

SPONSORS:



ec







2022 IEEE/AIAA TRANSPORTATION ELECTRIFICATION CONFERENCE AND ELECTRIC AIRCRAFT TECHNOLOGIES SYMPOSIUM (ITEC+EATS)

JUNE 15-17, 2022 ANAHEIM, CALIFORNIA

PROGRAM

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-3:45 PM
- 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 4:30 PM
- 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



AGENDA

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-10:15 AM
- COFFEE BREAK | CAROUSEL PRE-FUNCTION | 10AM-10:30AM
- TUTORIAL 6 | GLORIANA A | 10:30 AM-12:00 PM
- TECHNICAL SESSION 7 | BOHEMIA 10:30 AM-12:15 PM
- TECHNICAL SESSION 8 | DORIA 10:30 AM-12:15 PM
- TECHNICAL SESSION 9 | SONIA 10:30 AM-12:15 PM
- 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-5:45 PM
- TECHNICAL SESSION 18 | GLORIANA B | 4PM-5:45 PM
- TECHNICAL SESSION 19 | GLORIANA C | 4PM-5:45 PM
- TECHNICAL SESSION 20 | DELICIA | 4PM-5:45 PM
- TECHNICAL SESSION 21 | BOHEMIA | 4PM-5:45 PM
- TECHNICAL SESSION 22 | DORIA | 4PM-5:45 PM
- TECHNICAL SESSION 23 | SONIA | 4PM-5:45 PM

TUESDAY | JUNE 21

- VIRTUAL SESSION 1 7AM-9AM PST
- VIRTUAL SESSION 2 7AM-9AM PST
- VIRTUAL SESSION 3 7AM-9AM PST

JUNE 15 & 16 EXPO HOURS: 10AM-5PM



USEFUL INFORMATION

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.



Get Whova for ITEC+EATS 2022

Last Minute Technical Session Changes

Please note that there may be discrepencies 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.



WELCOME LETTER

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 COMMITEE

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.



PLENARY SESSION 1: JUNE 15 | 8AM-12PM | CAROUSEL BALLROOM



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 runway initiation and propagation mechanism and developed thermal runway 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.

PLENARY SESSION 1: JUNE 15 | 8AM-12PM | CAROUSEL BALLROOM



KEYNOTE 3: EV BATTERIES AS ENERGY RESOURCES – A FIVE YEARS PERSPECTIVE

VINCENT SCHACHTER, HEAD OF GLOBAL ENERGY SERVICES, ENEL X E-MOBILITY | JUNE 15, 2022 | 9:30 AM-10:00 AM | CAROUSEL BALLROOM

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.



KEYNOTE 4: TREND TOWARD MULTIPLE MOTOR TRACTION SYSTEMS

TERENCE WARD, SENIOR STAFF ENGINEER MOTOR & PROPULSION, FARADAY FUTURE | JUNE 15, 2022 | 10:30 AM-11:00 AM | CAROUSEL BALLROOM

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.

PLENARY SESSION 1: JUNE 15 | 8AM-12PM | CAROUSEL BALLROOM



KEYNOTE 5: AVIATION'S SUSTAINABLE FUTURE: NASA'S AERONAUTICS RESEARCH STRATEGY AND PLANS

ROBERT PEARCE, ARMD ADMIN, NASA JUNE 15, 2022 | 11:00 AM-11:30 AM | CAROUSEL BALLROOM.

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.



KEYNOTE 6: ROAD AND AIR ELECTRIFICATION -OPPORTUNITIES, SIMILARITIES AND DIFFERENCES

PETER SAVAGIAN, ADVISOR, C-EXEC, BOARD MEMBER, CONSULTANT. JUNE 15, 2022 | 11:30 AM-12:00 PM | CAROUSEL BALLROOM

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. board of ElectraMeccanica vehicles, and 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 QM Power, an electric motor company. 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 KRISHNAMURTHY, 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.

PLENARY SESSION 2: JUNE 16 | 8AM-12PM | CAROUSEL BALLROOM



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.

PLENARY SESSION 2: JUNE 16 | 8AM-12PM | CAROUSEL BALLROOM



KEYNOTE 11: FUNCTIONAL & PERFORMANCE METRICS TOWARDS SCALABLE ELECTRIC AVIATION

GUR KIMCHI, CHAIRMAN AND COFOUNDER AT AEROLANE, BOARD MEMBER AT ASCENT AEROSYSTEMS, VERTICAL AEROSPACE, AND NEAR EARTH AUTONOMY, ASCENT AEROSYSTEMS AND VERTICAL AEROSPACE

JUNE 16, 2022 | 11:00 AM-11:30 AM | CAROUSEL BALLROOM.

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.



KEYNOTE 12: BATTERY DIAGNOSTICS FOR LIFE CYCLE SAFETY, PROGNOSTICS, AND PLANNING

TRANSFORMING TRANSPORTATION FROM 2D TO 3D

JANNA STEFANOPOULOU, WILLIAM CLAY FORD PROFESSOR OF TECHNOLOGY, PROFESSOR, MECHANICAL ENGINEERING, UNIVERSITY OF MICHIGAN JUNE 16, 2022 | 11:30 AM-12:00 PM | CAROUSEL BALLROOM.

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.

TOWN HALL PANEL 1 HYDROGEN POWER FOR HEAVY DUTY TRANSPORTATION AND AIRCRAFT: SIMILARITIES, DIFFERENCES, AND OPPORTUNITIES FOR SYNERGIES? 15 JUNE 2022 | 2 PM - 5:00 PM

