ITEC is aimed at helping the industry transition from conventional vehicles to advanced electrified vehicles.
Welcome Message from General Chair

It is my utmost pleasure to welcome you to the 2013 IEEE Transportation Electrification Conference and Expo (ITEC’13). 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 heavy-duty, rail, and off-road vehicles and airplanes.

The ITEC’13 organizing committee has been working wholeheartedly to compose this excellent technical conference for you. Thanks to their dedication and countless hours of work as well as 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 two parallel short courses offered by internationally renowned industry 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. Furthermore, this year, ITEC includes a track, sponsored by the Department of Energy’s electric drive vehicle engineering program known as E3- Electrifying the Economy - Educating the Workforce: Taking Charge of the Electric Vehicle Industry’s Educational Needs.

We are passionately looking forward to meeting you at ITEC’13, wish you the heartfelt welcome to ITEC’13, and hope that you have a memorable experience. If you are not 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,

Alireza Khaligh
General Chair, ITEC’13
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.

You will experience...

ITEC features:
- 12 Keynote Presentations
- 10 Technical Tracks
- Numerous Presentations
- Educational EV/HEV Boot Camp
- Short Courses
- Half-Day Tutorials
- 100 Panel Presentations
- Industry Exhibition
- Public/Media Night

We have features for every step of the way...
IT’S ABOUT THE KNOWLEDGE SHARED...

Deepak Divan  
President and CTO  
VARENTEC, INC.

Jay Iyengar  
Vice President, Aerospace Engineering & Technology  
EATON CORPORATION

Robert Chin  
Group Manager in Electrical Machines and Motion Control  
ABB CORPORATE RESEARCH

Connie Bezanson  
Technology Manager, Office of Vehicle Technologies  
DEPARTMENT OF ENERGY

Martin Dober  
Senior Vice President  
MICHIGAN ECONOMIC DEVELOPMENT

Pam Wylie  
Technology Planning Manager  
FORD MOTOR COMPANY

Juergen Wiesenberger  
Director  
CONTINENTAL AUTOMOTIVE

Noel R. Mack  
Group Director, Driveline, Transmission & Hybrid Electric Systems  
RICARDO, INC.

Zilal Zhao  
Director of Global Product Management  
MAGNA ELECTRONICS

Michael Harpster  
Director of Propulsion Systems Research Lab  
GENERAL MOTORS

Martin Dober  
Senior Vice President  
MICHIGAN ECONOMIC DEVELOPMENT

Rupert Stuetzle  
Chief Technology Officer  
UBITRICITY
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 17, 2013) and Tuesday (June 18, 2013) as well as morning of Wednesday (June 19, 2013).

At each panel, the panel moderator/organizer and panelists will each give a short 10-15 minute presentation/speech and then open the floor to the audience for an open panel discussion and Q&A.

Panel 1
Automotive Technology Roadmap

Panel 2
Game Changing Technologies in Power Conversion for Electrification of Vehicles (Air, Sea, Ground)

Panel 3
Educational Programs on Transportation Electrification: Current Status and Future Needs

Panel 4
Wireless Charging

Panel 5
Wide Bandgap Devices

Panel 6
Economy and Workforce Development of Electric Vehicle Industry

Panel 7
Rare Earth Free Magnet Material

Panel 8
Chargers

Panel 9
The Evolution of Heavy Duty Vehicle Integrated Electronics Systems

Panel 10
Aerospace Applications – More Electric Aircraft

Panel 11
IEVC Forum: Innovating The Transportation Landscape Via Advanced Vehicle-To-Infrastructure Connectivity

Panel 12
Role of Entrepreneurship in Transportation Electrification Opportunities/Challenges

Panel 13
Energy Storage Systems

Panel 14
Transportation Electrification Standards Roundtable
General Chair
Alireza Khaligh, University of Maryland at College Park

General Co-Chairs
Burak Ozpineci, Oak Ridge National Laboratory, USA
Bulent Sarlioglu, University of Wisconsin-Madison, USA

Program Chair
Mahesh Krishnamurthy, Illinois Institute of Technology, USA

Program Co-Chair
Anand Sathyan, Chrysler Group LLC, USA

Assistant Program Chair
Narayan C. Kar, University of Windsor, Canada

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, Nexteer Automotive

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
John Shen, Illinois Institute of Technology, USA

