ITEC is aimed at helping the industry transition from conventional vehicles to advanced electrified vehicles.



2014 IEEE Transportation Electrification Conference and Expo (ITEC'14)

Components, Systems, and Power Electronics - From Technology to Business and Public Policy



June 15-18, 2014

Adoba Hotel Dearborn/Detroit Dearborn, Michigan, USA











Welcome Message from General Chair



It gives me great pleasure to welcome you to the 2014 IEEE Transportation Electrification Conference and Expo (ITEC'14). ITEC is aimed at helping the industry in the transition from conventional vehicles to advanced electrified vehicles. The conference is focused on components, systems, standards, and grid interface technologies, related to efficient power conversion for all types of electrified transportation, including electric vehicles, hybrid electric vehicles, and plug-in hybrid electric vehicles (EVs, HEVs, and PHEVs) as well as heavyduty, rail, and off-road vehicles and airplanes and ships.

The ITEC'14 organizing committee has worked diligently to create an excellent technical conference for you. We would like to express our heartfelt gratitude

for their dedication and countless hours of work. Thanks to ITEC's strategic and business plan and leadership of IEEE Power Electronics Society, Industry Applications Society, and Power & Energy Society, ITEC has quickly become the main global technical event for transportation electrification.

We have an excellent conference planned for you to experience, with a comprehensive program exceptionally attractive to industry, government agencies, and general public, in addition to the academic researchers, students, and educators. ITEC includes an Educational EV/HEV Boot Camp with five short courses offered by internationally renowned experts. In addition, we have world-class plenary speakers covering current status and future trends in transportation electrification. The program will also include state-of-the-art tutorials and numerous panel discussions, as well as over 100 high-quality technical paper presentations.

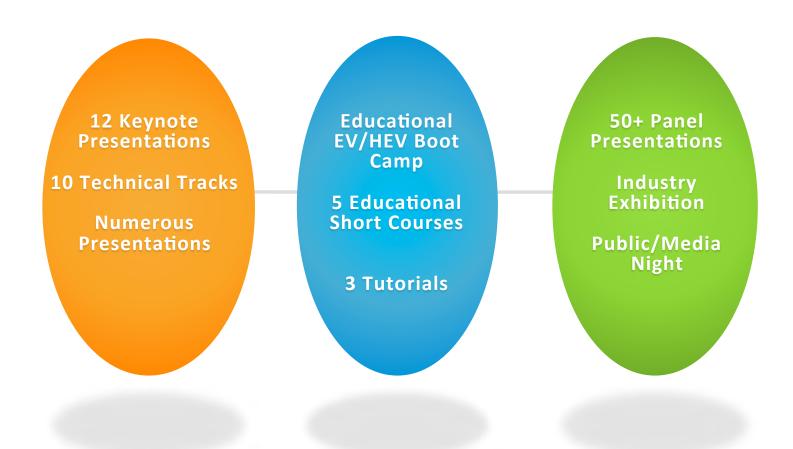
We would like to extend a warm welcome to this year's ITEC and look forward to meeting you over the four days of the conference. We hope that you have a memorable experience. If you are not already a part of the broader organizing community of ITEC and would like to be directly involved with the conference, we welcome you to join forces with us in improving ITEC and addressing the needs of the industry. After all, ITEC is your conference!

Warmest Regards,

Mahesh Krishnamurthy General Chair, ITEC'14

You will experience...

ITEC is focused on components, systems, standards, and grid interface technologies, related to efficient power conversion for all types of electrified transportation, including electric vehicles, hybrid electric vehicles, and plug-in hybrid electric vehicles (EVs, HEVs, and PHEVs) as well as heavy-duty, rail, off-road vehicles, airplanes and ships.



We have features for every step of the way...

IT'S ABOUT THE KNOWLEDGE SHARED...

Mazen Hammoud

Chief Engineer, Powertrain Electrification FORD MOTOR CO.

Ranbir Singh

President/CEO
GENESIC
SEMICONDUCTOR, INC.

Babak Fahimi

Director, REVT Laboratory
UT- DALLAS

Greg Hubbard

Director of Electrification Controls
GENERAL MOTORS

Micheal Austin

Vice President **BYD America**

Matt Stevens

CEO CROSSCHASM

Rik DeDoncker

Director, Institute for Power Electronics and Electrical Drives

RWTH AACHEN

Konrad Woronowicz

Fellow Expert
BOMBARDIER
TRANSPORTATION

Rob Lankin

Founder and CEO
ACCELERATED SYSTEMS INC

Christopher Ostrowski

Associate Director, Vehicle Electronics & Architecture U.S. ARMY (TARDEC)

Waleed Said

Sr. Fellow Electric Systems
UTC AEROSPACE SYSTEMS

Derek Grieve

Executive Leader, Systems and Projects Engineering
GE POWER CONVERSION

It's About Collaboration

All conference registrants are welcome to attend the panel discussions, which are in parallel with technical sessions, at no additional charge.

Panels are expected to be 80 minutes in duration and are scheduled in the afternoons of Monday (June 16, 2014) and Tuesday (June 17, 2014).

At each panel, the panel moderator/organizer and panelists will each give a short 5-10 minute presentation/ speech and then open the floor to the audience for an open panel discussion and Q&A.

Panel 1

Transportation Technologies of Vehicle to Infrastructure Interaction: Current Status and Challenges

Panel 2

Application of Wide Bandgap Semiconductors to Electrification of Vehicles for Power Electronic Converters – Benefits, Opportunities and Challenges

Panel 3

Fuel Cell Technology for Automotive Applications: Past, Present and **Future**

Panel 4 **Electrical Steels in Electric Machines for Transportation**

Panel 5

EV Energy Storage Systems: Potential Challenges and Future Solutions

Panel 6

Urban public transportation: Buses, tramways, metro, light rail, where is the future?

Panel 7

Future of Automotive Simulation Software: What capabilities should one expect?

Panel 8

48V: Architecture and Challenges

Panel 9

Wireless Charging

Panel 10 Racecar Electrification

Panel 11

Modern Methods in Education of Electric and Hybrid Vehicles



General Chair

Mahesh Krishnamurthy, Illinois Institute of Technology, USA

General Co-Chairs

Bruno Lequesne, E-Motors Consulting, LLC, USA Silva Hiti, General Motors, USA

Program Chair

Anand Sathyan, Chrysler Group LLC, USA

Assistant Program Chair

Xiaodong Shi, Mercedes-Benz R&D, North America

IEEE TAB/FDC Electric Vehicle Committee Co-Chairs and IEEE Transportation Electrification Initiative Chairs

Russell Lefevre, 2008 President, IEEE-USA Lee Stogner, 2010-2011 Director, IEEE Board of Directors

IAS Representatives

Burak Ozpineci, Oak Ridge National Laboratory Ayman El-Refaie, GE Avoki Omekanda, GM Mohammad Islam, Halla Mechatronics

PES Representatives

Paul Bishop, Secretary of IEEE P2030.1 Guide for Electric-Sourced Transportation Infrastructure Abdel-Aty Edris, Quanta Technology

Publications Chair

Omer C. Onar, Oak Ridge National Laboratory, USA

Registration Chair

Berker Bilgin, MacAUTO, McMaster University, Canada

Education Chair

Marshall Molen, Mississippi State University, USA

Awards Chair

Babak Nahidmobarakeh, University of Lorraine, France

Technical Chair for Electric Machines

Hossein Dadkhah, Chrysler LLC

IEEE Southeastern Michigan Section Liaison Chair, Kevin Taylor

Automotive Industry Liaison Chairs

Suresh Gopalakrishnan, GM Michael Degner, Ford Hong Yang, Chrysler LLC

Commercial Vehicle Industry Liaison Chair

William Batten, Oshkosh Corporation

Rail Vehicle Industry Liaison Chair

Tim Richter, GE Global Research

Off-Road Vehicle Industry Liaison Chairs

Travis Overdahl, Oshkosh Corporation Long Wu, John Deere

Aerospace Industry Liaison Chairs

Waleed Said, Hamilton Sundstrand Kamiar Karimi, The Boeing Company Nick Nagel, Triumph Aerospace Sayeed Mir, Eaton Aerospace

Naval/Ship Industry Liaison Chair

Uday Deshpande, General Atomics

Battery Industry Liaison Chair

Said Al-Hallaj, All Cell Technologies

Technical Track Chairs and Co-Chairs

Track 1: Power Electronics and Electric Motor Drives

Chair: Baiming Shao, Mercedes Benz, USA Co-Chair: Zhong Nie, Chrysler LLC, USA

Track 2: Electric Machines and Actuators

Chair: Xiaodong Shi, Mercedes-Benz, USA

Co-Chair: Ganga Jayaraman, MPC Woodward, USA

Track 3: Battery and Battery Management

Chair: Lucia Gauchia, Michigan Tech University, USA

Co-Chair: Srdjan Lukic, North Carolina State University, USA

Track 4: Electric, Hybrid Electric, and Plug-in Hybrid Electric Vehicle System Architectures

Chair: Sheldon Willimason, Concordia University

Co-Chair: Berker Bilgin, McMaster University, Canada

Track 5: Smart Grid, Electrical Infrastructure, and V2G

Chair: Elias Ayana, Cummins Generation, USA Co-Chair: Richard Scholer, Chrysler LLC, USA

Track 6: Electrification of Heavy-Duty and Off-Road Vehicles

Chair: Jin Wang, Ohio State University, USA Co-Chair: Qiuming Gong, Ford Motor Co., USA

Track 7: Fuel Cells and Applications in Transportation

Chair: Fei Gao, Université de Technologie de Belfort-Montbéliard (UTBM), France

Co-Chair: Omer C. Onar, Oak Ridge National Laboratory, USA

Track 8: Electrical Systems and Components for Sea, Undersea, Air, and Space Vehicles

Chair: Babak Nahid-Mobarakeh, University of Lorraine, France Co-Chair: Alireza Safaee, Bombardier Transportation, Canada

Track 9: Modeling, Simulation, and Control

Chair: Ali Davoudi, University of Texas at Arlington, USA

Co-Chair: Ilse Cervantes, Institute for Scientific and Technological Research of San Luis

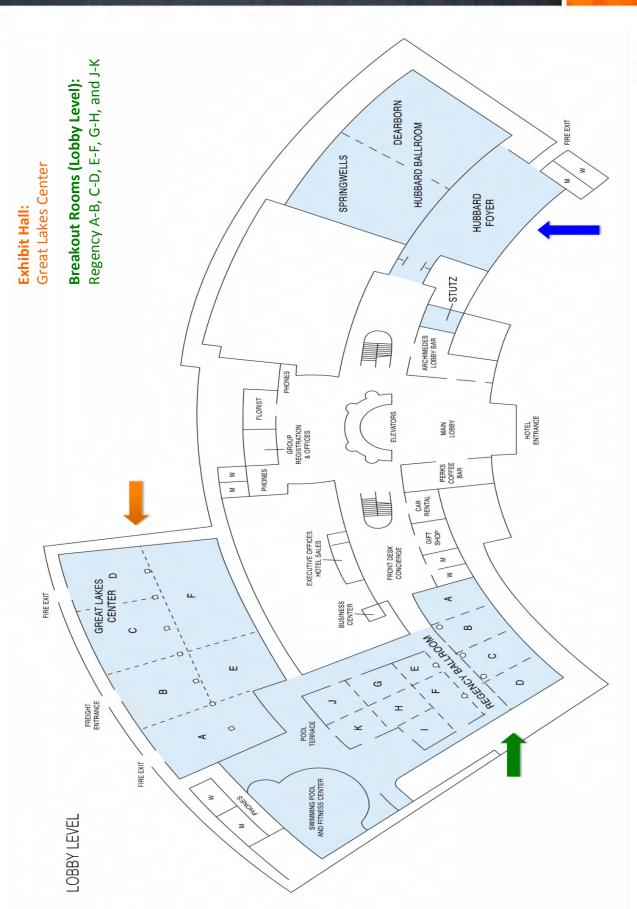
Potosi, Mexico

Track 10: Standards, Policies, and Regulations for Transportation Electrification