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



ARNAUD NAMER Head of Strategy, Universal Hydrogen



VAL MIFTAKHOV Founder & CEO -ZeroAvia

Aviation Fuels



TIM BROWN President and Founder, FirstElement Fuel Inc



TOWN HALL PANEL 2 BUILDING OUT ELECTRIC VEHICLE CHARGING INFRASTRUCTURE: EV SYSTEMS AND GRID

16 JUNE 2022 | 2 PM - 5:30 PM

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



KAREN HSU

Enel X Way

VINCENT WEYL

Sr. Director of Utilities Business Development,

Senior VP of Growth at IoTecha Corp







Associate Professor of Power Electronic Systems, Columbia University



President & CEO at Gridscape Solutions





Managed Charging Lead, Con Edison

YING SHI

Technical Specialist at Lucid Motors' Battery Software team



AARON SCHNEIDER

Business Development Manager - Utilities & Energy Services, Ford Pro

TOWN HALL PANEL 3: ELECTRIFIED FLIGHT DEVELOPMENT PROGRAMS

16 JUNE 2022 2 PM - 5:30 PM

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



PANEL 1: NASA ELECTRIC PROPULSION FLIGHT DEMOS

15 JUNE 2022 | 2 PM - 3:40 PM

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



RALPH JANSEN Deputy Project Manager for Technology - NASA EPFD Project



JEFF ENGLER Co-Founder and CEO of Wright Electric



AMY JANKOVSKY Project Manager at NASA Glenn Research Center

CHRISTINE ANDREWS

Systems, GE Aviation

Executive, Hybrid Electric



ED LOVELACE Chief Technology Officer, Ampaire Inc





SARA ROGGIA Senior Electric Propulsion System Engineer and Technical Fellow



ZUBAIR BAIG

Sr. Manager, Electric Propulsion, Pratt & Whitney



PANEL 2: BATTERY CHEMISTRY AND ALGORITHM ADVANCEMENTS FOR ELECTRIC VEHICLES AND AIRCRAFT 15 JUNE 2022 | 2 PM - 3:40 PM

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

HUAZHEN FANG

Associate Professor, University of Kansas





AUSTIN DULANEY Principal Data Scientist at Liminal Insights

NI DEL

SHASHANK SRIPAD

Battery researcher and PhD Candidate at Carnegie Mellon University





YUZHANG LI

Assistant Professor, University of California, Los Angeles

PANEL 3: ELECTRIC AIRCRAFT PROPULSION SYSTEMS 15 JUNE 2022 | 4PM - 5:40 PM

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



TODD SPIERLING

Sr Technical Fellow -Electrification, Collins Aerospace



PETER DEBOCK Program Director,



ARPA-E

Chief Engineer, Honeywell



PANEL 4: ELECTRIC MOTOR DESIGN ADVANCEMENTS

15 JUNE 2022 | 4PM - 5:40 PM

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.

PANEL 5: WBG DEVICES IN ELECTRIC VEHICLES AND AIRCRAFT: READY FOR LIFT-OFF?

16 JUNE 2022 | 2 PM - 3:40 PM

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:



PANEL LEAD AND MODERATOR: SHENGYI LIU

(Moderator) Technical Fellow, Chief Architect of Platform Subsystems, The Boeing Company



KIN P. CHEUNG

Project leader, Nanodevice Characterization Division, National Institute of Standards & Technology



ANDREW WOODWORTH

Hybrid Electric Aircraft Materials Technical Lead Nasa Glenn Research Center



ALAN MANTOOTH

Distinguished Professor, University of Arkansas

TIM MCDONALD

Sr. Director Applications and Marketing, CoolGaNTM Technology Development for Infineon Technologies.

KARIM BOUTROS

Senior Technology Qualification Engineer, Boeing Space Systems

PANEL 6: ADVANCEMENTS AND CHALLENGES IN HIGHER VOLTAGE (800+ V) ELECTRIC VEHICLES AND AIRCRAFT

16 JUNE 2022 | 2PM - 3:40PM

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 arching. 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

1/(6):

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

PANEL 7: WIRELESS CHARGING: CURRENT STATE OF THE ART

16 JUNE 2022 2 PM - 3:40 PM

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 (MODERATOR)

Associate Professor at Cornell University



OMER ONAR

(R&D Staff at Oak Ridge National Laboratory

NI. DOL



FRANK MCMAHON

SVP, Research & Development at Momentum Dynamics



MILISAV DANILOVIC

Senior Principal Scientist, WiTricity





REGAN ZANE

Center Director Utah State University

PANEL 8: AUTONOMOUS VEHICLES: IS THE FUTURE NOW?

16 JUNE 2022 4 PM - 5:40 PM

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 COURSES



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.



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.

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.

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.





SHORT COURSE 5: JUNE 17 | 8:30AM-12:00PM | GLORIANA B

Software-Defined Power Electronics: Theory and Study Cases SPEAKER: PHILIPPE WENDLING, VICE PRESIDENT, GTT LOW FREQUENCY ELECTROMECHANICAL APPLICATIONS, ALTAIR

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.



SHORT COURSE 6: JUNE 17 | 8:30AM-12:00PM | GLORIANA C EMACHINE OPTIMIZATION: FROM MACHINE PARAMETERS TO THERMALS AND NVH



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.

TEC+2022

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.

TUTORIALS



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.





TUTORIAL 5: JUNE 17 | 8:30AM-10AM | GLORIANA A

Introduction to Sustainable Aviation 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 the history and current developments in sustainable aviation. Participants will learn the 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"

TUTORIAL 6: JUNE 17 | 10:30AM-12PM | GLORIANA A



ML/AI-Driven Battery Management Techniques: Advanced Adaptive Cell Modeling Speaker: Fabrizio Martini, Co-Founder & CEO at Electra Vehicles, Inc.

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 extrapolatingintelligent 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.



INDUSTRY SESSIONS

MARSILLI

INDUSTRY SESSION 1: JUNE 15 | 2PM-3:30PM | GLORIANA B

Innovative solutions for e-Traction Motor and Battery Cell Connection System

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.



INDUSTRY SESSION 2: JUNE 15 | 4PM-5:30PM | DELICIA

Understanding Measurement Uncertainty for Electric Drives - HBK

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.



PRESENTATION 2 | 4:45PM

The Fundamentals of Battery Module and Pack Test - NH Research

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.



Switched Reluctance Motor (SRM) Technology: Value Proposition for Vehicular Applications -**Turntide Technologies**

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 torgue 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

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.

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.



TECHNICAL SESSION SCHEDULE

Wednesday, June 15

2PM-3:45PM

TS 1 Stationary and Dynamic Wireless Charging

Room | Bohemia

Chairs: Fei Lu, Xiwen Xu

2PM-2:20PM | A 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}Lockheed Martin, 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 El Meligy, Eiman ElGhanam, Mohamed Hassan, Ahmed Osman, American University of Sharjah, U.A.E.

3:20PM-3:40PM | MAXIMIZING ENERGY TRANSFER IN WIRELESS POWER TRANSFER SYSTEMS USING MAXIMUM POWER POINT TRACKING FOR IN-MOTION EV AND PHEV CHARGING

Joao Dinis, José Alberto, Antonio J. Marques Cardoso, CISE -Electromechatronic Systems Research Centre, University of Beira Interior, Portugál

Wednesday, June 15

4PM-

Electric Vertical Takeoff and Landing TS 2 (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}, Nirmit Prabhakar{1}, Dominik Karbowski{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 State

2:40PM-3PM | Drone Resilient Control Against Actuator Failures and Wind Gusts

Mohamed Nadir Boukoberine{2}, Roy Khattar{1}, Mohamed Benbouzid{2}, Nazih Moubayed{1}, {1}Lebanese University, Lebanon; {2}University of Brest, France

3PM-3:20PM | Electrical Energy Storage Design Space Exploration for a Hybrid-Electric Six Passenger Ouadrotor

George Thomas. Brian Malone, Jeffryes Chapman, Jeffrey Csank, NASA Glenn Research Center, United States

3:20PM-3:40PM | Preliminary Electric Motor Drivetrain **Optimization Studies for Urban Air Mobility Vehicles** Thomas Tallerico, Jeffryes Chapman, Andrew Smith, NASA Glenn Research Center, United States

Thursday, June 16 2PM-

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 Ünlübayir, 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 MÅGNET 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 Abulebdah{2}, Mustafa. Alparslan Zehir{2}, Eman Hammad{3}, {1}Clemson University, United States; {2}Marmara University, United States; {2}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 DuTemple 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, Mehdi Zadeh, Norwegian University of Science and Technology, Norway