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
Nader Nasr, 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: Fariborz Musavi, Delta-q Technologies Corp, Canada
Co-Chair: Zhong Nie, Chrysler LLC, USA

Track 2: Electric Machines and Actuators
Chair: Narayan C. Kar, University of Windsor, Canada
Co-Chair: Xiaodong Shi, Mercedes-Benz, USA

Track 3: Battery and Battery Management
Chair: Elias Ayana, Cummins Power Generation, USA
Co-Chair: Ganga Jayaraman, Woodward MPC, Inc, USA

Track 4: Electric, Hybrid Electric, and Plug-in Hybrid Electric Vehicle System Architectures
Chair: Sheldon Willimason, Concordia University, Canada
Co-Chair: Shuai Lu, Chongqing University, China

Track 5: Smart Grid, Electrical Infrastructure, and V2G
Chair: Srdjan Lukic, North Carolina State University, 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: Amin Hasanzadeh, Florida State University, USA

Track 7: Fuel Cells and Applications in Transportation
Chair: Omer C. Onar, Oak Ridge National Laboratory, USA
Co-Chair: Berker Bilgin, MacAUTO, Canada

Track 8: Electrical Systems and Components for Sea, Undersea, Air, and Space Vehicles
Chair: Babak Nahid-Mobarakeh, University of Lorraine, France
Co-Chair: Chris Edrington, Florida State University, USA

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
Co-Chair: Baiming Shao, Mercedes-Benz, USA
Meeting Room Floor Plan

Plenary Sessions:
Grand (Hubbard) Ballroom

Exhibit Hall:
Great Lakes Center

Breakout Rooms (Lobby Level):
Regency A-B, C-D, E-F, G-H, and J-K

Breakout Rooms (Second Level):
Rolls Royce, Desoto A, Desoto B, Stearns Knight, and Pierce Arrow
# Program-at-a-Glance

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday, June 17, 2013</th>
<th>Tuesday, June 18, 2013</th>
<th>Wednesday, June 19, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30AM-8:30AM</td>
<td>Conference Registration Open</td>
<td>Plenary Session 2</td>
<td>Tutorial 2 Session 7 Session 8 Panel 12</td>
</tr>
<tr>
<td>8:30AM-10:05AM</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
</tr>
<tr>
<td>10:05AM-10:20AM</td>
<td>Plenary Session 1</td>
<td>Plenary Session 2</td>
<td>Tutorial 2 Session 9 Panel 13 Panel 14</td>
</tr>
<tr>
<td>10:20AM-12:00PM</td>
<td>Coffee Break</td>
<td>Poster Session 1 Exhibit Hall Buffet Lunch</td>
<td>Poster Session 2 Exhibit Hall Buffet Lunch</td>
</tr>
<tr>
<td>12:00PM-2:00PM</td>
<td>Lunch (on own)</td>
<td>Poster Session 2 Exhibit Hall Buffet Lunch</td>
<td>Tutorial 1 Session 1 Panel 1 Panel 2 Panel 3 Panel 4 Panel 5 Panel 6 Panel 7 Panel 8 Panel 9 Panel 10 Panel 11</td>
</tr>
<tr>
<td>2:00PM-3:20PM</td>
<td>Tutorial 1 Session 1 Panel 1 Panel 2 Panel 3</td>
<td>Session 3 Session 4 Panel 7Panel 8</td>
<td>Conference Social Event in Exhibit Hall</td>
</tr>
<tr>
<td>3:20PM-4:20PM</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Public/Media Night in Exhibit Hall</td>
</tr>
<tr>
<td>4:20PM-5:40PM</td>
<td>Coffee Break at Exhibit Hall</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
</tr>
<tr>
<td>5:40PM-7:30PM</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
<td>Educational EV/HEV Boot Camp</td>
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</tbody>
</table>

**Exhibit Hall Open:**  
Monday, June 17\textsuperscript{th}, 12:00 Noon – 7:30 PM  
Tuesday, June 18\textsuperscript{th}, 12:00 Noon – 7:30 PM
ITEC’s Educational EV/HEV Boot Camp includes four half-day long short courses, which are scheduled for Sunday, June 16, 2013. These short courses are offered by industry leaders and are suitable for industry managers and engineers as well as researchers and students. The morning sessions will start at 8:30 AM and conclude at 12:00 noon, with a 30-minute break from 10:10 AM until 10:40 AM. The afternoon sessions will start at 2:00 PM and conclude at 5:30 PM with a 30-minute break from 3:30 PM until 4:00 PM.