Chair: Sanjaka G. Wirasingha, Chrysler LLC, USA

Meeting Room Floor Plan

Plenary Sessions: Springwells (Hubbard) Ballroom



Program-at-a-Glance

2014 IEEE Transportation Electrification Conference and Expo (ITEC'14) Program-at-a-Glance June 15-18, 2014

	7:30AM- 8:30AM	8:30AM- 10:10AM	10:10AM- 10:30AM	10:30AM- 12:00PM	12:00PM- 2:00PM	2:00PM- 3:20PM	3:20PM- 4:20PM	4:20PM- 5:40PM	5:40PM- 7:30PM
Sunday June 15, 2014	uədO	Educational EV/HEV Boot EV/HEV Camp		Educational Educational EV/HEV Boot Camp	Lunch (on own)	Educational EV/HEV Boot EV/HEV Camp	llaH tidi	Educational Educational EV/HEV Boot EV/HEV Camp	
Monday June 16, 2014	egistration	Plenary Session 1	e Break	Plenary Session 1	Poster Session 1 Exhibit Hall Buffet Lunch	Tutorial 1 Session 1 Session 2 Panel 1 Panel 2	reak in Exh	Tutorial 2 Session 3 Session 4 Panel 3 Panel 4	Public/ Media Night in Exhibit Hall
Tuesday June 17, 2014	A esnere R	Plenary Session 2	эћоЭ	Plenary Session 2	Poster Session 2 Exhibit Hall Buffet Lunch	Session 5 Session 6 Panel 5 Panel 6 Panel 7	S eaffed B	Session 7 Session 8 Panel 8 Panel 9	Conference Social Event in Exhibit Hall
Wednesday June 18, 2014	0 ე	Tutorial 3 Panel 11 Session 9		Session 10 Session 11 Session 12 Session 13	Exh	Exhibit Hall Open: Monday, June 16 th , 12:00 Noon – 7:30 PM	pen: .16 th .12:0	- 000N 00	7:30 PM

Monday, June 16th, 12:00 Noon – 7:30 PM Tuesday, June 17th, 12:00 Noon – 7:30 PM



Short Course 1: Linear Motor Drives and Applications in Rapid Transit Systems

Sunday, June 15, 2014

8:30 AM – 12:00 Noon

Venue: Regency A-B

Instructors: Dr. Alireza Safaee and Dr. Konrad Woronowicz,

Bombardier Transportation



Short Course Description: The infrastructure of congested urban centers occupies almost entire available living space and in every case there comes the time when passenger throughput can only be increased by introducing a mass transit system. The ever increasing demand to move more people must be answered within the confines of the existing infrastructure in energy efficient, cost effective expandable and environmentally friendly manner. One of the answers to this challenge is a heavy underground metro system requiring extensive and expensive underground infrastructure. This could be preferred when the underground system already exists and requires only gradual expansion. In any other case the development of a new underground system is cost prohibitive. The alternative is a ground level LRV, providing there is sufficient available real estate for its construction, or a small footprint, above ground automated Rapid Transit System, which introduces minimum disruption to the existing flow of transportation and is fast and efficient as it does not share the right of way guideway with any other traffic and can be easily erected above existing roads and through or above existing infrastructure, becoming an aesthetically pleasing architectural addition. Being above ground and exposed to all weather conditions, the Rapid Transit System performance depends highly on ever changing adhesion unless it is based on Linear Motor Propulsion. Linear motors provide adhesion independent traction capable of climbing high grades and negotiating sharp curves allowing for efficient and cost effective enhancement of the existing transportation networks.

Instructors Short Biographies: Alireza Safaee joined Bombardier Transportation in 2011. He specializes in power electronics with emphasis on bidirectional and resonant converters for transportation applications and conducts R&D in emerging transport technologies including linear motors and inductive power transfer applications. He received his Ph.D. from the University of Quebec in 2008. From 1997 to 2005, he worked as a design engineer at Manabe Taghzyeh Electronic Company, and developed chargers, inverters, stabilizers and UPS systems up to 200 kW.

Konrad Woronowicz is a Fellow Expert (highest engineering designation) at Bombardier Transportation. He defines and co-ordinates R&D efforts in emerging transport technologies. He has been with Bombardier for over 19 years developing next generation of transportation linear drives, special permanent magnet motor drives and contactless power transfer technologies. He has authored and co-authored over 20 patents. He received his doctorate from the West Pomeranian Univ. of Technology in the area of adaptive motor control. In addition to electric drives and wireless power transfer, he leads research on electromagnetic design, EMC and high output resonant converters. He is a member of IEEE and PEO (Professional Engineers Ontario).

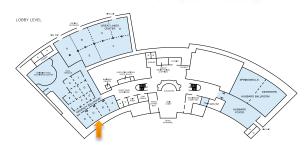


Short Course 2: Introduction to Electric Machine Design for Manufacturing

Sunday, June 15, 2014 8:30 AM – 12:00 PM

Venue: Regency C-D

Dr. Dan M. Ionel, FIEEE, Chief Engineer - Regal Beloit Corp. and Visiting Professor - University of Wisconsin Milwaukee Dr. Marius Rosu, SMIEEE, Lead Product Manager, ANSYS, Inc.



Short Course Description: The theoretical fundamentals and basic design sizing equations will be briefly reviewed. The main manufacturing methods for electric machine components and assemblies will be introduced and exemplified. The principles of design for manufacturing, including elements of workflow, material and process tolerances, robust design and six sigma control, will be illustrated with case studies. The complexity introduced by considering both cost and performance as concurrent objectives will be discussed and solved using formal mathematical optimization methods based on the study of thousands of candidate designs. The practical approach for using large-scale multi-physics models for the electromagnetic field, coupled with mechanical and thermal analysis will be exemplified with sensitivity studies for typical operational faults and manufacturing abnormalities. This short course may also serve as an introduction to the short course on Thermal Analysis of Traction Motors to be presented in the afternoon by Dr. Dave Staton.

Instructors Short Biographies: Dan M. Ionel is Chief Engineer with Regal Beloit Corp. and Visiting Professor at Univ. of Wisconsin, Milwaukee, WI. After post-doctoral research in the SPEED Lab, Univ. of Glasgow, UK, he worked in industrial R&D for large FTSE 100 and Fortune 1000 corporations in the UK and US. For the last three years, he also served as an instructor of short courses for IEEE, ANSYS, and Univ. of Wisconsin — Milwaukee and Madison. Dr. Ionel's design experience covers a wide range of electric machines and drives for applications with power ratings between 0.002hp and 10,000hp. He has published over 100 technical papers, including two Best Paper Awards from the IEEE, and holds more than 30 patents. An IEEE Fellow, Dr. Ionel is the Chair Elect of the IEEE Power and Energy Society Electric Motor Sub-committee, Chair of the Milwaukee IEEE Power Electronics Chapter, and Editor-in-Chief of the Electric Power and Components Journal.

Marius Rosu is Lead Product Manager for ANSYS Inc, the world's largest engineering simulation company. Dr. Rosu has a distinguished academic background with significant professional electrical and electromagnetic engineering expertise and over 15 years of experience. He joined ANSYS after completing studies and research at University "Politehnica" of Bucharest, Romania, Institute National Polytechnic of Grenoble, France, and Helsinki University of Technology, Finland. While with ANSYS he promoted from Application Engineer, to Group Leader for Simplorer modeling, and is currently Lead Product Manager for the Electromechanical Product Line. Dr. Rosu continuously evaluates new market opportunities that will enhance ANSYS' electromechanical product offering while maintaining technical leadership.



Short Course 3: Fundamentals of Power-train Design for All- and Hybrid-Electric Road Vehicles

Sunday, June 15, 2014

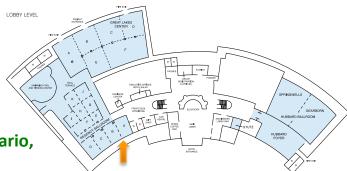
2:00 PM - 5:30 PM

Venue: Regency A-B

Instructor:

Dr. Nigel Schofield, McMaster University, Hamilton, Ontario,

Canada



Short Course Description: Future vehicle power-train concepts will invariably encompass dual or multiple off- or on-board energy sources, each of which will have a distinct electrical interface characteristic. This feature, coupled with dynamic electro-mechanical load profiles and wide thermal operating environments has a significant impact on the design of power-train components for all- and hybrid-electric vehicles. The short course will cover typical specification requirements for vehicle power-train components and their interconnection. It presents examples of component design and system integration via results from traction machine, generator and auxiliary component design studies, and finally reviews the impact of the power-train energy source on grid utilities.

Instructors Short Biography: Nigel Schofield received the degrees of B.Eng. (Hons.) in Electrical Power Engineering, and Ph.D. for research on the field-weakening capability of brushless permanent-magnet traction machines, from the University of Sheffield, UK, in 1990 and 1997, respectively. During the period 1993 to 1995 he served as a Senior Experimental Officer in the Department of Electronic and Electrical Engineering (EEE) at the University of Sheffield, before taking up the post of Design Engineer in industry. From 1997 to 2001, Dr. Schofield was a postdoctoral researcher in the Electrical Machines and Drives Research Group, Dept. of EEE, University of Sheffield, and from 2001 to 2004 a Lecturer in the Dept. of EEE. On 1 July 2004 he was appointed to a Mechatronics Lectureship in the School of Electrical and Electronic Engineering, at the University of Manchester, UK, and a Senior Lecturer in the School in 2009 where he lectured across all undergraduate years and on the Power Conversion M.Sc. On 1 Jan. 2013 Dr. Schofield joined the Department of Electrical and Computer Engineering at McMaster University, Ontario, Canada, as a Full Professor with Tenure. His research interests include electro-magnetic powertrains for all- and hybrid-electric vehicles; the vehicular application of electro-chemical and electrostatic energy sources; hydrogen fuel cell systems; aerospace machines and actuators; the industrial application of electro-magnetic devices and wind generator design and renewable energy schemes. Prof. Schofield is a Chartered Engineer and member of the UK IET and IEEE.



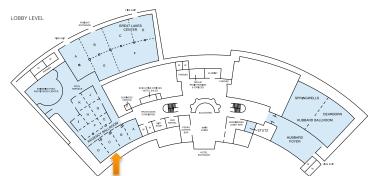
Short Course 4: Thermal Analysis of Traction Motors

Sunday, June 15, 2014

2:00 PM - 5:30 PM Venue: Regency C-D

Instructor:

Dr. Dave Staton, Director, Motor Design Ltd.



Short Course Description: There is currently wide and renewed interest in the research and development of electrical machines. On-going efforts are driven by new generations of green products, such as hybrid and electric vehicles. In view of this, reliable thermal models that can be used to model the heat transfer in the electrical machine are becoming ever more important. The use of thermal models allows optimisation of cooling strategies in order to be certain that the drive system will not suffer from thermal problems. The use of analytical lumped-circuit thermal methods to model motors is a key issue as traction motors operate with long and complex duty cycle loads / drive cycles that are almost impossible to model within a reasonable calculation time using numerical methods. Numerical methods are more effective in the calibration of the more complex cooling paths in the cooling circuit modelled in the analytical model. This short course is divided into 3 sections. Section 1 looks at the need for thermal analysis to optimize the design and ensure a motor is sized correctly for its intended load duty. It also highlights and compares the different analytical and numerical methods used in thermal analysis. Section 2 provides details of the key issues in electric machine thermal simulations, such as conduction, convection and radiation, loss prediction, winding heat transfer and temperature rise, interface thermal resistances, etc. Section 3 gives some examples of traction motor designs and how best to make fast and accurate estimates of the motors thermal performance.

Instructors Short Biography: Dr. Dave Staton completed his PhD in computer aided design of electric motors at Sheffield University in the 1980s. Since then he has worked in the field of motor design, including development of motor design software at Thorn EMI, the SPEED Laboratory at Glasgow University and Control Techniques who are part of Emerson Electric. He was instrumental in the development of the SPEED software which is used in electric motor design by leading electric motor manufacturers worldwide. In 1999, he founded Motor Design Ltd. focusing on development of thermal analysis software for electrical machines. MDL's main products are Motor-CAD, which helps simplify the electromagnetic and thermal analysis of electric motors and generators and Motor-LAB, which simplifies and speeds up the optimization of a motor design for a given set of drive cycles.



Short Course 5: Inverter and Converter Design for Electromagnetic Environmental Compliance

Sunday, June 15, 2014 2:00 PM – 5:30 PM

Venue: Regency E-F

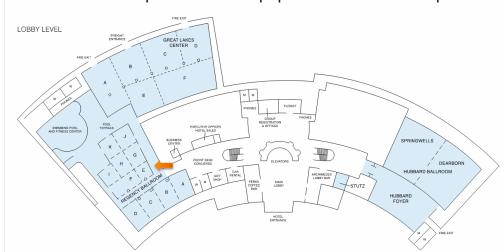
Instructor: Dr. Neal Clements, John Deere Electronic Solutions

Short Course Description: This short course is intended to introduce the basic concepts of EMI engineering as applicable to vehicle electrification. The course is technical in nature and is intended for electrical engineers involved in vehicle electrification and the design of equipment for vehicle electrification such as inverters, converters, etc. The course will cover the basics of EMI testing but will also present information related to the design of compatible power electronic converters and inverters. Shielding and filter design to meet conducted and radiated emission standards will be presented with an emphasis on CISPR-25 requirements.

Instructors Short Biography: Dr. Neal Clements currently works at John Deere Electronic Solutions in Fargo, ND. He is currently involved in the design of high power drive inverters, high frequency DC to DC converters, vehicle control electronics, and engine control electronics. He is responsible for various aspects of equipment design including electromagnetic compatibility compliance.

