3:40PM
- Technical Session 3 | Delicia | 2PM-3:45PM
- ITEC Steering Committee Meeting | Sonia | 1PM-2PM
- TEC Committee Meeting | Sonia | 2PM-3:40PM
- Short Course 3 | Bohemia | 2PM-5:30PM
- Short Course 4 | Doria | 2PM-5:30PM
- Coffee Break | Anabella Ballroom | 3:30PM - 4:30PM
- Tutorial 3 | Gloriana A | 4PM- 5:30PM
- Industry Session 3 | Gloriana B | 4PM- 5:40PM
- Panel 8 | Gloriana C | 4PM- 5:40PM
- Tutorial 4 | Delicia | 4PM- 5:40PM
- TTE Steering Committee and Editorial Board Meeting | Sonia | 4PM- 5:40PM
- Joint PELS/IAS Technical Committee Meeting | Sonia | 7PM- 8:15PM

JUNE 15 & 16
EXPO HOURS: 10AM-5PM
FRIDAY | JUNE 17
- SPEAKER READY ROOM | CARAMIA | 8AM-6PM
- TUTORIAL 5 | GLORIANA A | 8:30AM-10AM
- SHORT COURSE 5 | GLORIANA B | 8:30AM-12PM
- SHORT COURSE 6 | GLORIANA C | 8:30AM-12PM
- ROLLING RECAP | DELICIA | 8:30AM-10AM
- TECHNICAL SESSION 4 | BOHEMIA | 8:30AM-10:15AM
- TECHNICAL SESSION 5 | DORIA | 8:30AM-10:15AM
- TECHNICAL SESSION 6 | SONIA | 8:30AM-10:15AM
- COFFEE BREAK | CAROUSEL PRE-FUNCTION | 10AM-10:30AM
- TUTORIAL 6 | GLORIANA A | 10:30AM-12:00PM
- TECHNICAL SESSION 7 | BOHEMIA | 10:30AM-12:15PM
- TECHNICAL SESSION 8 | DORIA | 10:30AM-12:15PM
- TECHNICAL SESSION 9 | SONIA | 10:30AM-12:15PM
- PEASA WORKSHOP | CAROUSEL A | 8AM-12PM
- WOMEN IN ENGINEERING LUNCHEON | DELICIA | 12PM-2PM
- BUFFET LUNCH | CAROUSEL B | 12PM-2PM
- PEASA WORKSHOP | CAROUSEL A | 2PM-6PM
- TECHNICAL SESSION 10 | GLORIANA A | 2PM-3:45PM
- TECHNICAL SESSION 11 | GLORIANA B | 2PM-3:45PM
- TECHNICAL SESSION 12 | GLORIANA C | 2PM-3:45PM
- TECHNICAL SESSION 13 | DELICIA | 2PM-3:45PM
- TECHNICAL SESSION 14 | BOHEMIA | 2PM-3:45PM
- TECHNICAL SESSION 15 | DORIA | 2PM-3:45PM
- TECHNICAL SESSION 16 | SONIA | 2PM-3:45PM
- TECHNICAL SESSION 17 | GLORIANA A | 4PM-5:45PM
- TECHNICAL SESSION 18 | GLORIANA B | 4PM-5:45PM
- TECHNICAL SESSION 19 | GLORIANA C | 4PM-5:45PM
- TECHNICAL SESSION 20 | DELICIA | 4PM-5:45PM
- TECHNICAL SESSION 21 | BOHEMIA | 4PM-5:45PM
- TECHNICAL SESSION 22 | DORIA | 4PM-5:45PM
- TECHNICAL SESSION 23 | SONIA | 4PM-5:45PM

TUESDAY | JUNE 21
- VIRTUAL SESSION 1 7AM-9AM PST
- VIRTUAL SESSION 2 7AM-9AM PST
- VIRTUAL SESSION 3 7AM-9AM PST
Conference App
ITEC+EATS provides multiple functionalities through the conference app. Download Whova and use the code in the graphic, along with the email you registered with to log in to the event.

Use this app to submit questions to panel moderators, network, plan your agenda and more.

Last Minute Technical Session Changes
Please note that there may be discrepancies between the session schedule listed in the printed program and the publication file. Due to Covid-19 and Travel Restrictions, many papers required last minute accommodations. For the most up to date information about presentations, please check the conference app or the ITEC+EATS agenda page on the website: www.itec-conf.com/agenda.

Detailed Session Information and Speaker Bios
To provide more space in the printed program for note taking, the session information has been limited to basic descriptions. Much more detailed descriptions and speaker profiles are viewable on the website at www.itec-conf.com/agenda or on the conference app.

Notes about Covid-19 and Social Distancing
All attendees are requested to submit an attestation of health before entry. The ITEC+EATS Organizing Committe has provided materials to clearly communicate to others the level of social distancing you are able to observe. Each attendee received a green, yellow and red sticker with your registration materials. Place the sticker on your name tag to notify others the distance you would like to observe during interactions.

- Green indicates comfort with no requirements around social distancing.
- Yellow indicates caution or around 3 feet of distance requested at all times.
- Red indicates a high need for observance of 6 feet of social distancing.

These stickers are for your own comfort and sense of personal safety. Feel free to change the sticker according to the social setting you are in at the time.

Hand sanitizer has been provided with the registration materials and you are welcome to come to the registration desk for a replacement if needed.
It is our great pleasure to welcome you to the 2022 IEEE/AIAA Transportation Electrification Conference + Electric Aircraft Technology Symposium (ITEC+EATS). This conference builds on the decade-long legacy of ITEC, covering groundbreaking developments in electrified transportation technical areas. Transportation electrification is a key thrust towards a secure, connected, and sustainable humanity. The conference agenda includes the latest developments in electrified powertrain components, subsystems, vehicle designs, vehicle-grid interfaces, energy storage and conversion, and all types of electric and hybrid electric vehicles. This year also marks the beginning of a new grand experiment, where ITEC has teamed with EATS, an event co-sponsored by IEEE and AIAA.

ITEC started over 10 years ago with sponsorship of the IEEE Power Electronics Society (PELS), Industry Applications Society (IAS), Power and Energy Society (PES), and Transportation Electrification Community (TEC). ITEC established itself as the premier conference in transportation electrification with a global brand that focuses on the electrification of all types of vehicles and transportation systems. Started in 2018, EATS has rapidly emerged as the leading event for technical developments in the emerging area of aircraft electrification. The partnership with AIAA/IEEE EATS will allow ITEC+EATS to even better serve the transportation electrification industry and academia. Bringing the ITEC and EATS communities together this year has been an incredibly rewarding process, and we are confident that it will benefit our community as we collaboratively learn together across disciplines.

The 2022 ITEC+EATS event also marks our return to an in-person event, after multiple years of virtual events. We sincerely applaud the efforts of committees and conference organizers from virtual events of recent years, as it was no small feat building the engaging events in which we had the fortune of participating. With this in mind, however, we also recognize our communities have been eager at the opportunity to reconnect for hallway conversations, face-to-face presentations, and new introductions. The return to on-site participation is something we are excited about as well, though we find it prudent to remind all of our attendees that, even after all of this time, our global community is still facing a health crisis. It is our sincere plea that all of our attendees be responsible in their interactions and respect the boundaries set by other participants.

Due to the tremendous work of our organizing committee, we have an incredible event scheduled for this year. Conference attendees will have the opportunity to hear from technical visionaries through our keynote addresses, interact with leading experts in our eleven panel sessions, return with new knowledge through our twelve combined short courses and tutorials, and present the latest progress in the science and technology of transportation electrification through our technical sessions. ITEC+EATS this year also is home to two student design competitions as well as a groundbreaking workshop on high-voltage considerations of aerospace electrification.

In all sincerity, thank you for your participation in the 2022 ITEC+EATS event. We are confident that this event will be one to remember. We are privileged at this opportunity to work as a technical community to push the art of the possible forward. Let’s keep working together to build a better tomorrow.

Matthias Priendl
ITEC+EATS
General Chair

Phil Ansell
ITEC+EATS
General Co-Chair
ORGANIZING COMMITTEE

Program Chair:
Phillip Kollmeyer, McMaster University

Program Co-Chair:
Fei Gao, University of Technology of Belfort-Montbéliard

Assistant Program Chairs:
Bahareh Zaghari, Cranfield University
Liang Du, Temple University

Panels Chairs:
Jennifer Bauman, McMaster University
Chuck Lents, Raytheon Technologies
Weizhong Wang, Lucid Motors

Finance Chair:
W. Michael Eull, University of Strathclyde

Publication Chair:
Hao Chen

Publication Co-Chairs:
James D. Anderson, Columbia University
Gokcin Cinar, University of Michigan

Short Courses/Tutorials Chair:
Wesley Pennington, Tau Motors

Keynotes Co-Chair:
Marko Jaksic, Navistar
Edward Mugica, Boeing

Awards Co-Chair:
Poria Fajri, University of Nevada-Reno
Marty Bradley, University of Southern California

For a full list of committee members, please review the website at www.itec-conf.com/committee/

Thank you to all of the publication track chairs and many reviewers who served countless hours. You made it possible to accommodate a record number of submissions this year!

STEERING COMMITTEE

ITEC STEERING COMMITTEE

Bogdan Borowy, Satcon Technology Corporation
Rik DeDoncker, RWTH Aachen University
Deepak Divan, Georgia Institute of Technology
Ali Emadi (Chair), McMaster University
Babak Fahimi, University of Texas at Dallas
Silva Hiti, Rivian
Phil Krein, University of Illinois at Urbana-Champaign
John M. Miller, Oak Ridge National Laboratory
Jim Nagashima, Nagashima Advanced Technology Consulting
Kaushik Rajashekara, University of Texas at Dallas
John Shen, Simon Fraser University
Peter Steimer, ABB Switzerland Ltd.
Keynote 1: Progress of Research on New Energy Powertrain for Electric Vehicles

Minggao Ouyang, Director of the China-US Clean Vehicle Joint Research Center at Tsinghua University, Beijing, China.

June 15, 2022 | 8:30 AM-9:00 AM | Carousel Ballroom.

With systematic innovations in electrified powertrain technologies for electric vehicles (EVs), hybrid EVs, and fuel-cell vehicles, Ouyang Minggao has made these evolving modes of transportation safer and more durable. Thermal runaway of batteries often causes serious safety accidents in electric vehicles. Minggao has revealed the thermal runaway initiation and propagation mechanism and developed thermal runaway mitigation techniques for battery system to make EVs safer, that has spurred the development of international safety standards. To cope with the performance degradation of hydrogen fuel cells for vehicles, he developed a fuel cell-battery hybrid powertrain with model-based energy management and degradation diagnosis system for a city bus that ran successfully during the 2008 Beijing Olympic Games. His innovations have been adopted by battery and automobile manufacturers worldwide.

An IEEE member, Minggao is a professor and director of the China-US Clean Vehicle Joint Research Center at Tsinghua University, Beijing, China.

Keynote 2: Remaining Challenges for Electrifying the World

Alexander Hitzinger, Board Member, Advisor of Several Tech-Companies

June 15, 2022 | 9:00 AM-9:30 AM | Carousel Ballroom

Alexander Hitzinger has worked for many prestigious companies over the years. He has held leading engineering positions at Cosworth, Red Bull Technology, Porsche, Apple and the Volkswagen Group. At Porsche he led the team to win the 24hour of Le Mans race. At Apple he was leading Product Design for autonomous transportation. Until recently, has been CEO of Artemis GmbH where he oversaw as Chief Architect the revolutionary new vehicle concept for next generation autonomous mobility with the flagship-product Audi Landjet. Alexander has always had a passion for learning and growing. He has an Executive MBA from Warwick Business University in the UK and his undergrad Mechanical Engineering from the University of Applied Science in Landshut, Germany. Earlier this year Alexander took on the role of Chairman of the Board of Directors at Tau Motors Inc and several over Board roles at Technology companies in the US and Israel.
Vincent Schachter is currently Head of Global Energy Services at ENEL X e-Mobility, in charge of Vehicle-Grid Integration. He also serves as CEO of ENEL X France. From 2016 to 2018 he was Senior Vice-President, Energy Services at eMotorWerks, a Bay Area startup pioneer in the Vehicle-Grid integration space. eMotorWerks was acquired by Enel Group, the largest integrated utility in Europe, in October 2017. As Senior Advisor & Entrepreneur in Residence at Engie in 2016-2017, he designed disruptive large scale business models in the Distributed Energy Resources + digital arena, which led to “Energy Communities” business model and initial offers. As Vice President R&D at Total New Energies from 2009 to 2016, he built Total’s cleantech R&D from the ground up into a prominent international player in the fields of solar PV and industrial biotechnology. Vincent received his PhD in Computer Science from Ecole Normale Supérieure in Paris. He is a fellow of the American Institute for Medical and Biological Engineering and co-recipient of a US Presidential Green Chemistry Award.

Terence Ward is currently a Senior Principal Engineer for Energy Storage Systems, Powertrain and Thermal at Faraday Future. Mr. Ward has 37 years of aerospace and automotive experience. After working in aerospace, he began his automotive experience in 1994 working on the power inverter for General Motor’s EV1 electric vehicle. He has worked on IPM, induction and axial flux traction motors, power inverters, charging and energy storage systems. He has over 30 patents and co-authored three papers in the field of EVs - two of the papers were awarded Best Paper by IEEE Industry Applications Conference, 2004 and IEEE Energy Conversion Congress and Exposition, 2014. He was awarded a Chairmans Honors award and two Charles L. McCuen awards for excellence and innovation at General Motors. He is a Professional Engineer with retired status and has a B.S. degree in Mechanical Engineering from the University of Nebraska and an M.S. Degree in Materials from the of University of Southern California.
Mr. Bob Pearce is the Associate Administrator for NASA's Aeronautics Research Mission Directorate (ARMD). He manages the agency's aeronautics research portfolio and guides its strategic direction, including research in advanced air vehicle concepts, airspace operations and safety, integrated aviation systems, and the nurturing and development of transformative concepts for aviation. Bob has experience in all aspects of aviation R&D, including serving as Deputy Director of the FAA-led Next Generation Air Transportation System (NextGen) Joint Planning and Development Office (JPDO). Bob began his career as a design engineer at the Grumman Corporation, working on such projects as the Navy's F-14 Tomcat fighter and DARPA's X-29 Forward Swept Wing Demonstrator. He earned a Bachelor of Science degree in mechanical and aerospace engineering from Syracuse University, and a Master of Science degree in technology and policy from the Massachusetts Institute of Technology.