**Short Course 1: Wireless Power Transfer (WPT) Systems**

Sunday, June 16, 2013  
8:30 AM – 12:00 Noon  
*Venue: Regency A-B*

**Instructors: Dr. John Miller and Dr. Omer Onar, Oak Ridge National Laboratory**

**Short Course Description:** Wireless power transfer (WPT) is a convenient, safe, and autonomous means for charging electric and plug-in hybrid electric vehicles. This tutorial covers the essentials of magnetic resonance coupling and relevant aspects of WPT operation, an analytical approach to calculate the coupling coefficient of WPT, a control strategy based on grid-side power converter regulation, to optimize overall system performance, as well as modeling and simulation of WPT along with some experimental results obtained from the Oak Ridge National Laboratory. Experimental studies performed at the Oak Ridge National Laboratory covers the stationary and in-motion wireless power system operation results, performance of different coil designs, system characteristics under different switching frequencies, load clamping voltage, DC link voltage, high frequency inverter duty cycle, coil spacing, misalignment, foreign obstacles between the coils, insertion loss due to road surfacing materials, and the step-down transformer at the inverter input for increased inverter efficiency.

**Instructors Short Biographies:** Dr. John M. Miller is an IEEE and SAE fellow. Dr. Miller is the director of the Power Electronics and Electrical Power Systems Research Center and the manager of the Advanced Power Electronics and Electric Motors Program at the Oak Ridge National Laboratory. He has authored over 190 publications and holds 54 U.S. patents. Dr. Miller is the recipient of various awards and recognitions. Dr. Omer C. Onar is an R&D staff and Alvin M. Weinberg Fellow at the Power Electronics and Electric Machinery Group at the Oak Ridge National Laboratory. He is the recipient of the 2008–2009 Transportation Electronics Fellowship from the IEEE Vehicular Technology Society and the 2009 Joseph J. Suozzi INTELEC® Fellowship from the IEEE Power Electronics Society. He is the principle author/coauthor of over 45 journal and conference papers.
Short Course 2: Power Electronics Thermal Packaging and Reliability
Sunday, June 16, 2013
8:30 AM – 12:00 PM
Venue: Regency C-D

Instructors: Dr. Patrick McCluskey¹ and Dr. Avram Bar-Cohen¹,²
¹University of Maryland, ²Defense Advanced Projects Agency (DARPA)

Short Course Description: Power electronics are the critical enabling technology for electrified transportation. Their widespread incorporation has resulted in significant improvements in efficiency over previous technologies, but it also has made it essential that the reliability of power electronics be characterized and enhanced. Recently, increased power levels, made possible by new compound semiconductor materials, combined with increased packaging density have led to higher heat densities in power electronic systems, especially inside the switching module, making thermal management more critical to performance and reliability of power electronics. Following a review of heat transfer principles and thermal management techniques, along with prognostic health management approaches to assess and ensure reliability, this short course will present the latest developments in the packaging, assembly, and thermal management of power electronic modules and systems, along with modeling and testing techniques. This course will emphasize thermal management techniques capable of addressing the reliability concerns associated with increased power levels, power density, and temperature in power electronic components.

Instructors Short Biographies: Dr. Patrick McCluskey is an Associate Professor of Mechanical Engineering at the University of Maryland, College Park, where he conducts research in the Center for Advanced Life Cycle Engineering (CALCE) in the areas of thermal management, reliability, and packaging of electronic microsystems for use in extreme temperature environments and high power applications. Dr. McCluskey has published more than 100 refereed technical articles on these subjects, and has edited three books. He is an associate editor of the IEEE Transactions on Components, Packaging, and Manufacturing Technology. Dr. McCluskey is a fellow of the International Microelectronics and Packaging Society (IMAPS).