Friday, June 17

8:30AM-10:15AM

TS 4 NASA Session 1 - Hybrid Aircraft Design for Flight Demonstration Programs

Room | Bohemia

Chairs: Jonathan Gladin, Gokcin Cinar

8:30AM-8:50PM | 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

8:50AM-9:10AM | 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

9:10AM-9:30AM | ADVANCED 2030 SINGLE AISLE AIRCRAFT MODELING FOR THE ELECTRIFIED POWERTRAIN FLIGHT DEMONSTRATION PROGRAM

Anusha Harish, Mingxuan Shi, Jonathan Gladin, Dimitri N. Mavris, Georgia Institute of Technology, 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

TS 5 Motor Control

Room | Doria

Chairs: Veda Galigekere, FNU Nishanth

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 Joo{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-Ro Lee{2}, Hwigon Kim{2}, Seung-Ki Sul{2}, {1} Hyundai Motor Company, Korea; {2}Seoul National University, Korea

9:30AM-9:50AM | 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] Tau Motors, Inc., United States; [4] University of Strathclyde, United Kingdom

9:50AM-10:10AM | Comparative Study on Pulse Pattern Optimization for High-Speed Permanent Magnet Synchronous Motors

Aathira Karuvaril Vijayan{3}, Dianxun Xiao{3}, Battur Batkhishig{3}, Alan Dorneles Callegaro{3}, Rohit Baranwal{1}, Ali Emadi{2}, {1} Eaton Corporation, United States; {2}McMaster Automotive Resource Centre, {3}McMaster University, Canada

TS 6 SiC and GaN Wide Bandgap Inverters

Room| Sonia Chairs: Khai Ngo, Jiangbiao He

8:30AM-8:50PM | CONCEPT DESIGN OF A 1.4 MW DRIVE FOR ROTOR LOSS MINIMIZATION IN A PARTIALLY SUPERCONDUCTING MOTOR

Matthew Granger, Thomas Tallerico, Aaron Anderson, Justin Scheidler, Peter Kascak, Alex Leary, Ralph Jansen, NASA Glenn Research Center, United States

8:50AM-9:10AM | MODELING OF RMS CURRENT IN CSI FILTER CAPACITOR AND MINIMUM CONDUCTION LOSS OPERATION OF CSI-FED PMSM DRIVES FOR TRACTION APPLICATIONS

Sangwhee Lee, Wenda Feng, Feida Chen, Ken Chen, Thomas Jahns, Bulent Sarlioglu, University of Wisconsin Madison, United States

9:10AM-9:30AM | AN INTEGRATED MULTI-LEVEL ACTIVE GATE DRIVER FOR SIC POWER MODULES Dongwoo Han, Sanghun Kim, Xiaofeng Dong, Hui Li, Jinyeong Moon, Yuan Li, Fang Peng, Florida State University, United States

9:30AM-9:50AM | ELECTROTHERMAL DESIGN OF A GAN-BASED AXIALLY STATOR IRON-MOUNTED FULLY INTEGRATED MODULAR MOTOR DRIVE Armin Ebrahimian, Wagar A. Khan, Seyed Iman Hosseini

Sabzevari, Nathan Weise, Marquette University, United States

9:50AM-10:10AM | ANALYSIS AND CONCEPTUALIZATION OF A 400V 100 KVA FULL-GAN DOUBLE BRIDGE INVERTER FOR NEXT-GENERATION ELECTRIC VEHICLE DRIVES

Davide Cittanti, Enrico Vico, Eric Armando, Radu Bojoi, Politecnico di Torino, Italy

Friday, June 17

10:30AM-12:15PM

TS 7 Nasa Session 2 - Future Projections for Electrified Aircraft

Room| Bohemia

Chairs: Vincent Shultz, Herb Schlickenmaier

10:30AM-10:50PM | CABLE KEY PERFORMANCE PARAMETERS FOR MEGAWATT ELECTRIFIED AIRCRAFT PROPULSION CONCEPTUAL AIRCRAFT MODEL

Timothy Dever, Ralph Jansen, NASA Glenn Research Center, United States

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, Bijan Fazal, Evan Harrison, Mayank Bendarkar, Taylor Fields, Elena Garcia, Dimitri N. MavrisGeorgia Institute of Technology, United States

TS 8 Electric Traction Machine Design and Analysis

Room | Doria

Chairs: Wenda Feng, Carlos Vidal 10:30AM-10:50PM | DUAL-STATOR FIVE-PHASE PERMANENT MAGNET SYNCHRONOUS MACHINE WITH HYBRID SPOKE-VERNIER TYPE ROTOR FOR ELECTRIC VEHICLES

Mbika Muteba{2}, Shanelle Nicole Foster{1}, {1}Michigan State University, United States; {2}University of Johannesburg, South Africa

10:50AM-11:10AM | DYNAMICALLY RECONFIGURABLE MOTOR TECHNOLOGY FOR HIGH DENSITY AND HIGH EFFICIENCY HEV DRIVES WITHOUT RARE-EARTH MATERIALS

Hengchun Mao, Ron Ye, Michael Liu, Quanten Technologies, United States

11:10AM-11:30AM | AXIAL-FLUX SWITCHED RELUCTANCE MOTOR DESIGN FOR A LIGHT ELECTRIC VEHICLE APPLICATION

Jack Gillies{3}, Tim Lambert{1}, Ali Emadi{2}, Berker Bilgin{3}, {1}Accelerated Systems Inc, Canada; {2}McMaster Automotive Resource Centre, McMaster University, Canada; {3}McMaster University, Canada

11:30AM-11:50AM | NVH ANALYSIS OF ROTOR STEP SKEWING ON PERMANENT MAGNET SYNCHRONOUS MOTOR

Mohammed Elamin, Philippe Wendling, Altair Engineering, United States

11:50AM-12:10PM | THERMAL ANALYSIS OF MULTIPHASE INDUCTION MOTOR FOR ELECTRIC VEHICLE APPLICATIONS

Priyanka C P, Nithin S Nair, Jagadanand G, National Institute of Technology Calicut, India

Room | Sonia

Chairs: Balanthi Beig, Chunmeng Xu

10:30AM-10:50PM | 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 Preindl{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 Rambetius, Valeo Siemens eAutomotive Germany GmbH. Germanv

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 Poonjal Pai, Michael Ebli, Tobias Simmet, Adrian Lis, Marcus Beninger-BinaInfineon Technologies AG, Germany

Friday, June 17

2:00PM-3:45PM

TS 10 Aerospace Electrified Propulsion Systems

Room | Bohemia

Chairs: Jiangbiao He, Catherine Jones

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 State

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 Fendt{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 Bélijar{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}, Debbou 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 Hosseinzadehtaher{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

Trinnapop Boonseng, Anawach Sangswang, Sumate Naetiladdanon, King Mongkut's University of Technology Thonburi, Thailand

2:40PM-3PM | 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

3PM-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 Chinthavali{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 CHARGING TECHNOLOGY 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

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

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

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

2:20PM-2:40PM | 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

2:40PM-3PM | A POLYNOMIAL REGRESSION MODEL WITH BAYESIAN INFERENCE FOR STATE-OF-HEALTH PREDICTION OF LI-ION BATTERIES

Isaiah Oyewole{2}, Meriam Chelbi{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 Gómez, Tomislav Dragičević, Technical University of Denmark, Den