Peter Savagian is Founder and Principal at Electrified Future, Inc. He advises and consults for companies and venture capital firms in the electrification of transport and mobility and related services. He has pioneered in the EV industry for more than three decades. At General Motors he was Chief Engineer and Engineering Director of Propulsion systems. His work there included the 1996 GM EV1, a full range of hybrid vehicles, the Chevy Volt - industry-first Plug-in Hybrid Electric Vehicle, and the 2017 Chevy Bolt EV. He has served on the board of Directors at ElectraMeccanica vehicles, has led engineering and purchasing activities at EV startups Faraday Future and Canoo as well as electric aircraft startup Ampaire. Pete is presently an advisor to Sibros Technologies, an automotive software connectivity company and has several current advisory clients. He also is affiliated as a lecturer at the University of Wisconsin. He holds 45 patents and has authored 17 technical publications. Pete has a BS in Mechanical Engineering from the University of Wisconsin, an MS in Operations Research Engineering from the University of Southern California, and an MBA from Duke University.
PLENARY SESSION 2:
JUNE 16 | 8AM-12PM | CAROUSEL BALLROOM

KEYNOTE 7: RESEARCH AND EDUCATION PROGRAMS IN ENERGY, POWER, CONTROL NETWORKS
MAHESH KRISHNA MURTHY, PROFESSOR AT ILLINOIS INSTITUTE OF TECHNOLOGY AND EXPERT AT THE NATIONAL SCIENCE FOUNDATION
JUNE 16 | 8:30AM-9AM | CAROUSEL BALLROOM

Dr. Mahesh Krishnamurthy is an Expert at the Energy, Power, Control, and Networks (EPCN) program in the Division of Electrical, Communications, and Cyber Systems (ECCS) at the National Science Foundation. He is also a Professor of Electrical Engineering and Academic Director of the Kaplan Institute of Innovation and Tech Entrepreneurship at Illinois Tech. He is also the Director of the Grainger Power Electronics and Motor Drives Laboratory and has been awarded several teaching and research awards. He served as a Distinguished Lecturer with the IEEE-Vehicular Technology Society from 2011-2013 and 2013-2015 and Distinguished Speaker from 2015-2018 and 2018-2021. He has co-authored over 150 scientific articles, book chapters and technical reports and has 17 issued US patents with several pending. He is currently the Editor-in-chief for IEEE Transactions on Transportation Electrification, Editor for IEEE Electrification Magazine and Chair for the PELS Technical Committee (TC4) on Electrified Transportation Systems.

KEYNOTE 8: TRANSFORMING TRANSPORTATION FROM 2D TO 3D
GALEN CHUI, SENIOR VICE PRESIDENT OF ENGINEERING AND PRODUCTS, CUBIC TRANSPORTATION SYSTEMS.
JUNE 16, 2022, 9:00 AM-9:30 AM, CAROUSEL BALLROOM.

Galen Chui brings over seventeen years of engineering experience to his role as Senior Vice President of Engineering and Products at Cubic Transportation Systems. He worked for over a decade in Aerospace, developing various product lines on aircraft (hydraulics, actuation systems, fuel systems, and different engine solutions such as dynamic seals). He held multiple leadership roles within Eaton and had the opportunity to build a start-up organization within their Aerospace group which focused on electrification and digitalization. Galen also developed the next-generation construction equipment at Case New Holland and created the first electro-hydraulic construction equipment line for CNH (skid-steer loaders, dozers, TLB, and WHEX). In his role at Cubic, he most recently helped develop the Centre of Excellence for Artificial Intelligence and Smart Mobility between Cubic and McMaster University. This program aims to develop the next generation of diverse engineers, scientists, and leaders to deliver the future of public transportation for all. Galen earned his BSc in Electrical Engineering from Harvey Mudd College, an MBA from UCLA Anderson School of Management, and he holds a PMP certification and SAFe Agilist Certificate.
KEYNOTE 9: GE AVIATION BRINGING HYBRID ELECTRIC FLIGHT TO REALITY
CHRISTINE ANDREWS, EXECUTIVE, HYBRID ELECTRIC SYSTEMS, GE AVIATION
JUNE 16, 2022 | 9:30 AM-10:00 AM | CAROUSEL BALLROOM

Christine is the Hybrid Electric Systems leader for GE Aviation, responsible for the advancement of all power electronics technology development and integration with the gas turbine. Previously, Christine served as the Business Program Manager for the Aviation business at GE Research, where she evaluated future technologies and developed relevant aviation technologies from supporting next generation platforms to servicing existing fleet to improve revenues. Christine has been at GE for 9 years, and has held various leadership positions across many disciplines within aviation engineering that have yielded many technology advancements in both the combustor and augmentor modules. She has an excellent track record of establishing and maintaining strong customer relationships by consistent execution of government programs. Prior to joining GE, Christine held various engineering positions at Gulfstream Aerospace.

KEYNOTE 10: ELECTRIFICATION POTENTIAL IN THE SUB 100 PAX AIRPLANES
JEAN THOMASSIN, EXECUTIVE DIRECTOR, NEW PRODUCT AND SERVICE INTRODUCTION, PRATT & WHITNEY CANADA.
JUNE 16, 2022 | 10:30 AM-11:00 AM | CAROUSEL BALLROOM

Jean Thomassin was appointed Executive Director, New Product and Service Introduction (NPSI) at Pratt & Whitney Canada in 2020. In his role, Jean oversees the company’s efforts to develop enterprise level requirements for future sustainable propulsion systems, technologies and business models. Jean assumed this role after acquiring more than 20 years of experience working for Pratt & Whitney Canada and Raytheon Technologies Corporation’s Chief Technology Office (CTO). More specifically, he joined the CTO after serving for two years as Senior Director, Systems Engineering at Pratt & Whitney Canada. He is leading a joint collaboration between Pratt & Whitney and Collins, to develop a hybrid-electric propulsion technology demonstrator. In addition to these responsibilities, Jean played a key role in the development of innovative new technologies. Jean holds a bachelor’s degree in electrical engineering from the University of Sherbrooke, a master’s degree in mechanical engineering from Concordia University, and a Ph.D. in mechanical engineering from the University of Montreal.
Mr. Kimchi is a technology veteran and an industry pioneer working at the intersection of robotics, AI, physics, and safety engineering. When Amazon.com, Inc. (Nasdaq: AMZN) in 2012, he co-founded the Amazon Prime Air delivery-by-drone project and led the organization for the next seven years to its FAA certification as a Part 135 commercial airline. Prior to Amazon, Mr. Kimchi spent ten years at Microsoft (Nasdaq: MSFT) where he was integral in the development of key technologies including Virtual Earth & Bing Maps, Contextual & Geosocial search, Cloud Infrastructure, Augmented and Virtual Reality, and Enterprise Communications. A veteran of five early stage companies, Mr. Kimchi served on the board of Waze (acquired by Google) and was one of the early developers of VoIP technology and IP-based telecommunications interoperability standards. Mr. Kimchi is a founding member of the Federal Aviation Administration Drone Advisory Committee, and worked in collaboration with the FAA, SESAR, NASA, and ICAO on the development of the Federated Airspace Management Architecture, enabling the safe integration of UAS and UAM into the airspace around the world.

Prof. Anna Stefanopoulou, is the William Clay Ford Professor of Technology at the University of Michigan. She was an assistant professor at the University of California, Santa Barbara, a visiting professor at ETH, Zurich, and a technical specialist at Ford. She earned her diploma in Naval Architecture and Marine Engineering (91, NTUA, Athens), her PhD in Electrical Engineering (96, UMICH, Ann Arbor). She is a Fellow of the ASME (08), IEEE (09), and SAE (18). She has one book, 21 US patents, 400 publications (7 of which have received awards) on estimation and multivariable control of engines, fuel cells, and batteries.
The hydrogen economy often seems just around the corner, but the recent interest and growth in hydrogen projects and products for heavy duty transportation may finally make it a reality. In aviation, multiple organizations inside and outside the U.S. are studying and developing small and large aircraft that use hydrogen to address zero-emission goals. In this panel, leading researchers and industry experts will discuss the challenges and successes of using hydrogen to power heavy duty transportation and aircraft, and seek to define similarities and differences among these sectors. Are there ways to leverage ongoing and future activities that could accelerate development for both?

Speakers:

**MARTY BRADLEY**  
(MODERATOR)  
AIAA Fellow and Professor, University of Southern California

**MICHEL DELAFONTAINE**  
President, Alternative Aviation Fuels

**ARNAUD NAMER**  
Head of Strategy, Universal Hydrogen

**VAL MIFTAKHOV**  
Founder & CEO - ZeroAvia

**TIM BROWN**  
President and Founder, FirstElement Fuel Inc
The increasing integration of electric vehicles (EVs) into our society brings unprecedented opportunities and challenges for the power system. This panel will focus on EV charging systems, such as low-power onboard charging and high-power offboard charging, as well as the impacts of these charging systems on the electric grid. For example, smart-charging strategies can help manage the load during peak times, and EVs could in the future act as power supplies to the grid during peak times or outages. To explore these concepts, grid-to-vehicle (G2V), vehicle-to-grid (V2G), and vehicle-to-other-system (V2X) charging will be discussed. This panel will also cover engagement of the electric power industry in transportation electrification, design of fleet replacement programs and charging schedules specific to vehicle duty cycles to minimize ongoing costs. This panel will bring together researchers and industry experts to discuss the opportunities and challenges of this emerging paradigm.

**Speakers:**

**MICHAEL GINSBERG (MODERATOR)**
VP of Energy Transition, Bowman

**VINCENT WEYL**
Senior VP of Growth at IoTecha Corp

**KAREN HSU**
Sr. Director of Utilities Business Development, Enel X Way

**AARON SCHNEIDER**
Business Development Manager - Utilities & Energy Services, Ford Pro

**MATTIAS PREINDL**
Associate Professor of Power Electronic Systems, Columbia University

**VIPUL GORE**
President & CEO at Gridscape Solutions

**DEVI MOHAN**
Managed Charging Lead, Con Edison

**YING SHI**
Technical Specialist at Lucid Motors’ Battery Software team
Electrified Flight Development Programs Panel: There is no shortage of cool internet images and YouTube videos of electrified aircraft concepts. But many of these “products” are nothing more than fancy animations. This panel will highlight the innovators and companies that have turned electrified aircraft dreams into reality, with flight demonstrations of their concept aircraft. Panelist will discuss what they have learned about system components capabilities and limitations, getting experimental and nearly revenue generating aircraft into the sky, working with regulators and suppliers, and what the potential operational benefits of these aircraft applications could be. Aircraft applications targeting advanced air mobility, thin haul short duration missions, regional aircraft and even larger commercial enterprises will be discussed. This panel continues to be a favorite among conference attendees, as panelists are encouraged to discuss what went well, and what they would have done differently.

Speakers:

GOKCIN CINAR (MODERATOR)
Assistant Professor of Aerospace Engineering,
University of Michigan

JOSEF KALLO
Founder & CEO - H2Fly

REAGH SHERWOOD
National Research Council Canada

SUSAN YING
SVP Global Operations,
AMPAIRE

PATRICK ZDUNICH
Senior Researcher in Electric Aircraft at the National Research Council of Canada’s Flight

SERGIO CECUTTA
Partner at SMG Consulting

ERIKA HOLTZ
Engineering & Quality Manager Harbour Air Group
EPFD will sponsor a Panel on “Transformational Opportunities through Aircraft Propulsion Electrification.” Panel members will address EAP opportunities to transform aviation by introducing sustainable, environmentally friendly next-generation aircraft serving the thin haul/commuter, regional and single-aisle markets. Bob Pearce, NASA Associated Administrator for ARMD, will address NASA’s Strategy, Programs, and Progress for Aircraft Electrified Propulsion Technology in his keynote remarks. Gaudy Bezos-O’Connor, Project Manager of EPFD, will be the EPFD Panel moderator, where we anticipate EAP leaders from NASA, EPFD partners, and Industry Risk Reduction Partners will be represented on the panel.

Speakers:

GAUDY BEZOS-O’CONNOR  
Project Manager, 
Electrified Powertrain 
Flight Demonstration (EPFD) Project - NASA

JEFF ENGLER  
Co-Founder and CEO of 
Wright Electric

RALPH JANSEN  
Deputy Project Manager for Technology - NASA 
EPFD Project

AMY JANKOVSKY  
Project Manager at NASA 
Glenn Research Center

ED LOVELACE  
Chief Technology Officer, 
Ampaire Inc

CHRISTINE ANDREWS  
Executive, Hybrid Electric Systems, GE Aviation

SARA ROGGIA  
Senior Electric Propulsion System Engineer and Technical Fellow

ZUBAIR BAIG  
Sr. Manager, Electric Propulsion, Pratt & Whitney
The onboard battery technology is an inevitable topic when it comes to transportation electrifications. Not only does it primarily determine the driving range but also it has a high impact on charging speed. Advanced battery cell and pack designs and sensing strive to minimize manufacturing cost and maximize the hardware capability. Complimentarily, unlocking the battery's full potential requires accurate and optimized battery models and algorithms. The experienced academic researchers and seasoned industrial professionals are invited to discuss the tradeoffs of designing and manufacturing battery cells and packs, battery algorithm design strategy based on various cell chemistries, challenges of fast charging, advanced battery sensing, and the future trends of battery chemistry and algorithm improvements.

Speakers:

**YING SHI**
Technical Specialist, Battery Software & Control - Lucid Motors

**AUSTIN DULANEY**
Principal Data Scientist at Liminal Insights

**HUAZHEN FANG**
Associate Professor, University of Kansas

**SHASHANK SRIPAD**
Battery researcher and PhD Candidate at Carnegie Mellon University

**YUZHANG LI**
Assistant Professor, University of California, Los Angeles
The electric propulsion system, encompassing fuel cells, turbogenerators, batteries, distribution, inverters, converters, motors and propulsors, is the heart of an electrified aircraft. Technology advances continue to enable economically feasible and reduced emissions electric aviation applications. The providers of current and future propulsion systems along with university researchers pushing the limits of efficiency and power density, will discuss the technology advances, their perspective on feasible electrified aviation applications and missions, and their vision for zero carbon aviation. Panelists will describe propulsion system architectures under development, the component performance levels required and the potential aircraft, mission and societal benefits of these architectures applied to applications.

Speakers:

PASCAL THALIN
(MODERATOR)
Director, Aerospace Standards, Technology & Innovation

PETER DEBOCK
Program Director, ARPA-E

TODD SPIERLING
Sr Technical Fellow - Electrification, Collins Aerospace

ARIF SALAM
Chief Engineer, Honeywell
Aside from power electronics and batteries, the electric motor is the most crucial component in the EV powertrain. Regardless of the long history of electric motors, they are still advancing regularly with novel designs featuring higher efficiency, improved performance, as well as more cost-effective materials. Fewer losses in motors enable extended range given the same size of the battery. High power and torque density ensure a more compact package, allowing EVs to provide more space with less weight. Different types of electric motors have been adopted in EVs. Each type has its own advantages therefore sometimes a combination of different types of motors is used as an optimal trade-off among cost, efficiency, and performance. In this panel, the industry experts will elaborate on their practical design experiences and realistic challenges. The academic professors will discuss and demonstrate the emerging technologies and future trends of electric motor design and control.