Dr. Avram Bar-Cohen is an internationally recognized leader in the development and application of thermal science and engineering to microelectronic and optoelectronic systems. In his role at the Defense Advanced Projects Agency (DARPA) and through his professional service in IEEE and ASME, he has helped to define and guide the field of thermal packaging. He is the sitting President of the Assembly for International Heat Transfer Conferences, an Honorary member of ASME, and Fellow of IEEE, as well as Distinguished University Professor in the Department of Mechanical Engineering at the University of Maryland. Dr. Bar-Cohen is a recipient of numerous awards and recognitions. He has co-edited 16 books, authored/co-authored some 400 technical papers, delivered 65 keynote, plenary and invited lectures, and holds 8 US and 3 Japanese patents.
Short Course 3: Overview of Power Electronics Product Development Cycle and Fundamentals of Charger Design

Sunday, June 16, 2013
2:00 PM – 5:30 PM
Venue: Regency C-D

Instructors: Dr. Fariborz Musavi and Dr. Deepak S. Gautam
Delta-Q Technologies Corp.

Short Course Description: This seminar covers fundamental aspects of single stage versus two stage topologies in battery charging applications from characteristics of subsystems to component level requirements. The first part of the presentation will cover topics on topology selection, semiconductor and passive components selection and feedback control considerations for battery charging application. Charger operating strategies and controls are explained in the light of meeting transient and regulatory requirements. Technical details about charger performance, protections, and use of various simulation packages will also be covered. The second half of the seminar will emphasize on a practical product development cycle for designing an industrial and automotive battery charger. Thermal management techniques along with mechanical packaging considerations for design for manufacturability (DFM) will also be discussed. Some of the most common design and analysis techniques like DFMEA and WCCA will also be presented with examples. A typical test setup for testing a battery charger performance in the lab will be presented along with details for selecting some of the commonly used test and measuring test equipment. Examples from some of current product models are used to explain the current state of art of battery chargers. Potentials and challenges of industrial and automotive battery charging are also discussed.

Instructors Short Biographies: Dr. Fariborz Musavi has been with several high-tech companies including EMS Technologies Inc., Montreal, QC, Canada, DRS Pivotal Power, Bedford, NS, Canada and Alpha Technologies, Bellingham, WA, USA. Currently he is with Delta-Q Technologies Corp., Burnaby, BC, Canada, where he works as Manager of Research, Engineering and is engaged in research on simulation, analysis, and design of battery chargers for industrial and automotive applications. His current research interests include high power, high efficiency converter topologies, high power factor rectifiers, electric vehicles, and sustainable and renewable energy sources. Dr. Musavi is the recipient of the 2011 First Prize Paper Award from the IEEE Industry Applications Society.
Deepak S. Gautam is currently working for Delta-Q Technologies Corp., Burnaby, BC, Canada as a Power Electronics Engineer where his main responsibility is to develop high frequency switch-mode battery chargers for automotive and industrial application. His research interests are dc-dc and ac-dc converters, resonant converters and feedback control circuits. Mr. Gautam is the recipient of the University of Victoria fellowship, Andy Farquharson award for excellence in graduate student teaching and a best poster presentation award at the APEC 2012.
Short Course 4: Design and Optimization of Traction Motors with ACE+ Suite

Sunday, June 16, 2013
2:00 PM – 5:30 PM
Venue: Regency A-B

Instructors: Kunal Jain and Emmanuel Bot, ESI Group

Short Course Description: The development of a low-cost, high-performance interior permanent magnet (IPM) traction motor is essential to large-scale commercialization of Electric Vehicles. The traction motor not only drives the propulsion of the vehicle but also recharges the battery through regenerative braking. Additionally, the motors must operate consistently under extreme hot and cold temperatures along with varied road conditions. The key design barriers include the need of higher operating temperatures, increased energy density, durability, and reduced weight. The design and optimization process of the motors must help engineers address the above barriers. These challenges can be addressed in a systematic fashion with ACE+ Suite. ACE+ Suite is an ideal engineering design and analysis tool used by over 400 organizations worldwide because of its strong advanced CFD/Multiphysics capabilities. ACE+ Suite couples CFD, Electromagnetics, Structural, and Plasma solutions with each other. In the first half of the tutorial, an overview of electromagnetic capabilities of ACE+ Suite will be provided. Topics covered will include fundamentals of electromagnetics, losses in permanent magnets, eddy currents, skin effects. Subsequently, multiphysics phenomena such as Joule heating, Inductive Heating will be discussed. In addition, using CFD to perform parametric analysis and optimization studies will be addressed. In the second half, a few sample problems will be explained and solved on the concepts covered in the first half. The participants will leave the seminar ready to explore the world of multiphysics in design and optimization of traction motors.