Dr. Clements holds a PhD and an MSEE from the University of Wisconsin, an MSEE from the University of Cincinnati, and a BSEE from the University of Toledo. He is a member of the IEEE, the power electronics society of the IEEE (PELS), and the EMC society of the IEEE. He has served in the past as the power electronics chair of the Rock River Valley section of the IEEE.

Dr. Clements has worked extensively in aircraft electrical system design and has designed and qualified numerous power electronic designs for both civilian and military aircraft. He is also experienced with the design of electronic ballasts as well as other commercial and industrial power electronics. He has worked in diverse engineering areas including pulsed power and active vibration control. He has authored 6 peer reviewed papers and holds 7 U.S patents.



Keynote Presentations

Plenary Session 1

Monday, June 16, 2014 8:30 AM – 12:00 Noon

Venue: Grand (Hubbard) Ballroom

Chair: Dr. Silva Hiti

Co-Chair: Dr. Kaushik Rajashekhara

Welcome and Introduction

8:30 AM - 8:35 AM

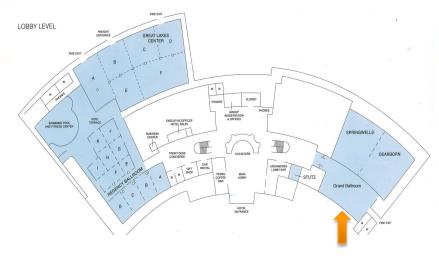
Dr. Mahesh Krishnamurthy, General Chair, 2014 IEEE Transportation Electrification Conference & Expo

Dr. Dong Tan, President, IEEE Power Electronics Society

Keynote Presentation 1: Electrified Powertrain Vehicles: State of the Industry 8:35 AM - 9:05 AM

Speaker: Dr. Mazen Hammoud, Chief Engineer, Electrified Powertrain Systems, Ford Motor Company

Short Biography: Dr. Mazen Hammoud is Ford's Electrified Powertrain Systems Chief Engineer. He leads a large engineering organization in charge of system architecture, component sizing, controls, and calibration for all HEV, PHEV, and BEV programs globally to deliver cost-effective best-in-class fuel economy and a superior driving experience. After Mazen assumed this role in 2012, Ford's Electrification market share has grown more than threefold to 14% of the segment, while winning multiple awards. Since joining Ford in 1998, Dr. Hammoud held several leadership positions in Powertrain controls and calibrations. He delivered multiple award winning programs for driveability and fuel economy using EcoBoost technology. In Powertrain electronics, he managed to reduce cost and complexity while improving quality by applying Ford's Commodity Business Plan and Supplier Aligned Business Framework strategies. Mazen's career, including eight years at GM, is focused on sustainability and the environment by reducing emissions and improving fuel economy of modern Powertrains. He is responsible for numerous innovations published in technical papers and international patents. Mazen frequently participates in panel discussions, represents Ford in media events, and delivers industry speeches. Dr. Hammoud holds a Bachelor (WSU), Master (U of M) and Ph.D. (U of M) degrees in Mechanical Engineering and an MBA in Organizational Behavior from the University of Michigan. He is an SAE Fellow and sits on several professional and academic boards.



Monday, June 16, 2014 Keynote Presentations

Keynote Presentation 2: Widebandgap Switches – Paving the Path Towards High Frequencies and Higher Temperatures

9:05 AM - 9:35 AM

Speaker: Dr. Ranbir Singh, President/CEO, GeneSiC Semiconductor Inc.

Short Biography: Dr. Ranbir Singh received a Ph.D. and MS degrees in Electrical and Computer Engineering, North Carolina State University, Raleigh, NC, and B. Tech from Indian Institute of Technology, Delhi. He founded GeneSiC Semiconductor Inc. in 2004. Prior to that he conducted research on SiC power devices first at Cree Inc, and then at the NIST, Gaithersburg, MD. In 2012, EE Times named Dr. Singh as among "Forty Innovators building the foundations of next generation electronics industry." In 2011, he won the R&D100 award towards his efforts in commercializing 6.5kV SiC Thyristors. He has published over 130 journal and conference papers, is an author on 28 issued US patents, and has authored a book.

Keynote Presentation 3: Toward an Optimal Electrified Propulsion Unit: A Multi-Physics Approach

9:35 AM - 10:05 AM

Speaker: Prof. Babak Fahimi, Director, Renewable Energy and Vehicular Technology Laboratory, University of Texas at Dallas

Short Biography: Dr. Babak Fahimi received his PhD in Electrical Engineering from Texas A&M University in 1999. Dr. Fahimi has been the recipient of DAAD scholarship (1993-1995), IEEE R.M. Bass Power Electronics Young Investigator Award (2003), Office of Naval Research Young Investigator Award (2004), SAE Ralph Teetor Educational award (2008), and Fulbright scholarship in 2010. Dr. Fahimi has co-authored 250 (65 Journal and 185 peer reviewed conference papers) scientific articles, 15 book chapters, and several technical reports in the general area of adjustable speed motor drives and power electronics. He holds ten US patents and has six more pending. Dr. Fahimi has supervised 13 PhD (four assistant/associate professors and the others in industry) and 15 M.S. students. He has been the principle investigator on number of successful projects funded by ARPA-E, DOE, NSF, ONR and various small and large industries.

Coffee Break

10:05 AM - 10:30 AM

Monday, June 16, 2014 Keynote Presentations

Keynote Presentation 4: Control Systems and Software: Meeting the Challenge of a Growing Electric Car Market

10:30 AM - 11:00 AM

Speaker: Mr. Greg Hubbard, Director, Electrification Controls, General Motors

Short Biography: Greg Hubbard is responsible for all BEV, PHEV, and HEV control system features and functions at General Motors. His global teams deliver the electric propulsion control system requirements, algorithms, software, test cases & results, and ECU integration. His teams have delivered control systems to series production for four unique electric propulsion architectures in the last five years. Prior to this, Greg developed novel control algorithms for hybrid electric vehicles and automatic transmissions at Allison Transmission. His work received over 40 patents and twice received General Motors' top engineering award: the "Boss" Kettering. Greg began his career in electric propulsion over 20 years ago competing in SunRayce '93: a collegiate solar powered car race. He then earned a BS in Mechanical Engineering from Rose-Hulman Institute of Technology and a MS in Mechanical Engineering from Massachusetts Institute of Technology where his research thesis was entitled "Modeling and Control of a Hybrid-Electric Vehicle Drivetrain."

Keynote Presentation 5: Global Advances in Electrified Public TransportationeBuses and eTaxi Take to the Roads

11:00 AM - 11:30 AM

Speaker: Mr. Micheal Austin, Vice President, BYD America

Short Biography: Entering his eighth year as Vice President, Micheal Austin has played an integral role in bringing BYD to the Americas. Originally from Colorado, Micheal attended Brigham Young University (BYU) earning a Bachelor's degree in Design Engineering as well as a Master's in Mechanical Engineering. Prior to joining BYD, Micheal was with Motorola for 15 years serving as a Senior Director and in Engineering, honored with Motorola's Distinguished Innovator award for receiving twenty three patents. Though he spends much of his time serving as BYD's spokesman leading the Overseas PR & Marketing departments, he remains actively involved in the Institute of Electrical and Electronics Engineers (IEEE) and is a founding board member of the IEEE Transportation Electrification Initiative (TEI) as well as the Editor-in-Chief of the IEEE's TEI monthly publication. Together, Micheal and his wife Shelley of 26 years have five children, and live near Chicago.

Monday, June 16, 2014 Keynote Presentations

Keynote Presentation 6: Efficiency through the Data Link: Connected Cars & the Electrified Experience

11:30 AM - 12:00 Noon

Speaker: Dr. Matt Stevens, Co-Founder & CEO, CrossChasm Technologies

Short Biography: Matt Stevens is Co-Founder & CEO of CrossChasm Technologies, the company that created FleetCarma and MyCarma. He has been involved in the design of over 20 hybrid and electric vehicles, ranging from cars to lunar rovers to stealth snowmobile and now works on making personal fuel economy labels for fleets and individuals looking to pick the best green vehicle for them. Matt holds a Ph.D. in Chemical Engineering, was named to Waterloo Region's Top 40 under 40, is an Adjunct Professor at the University of Waterloo, and is Past-Chairman of Electric Mobility Canada. He is also a proud graduate of the DOE's Advanced Vehicle Technology Competitions (AVTCs).

16

PS1-9

Poster Session 1

Poster Session 1: Power Electronics and Motor Drives **Session Chairs:** Dr. Zhong Nie, Chrysler Group LLC USA Dr. Sheldon Williamson, Concordia University, Canada Monday, June 16, 2014 12:00 PM - 2:00 PM Venue: Great Lakes Center (Exhibit Hall) PS1-1 Time-domain Steady-state Analysis of Fixed-Frequency Series Resonant Converter with Phase-Shift Modulation Alireza Safaee¹, Praveen Jain² and Alireza Bakhshai² ¹Bombardier Inc. Canada, ²Queen's University, Canada PS1-2 A Hybrid PWM Approach for the Traction Motor Control of Alternative Energy Vehicles Roufin Mahmood, Taimoor Shah and Habibur Rehman American University of Sharjah, United Arab Emirates PS1-3 A Hybrid Observer for the Full-Speed-Range Sensorless Control of Interior Permanent Magnet Motor **Drives** Yu Li, Allan Taylor and Kevin (Hua) Bai Kettering University PS1-4 High Range On-line Electric Vehicles Powered by Inductive Power Transfer Stijn Wolterink and Pavol Bauer Delft University of Technology, Netherlands PS1-5 Flux-weakening Loop Design for EV Drive with Permanent Magnet Synchronous Motor Quanrui Hao, Diego Mascarella and Geza Joos McGill University, Canada PS1-6 Efficiency Comparison of Wire and Wireless Battery Charging: Based on Connection Probability **Analysis** Mohammad Kabalo¹, Florence Berthold¹², Benjamin Blunier¹, David Bouquain¹, Sheldon Williamson² and Abdellatif Miraoui¹ ¹University of Technology Belfort-Montbeliard, France, ²Concordia university, Canada PS1-7 Dynamic Performance Analysis of Novel Series-connected Capacitor-run Three-phase Induction Motor Fed by Single-phase Supply Hui Zhong¹, Lin Zhao² and Yuzhe Zhang² ¹Shandong University, China, ²Gannon University, USA PS1-8 Interleaved SVPWM and DPWM for Dual Three-Phase Inverter-PMSM: An Automotive Application Subhadeep Bhattacharya, Diego Mascarella and Geza Joos McGill University, Canada

Variable Speed Brushless Hybrid Permanent Magnet Generator for Hybrid Electric Vehicles

Omid Beik¹, Nigel Schofield¹ and Ahmad Al-Adsani²

McMaster University, Canada, **PAAET, Kuwait

16

Poster Session 1

PS1-10	Design and Electromagnetic Analysis of a Novel 3-DOF Deflection Type Permanent Magnet Actuator Zheng Li ¹ , Caisheng Wang ² , Qingqing Lun ¹ and Lu Zhang ¹ ¹ Hebei University of Science and Technology, China, ² Wayne State University, USA
PS1-11	A Novel 3-DOF Sensing Methodology for M-DOF PM Motors Zheng Li ¹ , Caisheng Wang ² , Manjie Guo ¹ and Jun Ma ¹ ¹ Hebei University of Science and Technology, China, ² Wayne State University, USA
PS1-12	Investigation of Key Factors Influencing the Response of Permanent Magnet Synchronous Machines to Three-Phase Symmetrical Short-Circuit Faults Gilsu Choi and Thomas Jahns University of Wisconsin at Madison, USA
PS1-13	Average-Value Modeling of Hysteresis Current Controlled Brushless DC Motor Drives Hanling Chen and Aaron Cramer University of Kentucky, USA
PS1-14	FPGA Based D-PLL Control Technique of CLL Resonant Converter for EV Battery Chargers Asa Erdem, Colak Kerim, Bojarski Mariusz and Czarkowski Dariusz New York University, USA
PS1-15	Investigating Safety Issues Related to Electric Vehicle Wireless Charging Technology Yabiao Gao ¹ , Kathleen Farley ² and Zion Tse ¹ ¹ University of Georgia, USA, ² Southern Company Services, Inc., USA
PS1-16	A Fuzzy Logic Approach for Fault Diagnosis and Recovery in PHEV and EV Chargers Weiqiang Chen, Luocheng Wang, Artur Ulatowski and Ali Bazzi University of Connecticut, USA
PS1-17	Design of A Wireless Charging System Used in Light-duty Electrified Automobiles Yongsheng Fu and Hua (Kevin) Bai Kettering University, USA
PS1-18	Current Sensor Fault-Tolerant Operation of Dual Traction Inverters using Six-Phase Current Reconstruction Technique Haizhong Ye and Ali Emadi McMaster University, Canada
PS1-19	A Drive Cycle Based Electro-Thermal Analysis of Traction Inverters Haizhong Ye, Kai Yang, Hao Ge, Pierre Magne and Ali Emadi McMaster University, Canada
PS1-20	Power Electronic Converters for 12/8 Switched Reluctance Motor Drives: A Comparative Analysis Jin Ye and Ali Emadi McMaster University, Canada
PS1-21	Design Considerations for Loosely Coupled Inductive Power Transfer (IPT) System for Electric Vehicle Battery Charging - A Comprehensive Review Kunwar Aditya and Sheldon Williamson Concordia University, Canada