Speakers:

BERKER BILGIN
Assistant Professor at McMaster University

PIYUSH DESAI
Co-Founder & Vice President of Motor Design, Turntide Technologies

PHILLIPPE WENDLING
Vice President, GTT Low Frequency Electromechanical Applications, Altair

HENGCHUN MAO
Quanten Technologies

PETER SAVAGIAN
Founder and Principal, Electrified Future, Inc.
Wide bandgap (WBG) devices are now firmly planted into the design phases of many terrestrial electrified vehicles in order to achieve significant system-wide benefits. Yet questions regarding their reliability remain, especially in the aircraft operation environment. Readiness for aircraft applications remains to be answered. This panel will discuss device performance requirements, reliability issues, and qualification standard gaps associated with unique features of WBG devices, and converse successful stories as well as risk mitigation recommendations to aid in the continued growth of these game-changing devices in a much broader industrial application landscape.

Speakers:
As electrification is applied to increasingly higher power demand applications (trucks and aircraft), operation at high voltage (800 V to 3 kV) is required so that current is kept low for low losses and heat generation. High voltage operation comes with new design challenges to control partial discharge and arcing. For aviation applications operation at altitude is even more challenging as partial discharge initiation voltage can drop radically with increasing altitude and air pressure. Design standards and even fundamental physics understanding of material degradation under high field is lacking. This panel of industry and academic experts will discuss the challenges, technical approaches and ongoing research efforts in HV operation and distribution.

Speakers:

IAN COTTON
University of Manchester

RICHARD ANDERSSON
PhD, Electrical Engineer at Habia Cable AB

THIERRY LEBEY
Head of Research on High Voltage Engineering, Electrical and Electrics Department, Safran Tech

JEAN RIVENC
Expert in High Voltage, Partial discharges, Arc and Plasmas Technologies

PASCAL THALIN
Director, Aerospace Standards, Technology & Innovation
Wireless charging of electric vehicles continues to be a fascinating and critical area of research and development. Stationary wireless charging opens up great convenience for drivers and the possibility of future vehicles that can be fully autonomous while driving and charging. Dynamic wireless charging poses more challenges, but has the potential for even more benefits, as electric vehicles could charge while driving, reducing battery size and cost, and greatly increasing driving ranges. This panel brings together experts from academia and industry to discuss the latest developments and successes in the exciting field of electric vehicle wireless charging.

Speakers:

KHURRAM AFRIDI (MOTERATOR)
Associate Professor at Cornell University

OMER ONAR
(R&D Staff at Oak Ridge National Laboratory

FRANK MCMAMON
SVP, Research & Development at Momentum Dynamics

MILISAV DANILOVIC
Senior Principal Scientist, WiTricity

REGAN ZANE
Center Director
Utah State University
It has been a headline for about half a decade that autonomous vehicles are around the corner. Years later, we still have not seen a single vehicle that can completely and legally drive itself in any condition without a driver's interference. However, as more and more breakthroughs emerge in the AI field and an increasing amount of OEMs investing in autonomous driving, the future seems attainable. What have been the challenges that the researchers are facing? The regulations or technical bottlenecks? The industrial experts from the leading companies in this field will elaborate on the difficulties, the current status, and future trends of autonomous vehicles.

Speakers:

**MOHAMADREZA AHMADI (MODERATOR)**
Senior Research Scientist at TuSimple, La Jolla, CA

**YUXIAO CHEN**
Research scientist, Nvidia

**BEHRAD TOGHI**
Honda Research Institute

**ERIC WOLFF**
ML-based Planning for Autonomous Vehicles, Motional
SHORT COURSE 1: JUNE 15 | 2PM-5:30PM | DORIA
Fuel Cells for Aircraft Electrification
SPEAKER: DACONG WENG, SENIOR TECHNICAL CONSULTANT, BLUE SPIRIT AERO

In this short course, participants will learn about fuel cell power system and its application for aircraft electrification. The course will focus on following topics for proton exchange membrane (PEM) fuel cell and solid oxide fuel cell (SOFC) power systems:

- Fuel cell fundamentals in chemistry, thermodynamics, kinetics, and mass transfer
- PEM fuel cell power system and applications
- SOFC power system and applications

See Whova for detailed description.

SHORT COURSE 2: JUNE 15 | 2PM-5:30PM | SONIA
System Modeling and Digital Twin - From Concept to Virtual Prototype
SPEAKER: ARASH HASSANPOUR, LEAD APPLICATION ENGINEER, ANSYS

1) “Electric Machine Concept Evaluation”: This will be done using MotorCAD lumped-parameter Multiphysics. Most of this work would be in the tool examining machine performance across the different modules (emag., therm., lab., and mech.) assessing/creating an initial design against a specification for further optimization and system modeling.

(2) “Virtual Prototype of an Electrical Machine”: This will be shown from studies previously completed using System Modeling, Digital Twin, and Optimization tools within MotorCAD FMU’s to Simulink or Twinbuilder, and Ansys Optislang). There may be some live demo on the system simulation, but there will primarily be prepared materials for the Optimization. See Whova for detailed description.
Developing battery systems for modern electric vehicle applications requires a cross-functional team of engineers. Design challenges arise at all stages of the V-cycle, and a range of simulation tools are necessary to study the system. In this short course, MathWorks will show how to use tools like Powertrain Blockset, Simscape and Simulink Test to create accurate EV models and verify that they meet the system level requirements. We will describe detailed models of battery pack and software algorithms of battery management system describe both the physical plant models and controllers such as the Battery Management System that form the closed-loop simulation framework necessary to evaluate the battery performance over a range of test cases. We will show software-in-loop and hardware-in-loop testing methods to gain confidence after every design iteration.

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**SHORT COURSE 3: JUNE 16 | 2PM-5:30PM | BOHEMIA**

**USING SIMULINK FOR BATTERY SYSTEMS DEVELOPMENT**

**SPEAKER 1: MIKE SASENA, AUTOMOTIVE PRODUCT MANAGER, MATHWORKS**

Mike Sasena is a product manager, focusing on the automotive products developed at the MathWorks office in Novi, Michigan. Prior to joining MathWorks, Mike spent 14 years working on model-based system engineering projects for the automotive industry. His experience includes hybrid electric vehicle modeling for fuel economy analysis, Model Predictive Controls development and heterogeneous system simulation.

**SPEAKER 2: CHIRAG PATEL, SR. APPLICATION ENGINEER – CONTROL SYSTEMS, MATHWORKS**

Chirag Patel works with engineers working on control systems to streamline the transition from desktop simulations to real-time testing and hardware-in-loop (HIL) testing. Prior to joining MathWorks, Chirag worked at Lucid Motors, where he led the efforts of adopting Model-Based Design for electric powertrain, developed algorithms for battery management system and built HIL test system for vehicle control systems.

**SHORT COURSE 4: JUNE 16 | 2PM-5:30PM | DORIA**

**ELECTRIC ENGINES FOR AIRCRAFT VS. ELECTRIC TRACTION DRIVES**

**SPEAKER 1: EVGENI GANEV, CEO, EMPS CONSULTING LLC**

Dr. Evgeni Ganev is CEO of EMPS (Electromechanical Power Systems) Consulting LLC. His main interest is in electrification of the aerospace and automotive industries. He is focused on the powertrain of the electric and hybrid propulsion platforms. He has 40 years of engineering experience, 30 of which with Honeywell Aerospace as a Chief Engineer for EMPS.

**SPEAKER 2: ARIF SALAM, CHIEF ENGINEER FOR ELECTROMECHANICAL ACTUATION CONTROLS AND ELECTRIC POWER SYSTEMS AT HONEYWELL AEROSPACE**

Arif Salam is a Chief Engineer for Electromechanical Actuation Controls and Electric Power Systems at Honeywell Aerospace. He is currently the Principal Investigator for ARPA-E ASCEND project and the chief engineer for actuation controls and electric propulsion systems for UAM applications.

Electric Engines (EE) for aircraft will be compared with Electric Traction Drive Systems (eTDS) for terrestrial applications in the light of the electrification megatrend. It is clear that both aerospace and ground vehicles industries are experiencing massive electrification. It is particularly applicable to the propulsion systems and components. Major vehicle and power train architectures will be reviewed for both applications as well as the requirements for the entire systems and the major components. Priorities for both industry segments will be established and quantified. Full course description viewable in Conference App or online program.
This short course focuses on a novel family of software-defined power converters that aggregate atomic power electronic converter modules. These atomic modules are aggregated by a dedicated software stack. Special focus will be given to this software stack and how it can be leveraged for increasing flexibility and reprogrammability. This course will also present two examples of standardized atomic power hardware. From the analysis of these two examples, we will present the merits and challenges of software defined power electronics. As such, we will discuss reducing complexity, addressing electromagnetic compatibility (EMC), and component protection from the higher-level functional converter operation. The resulting converters are modular and reconfigurable with partial redundancy and self-healing properties. See Whova for detailed description.
Our path to discovery will focus on the analysis and optimization of a traction motor. The session will address the initial design using fast simplified multiphysics solutions in a specialized environment. This initial design will be enhanced by optimization.

The next step of the design will extend to a series of full finite element solutions in a dedicated environment. The dedicated environment provides customizable and scalable solutions, empowering the user to select and define the physics involved and the associated computations for optimization.

Electromagnetics, thermal and structural analysis, systems and NVH are part of these involved computations.

This session will offer some hands-on experience for the part related to the initial phase of the design. Make sure to bring your laptop for the hands-on part of this session.

In a race for sustainability and green energies, a multiphysics approach to the design of electrical machines is a must. In this session, we will discover some solutions available today to address the multiphysics concerns of the design and optimization.

- Our path to discovery will focus on the analysis and optimization of a traction motor. The session will address the initial design using fast simplified multiphysics solutions in a specialized environment. This initial design will be enhanced by optimization.
- The next step of the design will extend to a series of full finite element solutions in a dedicated environment. The dedicated environment provides customizable and scalable solutions, empowering the user to select and define the physics involved and the associated computations for optimization.
- Electromagnetics, thermal and structural analysis, systems and NVH are part of these involved computations.
- This session will offer some hands-on experience for the part related to the initial phase of the design. Make sure to bring your laptop for the hands-on part of this session.

SPEAKER 1: LIWEI ZHOU, RESEARCH ASSOCIATE, MP LAB, COLUMBIA UNIVERSITY.
Liwei Zhou (Graduate Student Member, IEEE) received the B.E. and the M.E. degrees both in electrical engineering from Shandong University, Jinan, China, in 2014 and 2017, respectively. He obtained the Ph.D. degree in electrical engineering from Columbia University, New York City, in 2022.

SPEAKER 2: MATTHIAS PRIENDL, ASSOCIATE PROFESSOR, COLUMBIA UNIVERSITY, GENERAL CHAIR, ITEC+EATS 2022.
Matthias Preindl (Senior Member, IEEE) received the B.Sc. degree in electrical engineering (summa cum laude) from the University of Padua, Padua, Italy, in 2008, the M.Sc. degree in electrical engineering and information technology from ETH Zurich, Switzerland, in 2010, and the Ph.D. degree in energy engineering from the University of Padua, in 2014.

SPEAKER 3: LUIZ FERNANDO LAVADO VILLA, ASSOCIATE PROFESSOR AT UNIVERSITY OF TOULOUSE, JEAN ALINEI, PRODUCT ENGINEER AT CNRS, MEMBER IEEE
Luiz Fernando Lavado Villa received his PhD in power electronics for renewable energy management from the University of Grenoble in 2013. He joined the University of Toulouse as an associate professor in 2014.

SPEAKER 4: JEAN ALINEI, PRODUCT ENGINEER AT CNRS, MEMBER IEEE
Mr. Jean Alinei is a product engineer at CNRS. He is leading the technical development of software defined power converters with Dr Villa. Prior to joining the LAAS-CNRS, Jean worked in the renewable field for major companies such as the french utility EDF and GE renewables.
TUTORIAL 1: JUNE 15 | 2PM-3:30PM | GLORIANA A
Thermal Loss Modeling for System-Level Simulations of Automotive Applications
Speaker: Kristofer Eberle, Director of Business Development, Plexim, Inc.

In this tutorial, participants will learn the details of thermal modeling approach in the context of common automotive applications, including three-phase traction inverter and EV charger power stages, using the PLECS simulation engine. PLECS further allows full control over the thermal structural model level of detail, including all transitions between the chip and ambient environment, so one can design a cooling solution suitable for each particular application. Full tutorial description viewable in Conference App.

TUTORIAL 2: CANCELLED

TUTORIAL 3: JUNE 16 | 4PM-5:40PM | GLORIANA A
Design of Electrified Propulsion Aircraft
Speaker: Marty Bradley, Sustainable Aviation Consultant & Fellow of the AIAA, Adjunct Lecturer at the University of Southern California, Senior Technical Fellow at Electra.aero and retired Boeing Technical Fellow

In this tutorial, participants learn about current developments in electrified propulsion, with an emphasis on electric and hybrid electric aircraft. Design examples will include aircraft of various sizes and missions. Powertrain architectures will be examined including pure electric, parallel hybrid, serial hybrid, and combinations with both combustion engines and fuel cells. The top technology challenges will be discussed.

TUTORIAL 4: JUNE 16 | 4PM-5:40PM | DELICIA
Tutorial 4: Li-ion and beyond Li-ion systems to power electric urban and regional air mobility
Speaker: Shashank Sripad, Battery researcher and PhD Candidate at Carnegie Mellon University

We will explore how Li-ion and Li-metal chemistries are evolving and how they enable electric urban air mobility. We will explore how to analyze the power and energy tradeoffs that Li-ion and Li-metal systems present. We will also discuss electric urban air mobility from an energy efficiency standpoint, comparing them to terrestrial vehicles.
In this tutorial, participants learn about the history and current developments in sustainable aviation. Participants will learn about the various topics related to sustainable aviation that include noise, alternative fuels (biofuels, synthetic fuels, methane, and hydrogen), and lifecycle environmental impact and analysis. The possible advantages and challenges of each type of alternative fuel and energy will be discussed. Electric aircraft will also be discussed, but to a limited extent. For more detailed instruction on electric and hybrid electric propulsion and aircraft, see the tutorial on “Design of Electrified Propulsion Aircraft”.

Join Fabrizio Martini, CEO and Co-Founder of Electra Vehicles, Inc., for a presentation on the Adaptive Cell Model, the continuously updating, AI solution to achieving accurate battery modeling and extrapolating intelligent battery control decisions. The onboard AI battery pack controls are trained on detailed laboratory cell simulations before installing the controls onboard vehicles. Once installed, the AI models continuously learn from on-the-road environmental, vehicle, driver, and BMS data to update the model according to real-time battery pack usage using Over-the-Air (OTA) Cloud updates. This allows the AI software to monitor and predict battery fault events like extreme capacity fade in time to correct battery usage for safer, more efficient charge and discharge strategies. Fabrizio Martini is proud to present this and more at ITEC + EATS 2022.
To optimize the performance of an electric powertrain, its efficiency must be verified both during development and during operation with measurements. These measurements will have an associated measurement uncertainty (MU) due to the accuracy of the measuring device and environmental conditions of the test. The MU indicates the probability with which a measurement result is in a specified interval around the “true” value. The measurement result therefore generally does not match the actual value, so that each real measurement is subject to a certain measurement deviation/error. This measurement error propagates from the measured quantities to other quantities calculated from these measurements. An error in voltage and current measurement, for example, propagates to the electric power, efficiency and ultimately the range of a vehicle. This presentation explains the estimation of measurement uncertainty for electric power motors and inverters. There will be a real-world example and methods to improve measurement uncertainty.