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 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

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 Gómez, 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

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}, Phillip 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}, Phillip J. Kollmeyer{1}, Ali Emadi{1}, {1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

Friday, June 17

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{1}, Kangbeen Lee{1}, Dheeraj Bobba{2}, Woongkul Lee{1}, {1}Michigan State University, United States; {2}Powersys-Solutions, United States

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

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, Xiaoqing 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

Parikshith Channegowda{2}, Bo Liu{2}, Baljit Riar{2}, Xin Wu{1}, {1}Pratt & Whitney, United States; {2}Raytheon Technologies Research Center, United States

5:20PM-5:40PM | A 4KV/100A DC SOLID-STATE CIRCUIT BREAKER WITH SOFT TURN-OFF OPERATION

Reza Kheirollahi{1}, Shuyan Zhao{1}, Xin Zan{3}, Hua Zhang{1}, Xiaonan Lu{2}, Al-Thaddeus Avestruz{3}, Fei Lu{1}, {1}Drexel University, United States; {2}Temple University, United States; {3}University of Michigan, 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 Kucuksari{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

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 21 Battery Thermal Management and System Design

Room|Gloriana A Chairs: Benedikt Schmuelling, Chunmeng Xu

4PM-4:20PM | ELECTRICAL AND THERMAL ACTIVE CO-MANAGEMENT FOR LITHIUM-ION BATTERIES

Zhuoyuan Zheng{2}, Zheng Liu{2}, Sara Kohtz{2}, Wuchen Fu{2}, Nenad Miljkovic{2}, Sonya Smith{1}, Pingfeng Wang{2}, {1}Howard University, United States; {2}University of Illinois Urbana-Champaign, United States

4:20PM-4:40PM | AC BATTERY: MODULAR LAYOUT AND CYBER-SECURE CELL-LEVEL CONTROL FOR COST-EFFECTIVE TRANSPORTATION ELECTRIFICATION

Claudio Burgos-Mellado{2}, Tomislav Dragičević{1}, Felipe Donoso{3}, {1}Technical University of Denmark, Denmark; {2}Universidad de O'Higgins, Chile; {3}University of Nottingham, United Kingdom

4:40PM-5PM | SYNERGIZED HEATING AND FAST CHARGING FOR LITHIUM-ION BATTERIES AT LOW TEMPERATURES

Xin Xu{1}, Zhongbao Wei{1}, Liang Du{2}, {1}Beijing Institute of Technology, China; {2}Temple University, United States

5PM-5:20PM | EXPERIMENTAL INVESTIGATION ON THERMAL RUNAWAY PROPAGATION IN LITHIUM-ION BATTERY CELL STACK

Sebastian Hoelle{2}, Simon Haberl{1}, Alexander Rheinfeld{1}, Patrick Osswald{1}, Sascha Zimmermann{1}, Olaf Hinrichsen{3}, {1}BMW Group, Germany; {2}BMW Group / Technical University of Munich, Germany; {3}Technical University of Munich, Germany

5:20PM-5:40PM | UNIFIED AVERAGE MODEL OF SWITCHED-PASSIVE-NETWORK EQUALIZER FOR PERFORMANCE ASSESSMENT IN LONG-TERM SIMULATIONS

Phuong-Ha La, Sung-Jin Choi, University of Ulsan, Korea

TS 22 DC to DC Converter Topologies and Control

Room| Gloriana B Chairs: Khai Ngo and Deepak Gunasekaran

4PM-4:20PM | DESIGN AND IMPLEMENTATION OF A NOVEL DUAL INPUT SINGLE OUTPUT CONVERTER FOR AUTOMOTIVE APPLICATIONS AND AUTONOMOUS DRIVING

Laurenz Tippe{2}, Michael Schmid{2}, Joachim Fröschl{1}, Hans-Georg Herzog{2}, {1}BMW Group, Germany; {2}Technical University of Munich, Germany

4:20PM-4:40PM | A NOVEL DUAL OUTPUT MULTI-RESONANT CONVERTER FOR ALL WHEEL DRIVE ELECTRIC VEHICLE

Ramana Manohar Reddy, Moumita Das, Indian Institute of Technology Mandi, India

4:40PM-5PM | A FULLY BALANCED VERTICALLY STACKED MULTILEVEL POWER CONVERTER TOPOLOGY WITH LINEAR SCALING USING DUAL ACTIVE HALF BRIDGE CONVERTERS

Matthew Jahnes, Matthias Preindl, MPLab, Columbia University, United States

5PM-5:20PM | RECEDING HORIZON ESTIMATION AND MODEL PREDICTIVE CONTROL FOR BASIC POWER MODULE WITH HIGH PERFORMANCE

Liwei Zhou{1}, Matthias Preindl{2}, {1}Columbia University, United States; {2}MPLab, Columbia University, United States

5:20PM-5:40PM | A MULTIFUNCTIONAL T-TYPE 4-LEG INVERTER FOR VARIOUS OPERATION MODES OF ELECTRIC AIRCRAFT PROPULSION

Jonathan Taylor, Majid Fard, Jiangbiao He, University of Kentucky, United States

TS 23 Heavy Duty Vehicles - Bus, Truck, and Light Rail

Room| Gloriana C Chairs: Mattia Ricco, Bowen Yang

4PM-4:20PM | IMPACT OF A STATIONARY ENERGY STORAGE SYSTEM IN A DC TROLLEYBUS NETWORK

Rudolf Francesco P. Paternost{2}, Riccardo Mandrioli{2}, Riccardo Barbone{2}, Vincenzo Cirimele{2}, Jelena Loncarski{2}, Mattia Ricco{1}, {1}Alma Mater Studiorum, University of Bologna, Italy; {2}University of Bologna, Italy

4:20PM-4:40PM | MODELING AND MULTI-PHYSICS OPTIMIZATION OF HIGH-POWER DYNAMIC WIRELESS CHARGING SYSTEMS

Anthony Agostino, Akhil Prasad, Diala Haddad, Steven Pekarek, Aaron Brovont, Dionysios Aliprantis, Purdue University, United States

4:40PM-5PM | SIMULATING ELECTRIC REFUSE COLLECTING VEHICLE PERFORMANCE: PERMANENT MAGNET VERSUS SWITCHED RELUCTANCE TRACTION MOTOR

Alexander Forsyth{1}, Francisco Juarez-Leon{2}, Jennifer Bauman{2}, {1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

5PM-5:20PM | PREDICTING POWER DEMAND IN URBAN TRANSPORTATION SYSTEMS USING AN EVOLUTIONARY NEURAL NETWORK

Michele Weisbach, Kay Herklotz, Heiko Fechtner, Utz Spaeth, Bela Gipp, Benedikt Schmuelling, University of Wuppertal, Germany

5:20PM-5:40PM | BATTERY ELECTRIC BUSES OPERATING IN QATAR: A COMPREHENSIVE ENERGY CONSUMPTION ANALYSIS

Rafah Alarrouqi, Sertac Bayhan, Luluwah Al-Fagih, Hamad Bin Khalifa University, Qatar

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 Electric Machines, Power Electronics, and Architectures for Electrified Transportation