Instructors Short Biographies: Kunal Jain is the Product Manager for ACE+ Suite. Prior to that, he was a lead developer of CFD-ACE+ solver with a strong focus on Fuel Cells. Emmanuel Bot is the Lead Applications Engineer focusing on Automotive Applications with ACE+ Suite. Prior to that, Emmanuel was a Support Engineer providing support to ACE+ suite customers worldwide.
**Monday, June 17, 2013**

**Keynote Presentations**

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**Plenary Session 1**
**Monday, June 17, 2013**
8:30 AM – 12:00 Noon

*Venue: Grand (Hubbard) Ballroom*

Chair: Dr. Ali Emadi, McMaster University

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**Welcome and Introduction**
8:30 AM – 8:35 AM

Dr. Alireza Khaligh, General Chair, 2013 IEEE Transportation Electrification Conference and Expo
Dr. Dong Tan, President, IEEE Power Electronics Society

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**Keynote Presentation 1: Integrating Distributed Energy Resources and Electric Vehicles**
8:35 AM – 9:05 AM

**Speaker:** Dr. Deepak Divan, President and CTO, Varentec, Inc.

**Short Biography:** Deepak Divan is President and CTO of Varentec, a company funded by green-tech venture capital firm Khosla Ventures that is providing innovative solutions to achieve a smart and dynamically controllable grid. He has over 35 years of experience in industry and academia in the areas of power electronics applied to utility and industrial systems. Deepak is a Fellow of the IEEE, past President of the IEEE Power Electronics Society, and has been requested to speak at dozens of conferences and symposiums on topics related to next generation power electronics to emerging solutions for dynamic grid control. From 2004-2011, he served as Professor in Electrical and Computer Engineering and Founding Director of the Intelligent Power Infrastructure Consortium at the Georgia Institute of Technology in Atlanta. Previously, Dr. Divan was a Professor in Electrical Engineering at the University of Wisconsin – Madison. He has over 250 papers and 40 issued and pending patents. Recently, Deepak spoke on a keynote panel at the ARPA-E Summit in Washington DC, on the topic “Future Grid: Beyond Smart Meters”. Dr. Divan combines unique perspectives on the changing landscape on the Transmission & Distribution grid, and the need for a transition to dynamic grid control, including advanced power electronics solutions. His research interests are in dynamic grid control, sustainable energy and advanced power electronics.
Keynote Presentation 2: Clean Transportation: In The Air and On The Roads
9:05 AM – 9:35 AM

Speaker: Jay Iyengar, Vice President, Aerospace Engineering & Technology, Eaton Corporation

Short Biography: Jay Iyengar has over 23 years of professional experience in complex propulsion systems & components in the transportation segment, covering both Automotive and Aerospace industries. Her current responsibilities include leading global Aerospace engineering & technology organization for Eaton Aerospace Group, a leaders of Aerospace Hydraulic, Fuel & Electrical power management. She received a M.S. degree in Mechanical Engineering from Wayne State University; a M.S. degree in Mechanical Engineering from Indian Institute of Technology, Bombay, India; and a B.S. degree in Mechanical Engineering from Mysore University, India.

Keynote Presentation 3: Two Sides Of The Same Coin” – Competitiveness Edges Via a Balanced Act In Research and Development
9:35 AM – 10:05 AM

Speaker: Dr. Robert Chin, ABB Corporate Research

Short Biography: Robert Chin is the Group Manager in Electrical Machines and Motion Control at ABB Corporate Research Centre in Scandinavia. He is leading corporate technology development activities in areas of electrical motors, generators and drive control, in connection to various ABB business units. He was the recipient of Cape Town Cooperation Silver Gilt Medal in 1998 and Mandel Cambridge Bursary in 1999. He is the Chairman of IEEE Industry Application Society (IAS) Sweden Chapter. Robert holds a doctoral degree in electrical engineering with a specialization in electrical machines.