In this session, Marsilli presents some new innovations for e-Traction motor winding and battery cell connection systems. To satisfy the market requests for high performing and efficient motors, Marsilli developed a new Distributed High Density (DHD) winding technology. To prove its features, two DHD-wound prototypes are used in a comparative analysis with a hairpin-wound motor. Data and results will be discussed during the session. This study is followed by a presentation of ad-hoc winding techniques for rare-earth-material-free rotors. The final part of the session is dedicated to a new automated system for Lithium-Ion-battery Cells Connection designed to be a valid alternative to the technologies currently available on the market.

Battery pack and module testing is becoming more critical than ever. Today, engineers face new challenges including increased complexity of the tests and set-ups, long development and test times, addressing safety requirements and avoiding hazards. Furthermore, testing to the application requires emulating real-world conditions by reacting to CAN, BMS and other communication protocols. In this presentation, learn about:

- Industry trends impacting battery test
- The fundamentals of battery module/pack testing
- How to reduce time to market and improve engineering productivity
- Next generation solutions for battery test
The electric aircraft market needs powerplants that are efficient, high performance, and compatible with both current and future infrastructure. VerdeGo built its first “iron bird” powertrain around an aviation diesel engine to leverage the ultra-high efficiency of diesel cycle engines and compatibility with global jet fuel infrastructure. Liquid fuels are 20X more energy dense than batteries resulting in transformational capability improvements. Electric motors enable aircraft to be designed to be more efficient and to be capable of new missions by merging thrust, attitude control, and active control of aerodynamics. Hybrid-electric powerplants emerged as the link between these two capabilities, to make electrification practical.

The transport sector accounts for 24% of global greenhouse gas emissions equaling 7.3 billion metric tons of carbon dioxide (CO2) emissions annually. Over 90% of the fuel used for transportation is petroleum based, primarily gasoline and diesel and internal combustion engines have proven to be inefficient wasting more than 65% the heat energy they produce. With the world in a race to electrify all types of vehicles, new technologies are emerging at a head-spinning pace. One technology on the rise is the switched reluctance motor (SRM). While SRMs are making inroads in the built environment with HVAC upgrades, there is a strong case to be made for vehicular applications. This presentation will explore top characteristics of SRMs that make it ideal for use in vehicles such as torque density, power and efficiency performance, and materials cost. Additional factors that will be explored include how the extended constant power range is optimal for traction drivetrains, the benefits of the SRM winding arrangement, and how SRMs stack up against IPM designs and win.
SOCIETY MEETINGS
JUNE 16

EATS AIAA EATTC | 7AM-8AM | DELICIA

ITEC STEERING COMMITTEE MEETING | 1PM-2PM | SONIA

TEC COMMITTEE MEETING | 2PM-3:40PM | SONIA

TTE STEERING COMMITTEE & EDITORIAL BOARD MEETING | 4PM-5:40PM | SONIA

JOINT PELS/IAS TECHNICAL COMMITTEE MEETING | 7PM-8:15PM | SONIA

Agenda: ITEC+EATS 2022 Presentation
- 7:00PM-7:10PM ITEC+EATS '22 General Chair: Dr. Matthias Priendl, Columbia University
IEEE Transactions on Transportation Electrification Presentation
- 7:10PM-7:20PM Editor-in-Chief: Dr. Mahesh Krishnamurthy - Illinois Tech
IEEE Power Electronics Society (PELS) Technical Committee on Vehicle and Transportation Systems (TC4)
- 7:20PM-7:30PM Committee Chair: Dr. Mahesh Krishnamurthy, Illinois Tech
IEEE Industry Applications Society (IAS) Transportation Systems Committee
- 7:30PM-7:40PM Committee Chair: Dr. Mohammad Nazmul Anwar
IEEE Transportation Electrification Community
- 7:40PM-7:50PM TEC Chair: Bruno Lequesne– E-motors Consulting, LLC
ITEC 2023 Presentation
- 7:50-8:00PM ITEC’23 General Chair: Dr. Phillip Kollmeyer, McMaster University

Technical Committee Meetings are open to all conference attendees and will discuss the activities of the PELS and IAS technical committees related to vehicle and transportation systems and ITEC. Please participate in these meetings if you are interested in getting involved with the IEEE-PELS and/or IEEE-IAS activities including ITEC, workshops, publications, awards, etc.
FULL DAY WORKSHOP

JUNE 17

POWER ELECTRONICS FOR AEROSPACE WORKSHOP SERIES (PEASA)-HIGH VOLTAGE | 8:30AM-6PM | CAROUSEL BALLROOM A

PEASA 2022 is a one-day workshop co-organized by the Technical Committee on Aerospace Power (TC11) of the IEEE Power Electronics Society (PELS) and 2022 IEEE/AIAA Transportation Electrification Conference and Electric Aircraft Technologies Symposium (ITEC+EATS). It aims to provide a forum for researchers, engineers, policy makers, and stakeholders to share latest developments of power electronics technologies for aerospace applications. Each year, the workshop will focus on a specific topic, such as electric propulsion, electromagnetic interference (EMI), electric vertical take-off and landing (eVTOL), power converters for space applications, control and protection of onboard power distribution systems, radiation hardened designs, reliability, etc. This year’s workshop focuses on high voltage related topics for aerospace power electronics which includes:

- High-performance insulation materials (e.g., high temperature and high dielectric strength)
- Dielectric materials characterization (e.g., dielectric spectroscopy, dielectric strength)
- Insulation material breakdown mechanisms (e.g., space charges in dielectrics)
- Insulation designs for power electronics converters (e.g., electric field grading techniques, overvoltage suppression, and insulation coordination)
- High-voltage cables and connectors
- Preventions of partial discharge, treeing, breakdown and arc
- Insulation reliability under extreme operation conditions (e.g., high altitude, high radiation, high temperature and high dv/dt voltage pulse)
- High-voltage testing techniques and standards
- Insulation condition monitoring, diagnostics and maintenance

ADDITIONAL SESSIONS

JUNE 17

WOMEN IN ENGINEERING LUNCHEON | 12PM-12PM | DELICIA

Title: Personal Journey Through Vehicle Electrification
Speaker: Silva Hiti, Sr. Director of the Electric Power Conversion, Rivian Automotive

The WIE Luncheon presentation given by Silva Hiti, will focus on her personal and professional experience and lessons learned as a woman engineer and engineering leader in the dynamic and growing field of vehicle electrification.

Time will be provided following the presentation for discussion and Q&A.

AIRCRAFT ELECTRIFICATION ROLLING RECAP | 8:30AM-10AM | DELICIA

The Rolling Recap is a summary of aircraft electrification papers and panel sessions from previous technical conferences and symposia worldwide. The Rolling Recap provides a one-chart overview that describes the research and its highlights and critical insights of the work. For the ITEC+EATS Rolling Recap, the panel will show highlights of 2021 Technical Presentations and highlights from the AIAA SciTech 2022. The Rolling Recap panel session will preview highlights from upcoming conferences and symposia, such as the AIAA Aviation 2022 and SciTech 2023. The Rolling Recap panels have been an integral part of both AIAA and IEEE meetings since 2018.
## Wednesday, June 15
### TS 1  Stationary and Dynamic Wireless Charging

Room | Bohemia  
---|---
Chairs: Fei Lu, Xiwen Xu

2PM-2:20PM | 100-KW WIRELESS POWER TRANSFER SYSTEM DEVELOPMENT USING POLYPHASE ELECTROMAGNETIC COUPLERS  
Omer Onar, Gui-Jia Su, Mostak Mohammad, Veda Prakash Galigekere, Larry Seiber, Cliff White, Jonathan Wilkins, Randy Wiles, Oak Ridge National Laboratory, United States

2:20PM-2:40PM | AN ULTRA-FAST WIRELESS CHARGING SYSTEM WITH A HULL-COMPATIBLE COIL STRUCTURE FOR AUTONOMOUS UNDERWATER VEHICLES (AUVS)  
Amr Mostafa{1}, Yao Wang{1}, Hua Zhang{1}, Sekhar Tangirala{2}, Fei Lu{1}, {1}Drexel University, United States; {2}University of North Carolina at Charlotte, United States

2:40PM-3PM | A FREQUENCY MODULATED MAXIMUM POWER POINT TRACKING METHOD FOR WIRELESS CHARGING SYSTEMS  
Xiwen Xu{2}, Tiefu Zhao{2}, Shen-En Chen{2}, Nicole Braxtan{2}, Derek Ward{1}, {1}North Carolina Department of Transportation, United States; {2}University of North Carolina at Charlotte, United States

3PM-3:20PM | DEPLOYMENT OPTIMIZATION OF DYNAMIC WIRELESS CHARGERS FOR ELECTRIC VEHICLES  
Ahmed Elnagdy, Eiman ElGhanam, Mohamed Hassan, Ahmed Osman, American University of Sharjah, U.A.E.

### TS 2  Electric Vertical Takeoff and Landing (EVTOL) Aircraft

Room | Bohemia  
---|---
Chairs: Brian Malone, Vincent Shultz

2PM-2:20PM | Urban Air Mobility: A Preliminary Case Study for Chicago and Atlanta  
Ayush Jha{2}, Nirmi Prabhakar{1}, Dominik Karbowskii{1}, Brian German{2}, {1}Argonne National Laboratory, United States; {2}Georgia Institute of Technology, United States

2:20PM-2:40PM | An Investigation Into Different eVTOL Propulsion Thermal Management Concepts Using Advanced 1-D Simulation Methods  
Thomas Holdstock, Lee Rogers, Drive System Design, United States

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## Thursday, June 16
### TS 3 Efficient and Robust Marine Power Systems

Room | Delicia  
---|---
Chairs: Nasibeh Zohrabi, Petter Sletten

2PM-2:20PM | DEVELOPMENT OF AN INTELLIGENT REAL-TIME CAPABLE ENERGY MANAGEMENT STRATEGY FOR A HYBRID MARITIME PROPULSION SYSTEM CONSIDERING COMPONENT AGING  
Cem Uluabayir, Payas Dinesh Vartak, Dirk Uwe Sauer, Institute for Power Electronics and Electrical Drives, RWTH Aachen University, Germany

2:20PM-2:40PM | PARALLEL OPERATION OF PERMANENT MAGNET SYNCHRONOUS GENERATORS UNDER SIX-STEP OPERATION MODE  
Jonghun Yun{2}, Young-Kwang Son{1}, Seung-Ki Sul{2}, {1}Korea Electrotechnology Research Institute, Korea; {2}Seoul National University, Korea

2:40PM-3PM | HOLISTIC PERFORMANCE BENCHMARKING IN POWER SYSTEMS WITH DISTRIBUTED CONTROL UNDER DISRUPTIVE CYBERATTACKS  
Payam Ramezani Badr{1}, Behnaz Papari{1}, Austin Robinson{3}, Christopher Edrington{1}, Ahmed Abulebdalah{2}, Mustafa Alparslan Zehir{2}, Eman Hammad{3}, {1}Clemson University, United States; {2}Marmara University, United States; {3}Marmara University, Turkey; {3}Texas A&M University, United States

3PM-3:20PM | ECONOMIC CONTROL FOR HYBRID-ELECTRIC SHIPBOARD MICROGRIDS CONSIDERING BATTERY DEGRADATION AND CYCLING LIFE COSTS  
Kaitlyn Sitch, Liang Du Temple University, United States

3:20PM-3:40PM | COMPARATIVE STUDY OF ENERGY EFFICIENCY AND COST OPTIMIZATION IN LOW-EMISSION MARINE POWER SYSTEMS WITH ALTERNATIVE FUELS  
Petter Sletten, Mehd Zadeh, Norwegian University of Science and Technology, Norway
8:30AM-9:50AM | TURBINE ELECTRIFIED ENERGY MANAGEMENT FOR SINGLE AISLE AIRCRAFT
Joseph Connolly{2}, Halle Buescher{1}, Santino Bianco{2}, Jonathan Kratz{2}, Dennis Culley{2}, Aria Amthor{2}, {1}HX5 LLC, United States; {2}NASA Glenn Research Center, United States

9:50AM-10:10AM | ADVANCED 2030 TURBOPROP AIRCRAFT MODELING FOR THE ELECTRIFIED POWERTRAIN FLIGHT DEMONSTRATION PROGRAM
Yu Cai{1}, Jiacheng Xie{1}, Gokcin Cinar{2}, Dimitri N. Mavris{1}, {1}Georgia Institute of Technology, United States; {2}University of Michigan, United States

9:10AM-9:30AM | MODELING AND SIMULATION OF A PARALLEL HYBRID ELECTRIC REGIONAL AIRCRAFT FOR THE ELECTRIFIED POWERTRAIN FLIGHT DEMONSTRATION (EPFD) PROGRAM
Gokcin Cinar{2}, Yu Cai{1}, Russell Denney{1}, Dimitri N. Mavris{1}{1}Georgia Institute of Technology, United States; {2}University of Michigan, United States

9:30AM-9:50AM | MODELING AND SIMULATION OF A PARALLEL HYBRID-ELECTRIC PROPULSION SYSTEM - ELECTRIFIED POWERTRAIN FLIGHT DEMONSTRATION (EPFD) PROGRAM
Konstantinos Milios, Christopher Hall, Andrew Burrell, Joshua Brooks, James Kenny Jr., Jonathan Gladin, Dimitri N. Mavris, Georgia Institute of Technology, United States

9:50AM-10:10AM | Megawatt Electric Aircraft Propulsion Power System Impedance Modelling
Timothy Dever, Peter Kascak, Ralph Jansen, NASA Glenn Research Center, United States

Bernard Steyaert{1}, Michael Eull{4}, Ethan Swint{3}, Wesley Pennington{3}, Matthias Preindl{2}, {1} Columbia University, United States; {2}MPLab, Columbia University, United States; {3}University of Strathclyde, United Kingdom

10:30AM-12:15PM | Future Projections for Electrified Aircraft

8:30AM-8:50AM | A Novel Approach to Dynamic Control of a Three-Phase MOSFET Power Inverter, Based on Bootstrap Constraints
Naser Pour Aryan, Bastian Vogler, Andreas Scheler, SEMIKRON Elektronik GmbH & Co. KG, Germany

8:50AM-9:10AM | A Torque Reference Limiter to Avoid Unstable Region of High-Frequency Signal Injection-Based Sensorless Control
Hyun-Jun Lee{1}, Je-Eok Joe{1}, Hak-Jun Lee{2}, Young-Doo Yoon{1}, {1}Hanyang University, Korea; {2}LS ELECTRIC Co., Ltd., Korea