Poster Session 1

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PS1-22	A Digital PWM Current Controller for Switched Reluctance Motor Drives Fei Peng and Ali Emadi McMaster University, Canada
PS1-23	Comprehensive Review of PV/EV/Grid Integration Power Electronic Converter Topologies for DC Charging Applications Siddhartha Anirban Singh and Sheldon Williamson Concordia University, Canada
PS1-24	Analytical Design Methodology of Double Stator Switched Reluctance Machine Mengying Luo and Babak Fahimi University of Texas at Dallas, USA
PS1-25	Inductive Power Transfer System With Improved Characteristics Dionisios Voglitsis ¹ , Georgios Tsengenes ² and Pavol Bauer ¹ ¹ Delft University of Technology, Netherlands, ² CO-WORKER Technology, Sweden
PS1-26	Robust Nonlinear Position Control of DC Motor with Friction Maha Sabra, Bashar Khasawneh and Mohamed A Zohdy Oakland University, USA
PS1-27	Optimal Microgrid Component Sizing using Mixed Integer Linear Programming Xiang Yu, Pawel Malysz, Shahin Sirouspour and Ali Emadi McMaster University, Canada
PS1-28	Theoretical analysis and experimental investigation of a high frequency bidirectional CPT system Dionisios Voglitsis, Todor Todorcevic, Venugopal Prasanth and Pavol Bauer Delft University of Technology, Netherlands
PS1-29	A Practical Approach to Inductive-Power-Transfer Systems for Transportation Applications using Boucherot Bridge Method Konrad Woronowicz and Alireza Safaee Bombardier Inc., Canada
PS1-30	Vibration Monitoring of PM Synchronous Machine with Partial Demagnetization and Inter-turn Short Circuit Faults Zhi Yang, Xiaodong Shi and Mahesh Krishnamurthy Illinois Institute of Technology, USA
PS1-31	Analysis of Stator Winding Inter-turn Short-circuit Fault in Interior and Surface Mounted Permanent Magnet Traction Machines Chunyan Lai, Aiswarya Balamurali, Vicki Bousaba, Lakshmi Varaha Iyer and Narayan Kar University of Windsor, Canada
PS1-32	A Flux-Weakening Control Approach for Interior Permanent Magnet Synchronous Motors Based on Z-Source Inverters Muyang Li, Jiangbiao He and Nabeel Demerdash Marquette University, USA

16

Poster Session 1

PS1-33	A Comprehensive Evaluation of SiC Devices in Traction Applications Fei Shang, Alejandro Pozo Arribas and Mahesh Krishnamurthy Illinois Institute of Technology, USA
PS1-34	Design of a Phase-Shifted ZVS Full-Bridge Front-End DC/DC Converter for Fuel Cell Inverter Applications Ian P. Farneth, Michael B. Satinu, Haoyu Wang and Alireza Khaligh University of Maryland, USA
PS1-35	Paviana and Companies of Bi Directional AC DC Conventors with VIC Compbility for On Board TV and
131-33	Review and Comparison of Bi-Directional AC-DC Converters with V2G Capability for On-Board EV and HEV Behnam Koushki ¹ , Alireza Safaee ² , Praveen Jain ¹ and Alireza Bakhshai ¹ ¹ Queens University, Canada, ² Bombardier Transportation Inc., Canada

Afternoon Breakout Sessions

TUTORIALS

ITEC conference registrants are welcome to attend the tutorials at no additional charge. Tutorials are expected to be 80 minutes in duration and are scheduled in parallel with the conference sessions. The afternoon tutorials will start at 2:00 PM and conclude at 3:20 PM. The morning tutorial will start at 8:30 AM and conclude at 10:10 AM, followed by a break. These tutorials are offered by technical leaders and are suitable for industry managers and engineers as well as researchers and students.

Tutorial 1: Affordable, Fuel Efficient Hybrids Utilizing 48-Volt Systems

Monday, June 16, 2014

2:00 PM - 3:20 PM

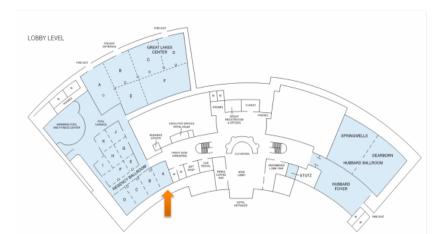
Venue: Regency A-B

Speaker: Mr. Bob Storc, Magna (Retired)

Tutorial Description: Continual pressure for higher fuel economy and lower CO2 emissions will challenge OEMs to provide solutions. Customer cost/price considerations will remain a very important factor in the marketplace.

48 Volt systems can provide a reasonable solution. Also, the 48 volt component set can be used for many (vehicle) commercial applications, further increasing economies of scale. How these systems are executed could play an important role on the path to vehicle electrification. The tutorial will discuss rationale and execution for such systems.

Speakers Short Biographies: Robert Storc has 48 years of Automotive Engineering and leadership experience, including General Motors, American Specialty Car and Magna International. His recent automotive contributions include architecting the Electric Ford Focus. He has 10 patents, including the GM Midgate TM. He is an avid car collector and races a vintage sports car. Bob is currently involved in various projects via Robert Storc Consulting LLC.



Afternoon Breakout Sessions

Tutorial 2: In the Loop: Understanding and Using Magnetic Material Properties

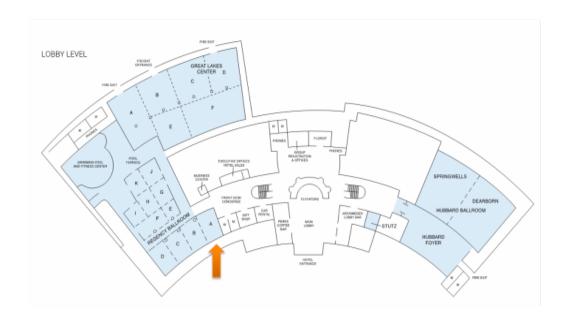
Monday, June 16, 2014

4:20 PM – 5:40 PM Venue: Regency A-B

Speaker: Mr. Steve Constantinides, Director of Technology, Arnold Magnetic Technologies

Tutorial Description: Soft magnetic materials have gotten "softer" while permanent magnets have increased in energy product and resistance to demagnetization. Accurate assessment of magnetic properties is essential for design whether by FEA or back-of-the-envelope calculations. What are the key properties, how are they measured, what additional information can be gleaned from the measurements?

Speakers Short Biographies: Steve Constantinides is Director of Technology at Arnold Magnetic Technologies Corporation, a global manufacturer of magnets, magnetic materials and precision magnetic assemblies. Steve is a ceramic scientist whose experience includes 12 years with Corning Inc. involved with glass ceramics, passive electronic components, combustion systems design and manufacturing management systems. After Corning, he joined tungsten carbide manufacturer GTE Valenite and was responsible for modernization and operation of over 40 vacuum and atmosphere furnaces. In 1988, he joined Crucible Magnetics as Manager of Technology and Quality Assurance for Neo, Samarium Cobalt and Alnico magnets. For the last 22 years, Steve has performed process and product development, manufacturing engineering and project management for Arnold Magnetic Technologies.



Monday, June 16, 2014 Afternoon Breakout Sessions

Technical Session 1: Modeling and Analysis of Electric Machines Session Chairs:

Dr. Rakib Islam, Nexteer Automotive, USA Dr. Berker Bilgin, McMaster University- MacAUTO, Canada

Monday, June 16, 2014 2:00 PM – 3:20 PM Venue: Regency C-D

TS1-1 Analytical 2-D Slot Model for Predicting AC Losses in Bar-Wound Machine Windings due to Armature Reaction

Wanjun Zhang and Thomas Jahns
University of Wisconsin-Madison, USA

TS1-2 Temperature effects on steady state performance of an Induction Machine and a Switched Reluctance Machine

Nasim Arbab, Wei Wang, Arash Hassanpour Isfahani and Babak Fahimi University of Texas at Dallas, USA

TS1-3 Adaptive Model Predictive Current Control for DSSRM Drives

Xin Li and Pourya Shamsi
Missouri University of Science and Technology, USA

TS1-4 Outer Rotor IPM Generator With Wide Constant Power Region for Automotive Applications

Emanuele Fornasiero, Mattia Morandin, Nicola Bianchi, Silverio Bolognani and Enrico Carraro University of Padova, Italy

Technical Session 2: Thermal modeling and analysis Session Chairs:

Dr. Omer C. Onar, Oakridge National Laboratory, USA Dr. Xiaodong Shi, Mercedes Benz R&D, USA

Monday, June 16, 2014 2:00 PM – 3:20 PM Venue: Regency G-H

TS2-1 State-Space Based Multi-Nodes Thermal Model for Li-ion Battery

Ying Xiao and Babak Fahimi
University of Texas at Dallas, USA

TS2-2 Transient Electro-Thermal Analysis for a MOSFET based Traction Inverter

Kai Yang¹, Jing Guo¹, Hao Ge¹, Berker Bilgin¹, Voiko Loukanov² and Ali Emadi¹

*McMaster University, Canada, *DV Electronics Ltd, Canada

TS2-3 Electrothermal Modeling and Experimental Validation of a LiFePO4 battery cell

Ying Xiao and Babak Fahimi
University of Texas at Dallas, USA

TS2-4 Heat Response of Prismatic Li-ion Cells

Maryam Ghalkhani¹, Gholam-Abbas Nazri², Narayan Kar¹ and Mehrdad Saif¹

*University of Windsor, Canada, ²Frontier Applied Sciences and Technologies, LLC, USA

Afternoon Breakout Sessions

Technical Session 3: Converter/Inverter Performance Analysis
Session Chairs:

Dr. Bin Wu, Mercedes Benz R&D, USA Nikit Shah, Chrysler Group LLC

> Monday, June 16, 2014 4:20 pm – 5:40 pm Venue: Regency C-D

TS3-1 Investigating the Influence of Interconnection Parasitic Inductance on the Performance of SiC Based DC-DC Converters in Hybrid Vehicles

Di Han, Woongkul Lee, Jukkrit Noppakunkajorn and Bulent Sarlioglu University of Wisconsin-Madison, USA

TS3-2 Stability analysis of a tightly controlled load supplied by a DC-DC boost converter with a modified sliding mode controller

Louis-Marie Saublet¹, Roghayeh Gavagsaz Ghochani¹, Serge Pierfederici¹, Babak Nahid-Mobarakeh¹ and Juvelino Da Silva²

¹GREEN, University of Lorraine, France, ²ERTE, BOWEN, France

TS3-3 **Performance Comparison Study of Two- and Three-Level Inverter for Electric Vehicle Application**Abhijit Choudhury¹, Pragasen Pillay¹, Mohammed Amer² and Sheldon. S Williamson¹

**Concordia University, Canada, **TM4 Inc, Canada

TS3-4 Dynamic Analysis of the Interaction between an Interleaved Boost Converter with Coupled Inductor and a Constant Power Load

Ruoyu Hou¹, Pierre Magne¹, Berker Bilgin¹, Sanjaka Wirasingha² and Ali Emadi¹ McMaster University, Canada, ²Chrysler Group LLC, USA

Technical Session 4: Advancements in Inverter Technology (Industry Presentation-only Session) Session Chairs:

Dr. Serdar H Yonak, Infineon Technologies, USA Dr. Mohammad Islam, Halla Mechatronics, USA

> Monday, June 16, 2014 4:20 pm – 5:40 pm Venue: Regency G-H

TS4-1 Losses comparison of two and three level IGBT inverters

Robert Ratz Ricardo, USA

TS4-2 HV Transient Voltage Failure Mitigation in Traction Inverters

Brian Peaslee

Magna Electronics, USA

TS4-3 Total Harmonics Distortion investigation of two and three level inverters as function of the switching

frequency Robert Ratz

Ricardo, USA

TS4-4 Closing the Test Gap – Advanced Testing of Traction Inverters

Horst Hammerer

SET Power Systems GmbH, Germany

Afternoon Breakout Sessions

Panel 1: Transportation Technologies of Vehicle to Infrastructure Interaction: Current Status and Challenges

Monday, June 16, 2014

2:00 PM - 3:20 PM

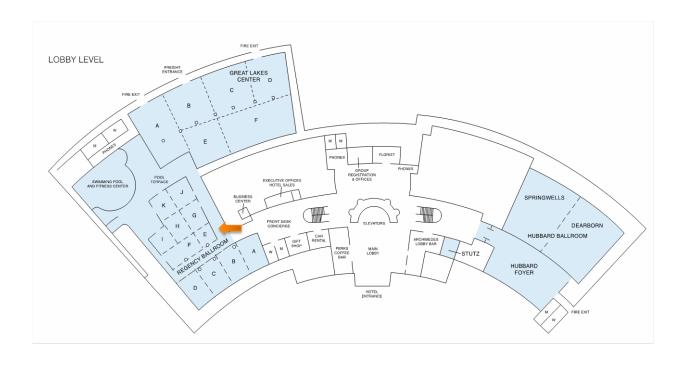
Venue: Regency E-F

Panel Organizer and Moderator: Dr. Qiuming Gong, Ford Motor Company

Panelists:

- Prof. Giorgio Rizzoni, Ohio State University
- · Prof. Johanna Mathieu, University of Michigan
- Mr. Richard Scholer, Chrysler Group, LLC
- Mr. David McCreadie, Ford Motor Company

Panel Summary: This panel is for discussing the vehicle to infrastructure interaction, including the PEV charging control technology, smart grid technology, vehicle communication with the infrastructure (GPS, V2G, V2V), etc. Panelists are invited from academia and industry sectors in the field. They will present their views on what the current status of the technology, and the challenging issues. The panelists will also discuss the impact of the charging/communication infrastructure development on increasing the market share of electrified vehicles.