Virtual Session on Whova Chairs: Bhim Singh, Sandun Kuruppu

7AM-7:20AM | COMPARISON OF SLOT/POLE TOPOLOGIES OF VARIABLE FLUX RELUCTANCE GENERATORS FOR AIRCRAFT APPLICATIONS

Ufuk Ayhan{1}, Hilmi Gurleyen{2}, Erkan Mese{1}, {1}Ege University, Turkey; {2}Usak University, Turkey

7:20AM-7:40AM | NOVEL INTEGRATED ELECTRICAL ARCHITECTURE FOR SOLAR-CHARGED ELECTRIC VEHICLES

Danial Sadeghpour, Jennifer Bauman, McMaster University, Canada

7:40AM-8AM | CARBON EMISSION COMPARISON OF SLOTTED AND SLOTLESS MOTORS FOR EVTOL APPLICATION

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 Notiingham Ningbo China, China; {2}University of Nottingham, United Kingdom

8AM-8:20AM | FAULT RIDE-THROUGH SCHEME AND CONTROL STRATEGY OF MULTILEVEL VOLTAGE-BALANCING DC-DC CONVERTER

Miao Wang, Xiaofeng Yang, Yongqi Zhu, Shixiang Li, Trillion Q Zheng, Beijing Jiaotong University, China

8:20AM-8:40AM | COMPARISON OF SHORT-CIRCUIT CURRENT CONTROL OF RESONANT SWITCHED-CAPACITOR CONVERTER

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

8:40AM-9AM | ANALYSIS OF ALL-ELECTRIC SHIP MOTIONS IMPACT ON PV SYSTEM OUTPUT POWER IN WAVES

Saman Nasiri{2}, Mostafa Parniani{2}, Frede Blaabjerg{1}, Saeed Peyghami{1}, {1}Aalborg University, Denmark; {2}Sharif University of Technology, Iran

VS 3 Battery Chargers and Battery Energy Storage Systems

Virtual Session On Whova Chairs: Yan Li, Zhongbao Wei

7AM-7:20AM | AN ADAPTIVE EV CHARGER BASED RECONFIGURABLE BIDIRECTIONAL ISOLATED DC-DC CONVERTER WITH WIDE VOLTAGE RANGE OF OPERATION

Saran Chaurasiya, Bhim Singh, Indian Institute of Technology Delhi, India

7:20AM-7:40AM | HIGH EFFICIENCY GAN-BASED NON-ISOLATED ELECTRIC VEHICLE ON-BOARD CHARGER WITH ACTIVE FILTERING

Alice Dong, Danial Sadeghpour, Jennifer Bauman, McMaster University, Canada

7:40AM-8AM | VOLTAGE SENSOR FAULT DETECTION IN LI-ION BATTERY ENERGY STORAGE SYSTEMS

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

8AM-8:20AM | MODIFIED DEADBEAT PREDICTIVE CURRENT CONTROL BASED ONBOARD CHARGER FOR INTEGRATION WITH SMART HOME

Utsav Sharma, Bhim Singh, Indian Institute of Technology Delhi, India

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

8:40AM-9AM | 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



1020 | AN APPROACH TO COMPARE MULTIPHASE DRIVES FOR AUTOMOTIVE SAFETY APPLICATIONS

Antonin Ribière{2}, Ngac-Ky Nguyen{2}, Eric Semail{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

Avneet Kumar{2}, Xuewei 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 PreindlMPLab, Columbia University, United States

1237 | NEUTRAL-POINT-LESS (NPL) MULTILEVEL INVERTER TOPOLOGY WITH SINGLE DC-LINK CAPACITOR: H-TYPE INVERTER

Mikayla Benson{2}, Xiaofeng Dong{1}, Musab Guven{2}, Kangbeen Lee{2}, Jinyeong Moon{1}, Woongkul Lee{2}{1}Florida State University, United States; {2}Michigan State University, United States

POSTER SESSION 1

June 15 | 2PM-4PM | Anabella Ballroom

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

1026 | COMPARISON OF SUBDOMAIN MODELS FOR OUTER ROTOR SLOTLESS HALBACH ARRAY PERMANENT MAGNET SYNCHRONOUS MOTORS

Junyeong Jung, Iqbal HusainNorth Carolina State University, United States

1027 | 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

1035 | A MULTI-OBJECTIVE OPTIMIZATION FRAMEWORK FOR THE DESIGN OF A HIGH POWER-DENSITY SWITCHED RELUCTANCE MOTOR

Mohammad Ehsan Abdollahi, Berker Bilgin, McMaster University, Canada

1058 | COMBINED ELECTROMAGNETIC AND THERMAL DESIGN OPTIMIZATION STUDIES OF IN-SLOT COOLING FOR UAM ELECTRIC MOTORS

Thomas Tallerico, Andrew SmithNASA Glenn Research Center, United States

1093 | 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

1154 | DESIGN CHARACTERISTICS OF UNEQUAL-TURN SINUSOIDAL WOUND ROTOR WINDING IN BRUSHLESS DOUBLY-FED INDUCTION GENERATOR

Seyed Mehdi Seyedi, Dorsa Talebi, Mesaad Albader, Hamid A. ToliyatTexas A&M University, United States

1215 | Multi-Physics Design Platform for a High Power Density Multi-Phase IPM Traction Motor: Analysis and Simulation

Ahmed Abdelrahman, Ashish Sahu, Nathan Emery, Dhafar Al-Ani, Berker BilginMcMaster University, Canada

1045 | Design Study of a Coupled Inner-Stator Magnetically Geared Motor for Electric Aircraft Applications

Thomas Tallerico, Justin Scheidler NASA Glenn Research Center, United States 1151 | EXTENDED GRADIENT-BASED MODEL FOR REAL-TIME DETERMINATION OF LOCAL TEMPERATURE-DEPENDENT CURRENTS WITHIN LITHIUM-ION BATTERIES Sebastian Menner, Michael BuchholzUlm University, Germany

1173 | BATTERY STORAGE INTEGRATION IN EV FAST CHARGING STATION FOR INCREASING ITS REVENUES AND REDUCING THE GRID IMPACT

Marco Stecca, Wiljan Vermeer, Thiago Batista Soeiro, Laura Ramirez Elizondo, Pavol Bauer, Peter PalenskyDelft University of Technology, Netherlands

1226 | A MULTI-OBJECTIVE DESIGN APPROACH FOR PV-BATTERY ASSISTED FAST CHARGING STATIONS BASED ON REAL DATA

Wiljan Vermeer, Gautham Ram Chandra Mouli, Pavol BauerDelft University of Technology, Netherlands

1256 | THE EFFECTS OF TEST PROFILE ON LITHIUM-ION BATTERY EQUIVALENT-CIRCUIT MODEL PARAMETERIZATION ACCURACY

Wenlin Zhang, Ryan Ahmed, Saeid HabibiMcMaster University, Canada

1281 | COMPARING TRADITIONAL AND MACHINE LEARNING MODELS FOR BATTERY SOC CALCULATION

Fernando Barrios{2}, James Di Donato{2}, Carlos Vidal{2}, Nithin Chemmanoor{2}, Ali Emadi{1}, Ryan Ahmed{2}, Saeid Habibi{2}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1185 | HIGH-SPEED TARGET SOC ALIGNMENT ALGORITHM FOR SECOND-LIFE BATTERY PACK MAINTENANCE