9:10AM-9:30AM | Suppression of Torque Ripple on MTPA Operation of IPMSM with Voltage Feedforwarding Control
Jae Sang Lim{1}, Yoon-Roo Lee{2}, Hwigon Kim{2}, Seung-Ki Sul{2}, {1}Hyundai Motor Company, Korea; {2}Seoul National University, Korea

10:30AM-10:50PM | Model Predictive Control for the Wound Rotor Synchronous Machine Using Piecewise Affine Flux Maps
Bernard Steyaert{1}, Michael Eull{4}, Ethan Swint{3}, Wesley Pennington{3}, Matthias Preindl{2}, {1} Columbia University, United States; {2}MPLab, Columbia University, United States; {3}University of Strathclyde, United Kingdom

10:50AM-11:10PM | Comparative Study on Pulse Pattern Optimization for High-Speed Permanent Magnet Synchronous Motors
Aathira Karuvaril Vijayan{3}, Dianxun Xiao{3}, Battur Bakthishig{3}, Alan Dorneles Callegaro{3}, Rohit Banawan{1}, Ali Emadi{2}, {1} Eaton Corporation, United States; {2}McMaster Automotive Resource Centre, {3}McMaster University, Canada

11:10AM-11:30PM | Model Predictive Control for the Wound Rotor Synchronous Machine Using Piecewise Affine Flux Maps
Bernard Steyaert{1}, Michael Eull{4}, Ethan Swint{3}, Wesley Pennington{3}, Matthias Preindl{2}, {1} Columbia University, United States; {2}MPLab, Columbia University, United States; {3}University of Strathclyde, United Kingdom

11:30AM-11:50PM | Comparative Study on Pulse Pattern Optimization for High-Speed Permanent Magnet Synchronous Motors
Aathira Karuvaril Vijayan{3}, Dianxun Xiao{3}, Battur Bakthishig{3}, Alan Dorneles Callegaro{3}, Rohit Banawan{1}, Ali Emadi{2}, {1} Eaton Corporation, United States; {2}McMaster Automotive Resource Centre, {3}McMaster University, Canada

Bernard Steyaert{1}, Michael Eull{4}, Ethan Swint{3}, Wesley Pennington{3}, Matthias Preindl{2}, {1} Columbia University, United States; {2}MPLab, Columbia University, United States; {3}University of Strathclyde, United Kingdom

12:10PM-12:30PM | Comparative Study on Pulse Pattern Optimization for High-Speed Permanent Magnet Synchronous Motors
Aathira Karuvaril Vijayan{3}, Dianxun Xiao{3}, Battur Bakthishig{3}, Alan Dorneles Callegaro{3}, Rohit Banawan{1}, Ali Emadi{2}, {1} Eaton Corporation, United States; {2}McMaster Automotive Resource Centre, {3}McMaster University, Canada
10:50AM-11:10AM | BATTERY KEY PERFORMANCE PROJECTIONS BASED ON HISTORICAL TRENDS AND CHEMISTRIES
Blake Tiede, Cody O'Meara, Ralph Jansen, NASA Glenn Research Center, United States

11:10AM-11:30AM | PROJECTING POWER CONVERTER SPECIFIC POWER THROUGH 2050 FOR AEROSPACE APPLICATIONS
Christopher Hall, Chrysoula Lydia Pastra, Andrew Burrell, Jonathan Gladin, Dimitri N. Mavris, Georgia Institute of Technology, United States

11:30AM-11:50AM | SPECIFIC POWER AND EFFICIENCY PROJECTIONS OF ELECTRIC MACHINES AND CIRCUIT PROTECTION EXPLORATION FOR AIRCRAFT APPLICATIONS
Chrysoula Lydia Pastra(1), Christopher Hall(1), Gokcin Cinar(2), Jonathan Gladin(1), Dimitri N. Mavris(1), (1)Georgia Institute of Technology, United States; (2)University of Michigan, United States

11:50AM-12:10PM | AN MBSE FRAMEWORK TO IDENTIFY REGULATORY GAPS FOR ELECTRIFIED TRANSPORT AIRCRAFT
Stephen Glinski, Bija Fazal, Evan Harrison, Mayank Bendarkar, Taylor Fields, Eleni Garcia, Dimitri N. Mavris, Georgia Institute of Technology, United States

TS 8 Electric Traction Machine Design and Analysis

10:30AM-10:50AM | DIRECT CONTACT JET IMPINGEMENT COOLING WITH NON-CONDUCTIVE FLUID FOR POWER CONVERTERS THAT ENABLES INCREASED POWER DENSITY
Matthew Jahnes(1), Michael Owen(2), Wesley Pennington(2), Matthias Freindl(1), (1)MPLab, Columbia University, United States; (2)Tau Motors, Inc., United States

10:50AM-11:10AM | THERMAL MODEL FOR ONLINE TEMPERATURE ESTIMATION OF DC-LINK CAPACITOR AND DC-BUSBARS CONSIDERING VARIABLE SWITCHING FREQUENCY, VARIABLE MODULATION METHOD AND VARIABLE COOLANT FLOW RATE
Alexander Rambettus, Valeo Siemens eAutomotive Germany GmbH, Germany

11:10AM-11:30AM | THERMAL MANAGEMENT BASED ON FLAT-PLATE PULSATING HEAT PIPES FOR POWER MODULES OF ELECTRIC POWERTRAINS
Robert Dreiling(1), Sascha Zimmermann(1), Thinh Nguyen-Xuan(1), Peter Schreivogel(1), Francesca Di Mare(2), (1)BMW Group, Germany; (2)Ruhr-University Bochum, Germany

11:30AM-11:50AM | ANALYSIS AND MODELING OF A LIQUID COOLED HEAT SINK FOR EV TRACTION INVERTER SYSTEMS
Paulo Silva E Silva(2), Eduardo Cattani da Silva(2), Lucas Rossato Rocha(2), Paulo Eckert(1), Rodrigo Vieira(2), (1)Federal University of Rio Grande do Sul, Brazil; (2)Federal University of Santa Maria, Brazil

11:50AM-12:15PM | Characteristics of a SiC MOSFET-Based Double Side Cooled High Performance Power Module for Automotive Traction Inverter Applications
Ajay Poornal Pai, Michael Ebli, Tobias Simmet, Adrian Lis, Marcus Beninger-Binal, Infineon Technologies AG, Germany

Friday, June 17
2:00PM-3:45PM

TS 10 Aerospace Electrified Propulsion Systems

2PM-2:20PM | DETAILED MODELING AND INVESTIGATION OF IMPACT OF TRANSIENT LOADING ON ELECTRICAL POWER SYSTEM OF MILITARY AIRCRAFT F-35
Irfan Khan, Syed Rahman, Texas A&M University, United States

2:20PM-2:40PM | A MODELLING DESIGN FRAMEWORK FOR INTEGRATED ELECTRICAL POWER AND NON-ELECTRICAL SYSTEMS DESIGN ON ELECTRICAL PROPULSION AIRCRAFT
Catherine Jones, Kieran Millar, Kenny Fong, Rafael Peña Alzola, Patrick Norman, Graeme Burt, University of Strathclyde, United Kingdom

2:40PM-3:00PM | PERFORMANCE TRADE-OFFS AND OPERATIONS OF ELECTRIC BOOSTED AIRCRAFT FOR 2030 SINGLE-AISLE
Market Ezgi Balkas, Mingxuan Shi, Jonathan Gladin, Neil Weston, Dimitri N. Mavris, Georgia Institute of Technology, United States
3:00PM-3:20PM | IMPLEMENTATION OF A 200 KW ADAPTABLE TESTING PLATFORM FOR EXPERIMENTAL RESEARCH IN ELECTRIFICATION OF AIRCRAFT PROPULSION
Osvaldo Arenas{1}, Madeline McQueen{2}, Douglas Robertson{1}, Ahmet Karataş{2}, {1}National Research Council Canada, Canada; {2}Ryerson University, Canada

3:20PM-3:40PM | ANALYSIS OF A HYBRID PARTIAL TURBOELECTRIC DISTRIBUTED PROPULSION SYSTEM FOR A MEDIUM ALTITUDE LONG ENDURANCE UA
Alexander Markov{2}, Gokcin Cinar{3}, Joshua Brooks{2}, Elena Garcia{2}, Russell Denney{2}, Dimitri N. Mavris{2}, Soumya Patnaik{1}, {1}Air Force Research Laboratory, United States; {2}Georgia Institute of Technology, United States; {3}University of Michigan, United States

TS 11 Electric Machine Modeling, Testing and Manufacturing Methods

Room | Doria
Chairs: FNU Nishanth, Liran Zheng

2PM-2:20PM | PCB WINDING FOR ELECTRIC MACHINES WITH INTEGRATED 3D PRINTED HEAT EXCHANGER
Ahmed Hembel, Bulent Sarlioglu, University of Wisconsin Madison, United States

2:20PM-2:40PM | PHYSICALLY INSPIRED NEURAL NETWORK FOR MODELING INDUCTION MACHINE NONLINEAR MAGNETIC SATURATION
Martin Nachtsheim{3}, Thomas Hartmann{1}, Christian Endisch{2}, {1}Technical University of Munich, Germany; {2}Technische Hochschule Ingolstadt, Germany; {3}Technische Hochschule Ingolstadt/Technical University of Munich, Germany

2:40PM-3PM | STANDSTILL FLUX LINKAGE MEASUREMENT USING PULSE AMPLITUDE MODULATED CURRENT INJECTION TOWARDS CHARACTERIZATION OF INTERIOR PERMANENT MAGNET MACHINES
Visweshwar Chandrasekaran{2}, Bernard Jose{2}, Petri Mäki-Ontto{2}, Ned Mohan{3}, Kaushik Basu{1}, Giri Venkataramanan{4}{1}Indian Institute of Sciences, India; {2}Trane Technologies, India; {2}Trane Technologies, United States; {2}Trane Technologies, Finland; {3}University of Minnesota, United States; {4}University of Wisconsin Madison, United States

3PM-3:20PM | NOVEL MACHINE INSULATION MATERIAL FOR TRANSPORTATION ELECTRIFICATION APPLICATIONS
Arshiah Mirza, Antigoni Konstantinou, Hiep Nguyen, Ali Bazzi, Yang Cao, University of Connecticut, United States

3:20PM-3:40PM MODELING GEOMETRIC WIRE BENDING BEHAVIOR IN NEEDLE WINDING PROCESSES USING CIRCULAR ARCS WITH TANGENTIAL LINEAR FUNCTIONS
Markus Kohler{3}, David Fendi{1}, Christian Endisch{2}, {1}Technical University of Munich, Germany; {2}Technische Hochschule Ingolstadt, Germany; {3}Technische Hochschule Ingolstadt/Technical University of Munich, Germany

TS 12 EMI and Partial Discharge Considerations for Aerospace and Automotive Systems

Room | Sonia
Chairs: Chunmeng Xu, Ripun Phukan

2PM-2:20PM | ANALYSIS OF STANDARD PARTS AGING UNDER PARTIAL DISCHARGES FOR AIRBORNE APPLICATIONS
Jean Rivenc{1}, Samuel Pin{2}, Cyril Van de Steen{2}, Frédéric Forget{1}, Emilie Fond{3}, Guillaume Bélajar{2}, Gilles Peres{1}, {1}Airbus SAS, France; {2}IRT Saint Exupéry, France; {3}Radiall, France

2:20PM-2:40PM | CONDUCTED EMI COMPARISON OF TWO ELECTRIC MACHINES USED IN ELECTRIFIED TRANSPORTATION
Mark Scott{2}, Will Perdikakis{3}, Chase Kitzmiller{4}, Kevin Yost{1}, Chad Miller{1}, {1}Air Force Research Laboratory, United States; {2}Miami University, United States; {3}PC Krause and Associates, United States; {4}UES Inc., United States

2:40PM-3PM | CONFIDENCE-LEVEL-BASED SEMI-SUPERVISED MACHINE LEARNING APPROACH FOR PARTIAL DISCHARGE SIGNAL CLASSIFICATION
M. Tahir Khan Niazi, Md Rashid Hussain, Chanyeop Park, Mississippi State University, United States

3PM-3:20PM | PARTIAL DISCHARGE AND ELECTROMAGNETIC INTERFERENCE UNDER REPETITIVE VOLTAGE PULSES WITH HIGH SLEW RATE IN AC MACHINE DRIVES
Kangbeen Lee, Mostafa Fereydoonian, Mikayla Benson, Woongkul Lee, Michigan State University, United States

3:20PM-3:40PM | A COMPACT INTEGRATED DM-CM FILTER WITH PCB EMBEDDED DC CURRENT SENSOR FOR HIGH ALTITUDE HIGH CURRENT APPLICATIONS
Ripun Phukan{2}, Xingchen Zhao{2}, Chewei Chang{2}, Dong Dong{2}, Rolando Burgos{2}, Debbo Mustapha{1}, Arnaud Platt{1}, {1}Airbus SAS, France; {2}CPES, Virginia Polytechnic Institute and State University, United States

TS 13 Fast Charging Systems

Room | Delicia
Chairs: Bo Zhang, Deepak Aswani

2PM-2:20PM | GRID RESILIENCE ASSESSMENT DURING EXTREME FAST CHARGING OF ELECTRIC VEHICLES VIA DEVELOPED POWER HARDWARE-IN-THE-LOOP
Mohsen Hosseinzadehtaheri{2}, Deepak Tiwari{1}, Nikoo Kouchakipour{2}, Ahmadreza Momeni{2}, Muhidin A. Lelic{1}, Ziping Wu{1}, {1}Commonwealth Edison, United States; {2}Quanta Technology, Canada; {2}Quanta Technology, United States
2:20PM-2:40PM | OPTIMAL DESIGN OF BATTERY-SUPPORTED FAST-CHARGING SYSTEMS ON AUSTRALIAN HIGHWAYS
Trinnapp Boonseng, Anawach Sangswang, Sumate Naeltladdanon, King Mongkut’s University of Technology Thonburi, Thailand

2:40PM-3:00PM | BESS OPTIMAL SIZING AND SCHEDULING FOR ENERGY ARBITRAGE AND FREQUENCY CONTAINMENT RESERVE VIA DUAL-LOOP OPTIMIZATION
Ramadhani Kurniawan Subroto, Daniel Gebbran, Alberto Barragan Moreno, Tomislav Dragičević, Technical University of Denmark, Denmark

3:00PM-3:20PM | A CONTROL STRATEGY FOR IMPROVING RESILIENCY OF AN DC FAST CHARGING EV SYSTEM
Michael Starke(1), Satarupa Bal(1), Namwon Kim(2), Madhu Chinthalvali(1), (1)Oak Ridge National Laboratory, United States; (2)University of North Carolina at Charlotte, United States

3:20PM-3:40PM | MOBILE CHARGING STATION: A COMPLEMENTARY STRATEGY FOR ELECTRIC VEHICLES
Shahab Afshar(1), Zachary Pecenak(2), Vahid Disfani(1), (1)University of Tennessee at Chattanooga, United States; (2)XENDEE Corp, United States