Afternoon Breakout Sessions

Panel 2: Application of Wide Bandgap Semiconductors to Electrification of Vehicles for Power Electronic Converters – Benefits, Opportunities and Challenges

Monday, June 16, 2014

2:00 PM - 3:20 PM

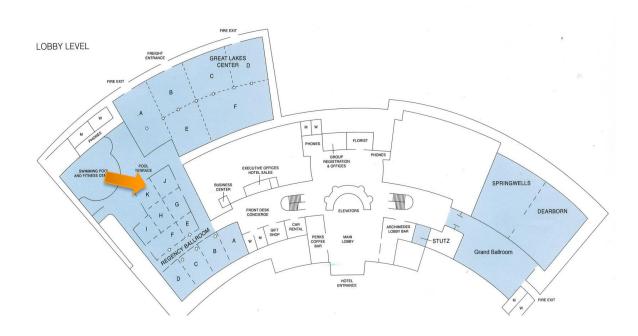
Venue: Regency J-K

Panel Organizer and Moderator: Dr. Bulent Sarlioglu, University of Wisconsin–Madison

Panelists:

- Mr. Peter Sandvik, GE Global Research
- Dr. Madhu Chinthavalim, Oak Ridge National Laboratory
- Dr. David Grider, Cree
- Mr. Julian Styles, GaN Systems
- Dr. Anant Agarwal, Department of Energy

Panel Summary: This panel will address the importance and benefits of wide bandgap (WBG) semiconductors and elaborate on potential applications of these new devices for electrification of vehicles (Electric vehicles, more electric aircraft and ships). The panel will elaborate on device and circuit level opportunities, challenges, and potential solutions for various power electronic applications using WBG semiconductors. The panel will draw attendees from aerospace, automotive and marine OEMs, subsystem manufacturers, and researchers from the industry and academia.



Monday, June 16, 2014 Afternoon Breakout Sessions

Panel 3: Fuel Cell Technology for Automotive Applications: Past, Present and Future

Monday, June 16, 2014

4:20 PM - 5:40 PM

Venue: Regency E-F

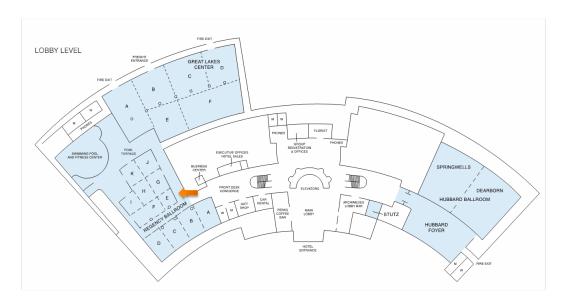
Panel Organizer and Moderator: Dr. Fei Gao, University of Technology of Belfort-Montbeliard, Belfort, France

Panelists:

- Dr. Abas Goodarzi, US Hybrid Corporation, USA
- Dr. Philipp Krüger, hySOLUTIONS GmbH, Germany
- Dr. Raja Rajashekara, University of Texas Dallas, USA
- Dr. Ilse Cervantes, Instituto Potosino de Investigación Científica y Tecnológica, Mexico

Panel Summary: Fuel cells are seen as potential candidates for clean transportation applications (cars, buses, utility vehicles) in the future. In recent years, a lot of scientific research has been conducted on fuel cell vehicles (FCV). Many of the major car manufacturers have also announced plans for the deployment of fuel cell vehicles on the market from 2015 to 2020. The question is: will you have a fuel cell car in your garage in the (near) future?

This panel will present a brief review of the fuel cell applications in the transportation from the 1970s to now. The panel will discuss the various challenges in the deployment of fuel cell vehicles, such as "fuel cell engine" performance and reliability, hydrogen infrastructure, economic/political considerations, and the challenges compared to their potential "clean energy" competitors: EV and PHEV. The panelists will discuss and share their opinions about the future of the fuel cell technology for automotive applications.



Afternoon Breakout Sessions

Panel 4: Electrical Steels in Electric Machines for Transportation

Monday, June 16, 2014

4:20 PM - 5:40 PM

Venue: Regency J-K

Panel Organizer and Moderator: Mr. Hossein Dadkhah, Chrysler Group, LLC

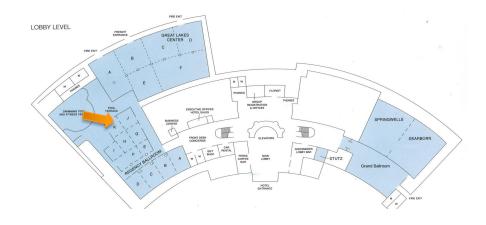
Panelists:

- Dr. Avoki Omekanda, GM Global R&D Center
- Mr. Yoshihiko Oda, JFE Steel
- Mr. Paul Ryan, Hitachi Metals
- Mr. Craig Woodward, Orchid International
- Mr. Altaf Syed, Reuland Electric

Panel Summary: Currently there is a very high need for enhanced energy savings with regard to both global environmental problems and stable energy supplies. In the transportation sector where there is considerable growth in energy consumption, it is becoming a difficult task to attain the desired energy savings. Traction motors play a major role in energy consumption in HEV/PHEV and EV vehicles. The electrical steel used as magnetic materials in traction motors plays a critical role in motor efficiency. As motor gets smaller and deliver higher power, the electrical steel used in these motors should have higher strength, higher permeability, lower core loss and reasonable cost. Technological advancement in the performance characteristics of electrical steel is vital to overcome these obstacles.

Agenda:

- Introduction Challenges to overcome with electrical steel applications
- Electrical steel material technology, different grade materials
- Lamination Stamping issues and solutions
- Lamination steel effects on motor performance



Monday, June 16, 2014 Technical Committee Meeting

Joint PELS/IAS Technical Committee Meeting

Monday, June 16, 2014

6:30 PM - 8:00 PM Venue: Regency C-D

Agenda

ITEC Strategic Plan, Vision, Progress Report, and 3-Year Plan

6:30 PM - 7:00 PM

ITEC Steering Committee Chair: Dr. Ali Emadi, McMaster University

Annual Committee Meeting of the IEEE Power Electronics Society (PELS) Technical Committee (TC) on Vehicle and Transportation Systems

7:00 PM - 7:30 PM

TC Chair: Ali Emadi, McMaster University

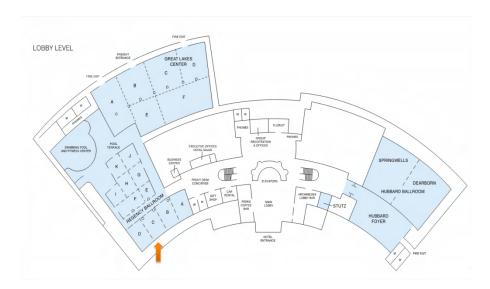
Committee Meeting of the IEEE Industry Applications Society (IAS) Transportation Systems Committee

7:30 PM - 8:00 PM

TC Chair: Dr. Ayman El-Refaie, General Electric

This meeting is open to all conference attendees and will discuss the activities of the technical committees of PELS and IAS related to vehicle and transportation systems, including ITEC.

Please attend this joint meeting if you are interested in getting more involved with the activities of IEEE-PELS and/or IEEE-IAS (e.g., ITEC, other conferences, workshops, publications, awards, etc.).



Tuesday, June 17, 2014

Keynote Presentations

Plenary Session 2

Tuesday, June 17, 2014

8:30 AM - 12:00 Noon

Venue: Grand (Hubbard) Ballroom

Chair: Dr. Bruno Lequesne, E-Motors Consulting LLC

Co-Chair: Dr. Anand Sathyan, Chrysler Group LLC

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Welcome and Introduction

8:30 AM - 8:35 AM

Blake Davis, President, IEEE Industry Applications Society

Keynote Presentation 1: Development and Innovation Activities in Germany to Accelerate Transportation Electrification

8:35 AM - 9:05 AM

Speaker: Prof. Rik W. De Doncker, Director, Institute for Power Electronics and Electrical Drives, RWTH Aachen University, Germany

Short Biography: Rik W. De Doncker received his Ph.D. in electrical engineering from KULeuven. In 1987, he was appointed Visiting Associate Professor at the University of Wisconsin- Madison, where he lectured and conducted research on high-performance induction motor drives and softswitching converters. After a short stay at IMEC, Leuven, Belgium, he joined the General Electric Company Corporate R&D Center, Schenectady, NY, in 1988. He led research on drives and highpower soft-switching converters, ranging from 100 kW to 4 MW, for aerospace, industrial, and traction applications. In November 1994, he joined Silicon Power Corporation (formerly GE-SPCO) as Vice President, Technology. Since October 1996, he has been a professor at Aachen University of Technology, Aachen, Germany, where he leads the Institute for Power Electronics and Electrical Drives. In 2006, he was appointed director of the E.ON Energy Research Center at RWTH Aachen University, where he also leads the Institute for Power Generation and Storage Systems. He has published over 250 technical papers and holds over 40 patents, with several pending. He is an IEEE Fellow and a past president of the IEEE Power Electronics Society (PELS). Between 2007-2013, Dr. De Doncker was member of the Board of the German engineering Society VDE-ETG. He is member of the EPE Executive Council and 2014 Chair of the EPE ECCE Coordination Committee. He was founding Chairman of the German IEEE IAS-PELS Joint Chapter. Dr. De Doncker is recipient of the IAS Outstanding Achievements Award and the IEEE Power Engineering Nari Hingorani Custom Power Award (2008). In 2009, he led a VDE/ETG Task Force on Electric Vehicles. In 2010, he became member of the German National Platform for Electromobility. He is the recipient of the 2013 Newell Power Electronics IEEE Technical Field Award, the highest distinction in this field within IFFF

Tuesday, June 17, 2014 Keynote Presentations

Keynote Presentation 2: Urban Mass Transit Systems: Current Status and Future Trends

9:05 AM - 9:35 AM

Speaker: Dr. Konrad Woronowicz, Fellow Expert, Bombardier Transportation, Total Transit Systems, Kingston, Ontario, Canada

Short Biography: Konrad Woronowicz is a Fellow Expert (the higher engineering designation) at Bombardier Transportation. He defines and co-ordinates R&D efforts in special emerging transport technologies. He has been with Bombardier for over 19 years developing next generation of transportation linear drives, special permanent magnet motor drives and contactless power transfer technologies. He has authored and co-authored more than 20 patents. He received his doctoral degree from the West Pomeranian University of Technology in the area of adaptive motor control. In addition to electric drives and wireless power transfer, he conducts research on electromagnetic design, EMC and high output resonant converters. He is a member of IEEE and PEO (Professional Engineers Ontario).

Keynote Presentation 3: Trends in Drive Systems for Electric Bikes and Scooters 9:35 AM – 10:05 AM

Speaker: Mr. Rob Lankin, Founder and CEO, Accelerated Systems Inc.

Short Biography: Rob Lankin (M.Sc., P.Eng.) is the founder and CEO of Accelerated Systems Inc., a Canadian company that develops and markets components for Light Electric Vehicles on a global basis. He has an engineering background in vehicle and robotics control system development, and has prior experience in managing two high tech companies (Agile Systems Inc. and SRE Controls Inc.) from startup to serial production in international markets. He has international patents for inventions in robotic and motor control applications. He is a past director of the Electric Vehicle Association of Canada and has been a member of a variety of compliance and regulatory committees.