Nguyen-Anh Nguyen, Phuong-Ha La, Sung-Jin ChoiUniversity of Ulsan. Korea

1149 | POWER RELAYS BASED NOVEL CIRCUIT WITH MULTIPLE DEVICE CHARACTERIZATION CAPABILITY FOR CRYOGENIC APPLICATIONS

Yuqi Wei, Md Maksudul Hossain, Alan MantoothUniversity of Arkansas, United States

1341 | LOW LOSS BI:2212 SUPERCONDUCTORS FOR ELECTRIC AIRCRAFT

Michael Sumption{1}, Jacob Rochester{1}, Alex Otto{2}{1}Ohio State University, United States; {2}Solid Materials Solutions, United States

1022 | DESIGN AND IMPLEMENTATION OF A NOVEL MULTI-DOMAIN MANAGEMENT FOR AUTOMOTIVE POWER NETS

Laurenz Tippe{2}, Alberto de Vergara Oberloher{2}, Michael Ebnicher{2}, Joachim Fröschl{1}, Hans-Georg Herzog{2} {1}BMW Group, Germany; {2}Technical University of Munich, Germany

1071 | FAST TIME-DOMAIN IMPEDANCE SPECTROSCOPY OF LITHIUM-ION BATTERIES USING PULSE PERTURBATION

Alan Li{1}, Youssef Fahmy{1}, Melissa Wu{1}, Matthias Preindl{2}{1}Columbia University, United States; {2}MPLab, Columbia University, United States

1096 | IMPACT OF TIME CONSTANTS OF REACTIVE POWER SOURCES ON SHORT-TERM VOLTAGE STABILITY

Elisabeth Scheiner, Ilya Burlakin, Niklas Strunz, Alexander Raab, Gert Mehlmann, Matthias LutherFriedrich-Alexander University Erlangen-Nuernberg, Germany

1191 | DECENTRALIZED ECONOMIC DISPATCH VIA PROXIMAL MESSAGE PASSING

Ryan Greenough, Graham McClone, Melvin Lugo Alvarez, Adil Khurram, Jan KleisslUniversity of California, San Diego, United States

1196 | DESIGN OF ELECTRIC DRIVE DYNAMICS USING IMPEDANCE SEPARATION AND IMPEDANCE SHAPING *Lav Thyagarajan*{1}, *Giri Venkataramanan*{2}{1}John Deere,

United States; {2}University of Wisconsin Madison, United States

1048 | IMPROVED THERMAL MANAGEMENT OF POWER MODULES AT TRANSIENT HEAT LOADING USING JET IMPINGEMENT

Samantha Jones-Jackson{2}, Peter Azer{2}, Ali Emadi{1} {1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1065 | TEMPERATURE EFFECT ON THERMAL IMAGING AND DEEP LEARNING DETECTION MODELS

Yixin Huangfu, Linnéa Campbell, Saeid HabibiMcMaster University, Canada

1150 | IMPROVE THE LSTM TRAJECTORY PREDICTION ACCURACY THROUGH AN ATTENTION MECHANISM

Tong Zhang, Zhiwen WangLanzhou University of Technology, China

1162 | ENERGY-AWARE DRIVING PROFILE OF AUTONOMOUS ELECTRIC VEHICLES CONSIDERING REGENERATIVE BRAKING LIMITATIONS

Masoud Mohammadi{3}, Shoeib Heydari{1}, Poria Fajri{3}, Farshad Harirchi{1}, Zonggen Yi{2}{1}Ford Motor Company, United States; {2}Idaho National Lab, United States; {3}University of Nevada Reno, United States

1178 | ACCELERATION CONTROL STRATEGY FOR BATTERY ELECTRIC VEHICLE BASED ON DEEP REINFORCEMENT LEARNING IN V2V DRIVING Matteo Acquarone, Angelo Borneo, Daniela Anna MisulPolitecnico di Torino, Italy

1204 COOPERATIVE ADAPTIVE CRUISE CONTROL: A GATED RECURRENT UNIT APPROACH

Alessia Musa, Pier Giuseppe Anselma, Matteo Spano, Daniela Anna Misul, Giovanni BelingardiPolitecnico di Torino, Italy

1270 | ENABLING RECONFIGURABLE NAVAL SCADA NETWORK THROUGH SOFTWARE-DEFINED NETWORKING *Justin Szatkowski*{1}, Yan Li{1}, Liang Du{2}{1}Pennsylvania State University, United States; {2}Temple University, United

States

1317 | INCORPORATION OF PHYSIOLOGICAL FEATURES IN DROWSINESS DETECTION USING DEEP NEURAL NETWORK APPROACH

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

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 Torino, 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 Torino, 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

POSTER SESSION 2

June 16 | 2PM-4PM | Anabella Ballroom

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

1344 | I-CORE PCB PLANAR INDUCTOR DESIGN FOR HIGH FREQUENCY AND HIGH POWER CONVERTERS

Alexandre Msellati, Matthew Jahnes, Matthias Preindl MPLab, Columbia University, United States

1283 | OFFLINE MODEL BASED MTPA METHODOLOGY United States; {2}University of Michigan, United States FOR OPTIMUM PERFORMANCE OF INTERIOR PERMANENT MAGNET MACHINES OVER FULL **RANGE OF SPEED AND TOROUE**

Visweshwar Chandrasekaran{3}, Bernard Jose{3}, Ashwin Karthik CONVERTERS Muralidharan{1}, Ned Mohan{4}, Kaushik Basu{2}{1}BREK Electronics, United States; {2}Indian Institute of Sciences, United States; {3}Trane Technologies, India; {3}Trane Technologies, United States; {4}University of Minnesota, United States

1230 | GENERALIZED ANALYTICAL SOLUTION FOR N- POWER SEGMENT AXIAL FLUX HALBACH ARRAYS

Alexander Forsyth{1}, Giorgio Pietrini{2}, Alan Dorneles Callegaro{2}, Ali Emadi{1}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1236 | A REVIEW OF TOROUE-DENSE ELECTRIC DRIVE SYSTEMS WITH POTENTIAL TO BRIDGE THE GAP WITH HYDRAULICS FOR OFF-HIGHWAY VEHICLE Celaya, Mexico; {2}TecNM- Instituto Tecnológico de Celaya, **ELECTRIFICATION**

Fnu Nishanth, Eric SeversonUniversity of Wisconsin Madison, United States

1241 | OPTIMUM DESIGN APPLYING STATOR CHAMFER AND ROTOR NOTCH STRUCTURE TO IMPROVE HARMONICS OF HIGH-DRIVING EFFICIENCY Hiller, Karlsruhe Institute of Technology, Germany ELECTRIC VEHICLE

So-Yeon Im{2}, Kvoung-Soo Cha{2}, Mvung-Seop Lim{2}, Yunyong Choi{1}, Yun-Jae Won{2}{1}DriveTech, Korea; {2}Hanyang University, Korea