TS 14 Battery State of Charge, State of Health, and Aging

Room| Gloriana A
Chairs: Gautham Ram Chandra Mouli, Kaitlyn Sitch

2:20PM-2:40PM | STATE OF CHARGE IMBALANCE CLASSIFICATION OF LITHIUM-ION BATTERY STRINGS USING PULSE-INJECTION-AIDED MACHINE LEARNING
Alan Li(1), Matthias Prendtl(2), (1)Columbia University, United States; (2)MPLab, Columbia University, United States

2:40PM-3:00PM | STATE OF CHARGE ESTIMATION FOR EV BATTERIES USING SUPPORT VECTOR REGRESSION
Sarah Jumah(2), Ahmed Elezab(2), Omar Zayed(2), Ryan Ahmed(2), Mehdi Narimani(2), Ali Emadi(1), (1)McMaster Automotive Resource Centre, McMaster University, Canada; (2)McMaster University, Canada

3:00PM-3:20PM | A POLYNOMIAL REGRESSION MODEL WITH BAYESIAN INFERENCE FOR STATE-OF-HEALTH PREDICTION OF LI-ION BATTERIES
Isaiah Oyewole(2), Meriam Cheibi(2), Abdallah Chehade(2), Ala Hussein(1), (1)Prince Mohammad Bin Fahd University, Saudi Arabia; (2)University of Michigan-Dearborn, United States

3PM-3:20PM | BATTERY DUAL EXTENDED KALMAN FILTER STATE OF CHARGE AND HEALTH ESTIMATION STRATEGY FOR TRACTION APPLICATIONS
Josimar Da Silva Duque(2), Phillip J. Kollmeyer(1), Mina Naguib(1), Ali Emadi(1), (1)McMaster Automotive Resource Centre, McMaster University, Canada; (2)McMaster University, Canada

3:20PM-3:40PM | 1181 ENHANCEMENT OF STRESS CYCLE-COUNTING ALGORITHMS FOR LI-ION BATTERIES BY MEANS OF FUZZY LOGIC
Alberto Barragan-Moreno, Pere Izquierdo Gomez, Tomislav Dragičević, Technical University of Denmark, Denmark

TS 15 Fault Detection and Cyber Security

Room| Gloriana B
Chairs: Nasibeh Zohrabi, Saddam Aziz

2PM-2:20PM | DEGRADATION OF AVIATION WIRES DUE TO PARTIAL DISCHARGE UNDER HIGH DV/DT SQUARE-WAVE VOLTAGES AND LOW PRESSURE
Khalid Alkhalid(3), Pengyu Fu(3), Jin Wang(3), Dennis Grosjean(2), Daniel Schweickart(1), Faisal Alsafi(3), Zhuo Wei(3), Boxue Hu(3), (1)Air Force Research Laboratory/RQQE, United States; (2)Innovative Scientific Solutions, United States; (3)Ohio State University, United States

2:20PM-2:40PM | DATA-DRIVEN DETECTION OF PHYSICAL FAULTS AND CYBER ATTACKS IN DUAL-MOTOR EV POWERTRAINS
Bowen Yang, Jin Ye, University of Georgia, United States

2:40PM-3PM | FAULT DIAGNOSIS IN LITHIUM-ION BATTERY OF HYBRID ELECTRIC AIRCRAFT BASED ON STRUCTURAL ANALYSIS
Ye Cheng(2), Matilde D’Arpino(1), Giorgio Rizzoni(2), (1)Center for Automotive Research - The Ohio State University, United States; (2)Ohio State University, United States

3PM-3:20PM | DATA-DRIVEN THERMAL MODELLING FOR ANOMALY DETECTION IN ELECTRIC VEHICLE CHARGING STATIONS
Pere Izquierdo Gomez, Alberto Barragan-Moreno, Jyun Lin, Tomislav Dragičević, Technical University of Denmark

3:20PM-3:40PM | COMPREHENSIVE INDUCTION MOTOR FAULT DIAGNOSIS USING EXTREMUM SEEKING CONTROL
Vahe Seferian(1), Ali Bazzi(2), (1)American University of Beirut, Lebanon; (2)University of Connecticut, United States
TS 16  Control, Modeling, and Design of Electric and Hybrid Electric Vehicles

Room | Gloriana C  
Chairs: Carlos Vidal, Liwei Zhou

2PM-2:20PM | ROBUST MODELING FOR OPTIMAL CONTROL OF PARALLEL HYBRIDS WITH DYNAMIC PROGRAMMING  
Federico Miretti, Daniela Anna Misul, Politecnico di Torino, Italy

2:20PM-2:40PM | EFFECT OF IMMEDIATE REWARD FUNCTION ON THE PERFORMANCE OF REINFORCEMENT LEARNING-BASED ENERGY MANAGEMENT SYSTEM  
Atriya Biswas(2), Yue Wang(2), Ali Emadi(1), (1)McMaster Automotive Resource Centre, McMaster University, Canada; (2)McMaster University, Canada

2:40PM-3PM | ANALYZING THE IMPACT OF ON-BOARD PHOTOVOLTAICS ON ELECTRIC VEHICLE ENERGY CONSUMPTION  
Timofey Golubev, Deniz Hinz, Zachary Edel, ThermoAnalytics, Inc., United States

3PM-3:20PM | BATTERY STATE-OF-HEALTH ADAPTIVE ENERGY MANAGEMENT OF HYBRID ELECTRIC VEHICLES  
Pier Giuseppe Anselma(2), Philip J. Kollmeyer(1), Ali Emadi(1), (1)McMaster Automotive Resource Centre, McMaster University, Canada; (2)Politecnico di Torino, Italy

3:20PM-3:40PM | REAL-TIME PERFORMANCE AND DRIVEABILITY ANALYSIS OF A CLUTCHLESS MULTI-SPEED GEARBOX FOR BATTERY ELECTRIC VEHICLE APPLICATIONS  
Eduardo Louback(2), Fabricio Machado(2), Lucas Bruck(2), Philip J. Kollmeyer(1), Ali Emadi(1), (1)McMaster Automotive Resource Centre, McMaster University, Canada; (2)McMaster University, Canada

4:00PM-5:45PM

TS 17  Fuel Cells for Aircraft Electrification

Room | Bohemia  
Chairs: Catherine Jones, Charles Lents

4PM-4:20PM | IDENTIFICATION AND DESCRIPTIONS OF FUEL CELL ARCHITECTURES FOR AIRCRAFT APPLICATIONS  
Marty Bradley, University of Southern California, United States

4:20PM-4:40PM | HYBRIDIZED, HIGH PRESSURE, LIQUID FUELED SOLID OXIDE FUEL CELL (SOFC) FOR AIRCRAFT PRIMARY POWER  
Hani Hawa, Subir Roychoudhury, Christian Junaedi, Precision Combustion, Inc., United States

4:40PM-5PM | UNIVERSAL RANGE EQUATION FOR UNCONVENTIONAL AIRCRAFT CONCEPTS  
Anusha Harish, Jonathan Gladin, Dimitri N. Mavris, Georgia Institute of Technology, United States

5PM-5:20PM | MINIMISING THE EFFECT OF DEGRADATION OF FUEL CELL STACKS ON AN INTEGRATED PROPULSION ARCHITECTURE FOR AN ELECTRIFIED AIRCRAFT  
Tianzhi Zhou, Hossein Balaghi Enalou, Evangelia Pontika, Bahareh Zaghari, Panagiotis Laskaridis, Cranfield University, United Kingdom

5:20PM-5:40PM | SYSTEM-LEVEL MODELING AND ENERGY MANAGEMENT STRATEGY DESIGN FOR FUEL CELL ELECTRIC AIRCRAFT  
Tianying Yu, Hao Bai, Yigeng Huangfu, Peng Li, Wenzhuo Shi, Zelong Zhang, Northwestern Polytechnical University, China

TS 18  Electric Machines for Aerospace Applications

Room | Doria  
Chairs: Kevin Yost, Ifran Khan

4PM-4:20PM | COMPARATIVE ANALYSIS OF WOUND-FIELD FLUX-SWITCHING MACHINES WITH DIFFERENT FIELD AND ARMATURE WINDING CONFIGURATIONS  
Mostafa Fereydoonian(3), Kangbeen Lee(1), Dheeraj Bobba(2), Woongkul Lee(1), (1)Michigan State University, United States; (2)Powersys-Solutions, United States; (3)Politecnico di Torino, Italy

4:20PM-4:40PM | COOLING JACKET FOR HIGH POWER DENSITY SEGMENTED ELECTRIC MOTOR  
Zhaoxi Yao, Raphael Kahat Mandel, F. Patrick McCluskey, University of Maryland, United States

4:40PM-5PM | BEARING CURRENT MODELLING AND INVESTIGATION IN AXIAL FLUX PERMANENT MAGNET SYNCHRONOUS MOTORS FOR AEROSPACE APPLICATIONS  
Mohamed Abdalmagid(3), Giorgio Pietrini(3), Alan Dorneles Callegaro(3), Mikhail Goykhman(1), Ali Emadi(2), (1)Eaton Aerospace LLC, United States; (2)McMaster Automotive Resource Centre, McMaster University, Canada; (3)McMaster University, Canada

5PM-5:20PM | FIELD WEAKENING DESIGN FOR A HIGH SPEED NINE-PHASE PERMANENT MAGNET SYNCHRONOUS MACHINE IN MORE ELECTRIC AIRCRAFT  
Mi Tang, Yuzheng Chen, Tao Yang, University of Nottingham, United Kingdom

5:20PM-5:40PM | HIGH-FREQUENCY MODELING AND INTER-TURN VOLTAGE DISTRIBUTION ANALYSIS OF A MODULAR ELECTRIC MACHINE FOR ELECTRIC AIRCRAFT PROPULSION  
Hao Zeng, James Swanke, Thomas Jahns, Bulent Sarlioglu, University of Wisconsin Madison, United States
5PM-5:20PM | DEEP REINFORCEMENT LEARNING BASED APPROACH FOR OPTIMAL POWER FLOW OF MICROGRID WITH GRID SERVICES IMPLEMENTATION
Jingping Nie(1), Yanchen Liu(1), Liwei Zhou(1), Xiaofan Jiang(1), Matthias Preindl(2), (1)Columbia University, United States; (2)MPLab, Columbia University, United States

5:20PM-5:40PM | EV PENETRATION IMPACT ANALYSIS ON TRANSMISSION SYSTEM USING CO-SIMULATION
Jubair Yusuf, A S M Jahid Hasan, Sadrul Ula, University of California, Riverside, United States

TS 19  Solid State Circuit Breakers for Aerospace and Marine Applications
Room | Sonia
Chairs: Fei Lu, Luocheng Wang

4PM-4:20PM | SIC BASED SOLID STATE CIRCUIT BREAKER: THERMAL DESIGN AND ANALYSIS
Chunmeng Xu, Xiaoping Song, Pietro Cairoli, ABB Inc, United States

4:20PM-4:40PM | SOLID-STATE DC CIRCUIT BREAKER BASED ON HTS FAULT CURRENT LIMITER AND SIC MOSFET MODULES
Trevor Arvin(2), Jiangbiao He(2), Keith Waters(1), (1)Schneider Electric, United States; (2)University of Kentucky, United States

4:40PM-5PM | ENERGY DISSIPATION CIRCUIT SIMULATION & COMPARISON IN MEDIUM VOLTAGE SOLID-STATE CIRCUIT BREAKERS
Matthew Hughes, Nathan Weise, Marquette University, United States

5PM-5:20PM | TESTING SOLID STATE DC CIRCUIT BREAKERS FOR ELECTRIFIED AIRCRAFT APPLICATIONS
Parikshit Channegowda(2), Bo Liu(2), Baljit Riar(2), Xin Wu(1), (1)Pratt & Whitney, United States; (2)Raytheon Technologies Research Center, United States

TS 20  Management of Grid Impacts of Electrified Vehicles
Room | Delicia
Chairs: Behnaz Papari, Atriya Biswas

4PM-4:20PM | GRID-SAFE – A VOLTAGE SENSITIVE EVSE TO MITIGATE TRANSFORMER OVERLOADS
Deepak Aswani, Jon Mycko, Sacramento Municipal Utility District, United States

4:20PM-4:40PM | MODELING AND DATA ANALYSIS OF ELECTRIC VEHICLE FLEET CHARGING
Sadik Kucuksan(2), Nuh Erdogan(1), (1)Robert Gordon University, United Kingdom; (2)University of Northern Iowa, United States

4:40PM-5PM | STOCHASTIC BATTERY SOC MODEL OF EV COMMUNITY FOR V2G OPERATIONS USING CTA-2045 STANDARDS
Huangjie Gong, Rosemary Alden, Dan Ionel, University of Kentucky, United States
Tuesday, June 21st 7:00AM-9:00AM

VS 1 Control, Estimation, and Observers for Electric Drivetrains
Room | Virtual on Whova
Chairs: Rui Ma, Jennifer Bauman

7AM-7:20AM | SMITH PREDICTOR CONTROL FOR DYNAMICALLY VARYING DC LINK VOLTAGE WITH 240°-CLAMPED SPACE VECTOR PWM IN HYBRID ELECTRIC TRACTION DRIVES
Haleema Qamar, Hafsa Qamar, Arnab Acharya, Raja Ayyanar, Arizona State University, United States

7:20AM-7:40AM | AN IMPROVED FLUX OBSERVER BASED POSITION SENSORLESS SINGLE STAGE BLDC MOTOR DRIVE WITH REGENERATIVE BRAKING FOR SOLAR POWERED LEV
Biswajit Saha, Bhim Singh, Indian Institute of Technology Delhi, India

7:40AM-8AM | ACCURATE LINE RESISTANCE ESTIMATION IN A MULTI-SOURCE ELECTRICAL POWER SYSTEM OF THE MORE ELECTRIC AIRCRAFT: AN INTELLIGENT AND DATA-DRIVEN APPROACH
Habibu Hussaini[2], Tao Yang[1], Mohamed A. A. Mohamed[1], Ge Bai[1], Yuan Gao[1], Yuzheng Chen[1], Serhiy Bozhko[1]
[1]University of Nottingham, United Kingdom; [2]University of Nottingham / Federal University of Technology, United Kingdom

8AM-8:20AM | INFLUENCE OF ASYMMETRIC SAMPLING DELAY ON PMSM FOC DRIVES WITH VARYING ROTOR POSITION
Garret Ray, Sandun Kuruppu, Mateo Acosta, Saginaw Valley State University, United States

8:20AM-8:40AM | A NOVEL ENERGY MANAGEMENT STRATEGY BASED ON MINIMUM INTERNAL LOSS FOR A FUEL CELL UAV
Rui Ma, Jian Song, Hongyu Zhang, Xiaoyue Chai, Hailong Sun, Northwestern Polytechnical University, China
**VS 2**