Coffee Break

10:05 AM - 10:20 AM

Tuesday, June 17, 2014 Keynote Presentations

Award Ceremony

8:20 AM - 10:30 AM

Presentation of IEEE Fellow Certificate to Dr. Hao Huang by President of the IEEE Industrial Application Society Mr. Blake Lloyd

Presentation of the 2014 IEEE Transportation Technologies Award to Dr. Linos Jacovides by IEEE Past President Dr. Peter Staecker

Keynote Presentation 4: Next Generation Combat Vehicle Electrical Power Architecture Development

10:30 AM - 11:00 AM

Speaker: Mr. Christopher Ostrowski, Associate Director, Vehicle Electronics and Architecture US Army Tank Automotive Research Development and Engineering Center (TARDEC)

Short Biography: Mr. Ostrowski is the Associate Director for Vehicle Electronics and Architecture (VEA) within the US Army Tank Automotive Research, Development, and Engineering Center (TARDEC). Today, he activity manages a staff of 42 people and is responsible for not only providing Science and Technology solutions but also engineering services to both PEO GCS and PEO CS & CSS. Prior to this, Mr. Ostrowski was the Technical Program Manager for Unmanned Ground Vehicles where he managed the following two programs: RVCA for FCS ATO and Autonomous Platform Demonstrator (APD). Previously he was the Director of SOSCOE (Systems of Systems Common Operating Environment) for PM FCS. Before FCS, Mr. Ostrowski spent two years at General Motors Onstar Division where he was responsible for the launch of Onstar on Honda's Acura vehicles. His professional career as a Department of Army Civilian began twenty-three years ago in 1991 as an electrical engineer with TARDEC. He spent the first 10 years of his career at TARDEC in a variety of roles and increasing responsibilities (including Army Science and Technology Objective Manager, Advanced Technology Development Manager, Weapon System Technical Architecture Working Group Chair). His areas of interest are systems engineering, embedded systems development, middleware, real-time data busses and software engineering.

Tuesday, June 17, 2014 Keynote Presentations

Keynote Presentation 5: The Electrification of Systems on Aircraft – A Transformational Process to Current Reality

11:00 AM - 11:30 AM

Speaker: Dr. Waleed Said, Senior Fellow Electric Systems, UTC Aerospace Systems

Short Biography: Waleed Said is a Sr. Fellow in Electric Systems at United Technologies Corporation Aerospace Systems (UTAS), a combined legacy Hamilton Sundstrand and Goodrich corporations. He has over 28 years of aerospace experience that involves aircraft and spacecraft electronic systems. Currently Waleed is the Power Electronics technical lead for the UTAS power conversion products. After spending a significant part of his career managing and strategizing technology roadmaps, research and technology development for aircraft electrical systems, Waleed's duties now also include setting the company standards for the design, development and qualification of high reliability power electronics systems. Waleed holds a BS in physics, MS in electric power engineering and a PhD in power electronics and variable speed drives.

Keynote Presentation 6: Electrifying Marine, "Full Current Ahead" – Clean, Efficient, Reliable and Quiet

11:30 AM - 12:00 Noon

Speaker: Mr. Derek Grieve, Executive Leader – Systems & Projects Engineering, GE Energy Management, Power Conversion

Short Biography: Derek was born in Edinburgh, Scotland. He studied at Heriot-Watt University in Edinburgh and graduated with a B.S.C. (Hons.) Degree in Electrical and Electronic Engineering in 1981. He then joined GEC Large Electrical Machines Limited in Rugby. After 3 years working in the Fundamental Development Team, he was appointed to the position of Section Leader A.C. Machine Design and subsequently became Engineering Director for Large Electrical Machines, Rugby. In 1999, Derek was appointed as Technical Director for the Company's Motors and Generators businesses world-wide, working out of the Company's machine's business in Nancy, France. Derek studied part-time at the University of Warwick and graduated with a M.Sc. Degree in Engineering Business Management, specialising in Technology Management in 2003. Derek was appointed to the position of Director Technology, Northern Europe in 2004 and, in May 2012, was appointed to the position of Executive Leader – Systems & Projects Engineering, leading the engineering execution of world-wide contracts in Marine, Energy, and Industry markets.

Poster Session 2

Poster Session 2: Vehicle Powertrains and Energy Storage Session Chairs:

	Dr. Lucia Gauchia Babe, Michigan Technological University, USA Dr. Pourya Shamsi, Missouri University of Science and Technology, USA
	Tuesday, June 17, 2014 12:00 PM — 2:00 PM Venue: Great Lakes Center (Exhibit Hall)
PS2-1	Tabu Search based Solution to the Electric Vehicle Energy Efficient Routing Problem Rami Abousleiman and Osamah Rawashdeh Oakland University, USA
PS2-2	Parameters Design and Speed Control of A Solar Race Car with In-wheel Motor Junnian Wang, Xu Zhang and Dan Kang Jilin University, China
PS2-3	Improved Lithium-Ion Battery Model with Hysteresis Effect Rudy Tjandra ¹ , Suguna Thanagasundram ² , King Jet Tseng ¹ and Andreas Jossen ³ ¹ Nanyang Technological University, Singapore, ² Tum Create Centre of Electromobility, Singapore, ³ Technische Universitat Munchen, Germany
PS2-4	Review on the aging mechanisms in Li-ion batteries for electric vehicles based on the FMEA method Christian Schlasza ¹ , Peter Ostertag ¹ , Daniela Chrenko ² , Reiner Kriesten ³ and David Bouquain ⁴ ¹ Robert Bosch GmbH, Germany, ² University of Burgundy, France, ³ University of Applied Sciences Karlsruhe, Germany, ⁴ University of Technology Belfort-Montbeliard, France
PS2-5	Testing Environment for Vehicle to Grid (V2G) Applications for Investigating a Voltage Stability Support Method Christoph Aldejohann, Jonas Maasmann, Willi Horenkamp, Fritz Rettberg and Christian Rehtanz TU Dortmund University, Germany
PS2-6	Fuel Cell Modeling With dSPACE And OPAL-RT Real Time Platforms Elena Breaz ¹ , Fei Gao ² , Damien Paire ² and Radu Tirnovan ¹ ¹ Technical University of Cluj Napoca, Romania, ² University of Technology of Belfort Montbeliard, France
PS2-7	Application of Dynamic Cell Resistance for Determination of State of Charge Mohammad Foad Samadi, Abbas Nazri and Mehrdad Saif University of Windsor, Canada, Wayne State University, USA
PS2-8	Autonomy Estimation for EV based on Road Planning Software Daniela Chrenko ¹ , Alexandre Ravey ² , Robin Roche ² and David Bouquain ² ¹ University of Burgundy, France, ² University of Technology Belfort-Montbeliard, France
PS2-9	A Hybrid Electric Vehicle with Minimal Energy Storage System Masood Shahverdi, Michael Mazzola, Matthew Doude and Quintin Grice Mississippi State University, USA
PS2-10	Hybrid-OD Matrix based Simulation Approach to Identify E-Charging Hotspots in Transport Network Eiman Y. ElBanhawy ¹ , Ruth Dalton ¹ , Venky N. Shankar ² and Karim A. Abdel Warith ³

¹Northumbria University, United Kingdom, ²The Penn State University, USA, ³Purdue University, USA

17

Poster Session 2

PS2-11	Powertrain Energy Management for Hybrid Electric Scooter
	Michael Guarisco, Alexandre Ravey, Beatrice Bouriot and David Bouquain University of Technology Belfort-Montbeliard, France
PS2-12	A Multi-tiered Real-time Pricing Algorithm for Electric Vehicle Charging Stations Qin Yan, Ilaval Manickam, Mladen Kezunovic and Le Xie Texas A&M University, USA
PS2-13	Agent Based Modeling of E-Mobility Eiman ElBanhawy ¹ , Ruth Dalton ¹ and Chimay Anumba ² ¹ Northumbria University, United Kingdom, ² Penn State University, USA
PS2-14	A Robust Integrated Starter/Alternator Drive Adopting a Synchronous Reluctance Machine for Automotive Applications Mattia Morandin, Emanuele Fornasiero, Nicola Bianchi and Silverio Bolognani University of Padova, Italy
PS2-15	Comparative Study of Series-Series and Series-Parallel Topology for Long Track EV Charging Application Kunwar Aditya and Sheldon Williamson Concordia University, Canada
PS2-16	Feasibility Analysis of EV/PHEV Support for Grid-isolated Networks (International Islanding) Ebrahim Saeidi ¹ , Behzad Asaei ² and Sheldon Williamson ¹ ¹ Concordia University, Canada, ² University of Tehran, Iran
PS2-17	Model Predictive Control of a Bidirectional AC-DC Converter for V2G and G2V Applications in Electric Vehicle Battery Charger Md. Parvez Akter ¹ , Saad Mekhilef ¹ , Nadia Mei Lin Tan ² and Hirofumi Akagi ³ ¹ University of Malaya, Malaysia, ² Universiti Tenaga Nasional, Malaysia, ³ Tokyo Institute of Technology, Japan
PS2-18	Efficiency Optimization for Bidirectional IPT system Bac Xuan Nguyen ¹ , Don Mahinda Vilathgamuwa ² , Gilbert Foo ¹ , Udaya Madawala ³ and Andrew Ong ¹ ¹ Nanyang Technological University, Singapore, ² Queensland University of Technology, Australia, ³ University of Auckland, New Zealand
PS2-19	Comparative Study of Transformer Topologies for Distributed IPT Systems Evangelos Lanaras, Venugopal Prasanth and Pavol Bauer Delft University of Technology, Netherlands
PS2-20	Stochastic Optimization for Economic Operation of Plug-in Electric Vehicle Charging Stations at a Municipal Parking Deck Integrated with On-site Renewable Energy Generation Yi Guo, Jian Hu and Wencong Su University of Michigan-Dearborn, USA
PS2-21	Improved Modeling of Lithium-Based Batteries using Temperature-Dependent Resistance and Overpotential Larry Juang, Phillip Kollmeyer, Thomas Jahns and Robert Lorenz University of Wisconsin-Madison, USA

Poster Session 2

PS2-22	Vehicle Charging Stations with Solar Canopy: A Realistic Case Study within a Smart Grid Environment Wei Tian, Yong Jiang, Mohammad Shahidehpour and Mahesh Krishnamurthy Illinois Institute of Technology, USA
PS2-23	Analysis of Space-Time Behavior of Electric vehicle commuter, Experience the metropolitan and intercities scales Eiman ElBanhawy Northumbria University, United Kingdom
PS2-24	State-of-Health based Load Sharing Strategy in Vehicle-To-Grid Systems Hussam Khasawneh and Mahesh Illindala The Ohio State University, USA
PS2-25	Loss Optimization and Ultracapacitor Pack Sizing for Vehicles with Battery/Ultracapacitor Hybrid Energy Storage Phillip Kollmeyer, Larry Juang and Thomas Jahns Univeristy of Wisconsin-Madison, USA
PS2-26	Anticipative Charging of Plug-in Electric Vehicles and Its Impact on the Grid Mahdi Kefayati and Ross Baldick The University of Texas at Austin, USA
PS2-27	External Short Circuit Fault Diagnosis for Lithium-Ion Batteries Bing Xia ¹ , Chen Zheng ¹ , Chris Mi ¹ and Brian Robert ² ¹ University of Michigan-Dearborn, USA, ² Ford Motor Company, USA
PS2-28	A data-driven bias-correction based lithium-ion battery modeling approach for electric vehicles application Gong Xianzhi, Xiong Rui and Chris Mi University of Michigan-Dearborn, USA
PS2-29	A Novel LLC Resonant Converter with Semi Bridgeless Active Rectifier Erdem Asa, Kerim Colak, Bojarski Mariusz and Czarkowski Dariusz New York University, USA
PS2-30	Testing of Smart Charging Controller for dynamic charging from solar panels Bill Bakolas ¹ , Pavol Bauer ² , Dick Prins ¹ and Michael Coussement ¹ ¹ Cohere Energy Solutions, Netherlands, ² Delft University of Technology, Netherlands

Tuesday, June 17, 2014

Afternoon Breakout Sessions

Technical Session 5: Conductive/Inductive charging technology, battery standards Session Chairs:

Mr. Martin M Weiss, NH Research, USA Dr. Pawel Malysz, McMaster University-MacAUTO, Canada

> Tuesday, June 17, 2014 2:00 PM – 3:20 PM Venue: Regency A-B

TS5-1 **Design of a Universal Inductive Charger for Electric Vehicles**Nan Liu and Thomas Habetler

Georgia Institute of Technology, USA

TS5-2 A bidirectional battery charger for electric vehicles with V2G and V2H capability and active and reactive power control

lason Vittorias, Michael Metzger, Dennis Kunz, Matthias Gerlich and Georg Bachmaier Siemens AG, Corporate Technology, Germany

TS5-3 A High Density 3.5 kW Isolated On-Vehicle Battery Charger Using SiC SBDs and SiC DMOSFETs