Coffee Break
10:05 AM – 10:20 AM
Monday, June 17, 2013

Keynote Presentations

DOE E3 Welcome Messages
10:20 AM – 10:30 AM
Welcome message from the Senator Debbie Stabenow, U.S. Senator for Michigan
Farshad Fotouhi, Dean, College of Engineering, Wayne State University
Jean Redfield, President and CEO, NextEnergy

Keynote Presentation 4: An Overview of DOE Activities and Efforts on Transportation Electrification
10:30 AM – 11:00 AM

Speaker: Connie Bezanson, Technology Manager, Office of Vehicle Technologies, Department of Energy

Short Biography: Connie Bezanson serves as the technology manager for education and outreach at the Office of Vehicle Technologies within the U.S. Department of Energy. She manages the Graduate Automotive Technology Education, Advanced Vehicle Competition, and the Electric Drive Education activities funded by the Recovery Act. She received a B.S. in Mechanical Engineering from The Catholic University of America. Connie Bezanson has experience managing several advanced vehicle competitions including EcoCAR and Challenge X and serves as the DOE manager responsible for collaborations with the Automotive X Prize.

Keynote Presentation 5: Michigan and the Electric Vehicle Industry
11:00 AM – 11:30 AM

Speaker: Martin Dober, Senior Vice President, Michigan Economic Development Corporation

Short Biography: Martin Dober is senior vice president of entrepreneurship and innovation for the Michigan Economic Development Corporation (MEDC). In this role, he leads a team focused on delivering programs that encourage entrepreneurship and innovation across business sectors, and directs all programs under the state’s 21st Century Jobs Fund – a $1 billion, ten-year initiative to transform Michigan’s economy. This includes managing a $100 Million portfolio of direct investments into early stage companies; and $80 Million of recent investments into the infrastructure to support entrepreneurs around the state – including pre-seed capital programs, business incubator and accelerator support, statewide business plan competitions, university technology transfer initiatives, and other support services for start-up companies. Before joining the MEDC, Dober held senior-level business development positions in several small technology companies, including iRobot Corporation, American Systems Technology, Inc., and EIP, Inc. His career also includes experience in mergers & acquisitions at Delphi, corporate finance at Chrysler, and engineering at the Budd Company.
Keynote Presentation 6: Roadmap towards a Sustainable Electric Vehicle Market
11:30 AM – 12:00 Noon

Speaker: Pam Wylie and Lois Miller, Managers, Electrification Business Strategy, Ford Motor Company

Short Biography: Lois Miller and Pam Wylie are Ford Motor Company’s managers of Global Electrification Business Strategy. Appointed to this position April 2012 as long-time job share partners, Lois & Pam lead the strategy and planning for the next generation of Ford’s global electric vehicle portfolio, touching all aspects of electrified transportation. Prior to taking their current role, Lois & Pam have held several key management positions within the Ford Product Strategy and Planning organization, including manager of the North America Cycle Plan, manager of Global Technology Planning and manager of Small Car Planning & Strategy. Prior to their planning roles, Lois & Pam held several positions within Product Development, including Chassis Product Design, Program Management, Quality and Product Launch experiences. Lois first joined Ford in 1990 in Explorer Quality and Pam joined Ford in 1992 in Advanced Engineering. Lois received her bachelor’s degree in Electrical Engineering from Bucknell University and completed advanced studies in Business Administration at Central Michigan University. Pam received her bachelor’s degree in Mechanical Engineering from the University of Michigan and her master’s degree in Mechanical Engineering and master’s degree in Business Administration from the University of Michigan.
HALF-DAY TUTORIALS

ITEC conference registrants are welcome to attend the tutorials at no additional charge. Tutorials are expected to be three hours in duration and are scheduled in parallel with the conference sessions. The afternoon tutorials will start at 2:00 PM and conclude at 5:40 PM with an hour break from 3:20 PM until 4:20 PM. The morning tutorial will start at 8:30 AM and conclude at 12:00 noon, with a 30-minute break from 10:10 AM until 10:40 AM. These tutorials are offered by technical leaders and are suitable for industry managers and engineers as well as researchers and students.