**Virtual Session on Whova**

**Chairs:** Bhim Singh, Sandun Kuruppu

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<tr>
<td>7AM-7:20AM</td>
<td><strong>COMPARISON OF SLOT/POLE TOPOLOGIES OF VARIABLE FLUX RELUCTANCE GENERATORS FOR AIRCRAFT APPLICATIONS</strong></td>
<td>Ufuk Ayhan{1}, Hilmi Gurleyen{2}, Erkan Mese{1}, {1}Ege University, Turkey; {2}Usak University, Turkey</td>
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<td>7:20AM-7:40AM</td>
<td><strong>NOVEL INTEGRATED ELECTRICAL ARCHITECTURE FOR SOLAR-CHARGED ELECTRIC VEHICLES</strong></td>
<td>Danial Sadeghpour, Jennifer Bauman, McMaster University, Canada</td>
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<td>7:40AM-8AM</td>
<td><strong>CARBON EMISSION COMPARISON OF SLOTTED AND SLOTLESS MOTORS FOR EVTOL APPLICATION</strong></td>
<td>Nisarg Dave{2}, Xuebei Zhang{2}, David Gerada{2}, Zeyuan Xu{2}, He Zhang{1}, Jing Li{1}, Gaurang Vakil{2}, Chris Gerada{2}, {1}University of Nottingham Ningbo China, China; {2}University of Nottingham, United Kingdom</td>
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<td>8AM-8:20AM</td>
<td><strong>FAULT RIDE-THROUGH SCHEME AND CONTROL STRATEGY OF MULTILEVEL VOLTAGE-BALANCING DC-DC CONVERTER</strong></td>
<td>Miao Wang, Xiaofeng Yang, Yongqi Zhu, Shixiang Li, Trillion Q Zheng, Beijing Jiaotong University, China</td>
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<td>8:20AM-8:40AM</td>
<td><strong>COMPARISON OF SHORT-CIRCUIT CURRENT CONTROL OF RESONANT SWITCHED-CAPACITOR CONVERTER</strong></td>
<td>Haixia Tan{1}, Xiaofeng Yang{1}, Yan Liu{1}, Chengzhang Yan{1}, Trillion Q Zheng{1}, Qian Chen{2}, {1}Beijing Jiaotong University, China; {2}State Grid Zhejiang Electric Power Co., Ltd., China</td>
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<td>8:40AM-9AM</td>
<td><strong>ANALYSIS OF ALL-ELECTRIC SHIP MOTIONS IMPACT ON PV SYSTEM OUTPUT POWER IN WAVES</strong></td>
<td>Saman Nasiri{2}, Mostafa Pariani{2}, Frede Blaabjerg{1}, Saeed Peyghami{1}, {1}Aalborg University, Denmark; {2}Sharif University of Technology, Iran</td>
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**VS 3**

**Virtual Session On Whova**

**Chairs:** Yan Li, Zhongbao Wei

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<td>7AM-7:20AM</td>
<td><strong>AN ADAPTIVE EV CHARGER BASED RECONFIGURABLE BIDIRECTIONAL ISOLATED DC-DC CONVERTER WITH WIDE VOLTAGE RANGE OF OPERATION</strong></td>
<td>Saran Chaurasiya, Bhim Singh, Indian Institute of Technology Delhi, India</td>
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<td>7:20AM-7:40AM</td>
<td><strong>HIGH EFFICIENCY GAN-BASED NON-ISOLATED ELECTRIC VEHICLE ON-BOARD CHARGER WITH ACTIVE FILTERING</strong></td>
<td>Alice Dong, Danial Sadeghpour, Jennifer Bauman, McMaster University, Canada</td>
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<td><strong>VOLTAGE SENSOR FAULT DETECTION IN LI-ION BATTERY ENERGY STORAGE SYSTEMS</strong></td>
<td>Namireddy Praveen Reddy{2}, Yuxuan Cai{1}, Roger Skjetne{2}, Dimitrios Papageorgiou{3}, {1}Nordic Semiconductor ASA, Norway; {2}Norwegian University of Science and Technology, Norway; {3}Technical University of Denmark, Denmark</td>
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<td><strong>MODIFIED DEADBEAT PREDICTIVE CURRENT CONTROL BASED ONBOARD CHARGER FOR INTEGRATION WITH SMART HOME</strong></td>
<td>Utsav Sharma, Bhim Singh, Indian Institute of Technology Delhi, India</td>
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<td><strong>A NOVEL ENERGY MANAGEMENT STRATEGY BASED ON MINIMUM INTERNAL LOSS FOR A FUEL CELL UAV</strong></td>
<td>Rui Ma, Jian Song, Hongyu Zhang, Xiaoyue Chai, Hailong Sun, Northwestern Polytechnical University, China</td>
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<td>8:40AM-9AM</td>
<td><strong>DEVELOPMENT OF A MIXED INDUCTIVE AND CAPACITIVE WIRELESS POWER TRANSFER TO IMPROVE MISALIGNMENT PERFORMANCE FOR CHARGING ELECTRIC VEHICLES</strong></td>
<td>Milad Behnamfar, Hassan Jafari, Arif Sarwat, Florida International University, United States</td>
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1020 | AN APPROACH TO COMPARE MULTIPHASE DRIVES FOR AUTOMOTIVE SAFETY APPLICATIONS
Antonin Ribière{2}, Ngac-Ky Nguyen{2}, Eric Semali{2}, Christophe Espanet{1}{1}Moving Magnet Technologies, France; {2}Université de

1087 | FAULT RIDE-THROUGH SCHEME AND CONTROL STRATEGY OF MULTILEVEL VOLTAGE-BALANCING DC-DC CONVERTER
Miao Wang, Xiaofeng Yang, Yongqi Zhu, Shixiang Li, Trillion Q ZhengBeijing Jiaotong University, China

1128 | DYNAMIC VIBRATIONAL ANALYSIS OF A TRACTION INVERTER HOUSING
Eduardo Louback, Jigar Mistry, Peter Azer, Berker BilginMcMaster University, Canada

1147 | IDENTIFICATION AND SUPPRESSION OF ELECTROMAGNETIC NOISE OF VARIABLE RELUCTANCE RESOLVER FOR HYBRID ELECTRIC VEHICLE
Hwigon Kim{2}, Jooyun Lee{2}, Jae Sang Lim{1}, Young Un Kim{1}, Seung-Ki Sul{2}{1}Hyundai Motor Company, Korea; {2}Seoul National University, Korea

1165 | A DUAL SWITCHED CAPACITOR AND SINGLE SWITCH HIGH VOLTAGE GAIN DC-DC CONVERTER
Aneet Kumar{2}, Xuwei Pan{2}, Abdul R Beig{1}, Guangcheng Ye{2}, Lingling Cao{2}, Xiaogang Xiong{2}{1}Advance Power and Energy Centre, EECS Khalifa University, U.A.E.; {2}Harbin Institute of Technology, China

1180 | DESIGN CONSIDERATIONS OF MULTI-PHASE MULTILEVEL INVERTERS FOR HIGH-POWER DENSITY TRACTION DRIVE APPLICATIONS
Partha Pratim Das, Subhransu Satpathy, Subhashish Bhattacharya, Victor VeliadisNorth Carolina State University, United States

1207 | A TRIPLE VOLTAGE BOOST FRONTEND HYBRID T-TYPE CONVERTER
A Narendra Babu{4}, Naveen Yalla{1}, Sanjeev Pannala{5}, Sukanta Halder{3}, Pramod Agarwal{2}{1}Indian Institute of Technology BHU Varanasi, India; {2}Indian Institute of Technology Roorkee, India; {3}Sardar Vallabhbhai National Institute of Technology Surat, India; {4}Velagapudi Ramakrishna Siddhartha Engineering College, India; {5}Washington State University, United States

1232 | NOVEL UPPER CAPACITOR FOR HALF-BRIDGE SWITCHING CONVERTER TOPOLOGIES THAT REDUCES EMI AND CAPACITOR RIPPLE CURRENT
Matthew Jahnes, Matthias PreindIMPLab, Columbia University, United States

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Mikyala Benson{2}, Xiaofeng Dong{1}, Musab Guven{2}, Kangbeen Lee{2}, Jinkyung Moon{1}, Woongkuk Lee{2}{1}Florida State University, United States; {2}Michigan State University, United States

1242 | ANALYSIS OF DC-LINK VOLTAGE RIPPLE BY GENERALIZED DISCONTINUOUS PWM STRATEGY IN TWO-LEVEL THREE-PHASE VOLTAGE SOURCE INVERTERS
JUNHYUK LEE, MEYONG-WON KIM, ISSAC KIM, JUNG-WOOK PARKYONSEI UNIVERSITY, KOREA

1260 | COMPARISON OF SUBDOMAIN MODELS FOR OUTER ROTOR SLOTLESS HALBACH ARRAY PERMANENT MAGNET SYNCHRONOUS MOTORS
Junyeong Jung, Iqbal HussainNorth Carolina State University, United States

1278 | PERFORMANCE IMPROVEMENT OF SURFACE PERMANENT MAGNET VERNIER MOTOR BY ADJUSTING CURRENT CONTROL ANGLE CONSIDERING MAGNETIC SATURATION
Jingwei Zhu{2}, Feida Chen{3}, Jiahao Chen{2}, Yuefei Zuo{2}, Hao Chen{1}, Christopher H.T. Lee{2}{1}Chalmers University of Technology, Sweden; {2}Nanyang Technological University, Singapore; {3}University of Wisconsin Madison, United States

1305 | A MULTI-OBJECTIVE OPTIMIZATION FRAMEWORK FOR THE DESIGN OF A HIGH POWER-DENSITY SWITCHED RELUCTANCE MOTOR
Mohammad Ehsan Abdollahi, Berker Bilgin, McMaster University, Canada

1335 | COMBINED ELECTROMAGNETIC AND THERMAL DESIGN OPTIMIZATION STUDIES OF IN-SLOT COOLING FOR UAM ELECTRIC MOTORS
Thomas Talleric, Andrew SmithNASA Glenn Research Center, United States

1358 | OPTIMAL DESIGN OF DOUBLE-STATOR SWITCHED RELUCTANCE MACHINE WITH SOLUTION DATABASE METHOD
Jiale Huang{2}, Jiayu Liu{2}, Lefei Ge{2}, Qunbi Zhao{1}, Xiaoli Duan{1}, Haiying Meng{1}{1}AVIC Shaanxi Aero Electric Co., Ltd., China; {2}Northwestern Polytechnical University, China

1372 | DESIGN CHARACTERISTICS OF UNEQUAL-TURN SINUSOIDAL WOUND ROTOR WINDING IN BRUSHLESS DOUBLY-FED INDUCTION GENERATOR
Seyed Mehdi Seyedi, Dorsa Talebi, Masaad Albadie, Hamid A. ToliatTexas A&M University, United States

1392 | Multi-Physics Design Platform for a High Power Density Multi-Phase IPM Traction Motor: Analysis and Simulation
Ahmed Abdelrahman, Ashish Sahu, Nathan Emery, Dharf Al-ANI, Berker BilginMcMaster University, Canada

1404 | Design Study of a Coupled Inner-Stator Magnetically Geared Motor for Electric Aircraft Applications
Thomas Talleric, Justin Scheidler NASA Glenn Research Center, United States
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<td>Ford Motor Company, United States; Idaho National Lab, United States; University of Nevada Reno, United States</td>
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<td>Alessia Musa, Pier Giuseppe Anselma, Matteo Spano, Daniela Anna Misul</td>
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<td>Justin Szatkowski, Yan Li, Liang Du</td>
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Mostafa Zaman{3}, Sujay Saha{2}, Nathan Puryear{3}, Nasibeh Zohrabi{1}, Sherif Abdelwahed{3}{1}Pennsylvania State University, United States; {2}University of Dhaka, Bangladesh; {3}Virginia Commonwealth University, United States

1004 | HIGH-LEVEL INTEGRATION SIZING TOOL FOR ELECTRICAL ARCHITECTURES (HIGHLITE)
Brian Raczkowski{2}, Michelle Boyd{2}, Michael Johnson{2}, Rodney Yeu{2}, Eric Walters{2}, Adam Donovan{1}, Soumya Patnaik{1}{1}Air Force Research Laboratory, United States; {2}PC Krause and Associates, United States

1040 | VIABILITY STUDY OF AN ELECTRIFIED REGIONAL TURBOPROP
Chrysoula Lydia Pastra{1}, Cuyler Dull{1}, Rodolfo Flores Berumen{1}, Cem Yumuk{1}, Gokcin Cinar{2}, Dimitri N. Mavris{1}{1}Georgia Institute of Technology, United States; {2}University of Michigan, United States

1122 | NEURAL NETWORK-BASED ONLINE ENERGY MANAGEMENT FOR MULTI-MODE POWER SPLIT HYBRID VEHICLES
Mina Naguib{1}, Lucas Bruck{2}, Ali Emadi{1}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1312 | A BLIND MODELING TOOL FOR STANDARDIZED EVALUATION OF BATTERY STATE OF CHARGE ESTIMATION ALGORITHMS
Phillip J. Kollmeyer, Mina Naguib, Fauzia Khanum, Ali EmadiMcMaster Automotive Resource Centre, McMaster University, Canada

1267 | A FRAMEWORK FOR PRACTICAL DESIGN OF SWITCHING NODES WITH PARALLEL-CONNECTED MOSFETS
Rachit Pradhan{3}, Mohamed I. Hassan{3}, Alan Dorneles Callegaro{3}, Piranavan Suntharalingam{1}, Mario F. Cruz{1}, Ali Emadi{2}{1}Eaton Corporation, United States; {2}McMaster Automotive Resource Centre, McMaster University, Canada; {3}McMaster University, Canada

1290 | CRYOGENIC FOUR-SWITCH BUCK-BOOST CONVERTER DESIGN FOR ALL ELECTRIC AIRCRAFT
Yuqi Wei, Md Maksudul Hossain, Andrea Stratta, Alan MantoothUniversity of Arkansas, United States

1304 | OPERATING PRINCIPLE OF NEUTRAL-POINT-LESS (NPL) MULTILEVEL INVERTER TOPOLOGY: X-TYPE INVERTER
Musab Guven{2}, Mikayla Benson{2}, Xiaofeng Dong{1}, Jinyeong Moon{1}, Woongkul Lee{2}{1}Florida State University, United States; {2}Michigan State University, United States

POSTER SESSION 2
June 16 | 2PM-4PM | Anabella Ballroom

1156 | THE DEVELOPMENT OF A DRIVE AND DUTY CYCLE FOR A REFUSE TRUCK IN THE CITY OF HAMILTON USING NON-INVASIVE SENSORS
ack Toller{2}, Atriya Biswas{2}, Ali Emadi{1}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1202 | MAKING THE CASE FOR PREDICTIVE THERMAL MANAGEMENT OF FUEL CELL SYSTEMS FOR ELECTRIFIED VEHICLES
Pier Giuseppe Anselma, Sara Luciani, Andrea TonoliPolitecnico di Toro, Italy