Timothy Han, Seok Joo Jang, Jared Preston and David Ouwerkerk Global Power Electronics, Inc., USA

TS5-4 EV Battery Standards Gap Analysis Related to Damaged and Recycled Batteries

Rich Byczek Intertek, USA

Technical Session 6: Electric Machines and Drives (Industry Presentation-only Session) Session Chairs:

Dr. Silva Hiti, General Motors, USA Dr. Chandra Namuduri, General Motors, USA

> Tuesday, June 17, 2014 2:00 PM – 3:20 PM Venue: Regency E-F

TS6-1 Latest sintered NdFeB magnet technology "Heavy rare-earth reduction technique

Takashi Yawata

Shin-Etsu Chemical Co., Japan

TS6-2 Traction motor optimization to meet range objectives

Brian Peaslee

Magna Electronics, USA

TS6-3 Performance/cost comparison of induction-motor (copper rotor & aluminum rotor) & permanent-

magnet-motor in a hybrid electric car

Malcolm Burwell

International Copper Association, USA

TS6-4 Shaft Voltages and currents in Traction Motors – Issues and Remedies

Matt Roman

Electro Static Technology, USA

Tuesday, June 17, 2014

Afternoon Breakout Sessions

Technical Session 7: Converter/inverter control strategies Session Chairs:

Dr. Suresh Gopalakrishnan, General Motors, USA Dr. Young Joo Lee, Chrysler Group LLC, USA

> Tuesday, June 17, 2014 4:20 PM – 5:40 PM Venue: Regency A-B

TS7-1 A Passive Auxiliary Circuit for Load and Line Independent Zero Voltage Switching in Full Bridge Converters with Reduced Conduction Losses for Transportation Applications

Alireza Safaee¹, Praveen Jain² and Alireza Bakhshai²

Alireza Safaee⁻, Praveen Jain⁻ and Alireza Bakhshai⁻

Bombardier Inc., Canada, ²Queen's University, Canada

TS7-2 DC Bus Current Harmonics of a Three-phase PWM Inverter with the Zero Sequence Injection
Saeid Haghbin

Chalmers University of Technology, Sweden

TS7-3 Philosophy of Topology and Components Selection for Cost and Performance in Automotive Converters

Alexander Isurin and Alexander Cook Vanner inc., USA

TS7-4 High-Efficiency Pulse-Width Modulated Full-Bridge Converter for Low-Voltage Battery Charging Applications

Min-Kwon Yang, Hyoung-Sup Cho, Seung-Jae Lee and Woo-Young Choi Chonbuk National University, Korea (South)

Technical Session 8: Advanced battery management Session Chairs:

Dr. Tae-Kyung Lee, Ford Motor Co., USA Dr. Vassilios Tsourapas, Eaton, USA

> Tuesday, June 17, 2014 4:20 PM – 5:40 PM Venue: Regency E-F

- TS8-1 Optimal Power Split and Sizing of Hybrid Energy Storage System for Electric Vehicles
 Junyi Shen, Amin Hasanzadeh and Alireza Khaligh
 University of Maryland, USA
- TS8-2 Power Management for Plug-in Hybrid Electric Vehicles using Reinforcement Learning with Trip Information

Chang Liu and Yi Lu Murphey

University of Michigan-Dearborn, USA

- TS8-3 **Battery Management System in the Bayesian Paradigm: Part I: SOC Estimation** Ienkaran Arasaratnam¹, Tjong Jimi² and Ryan Ahmed¹
 - ¹McMaster University, Canada, ²Ford Motor Company, Canada
- TS8-4 Battery Operation Cycle Management for Electric Vehicles with Battery Switching Technology
 Georgios Doukas¹, Pavol Bauer¹ and Jos van der Burgt²

 ¹Delft University of Technology, Netherlands, ²DNV KEMA, Netherlands

Panel 5: Electric Vehicle Energy Storage Systems: Potential Challenges and Future Solutions

Tuesday, June 17, 2014

2:00 PM - 3:20 PM

Venue: Regency J-K

Panel Organizer and Moderator: Dr. Sheldon Williamson, Concordia University, Montreal, PQ, Canada

Panelists:

- Mr. Steve Pullins, Horizon Energy Group, and Green Energy Corp.
- Mrs. Gitanjali Dasgupta, Electrovaya, Toronto, ON, Canada
- Dr. Lucia Gauchia Babe, Michigan Technological University
- Dr. I. (Haran) Arasaratnam, MacAuto, McMaster University, Hamilton, ON, Canada
- Mr. Phillip Weicker, Stealth Mode
- Dr. Sandeep Sovani, ANSYS

Panel Summary: Over the last 20 years, a revolution has occurred in the generation, distribution, and use of power, as power electronics have replaced hydraulic, pneumatic and other traditional control methods. This has occurred as a result of the smaller size and weight, higher efficiency (lower losses), and higher reliability of these solid-state power electronic switching systems. This revolution is now being extended via the incorporation of wide bandgap semiconductor devices in power electronic systems in place of silicon devices. These wide bandgap semiconductors promise even higher efficiency, faster switching, higher breakdown strength, higher thermal conductivity, and higher temperature operation. However, there are still issues related to material quality, device reliability, high temperature packaging, and thermal management of these wide bandgap power systems. We have assembled a panel of experts to address these issues standing in the way of widespread incorporation of wideband gap devices in power electronics.

Panel 6: Urban Public Transportation: Buses, Tramways, Metro, Light Rail, Where is the Future?

Tuesday, June 17, 2014

2:00 PM - 3:20 PM

Venue: Regency G-H

Panel Organizer and Moderator: Bruno Lequesne, E-Motors Consulting, LLC

Panelists:

- Mr. Tamás Ruzsányi, Ganz-Skoda Ltd., Hungary
- Dr. Konrad Woronowicz, Bombardier, Canada
- Dr. Andreas Malikopoulos, Oak Ridge National Laboratory, USA
- Mr. Micheal Austin, BYD America, USA

Panel Summary: People worldwide are moving to cities in unprecedented numbers, creating a pressing need for new public transportation infrastructures. In more developed nations, the desire to reduce emissions can also lead to looking at new means of commuting. At the same time, there has never been so many possible options available for engineers and city developers, from buses moved by seemingly any fuel imaginable, to light rail systems, to more investment-heavy systems such as underground metros. This panel will look at the current trends in this regard, both at the system level, and in terms of new vehicle technology. It should be of interest to system designers, engineers developing the needed buses, trains, components, and underlying technology, as well as city planners.

Panel 7: Future of Automotive Simulation Software: What Capabilities Should One Expect?

Tuesday, June 17, 2014

2:00 PM - 3:20 PM

Venue: Regency C-D

Panel Organizers: Dr. Mahesh Krishnamurthy, Illinois Institute of Technology, and Dr. Anand

Sathyan, Chrysler Group, LLC

Panel Moderator: Dr. Fei Gao, UTBM, France

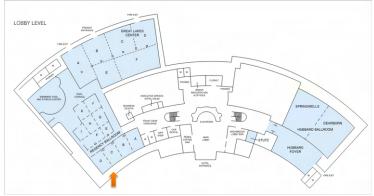
Panelists:

Mr. Beat J. Arnet, Plexim Inc., North America, USA

- Mr. Larry Michaels, Argonne National Laboratory, USA
- Mr. Sachin Bhide, Chrysler Group, LLC, USA
- Dr. Omer C. Onar, Oakridge National Laboratory, USA

Panel Summary: The automotive industry is undergoing a significant growth period with growing emphasis on hybrid, plug-in hybrid and electric vehicles. Several innovative solutions in power electronics; electric machines & drives and drivetrain configurations are being researched. However any proposed solution is required to prove its effectiveness not only for new vehicle models, but also for existing vehicles in order to find broad acceptance.

This panel will explore capabilities that would facilitate research and development in transportation electrification. Some of the questions would include (but not limited to): What features are important in vehicle modeling and what unique features currently exist? How flexible is each tool in incorporating emerging technologies such as wide bandgap devices, hybrid energy storage and drivetrain configurations? What level of accuracy can be expected from the simulations? Should engineers in the transportation sector be expected to have knowledge of hardware-in-the-loop systems? If yes, how can the learning curve be shortened without trivializing the problem?



Panel 8: 48V: Architecture and Challenges

Tuesday, June 17, 2014 4:20 PM – 5:40 PM

Venue: Regency J-K

Panel Organizer and Moderator: Dr. Bruno Lequesne, E-Motors Consulting, LLC

Panelists:

- Mr. Michael Reynolds, GM Global R&D Center
- Mr. Robert Storc, Magna (retired), Robert Storc Consulting, LLC
- Mr. Tom Watson, JCI Controls
- Dr. Tomy Sebastian, Halla Mechatronics

Panel Summary: 42V was proposed as a new automotive standard and extensively studied 10-15 years ago, then abandoned. Is it time for a comeback, rebranded as it may be as "48V"? Has the experience with hybrids made engineers and the public more comfortable with higher voltages? Have the arcing and cost issues been resolved sufficiently? Is this a matter of hybrids moving down in voltages, or of the standard 12V moving up? What about trucks (often already at 24V) and off-road vehicles? Are there new drivers to justify this switch? What architecture will be adopted? This panel is designed to provide a snapshot of the current status of this effort, first proposed in 2011 by five German automakers. It will review the remaining barriers, technical and commercial. It will also present an overview of the various possible architectures, and look at the proverbial crystal bowl to tell where the industry is heading.

Tuesday, June 17, 2014

Afternoon Breakout Sessions

Panel 9: Wireless Charging

Tuesday, June 17, 2014 4:20 PM – 5:40 PM

Venue: Regency C-D

Panel Organizers:

Dr. Joachim Taiber, ICAR - Clemson University Dr. Omer Onar, Oak Ridge National Laboratory

Panel Moderator:

Dr. Pavol Bauer, Delft University of Technology

Panelists:

- Dr. Kevin Bai, Kettering University
- Mr. Jae Lee, Toyota Research
- Dr. Jan-Mou Li, Oak Ridge National Laboratory
- Mr. Michael O'Halloran, CH2M Hill
- Mr. Jeremy McCool, Hevo Systems
- Dr. Konrad Woronowicz, Bombardier

Panel Summary: Wireless charging is being adopted on the technology roadmaps of many automotive OEM's – however, integrating the technology into the vehicle design has implications for package, vehicle electronics as well as HMI. Furthermore the integration of wireless charging technology into road requires also careful consideration of multiple aspects— both from a technological, economical, safety, security as well as from a policy perspective. This panel will stimulate a discussion between industry experts with vehicle or infrastructure backgrounds as well as academic experts which vehicle and infrastructure implications are identified that will require standardization activities.

Panel 10: Racecar Electrification

Tuesday, June 17, 2014 4:20 PM – 5:40 PM

Venue: Regency G-H

Panel Organizer and Moderator: Dr. Shuai Lu, Chongqing University, China

Panelists:

- Mr. Larry Rinehart, Rinehart Motion Systems, LLC
- Mr. Chris Ellis, Hykenesis, United Kingdom
- Mr. William Long, McMaster University, Canada
- Dr. Shuai Lu, Chongqing University, China
- Dr. Jenna Pollock, Tesla Motors, USA

Panel Summary: Race car events, particularly Formula-1 and Le Mans, have been showcasing automotive technologies to billions of fans for more than half a century. Racecar development is the stimulus for cutting edge technologies and inspiration to engineers and individual fans. The macro trend of vehicle electrification also penetrates into car races. The extreme technical requirements and severe duty cycles pushed the electric drivetrain of a racecar towards a much higher power density and dynamic performances than hybrid and electrical road vehicles. Besides the shorter lap time, high efficiency and fuel economy is a new winning factor in the game. This panel introduces the racecar electrification from perspectives of the teams, university activities, sports media, electric drive subsystem developing teams, etc. New car races and the new rules with the hybrid and all electric powertrains, various extreme electric drives technologies developed, and their road vehicle relevance, are to be discussed.

Tutorial 3: Energy Management and Optimization LOBBY LEVEL

Wednesday, June 18, 2014 8:30 AM – 12:00 Noon

Venue: Regency A-B



Speaker:

Dr. Ilse Cervantes, Institute of Scientific and Technological Research of San Luis Potosi (IPICyT), Mexico

Tutorial Description: Hybrid power propulsion systems of hybrid electrical vehicles (HEV) and fuel cell hybrid electrical vehicles (FCHEV) open the possibility of reducing fuel consumption, and therefore increasing tank-to-wheel efficiency of the vehicle, as batteries and super-capacitors are used to provide the power demand. Optimal-based energy management strategies (EMS) are supervisory controllers used to decrease such fuel consumption to the minimum possible, in face of operation restrictions and vehicle dynamics. The aim of this tutorial is to provide basic tools of optimization and analysis for the design of these energy management systems. Tutorial goals are: to review the existing optimization-based strategies, to provide elementary static and dynamic optimization solution tools, and to illustrate the use of these tools in practical applications.