Tutorial 1: Energy Storage for BEVs: An Engineering Perspective
Monday, June 17, 2013
2:00 PM – 5:40 PM
Venue: Regency A-B

Speakers: Mr. Ashish Arora and Dr. John Martens, Exponent Engineering and Scientific Consulting

Tutorial Description: Energy storage for HEVs and EVs is making a transition to the Lithium ion-based chemistries due to the advantages of relatively lower cost and weight and higher energy density and reliability. Various design topologies and comprehensive battery management systems are implemented to manage the battery system and ensure proper operation. As such, a system level approach to designing the battery system is used to ensure that the required safety features operate as intended and provide adequate safety, reliability and performance. This tutorial will cover topics including: General battery system requirements for HEVs and EVs, Introduction to the lithium-ion technology and its operation, A comparison of battery chemistries for BEVs, Steps involved in the manufacture of Lithium ion cells, Techniques used for the characterization and evaluation of battery performance, Typical design topologies and battery management architectures employed for small and large format lithium-ion batteries, Control circuit topologies used to mitigate the safety concerns typically associated with Lithium-ion batteries, Typical tests performed on battery systems and the approach taken by industry standards to evaluate the safety and reliability of batteries used in both HEVs and EVs.

Speakers Short Biographies: Ashish Arora is a Principal Engineer in Exponent’s Electrical and Computer Engineering practice. Mr. Arora specializes in electrical and electronic systems particularly in power converter and rechargeable battery technology design and safety evaluation. Dr. John D. Martens is a Principal Engineer in Exponent’s Electrical Engineering and Computer Science practice. He specializes in control systems and software, microprocessor-based and computer systems, circuit design and analysis, electronic components failure analysis, and consumer products design and failure analysis.
## Poster Session 1: Power Electronics, Motor Drives, and Vehicular Applications

**Session Chairs:**
Dr. Avoki M. Omekanda, Staff Research Engineer, General Motors – Global R&D Center
Dr. Emad Dlala, Application Engineer – Ansys Inc.

**Monday, June 17, 2013**
12:00 PM – 2:00 PM  
*Venue: Great Lakes Center (Exhibit Hall)*

### PS-1
**A Simplified Power Loss Calculation Method for PFC Boost Topologies**  
Fariborz Musavi¹, Wilson Eberle² and William G. Dunford²  
¹Delta-Q Technologies Corp., Canada, ²The University of British Columbia, Canada

### PS-2
**A Novel Highly Efficient Tank-Less Inverter for Transportation Applications**  
Abhinava Chaitanya Moreddy and Venkataraman Aditya  
Nanyang Technological University, Singapore

### PS-3
**Neutral-Point Voltage Balancing of Three-Level Inverter Using Modified Carrier-Based Space Vector Modulation and THD Comparison with the Two-Level Inverter**  
Lekha Sejpal¹, Luiz Lopes¹, Amar Mohammed² and Sheldon Williamson¹  
¹Concordia University, Canada, ²TM4 Inc., Canada

### PS-4
**Analysis and Design of Dual Clamp Current Fed DC-DC Converter for a 28V Li-ion Electric Accumulator**  
Parampreet Kaur Toor¹, Ali Emadi¹ and Hassan A. Kojori¹  
¹McMaster University, Canada, ²Honeywell Aerospace, Canada

### PS-5
**Analysis and Design of a High Voltage Electric Accumulator**  
Abdul Lateef¹, Ali Emadi¹ and Hassan Kojori¹  
¹McMaster University, Canada, ²Honeywell Aerospace, Canada

### PS-6
**Design Considerations for Wireless Electric Vehicle Charging**  
Matthew Bloom, Geng Niu and Mahesh Krishnamurthy  
Illinois Institute of Technology, USA

### PS-8
**Multiple Input Integrated DC/DC Converters and Supervisory Control for Fuel Cell/Battery/Ultracapacitor Electric Vehicle**  
Seyoung Kim and Sheldon Williamson  
Concordia University, Canada

### PS-9
**An Electro-Thermal Cycle-Lifetime Estimation Model for LiFePO4 Batteries**  
Junyi Shen, Serkan Dusmez, and Alireza Khaligh  
University of Maryland at College Park, USA