1248 | SURFACE-MOUNTED V-SHAPES PM ASSISTED-SYNCHRONOUS RELUCTANCE MOTOR FOR LIGHT **ELECTRIC VEHICLES**

Mbika MutebaUniversity of Johannesburg, South Africa

1305 | ANALYTICAL CALCULATION OF EQUIVALENT CIRCUIT PARAMETERS AND OPERATIONAL INDUCTANCE IN MULTIPLE-POLE SLOTLESS PMSMS

Xiaolong Zhang, Kiruba Sivasubramani Haran, Jiangiao XiaoUniversity of Illinois Urbana-Champaign, United States

1338 | WOUND ROTOR SYNCHRONOUS MACHINE CURRENT ESTIMATION USING A LINEAR LUENBERGER OBSERVER

Michael Eull{2}, Max Parker{2}, Matthias Preindl{1}{1}MPLab, Columbia University, United States; {2}University of Strathclyde, United Kingdom

1318 | EXPERIMENTAL CHARACTERIZATION AND MODELING OF A YASA P400 AXIAL FLUX PM TRACTION MACHINE FOR ELECTRIC VEHICLES

Alexander Allca-Pekarovic{2}, Phillip J. Kollmeyer{1}, Alexander Forsyth{1}, Ali Emadi{1}{1}McMaster Automotive Resource Centre, McMaster University, Canada; {2}McMaster University, Canada

1083 | FINALIZED DESIGN AND PERFORMANCE ANALYSIS OF A HYBRID TURBO-ELECTRIC **REGIONAL JET FOR THE NASA ULI PROGRAM**

Mingxuan Shi{1}, Metin Ozcan{1}, Gokcin Cinar{2}, Jonathan Gladin{1}, Dimitri N. Mavris{1}{1}Georgia Institute of Technology,

1205 | MULTI-OBJECTIVE DESIGN OPTIMIZATION OF ELECTRIC AIRCRAFT PROPULSION POWER

Benjamin Luckett, Jiangbiao He, University of Kentucky, United States

1018 | DESIGN AND IMPLEMENTATION OF REAL-TIME SIMULATION SOLVER FOR HIGH FREQUENCY

Luc-Andre Grégoire, Sebastien Cense, Marnaud Ndungu, Jean Bélanger, OPAL-RT Technologies Inc., Canada

1139 | COMPARISON BETWEEN DISCRETIZATION TECHNIQUES ON HIL FRACTIONAL-ORDER CONTROLLERS

Luis M. Martinez-Patiño{2}, Allan G. Soriano-Sanchez{1}, Francisco J. Perez-Pinal{2}{1}CONACyT- Instituto Tecnológico de Mexico

1195 | HARDWARE-IN-THE-LOOP TEST RIG FOR **RAPID PROTOTYPING OF BATTERY MANAGEMENT** SYSTEM ALGORITHMS

Alexis Kalk, Yusuf Salikoglu, Lars Leister, Dennis Bräckle, Marc

1197 | ELECTRIC VEHICLE TIRES TEST BENCH **DESIGN FOR LABORATORY**

Runfeng Li, Yunchang Yu, Wenfei Ji, Yiwen Sun, Guangyu TianTsinghua University, China

1179 | A MW SCALE CHARGING ARCHITECTURE FOR SUPPORTING EXTREME FAST CHARGING OF HEAVY-**DUTY ELECTRIC VEHICLES**

Michael Starke, Radha Sree Krishna Moorthy, Aswad Adib, Benjamin Dean, Madhu Chinthavali, Bailu Xiao, Steven CampbellOak Ridge National Laboratory, United States

1064 | STUDY OF FLASHOVER UNDER DIVERSE AMBIENT CONDITIONS MIMICKING MVDC SHIPBOARD POWER SYSTEM UNDER DC AND TRANSIENT VOLTAGE

Yang Liu, Ebrahim Karimi, Ning Guo, Minuk Lee, Lukas GraberGeorgia Institute of Technology, United States

1119 | A DIODE-FREE MOV2-RC SNUBBER FOR SOLID-STATE CIRCUIT BREAKER

Shuyan Zhao, Reza Kheirollahi, Yao Wang, Hua Zhang, Fei LuDrexel University, United States

1121 | ELECTRET BASED MITIGATION OF PARTIAL DISCHARGE IN PWM INVERTER DRIVEN SYSTEM

Farhina Hague, Omar Faruge, Chanyeop ParkMississippi State University, United States

1157 |DEGRADATION OF AVIATION WIRES DUE TO PARTIAL DISCHARGE UNDER HIGH DV/DT SOUARE-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}, DragičevićTechnical University of Denmark, Denmark Boxue Hu{3}{1}Air Force Research Laboratory/ROOE, 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}, Menggi 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

1216 | DESIGN CONSIDERATIONS FOR A MODULAR 2-STAGE LCLC FILTER FOR THREE PHASE AC-DC INTERLEAVED CONVERTERS

Ripun Phukan{1}, David Nam{2}, Dong Dong{1}, Rolando Burgos{1}{1}CPES, Virginia Polytechnic Institute and State University, United States; {2}Virginia Polytechnic Institute and State University, United States

1229 | A REVIEW ON PARTIAL DISCHARGE PHENOMENON IN ROTATING MACHINES OPERATED USING WBG MOTOR DRIVES

Sama Salehi Vala, Abdul Basit Mirza, Fang LuoStony Brook University, United States

1313 | INSPECTING IMPACT OF CABLING INFRASTRUCTURE ON REFLECTED WAVE AND EMI FOR MORE ELECTRIC AIRCRAFT (MEA) MOTOR DRIVES

Kushan Choksi{3}, Yuxuan Wu{3}, Mustafeez Ul Hassan{3}, Fang Luo{3}, Bo Liu{2}, Xin Wu{1}{1}Pratt & Whitney, United States: {2}Raytheon Technologies Research Center, United States; {3}Stony Brook University, United States

1146 | MODEL-BASED SOFTWARE DEVELOPMENT -AUTOCODE TO AUTOSAR

Keyur Patel Nexteer Automotive, United States

1164 | A FRAMEWORK FOR SCHEDULING HOUSEHOLD CHARGING OF ELECTRIC VEHICLES

Ahmad Almaghrebi{3}, Fabio Vitor{1}, Kevin James{2}, Fares Aljuheshi{2}, Mahmoud Alahmad{2}{1}University of Nebraska Omaha, United States; {2}University Of Nebraska-Lincoln, United States; {3}University of Nebraska–Lincoln, United States

1072 | 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 Gebbran, Pere Izquierdo Gómez, Tomislav

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 OUANTUM 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

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 HassanAmerican 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 Dragičević{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 VOLTAG ISOLATION

Yao Wang, Shuyan Zhao, Reza Kheirollahi, Hua Zhang, Fei LuDrexel University, 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

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 HassanAmerican 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 Dragičević{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 Kheirollahi, Hua Zhang, Fei LuDrexel University, United States

1224 | CALCULATION OF AC LOSSES IN MULTI-PHASE LITZ COIL SYSTEMS

Noah Salk, Chathan CookeMassachusetts 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 SarwatFlorida 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

EXHIBITOR DIRECTORY

EXPO HOURS: JUNE 15 & 16 | 10AM-5:00PM | ANABELLA BALLROOM

ATE CORP

BOOTH 100

DSPACE

2540 N. 1st Street

CA, USA 95131

Suite 201 San Jose.