Speakers Short Biographies: Ilse Cervantes (AM'03–SM'07) received her Ph.D. degree in applied mathematics and control (with highest distinction) from the Universidad Autonoma Metropolitana-Mexico. She is currently associate professor of the Institute of Scientific and Technological Research of San Luis Potosi, Mexico (IPICYT), and before joining IPICyT, she was associate professor at the National Polytechnic Institute of Mexico (IPN), where she imparted graduate courses and performed research on mathematics and control with emphasis in real-time control applications in electromechanical systems. She is author/coauthor of more than 100 journal and conference papers. Her current interests are control applications to vehicular systems and hybrid control. She is currently editor-in-chief of the special issue "Control, Analysis and Modelling of Vehicular Systems" in Mathematical Problems in Engineering to appear in 2014 and she has served as associate editor of the special issues of IEEE Trans. on Power Electronics "Transportation Electrification and Vehicle Systems" (2013) and IEEE Journal of Emerging and Selected Topics in Power Electronics Special Issue on "Transportation Electrification". She is founder member of IEEE-WIE (Women in Engineering).

Panel 11: Modern Methods in Education of Electric and Hybrid Vehicles

Wednesday, June 18, 2014

8:30 AM - 9:50 AM

Venue: Regency C-D

Panel Moderator: Prof. Pavol Bauer, Delft University of Technology, Netherlands

Panelists:

Prof. Babak Nahidmobarakeh, Université de Lorraine, France

- Prof. Andreja Rojko, University of Maribor, Slovenia
- Prof. Thomas Jahns, University of Wisconsin- Madison, USA
- Prof. Rik De Doncker, RWTH Aachen, Germany

Panel Summary: Traditional education in the electric and hybrid vehicle field still use classical methods of explanation, and printed educational material are typical in this regard. This is a particular challenge due to the unavoidable interaction of physical phenomena in electrical, electronic, magnetic and control circuits. To overcome the abstraction, a unique solution consists in utilizing interactive e-learning educational materials. Interactivity-Animations accompany the developed material and clarify the subject studied. Such material should include:

- Drivetrain and combined energy storage system for electric hybrid vehicles
- Power management techniques for hybrid electric cars
- Power electronics for electric cars
- Power control and energy management in DC microgrids

This panel will present the panelists' views of the e-learning facilities for electric and hybrid vehicles from the electric power generation, distribution and control points of view, and will be an opportunity to share experience and best practices in this multidisciplinary field.

Technical Session 9: Energy Storage System Modeling, Development and Evaluation Session Chairs:

Dr. Matthias Preindl, McMaster University, Canada Dr. I. (Haran) Arasaratnam, Ford Motor Co., Canada

Wednesday, June 18, 2014 8:30 AM – 10:10 AM

Venue: Regency E-F

TS9-1 Battery evaluation in a systems context using Battery Component in the Loop

Neeraj Shidore¹, Namdoo Kim¹, Daehung Lee¹, Ram Vijayagopal¹, Aymeric Rousseau¹, Jason Kwon², Eric Haggard³ and Benoit Honel³

Argonne National Laboratory, United States, **Samsung SDI Korea (South), **LMS International, United States

TS9-2 A multi physical model for PEM fuel cells including a two dimensional fluidic finite element analysis in real time

Pierre Massonnat, Fei Gao, Damien Paire, David Bouquain and Abdellatif Miraoui University of Technology Belfort-Montbeliard, France

TS9-3 **Hybrid Electric Vehicle Simulation with Integrated Battery Compact Physical Model**Mike Arnett¹, Iakovos Papadimitriou¹ and John Milios²

**Gamma Technologies, Inc., USA, **Sendyne Corp., USA

TS9-4 **Development of a Hybrid Energy Storage System for Electric and Hybrid Electric Vehicles**Kun Zhuge and Mehrdad Kazerani
University of Waterloo, Canada

Technical Session 10: Vehicle Modeling Diagnostics and Testing

Session Chairs:

Mr. Sachin Bhide, Chrysler Group, LLC , USA Dr. Sanjaka Wirasingha, Chrysler Group LLC, USA

	10:30 am – 12:10 pm Venue: Regency A-B		
TS10-1	Industry Presentation-only: Modeling Hybrid Systems Using Advanced Simulation Technology Emad Dlala ANSYS, USA		
TS10-2	Industry Presentation-only: Piecewise Linearization for Nonlinear Powertrain Models Simon O. Omekanda Chrysler Group LLC, USA		
TS10-3	Diagnosis of Open-Circuit Switch Faults in Multilevel Active-NPC (ANPC) Inverters Jiangbiao He and Nabeel Demerdash Marquette University, USA		
TS10-4	A discrete-time tool to analyze the stability of weakly filtered active front-end PWM converters Mehdi Karbalaye Zadeh ¹ , Gavagsaz Ghochani Roghayeh ² , Pierfederici Serge ² , Nahid-Mobarakeh Babak ² and Marta Molinas ¹ **Norwegian University of Science and Technology, Norway, **GREEN, University of Lorraine, France**		
TS10-5	Simplified Electric Vehicle Powertrain Model for Range and Energy Consumption based on EPA Coast-down Parameters and Test Validation by Argonne National Lab Data on the Nissan Leaf		

John G. Hayes and Kevin Davis University College Cork, Ireland

Wednesday, June 18, 2014

Morning Breakout Sessions

	Technical Session 11: Vehicles charging planning and management Session Chairs: Dr. Mehrdad Kazerani, University of Waterloo, Canada Dr. Omer C. Onar, Oakridge National Laboratory, USA		
Wednesday, June 18, 2014 10:30 am – 12:10 pm Venue: Regency C-D			
TS11-1	Hybrid Multi-Agent Based Resilient Control for EV connected Micro Grid System Andrew Hintz, Udupi Prasanna and Kaushik Rajashekara The University of Texas at Dallas, USA		
TS11-2	Industry Presentation-only: HEV System Design and Validation: Virtual Supply Chains Kurt Mueller Synopsys, USA		
TS11-3	Multiplexed Electric Vehicle Charger Provides Affordable and Flexible Level 2 Charging Joseph Maurio, Christopher McClure, Liam Tallon and Larry Hajnos Northrop Grumman Electronic Systems, USA		
TS11-4	Game Theoretic Approach to Offering Participation Incentives for Electric Vehicle to Vehicle Charge Sharing Promiti Dutta and Albert Boulanger Columbia University, USA		
TS11-5	Control Strategies for Electric Vehicle (EV) Charging Using Renewables and Local Storage Charles Castello ¹ , Tim LaClair ² and L. Curt Maxey ² ¹ NASA, USA, ² Oak Ridge National Laboratory, USA		

Technical Session 12: Traction Motors: Design and Optimization Session Chairs: Dr. Baiming Shao, Mercedes Benz R&D, USA Dr. Xiaodong Shi, Mercedes Benz R&D, USA 10:30 am - 12:10 pm Venue: Regency E-F TS12-1 **Direct Flux Control of PM Synchronous Motor Drives for Traction Applications** Gianmario Pellegrino¹, Boazzo Barbara¹ and Thomas M. Jahns² ¹Politecnico di Torino, Italy, ²University of Wisconsin-Madison, USA TS12-2 Comparative study of Structural Rigidity of Induction Machine and Switched Reluctance Machine Lizon Maharjan, Shiliang Wang, Arash Hassanpour Isfahani, Wei Wang and Babak Fahimi University of Texas at Dallas, USA Optimization of a traction PMASR motor according to a given driving cycle TS12-3 Enrico Carraro, Mattia Morandin and Nicola Bianchi University of Padova, Italy TS12-4 A Novel Linear Induction Motor Equivalent-Circuit with Optimized End-Effect Model including **Partially-Filled End Slots** Konrad Woronowicz and Alireza Safaee Bombardier Inc, Canada TS12-5 **Multiphase Machines for Electric Vehicle Traction** Nigel Schofield¹, Xin Niu² and Omid Beik¹ ¹McMaster University, Canada, ²The University of Manchester, United Kingdom

Technical Session 13: Converter/Inverter Design and Control **Session Chairs:**

Mr. Robert Bonetti, Chrlsyer Group, LLC, USA Dr. Pierre Magne, McMaster University-MacAUTO, Canada

Wednesday, June 18, 2014

10:30 AM – 12:10 PM Venue: Regency G-H		
TS13-1	Laminated Busbar Design Criteria in Power Converters for Electrified Powertrain Applications Mariam Khan ¹ , Berker Bilgin ¹ , Pierre Magne ¹ , Sanjaka Wirasingha ² and Ali Emadi ¹ **McMaster University, Canada, **Chrysler Group LLC, USA**	
TS13-2	Design Analysis and Improvement of an IGBT Gate Drive Circuit for Magnet Power Supplies using a Physics-Based Circuit Model Byeong Song and Ju Wang Argonne National Labortory, USA	
TS13-3	Sensitivity Analysis of the Control of a Three-phase Open-End Winding H-bridge Drive Abdelfatah Kolli ¹ , Olivier Bethoux ² , Alexandre De Bernardinis ¹ , Eric Laboure ² and Gerard Coquery ¹ IFSTTAR, France, ² LGEP, France	
TS13-4	Balanced Multiphase High Frequency Micro-Distribution Power Bus For Electric Vehicles Frederick Klatt Best Electric Machine, USA	
TS13-5	A two-phases interleaved One Cycle Control PFC for Automotive Application Davide Giacomini and Alex Lollio	

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2015 ITEC: Call for Papers



June 14-17, 2015 Dearborn, Michigan, USA http://itec-conf.com/

Paper and presentation proposals are being invited in the following or related technical track topic areas:

- Power Electronics and Electric Motor Drives
- Electric Machines and Actuators
- Battery and Battery Management
- Electric, Hybrid Electric, and Plug-in Hybrid Electric Vehicle System Architectures
- Smart Grid, Electrical Infrastructure, and V2G
- Electrification of Heavy-Duty and Off-Road Vehicles
- Fuel Cells and Applications in Transportation
- Electrical Systems and Components for Sea, Undersea, Air, and Space Vehicles
- Modeling, Simulation, and Control
- Standards, Policies, and Regulations for Transportation Electrification

Paper Submission Guidelines

Prospective authors are invited to submit their paper proposals through the conference webpage (http://itec-conf.com/). Each paper proposal must include:

Technical track name, paper title, name(s) of author(s), affiliation(s), mailing address(es), and e-mail address(es). If there are multiple authors, please identify the corresponding author.

An abstract of maximum 100 words and a digest of maximum 5 pages (single-column, double spaced, including figures and tables).

Special Presentation (SP) only Sessions

Authors who would like to present their work, but do not wish to contribute a full paper can submit a 1-page digest for "Special Presentation (SP) only Sessions." A regular paper is not needed. If accepted, speakers could make a presentation at the conference. Such presentations and 1-page digests will not be published in IEEE Xplore.

2015 ITEC: Call for Papers



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Key Dates

Deadline for submission of paper proposals (abstracts/digests): November 14, 2014

Author's notification of acceptance: February 6, 2015

Deadline for submission of final camera-ready manuscripts: April 3, 2015

Deadline for early registration: April 3, 2015

Exhibition

The conference will feature an industry exhibition focused on electrified vehicles and components, subsystems, and systems for all types of electrified vehicles and transportation systems (land, air, space, and sea). Exhibitor package includes:

Two complimentary registrations with every 10'x10' booth space purchased Presentation time in the exhibit hall Exhibitor literature will be included in conference materials

Unit Cost (10'x10' Booth Space) Corporation: \$2,500.00

Non-Profits, Small Businesses/Start-Ups/Universities: \$1,500.00

Exhibitor Registration

Register online at http://itec-conf.com/exhibition/

General Chair: Anand Sathyan, Chrysler Group LLC

Program Chair: Berker Bilgin, MACAUTO, McMaster University

Program Co-Chair: Xiaodong Shi, Mercedes Benz R&D

Conference Venue and Contacts

Conference Site and Hotel Reservation

Adoba Hotel Dearborn/Detroit (Former Hyatt Regency) 600 Town Center Drive Dearborn, Michigan 48126, USA Tel: +1-313-593-1234

URL: http://dearborn.hyatt.com



Hotel Reservation

The conference booking website will help ITEC attendees make, modify and cancel their hotel reservations online, as well as take advantage of any room upgrades, amenities or other services offered by the hotel:

http://adobadearborn.com/



ITEC's negotiated Group Rate is:

Without breakfast: \$125

With breakfast: \$134

(Group registration code: 1267)

This Group Rate is exclusive of applicable sales/room taxes. In order to take advantage of the above negotiated Group Rate, the reservation cut-off date is Friday, May 23, 2014 at 5:00 PM (U.S. Eastern) time, on a first come, first served basis.

CONFERENCE GENERAL CHAIR

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