1307 | REAL-TIME AMBIENT TEMPERATURE ESTIMATION USING KALMAN FILTER AND TRACTION POWER-AWARE CABIN CLIMATE CONTROL IN BATTERY ELECTRIC VEHICLES
Maryam Alizadeh{2}, Sumedh Dhale{2}, Ali Emadi{1}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1211 | IMPACT OF PREDICTIVE BATTERY THERMAL MANAGEMENT FOR A 48V HYBRID ELECTRIC VEHICLE
Pier Giuseppe Anselma, Federico Miretti, Ezio SpessaPolitecnico di Toro, Italy

1030 | AN ULTRA-FAST METHOD FOR ANALYZING IPM MOTORS AT MULTIPLE OPERATING POINTS USING SURROGATE MODELS
Bryton Praslicka, Narges Taran, Cong MaBorgWarner Inc., United States

1326 | ZERO SEQUENCE POWER BALANCING COMPENSATION FOR THIRD HARMONIC INJECTION OF MULTI-STAGE GRID-TIED ENERGY CONVERSION SYSTEMS
Liwei Zhou{1}, Matthias Preindl{2}{1}Columbia University, United States; {2}MPLab, Columbia University, United States

1334 | PIECEWISE AFFINE MAXIMUM TORQUE PER AMPERE FOR THE WOUND ROTOR SYNCHRONOUS MACHINE
Bernard Steyaert{1}, Ethan Swint{3}, Wesley Pennington{3}, Matthias Preindl{2}{1}Columbia University, United States; {2}MPLab, Columbia University, United States; {3}Tau Motors, Inc., United States

1342 | A SOFTWARE-DEFINED STACKED MULTILEVEL MOTOR DRIVE INVERTER WITH LINEAR COMPONENT SCALING
Noah Silverman{1}, Liwei Zhou{1}, Matthew Jahnes{2}, Matthias Preindl{2}{1}Columbia University, United States; {2}MPLab, Columbia University, United States
1157 | DEGRADATION OF AVIATION WIRES DUE TO PARTIAL DISCHARGE UNDER HIGH DV/DT SQUARE-WAVE VOLTAGES AND LOW PRESSURE
Khalid Alkhalid{3}, Pengyu Fu{3}, Jin Wang{3}, Dennis Grosjean{2}, Daniel Schweickart{1}, Faisal Alsaif{3}, Zhuo Wei{3}, Boxue Hu{3}{1}Air Force Research Laboratory/RQQE, United States; {2}Innovative Scientific Solutions, United States; {3}Ohio State University, United States

1170 | DEGRADATION ANALYSIS OF THE METALLIZED FILM CAPACITANCE UNDER VARIOUS CONDITIONS IN EV APPLICATIONS
Guanliang Liu{2}, Mengqi Wang{2}, Shahid Aziz Khan{2}, Xi Lu{1}, Kewei Xiao{1}{1}Ford Motor Company, United States; {2}University of Michigan-Dearborn, United States

1186 | ASSESSING DEGRADATION-AWARE MODEL PREDICTIVE CONTROL FOR ENERGY MANAGEMENT OF A GRID-CONNECTED PV-BATTERY MICROGRID
Alan Li{1}, Matthias Preindl{2}{1}Columbia University, United States; {2}MPLab, Columbia University, United States

1148 | OPTIMAL DISPATCH SCHEDULE FOR A FAST EV CHARGING STATION WITH ACCOUNT TO SUPPLEMENTARY BATTERY HEALTH DEGRADATION
Yihao Wan, Daniel Gebbren, Pere Izquierdo Gómez, Tomislav DragičevićTechnical University of Denmark, Denmark

1203 | TOWARD A BETTER ESTIMATION OF THE CHARGING CORRIDOR LENGTH OF IN-MOTION-CHARGING TROLLEYBUSES
Ibrahim Diab, Gautham Ram Chandra Mouli, Pavol BauerDelft University of Technology, Netherlands

1269 | BI-LEVEL OPTIMIZATION FRAMEWORK FOR HEAVY-DUTY ELECTRIC TRUCK CHARGING STATION DESIGN
Derek Jackson{1}, Yue Cao{1}, Ian Beil{2}{1}Oregon State University, United States; {2}Portland General Electric, United States

1297 | A DIGITALLY-SECURED AUTOMATED FLEET MANAGEMENT SCHEME FOR ELECTRIC BUSES BASED ON BLOCKCHAIN
Jean-Michel Clairand{3}, Vartika Kulshrestha{1}, Shashank Vyas{2}{1}Alliance University, India; {2}SoftBank Energy Limited, India; {3}Universidad de las Américas - Ecuador, Ecuador

1314 | DYNAMICS ANALYSIS OF MICROGRIDS INTEGRATED WITH EV CHARGING STATIONS BASED ON QUANTUM APPROXIMATE OPTIMIZATION ALGORITHM
Hang Jing{3}, Ye Wang{2}, Yan Li{3}, Liang Du{4}, Ziping Wu{1}{1}Commonwealth Edison, United States; {2}Duke University, United States; {3}Pennsylvania State University, United States; {4}Temple University, United States
1314 | DYNAMICS ANALYSIS OF MICROGRIDS INTEGRATED WITH EV CHARGING STATIONS BASED ON QUANTUM APPROXIMATE OPTIMIZATION ALGORITHM
Hang Jing[3], Ye Wang[2], Yan Li[3], Liang Du[4], Ziping Wu[1]

1023 | DESIGN AND TUNING OF LCC COMPENSATION NETWORKS FOR DD-DDQ COILS IN DYNAMIC WIRELESS EV CHARGING SYSTEMS
Mustafa Abdulhameed, Eiman ElGhanam, Ahmed Osman, Mohamed Hassan
American University of Sharjah, U.A.E.

1201 | VOLTAGE CONTROL STRATEGY FOR DAB POWER CONVERTER BASED ON MDCS-MPC
Miguel López[1], Nenad Mijatovic[1], Jose Rodriguez[2], Tomislav Dragićević[1][1]Technical University of Denmark, Denmark; [2]Universidad San Sebastian, Chile

1219 | COMPACT PCB COIL-BASED BILATERAL INDUCTIVE POWER RELAY SYSTEM POWERING MULTIPLE GATE DRIVERS WITH RELIABLE VOLTAGE ISOLATION
Yao Wang, Shuyan Zhao, Reza Kheirrollahi, Hua Zhang, Fei Lu
Drexel University, United States

1224 | CALCULATION OF AC LOSSES IN MULTIPHASE LITZ COIL SYSTEMS
Noah Salk, Chathan Cooke
Massachusetts Institute of Technology, United States

1274 | DEVELOPMENT OF A MIXED INDUCTIVE AND CAPACITIVE WIRELESS POWER TRANSFER TO IMPROVE MISALIGNMENT PERFORMANCE FOR CHARGING ELECTRIC VEHICLES
Milad Behnamfar, Hassan Jafari, Arif Sarwat
Florida International University, United States

1291 PASSIVE SHIELDING DESIGN OF AN INDUCTIVE POWER TRANSFER SYSTEM FOR RAILWAY APPLICATIONS
Karl Lin[3], Xiwen Xu[3], Tiefu Zhao[3], Shen-En Chen[3], Nicole Braxtan[3], Dave Cook[2], Derek Ward[1][1]North Carolina Department of Transportation, United States; [2]Rail Propulsion Systems, United States; [3]University of North Carolina at Charlotte, United States

1309 | SIZING CONSIDERATIONS FOR EV DYNAMIC WIRELESS CHARGING SYSTEMS WITH INTEGRATED ENERGY STORAGE
Donovin Lewis[2], Huangjie Gong[2], Greg Erhardt[2], Rong Zeng[1], Omer Onar[1], Veda Prakash Galigekere[1], Burak Ozpineci[1], Dan Ionel[2][1]Oak Ridge National Laboratory, United States; [2]University of Kentucky, United States

1316 | AN INTEGRATED DESIGN OF COST-EFFECTIVE BIPOLAR HEXAGONAL COIL AND ACTIVE DISTURBANCE REJECTION CONTROL FOR WIRELESS POWER TRANSFER
Heshou Wang[1], Shengrong Zhuo[2], Fei Gao[3], Elena Breaz[3], Arnaud Gaillard[3], Ka Wai Eric Cheng[1][1]Hong Kong Polytechnic University, Hong Kong; [2]Northwestern Polytechnical University, China; [3]University of Technology of Belfort-Montbéliard, France

1308 | CONSTANT OVERPOTENTIAL FAST CHARGING FOR LITHIUM-ION BATTERY WITH TWIN DELAYED DDPG ALGORITHM
Xiaofeng Yang[1], Zhongbao Wei[1], Liang Du[2][1]Beijing Institute of Technology, China; [2]Temple University, United States

1271 | Denial of Service Cyberattacks to Naval Software Defined-Networking-Enabled SCADA Network
Ethan Liu[1], Yan Li[1], Liang Du[2][1]Pennsylvania State University, United States; [2]Temple University, United States
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Powersys is a worldwide engineering software and services company delivering global solutions for electrification to industries, research institutes and universities involved in Electrical Vehicle and Grid applications.

LASER TECHNOLOGIES

With over 35 years of experience in high precision manufacturing, Laser Technologies covers every facet of the 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.

DYNAMIC WPT

DWPT’s innovative technology provides solutions that mean you never need to stop and plug into refill your electric vehicle’s battery, because the battery is refilled in normal use. This leads to smaller battery packs, reduced vehicle weight and elimination of range anxiety.

MARSILLI

MARSILLI has developed in depth and ground breaking expertise in all the assembly processes which have a winding phase as the core. Today, MARSILLI is a worldwide leader in Winding & Assembly Systems for coils and motors where precision, flexibility and customization are mandatory.

OPAL-RT

OPAL-RT is the world leader in the development of PC/FPGA-based real-time simulators, Hardware-in-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems used in power grids, power electronics, motor drives, automotive, trains, aircraft and various industries, as well as R&D centers and universities.
D&V ELECTRONICS  

130 Zenway Boulevard  
Woodbridge, ON L4H 2Y7  
Canada  
1-833-528-1288  

Founded in 1997 by Dr. Voiko Loukanov, we have continuously pioneered the innovation and development of scientific testing technologies. Our strong electrical knowledge, along with our thorough knowledge of measurement technologies and data analysis have led to the development of test systems that provide state of the art accuracy and reliability.

JFE SHOJI POWER CANADA  

845 Laurentian Drive,  
Burlington, ON L7N 3W7  
(905) 637-3033  

Seeking to provide a solution based approach to our clients and our industry – to sustain and improve our electrical infrastructure; and our aspiration to be a GREAT company. Our focus is on providing solutions to clients – and creating strategic relationships where we are entrusted by our clients as industry, business and technical advisors.

VERDEGOAERO  

1511 Aviation Center Parkway  
Daytona Beach FL 32114  
United States  

VerdeGo Aero is creating power and propulsion technologies that enable our customers to develop high-performance electric aircraft. Our hybrid-electric powerplants solve the critical performance challenges necessary to make electrification of flight practical, useful, and scalable.

HBK WORLD  

McMaster Innovation Park, 175 Longwood Road South, Suite 301A  
Hamilton, Ontario L8P 0A1, Canada  

Enedym is a technology start-up company from McMaster University. The company is headquartered at the McMaster Innovation Park in Hamilton, Ontario, Canada. Enedym has ownership of over 50 patents and pending patent applications and related inventions developed by the Canada Excellence Research Chair in Hybrid Powertrain Dr. Ali Emadi and his research group at the McMaster Automotive Resource Centre (MARc), McMaster University.

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MAKO AEROSPACE INC BOOTH 318

Mako’s vision for the future is compelling air transport that inspires and excites while achieving balance with the environment.

Our first step is to develop technology that enables sustainable flight and ensures adoption by the industry. This is impossible without technology that is economically competitive with traditional propulsion.

Unit 3, 24 Fairykirk Rd, Rosyth, Dunfermline KY11 2QQ
United Kingdom

MakoAerospace

EMCWA BOOTH 303

ELECTRICAL MACHINE COIL WINDING ASSOCIATION

Since our formation in 1974, EMCWA membership has risen sharply. Our objective, however, is more aggressive than simply raising the count... our goal is to advance our industry through education, participation, and communication. These industry advancements include: scholarships, technical conferences, industry exhibitions, international participation, workshops, seminars, membership rosters and directories, and technical proceedings manuals.

PELS/TEC BOOTH 304

The Power Electronics Society is one of the technical societies of the Institute of Electrical and Electronics Engineers (IEEE). For over 20 years, PELS has facilitated and guided the development and innovation in power electronics technology. The IEEE Transportation Electrification Community coordinates broad and deep activities throughout the IEEE in the growing electrification revolution across transportation domains, including advances in electric and hybrid cars, more-electric ships and aircraft, rail systems, personal transport, and the motive, storage, power grid, electronic intelligence, and control technologies that make them possible.

ELANTAS is a leading manufacturer of insulating and protective materials with focus on the global electrical and electronics industry.

The ELANTAS group offers a comprehensive portfolio of wire enamels, impregnating resins and varnishes, casting and potting resins, flexible electrical insulation materials, materials for electronic protection, specialty industrial coatings, products for printed electronics as well as a wide range of tooling and composite materials.

ELANTAS BOOTH 309

ELANTAS

ALTAIR BOOTH 310

Business is complex. But in complexity, there is opportunity for innovative solutions. Our comprehensive, open-architecture solutions for data analytics & AI, computer-aided engineering, and high-performance computing (HPC), enable design and optimization for high performance, innovative, and sustainable products and processes in an increasingly connected world.

ALTAIR

TURNTIDE TECHNOLOGIES BOOTH 306

1295 Forgewood Ave.
Sunnyvale, CA 94089

Our goal is to eliminate the 25% of global electricity consumption that is wasted by legacy electric motors, thus accelerating the world’s transition from fossil fuels and leaving them in the ground where they belong.

EMCWA is a leading manufacturer of insulating and protective materials with focus on the global electrical and electronics industry.

Business is complex. But in complexity, there is opportunity for innovative solutions. Our comprehensive, open-architecture solutions for data analytics & AI, computer-aided engineering, and high-performance computing (HPC), enable design and optimization for high performance, innovative, and sustainable products and processes in an increasingly connected world.

ALTAIR

EMCWA

PELS/TEC

ELANTAS

ALTAIR
Outsourced manufacturer of electric motors & generators. Serving Fortune 500 Industrials & Industry disruptors. Private company in business since 1909. Global operations with locations in USA, Canada, Mexico, South Africa.

12700 Sunrise Valley Drive, Suite 200 Reston, VA 20191-5807
703.264.7500

The American Institute of Aeronautics and Astronautics is a professional society for the field of aerospace engineering. The AIAA is the U.S. representative on the International Astronautical Federation and the International Council of the Aeronautical Sciences. In 2015, it had more than 30,000 members among aerospace professionals.

Motor Drives | Power Electronics | Batteries