Tel. +1 949 403-0830

BOOTH 101

10401 Roselle Street San Diego, CA 92121 800-404-ATEC (2832)



Advanced Test Equipment Corp. (ATEC) is the rentals, sales and service leader for test and measurement instruments, offering thousands of choices for rent or purchase, and equipment calibration. ATEC equips customers with everything from the latest technology to legacy equipment, for applications ranging from everyday use to unique and industry specific applications.

AIAA

BOOTH 103

BOOTH 107

12700 Sunrise Valley Drive, Reston, VA 20191-5807 Tel. 800.639.2422



AIAA is the world's largest technical society dedicated to the global aerospace profession. Created in 1963 by the merger of the two great aerospace societies of the day, the American Rocket Society (founded in 1930 as the American Interplanetary Society), and the Institute of the Aerospace Sciences (established in 1933 as the Institute of the Aeronautical Sciences), AIAA carries forth a proud tradition of more than 80 years of aerospace leadership.

REXGEAR

3200 Guasti Rd Ste 100 Ontario, California 91761 +1 (951) 888-3128



Manufacturers and engineers come to us when they need to power, test or measure something, and they haven't found an off-the-shelf solution that quite meets their needs.

Sometimes we're a pain in the butt and ask too many questions. It's not because we like to be a pain. We just want your stuff to work.

CHROMA SYSTEM SOLUTIONS BOOTH 106

19772 Pauling Foothill Ranch, CA 92610 Tel: 949-600-6400



Chroma manufactures high quality power conversion and electrical safety test instruments and automated test systems to suit a variety of applications.

From aerospace and defense to automotive and renewable energy technologies, Chroma products are providing consistent, accurate, and efficient measurements to the world's leading R&D labs.

GLENAIR

2540 N. 1st Street Suite 201 San Jose, CA, USA 95131 +1 949 403-0830

BOOTH 108

Glenair manufactures high-reliability connectors and cables for mission-critical land, sea, air, and space applications. The company began operations in 1956 producing electrical connector backshells and accessories.



dSPACE

THERMOANALYTICS

BOOTH 111

23440 Airpark Blvd PO Box 66 Calumet, MI 49913 United States +1 (906) 482-9560

ThermoAnALYTICS believeS in creating the best analysis and thermal software possible to empower our customers to design the best products possible.

THERMO

ANALYTIC

Just as THEIR customers continue to innovate and iterate, so do THEY. THEIR customers are determined engineers who are smart, passionate, and continually seeking to create designs that meet their full potential.

SHELL

2 Drydock Ave Boston, MA 02210 Tel. +1 281 544-7860

As one of the world's largest energy suppliers, Shell has played a part in the essential journeys people make every day for well over a century. Our aim now is to become one of the largest electric charging solutions providers globally, meeting customer demand at home, at work or on the go.

AICT

BOOTH 116

864-1. lui-dona. Yeongtong-gu, Suwon-si, Gyeonggi-do Korea Tel: +82-31-888-9114



ADVANCED INSTITUTE OF CONVERGENCE TECHNOLOGY

AICT is South Korea's first and largest research institute dedicated to the research and development of convergence technology. In March 2008, AICT was jointly established by the Gyeonggi provincial government and Seoul National University to undertake the convergence of diverse fields in science and technology for the benefit of public end users. AICT has become the powerhouse of innovations

ENEDYM

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

enedym

BOOTH 117

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 Universit

BOOTH 200

2540 N. 1st Street Suite 201 San Jose, CA, USA 95131 +1 949 403-0830

PLEXIM



Plexim, with locations in Zurich and Boston, is an innovative software company active in the field of technical simulation. For 20 years we have successfully developed and marketed PLECS - the leading simulation software for power electronic systems and electrical drives. In addition, we offer automatic code generation and real-time systems as pioneering technologies for the development and test of controls.

NH RESEARCH

BOOTH 201

16601 Hale Avenue Irvine, California 92606 (949) 474-3900



NH Research (NHR) enables electrification by accelerating innovation, validation and functional test of today's technologies. Backed by over 50 years of experience in power conversion and electrification test systems NHR provides world class test instruments and systems for a wide range of industries.



BOOTH 113



DYNAMIC WPT

310 E Walnut Ave – Unit A Fullerton, CA 92832 (248) 880-8018



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.

POWERSYS SOLUTIONS/ TYPHOON HIL

2791 Research Dr Rochester Hills, MI 48309 USA Tel: +1 248 564 2000



BOOTH 205

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.

GMW ASSOCIATES

BOOTH 206

BOOTH 210

BOOTH 202

955 Industrial Rd, San Carlos, CA 94070, United States



GMW is a company that exists to solve customer problems, with our core expertise being in magnetics. This magnetics expertise drives our focus in sensors, transducers and test and measurement instrumentation. Key industries remain Particle Accelerators and MRI, with Electric Vehicles, Power Electronics, Spintronics, Materials Research, Oil & Gas all contributing.

LASER TECHNOLOGIES

BOOTH 207

LASER Technologies

2540 N. 1st Street, Suite 201 San Jose, CA, USA 95131 +1 949 403-0830

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.

MARSILLI

MARSILLI

Via per Ripalta Arpina, 14 26012 Castelleone (CR) ITALY

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**

BOOTH 211



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

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



BOOTH 212

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.

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 Universit

JFE SHOJI POWER CANADA

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



BOOTH 214

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.

QUANTEN TECHNOLOGIES

BOOTH 219

BOOTH 213

3420 Black Canyon Dr., Plano, TX, 75025, USA

SPARK & PEIK

113H Grehan Bldg.,

University of Kentucky,



Engaged in R & D, manufacturing and sales of motor for new energy vehicles. 20 years of industrial experience in automotive, power electronics or energy, rich experience in technology development, product design and manufacturing, and marketing.

VERDEGOAERO

1511 Aviation Center Parkway Daytona Beach FL 32114 United States

BOOTH 300



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. Lexington, KY 40506-0046

The SPARK research group affiliated with the Power and Energy Institute of Kentucky (PEIK) will participate in a newly awarded research project led by the Electric Power Research Institute (EPRI), in collaboration with utilities and industry,

BOOTH 301



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.

IEEE Transportation Electrification The 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

BOOTH 309



BOOTH 306

BOOTH 310

1295 Forgewood Ave. Sunnyvale, CA 94089

ALTAIR

by Software Motor Company

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.

C ELANTAS

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.

BOOTH 318



Business is complex. But in complexity, there is opportunity for innovative solutions. Our comprehensive, openarchitecture 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.

MAKO AEROSPACE INC



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

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.

IEC HOLDEN

TABLETOP

8180 Cote-de-Liesse Road Montreal, Quebec, Canada

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.

AIAA

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



TABLETOP

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

INDUSTRY SPONSORS

LANYARD SPONSOR

enedym

VIP GIFT SPONSOR

ר הי

Motor Drives | Power Electronics | Batteries