### PS-10
**Study of Permanent Magnet Machine Based Flywheel Energy Storage System for Peaking Power Series Hybrid Vehicle Control Strategy**  
Xiaomin Lu, Lakshmi Varaha Iyer, Kaushik Mukherjee and Narayan Kar  
University of Windsor, Canada
| PS-11 | Hybrid Energy Storage System (HESS) in Vehicular Applications: A Review On Interfacing Battery And Ultra-capacitor Units  
Amir Ostadi and Mehrdad Kazerani  
University of Waterloo, Canada |
| PS-12 | Fault Sensitive Modeling and Diagnosis of PEM Fuel Cell for Automotive Applications  
Ali Mohammadi¹, David Bouquain¹, Deatrice Bouriot¹, Abdesslem Djerdir¹ and Davood Khaburi¹  
¹Universite de Technologie de Belfort-Montbéliard, France, ²University of Science and Technology, Iran |
| PS-13 | Pulse Charger with Zero Current Switching and Isolation for Electric Vehicles and Renewable Energy Applications  
Sunil Abeyratne¹, Parami Wijesinghe¹ and Chamika Liyanagedera²  
¹University of Peradeniya, Sri Lanka, ²Purdue University, USA |
| PS-14 | Review and Comparison of Inductive Charging Circuit Topologies for Electric and Hybrid Electric Vehicles  
Bernardo Peschiera and Sheldon Williamson  
Concordia University, Canada |
| PS-15 | Wavelet-Transform Based Energy and Power Decoupling Strategy for an Ultracapacitor-Battery Hybrid Power-Split Gear Powertrain  
Serkan Dusmez and Alireza Khaligh  
University of Maryland at College Park, USA |
| PS-16 | Study of the Electric Power Balance in a Vehicle for the Choice of the Battery  
Gianmarco Capano, Maurizio Mozzone and Narayan Kar  
University of Windsor, Canada |
| PS-17 | Extended Kalman Filter Based Battery State Of Charge (SOC) Estimation for Electric Vehicles  
Chenguang Jiang, Allan Taylor, Chen Duan and Kevin (Hua) Bai  
Kettering University, USA |
| PS-18 | Study of Misalignment for On Road Charging  
Venugopal Prasanth and Pavol Bauer  
Delft University of Technology, Netherlands |
| PS-19 | SOC Estimation for Aged Lithium-Ion Batteries Using Model Adaptive Extended Kalman Filter  
Saeed Sepasi, Reza Ghorbani and Bor Yann Liaw  
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| PS-20 | Simulation Analysis of a Pitch Trim Actuator  
Ganga Jayaraman and Zenon Szulyk  
Woodward Inc., USA |
| PS-21 | A Comprehensive Review of Power Electronic Converter Topologies to Integrate Photovoltaics (PV), AC Grid, and Electric Vehicles  
Nina Naghizadeh and Sheldon Williamson  
Concordia University, Canada |
| PS-22 | Brushless Wound-Rotor [Synchronous] Doubly-Fed Machine only By Brushless Real-time Control  
Frederick Klatt  
Best Electric Machine, USA |
| PS-23 | Electrical Bearing Damage -- A Lurking Problem in Inverter-Driven AC Traction Motors  
Adam Willwerth and Matthew Roman  
*Electro Static Technology, USA* |
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| PS-24 | Space Vector Based Field Oriented Control of Permanent Magnet Synchronous Motor with a 3-Level Scheme  
Pinkymol Harikrishna Raj, Ali Iftekhar Maswood and Aditya Venkataraman  
*Nanyang Technological University, Singapore* |
| PS-25 | System Identification for Fault Diagnosis of Permanent Magnet Machines  
Dusan Progovac, Le Yi Wang and George Yin  
*Wayne State University, USA* |
| PS-26 | Optimal Design Considerations for Interior Permanent Magnet Motor for a Range-Extended Electric Vehicle  
Yong Jiang, Zhi Yang and Mahesh Krishnamurthy  
*Illinois Institute of Technology, USA* |
| PS-27 | Poly-Phase Motor Drives Under Fault and Normal Conditions: Application for a Five-Phase Induction Motor  
Salem Alloune  
*University of Bejaia, Algeria* |
| PS-28 | Regenerative Braking of Battery-Powered Converter-Controlled PM Synchronous Machines  
Aravind Samba Murthy and David Taylor  
*Georgia Institute of Technology, USA* |
Monday, June 17, 2013
Afternoon Breakout Sessions

**Technical Session 1: Power Electronics- I**

*Session Chairs:*
Dr. Chandra Namuduri, Technical Fellow – General Motors R&D Center
Dr. Elias Ayana, Cummins Generation

**Monday, June 17, 2013**
2:00 PM – 3:20 PM
Venue: Regency J-K

**S1-1** Analysis and Optimization of Buffer Circuits in High Current Gate Drive
Yang Xue, Zhiqiang Wang, Leon Tolbert and Benjamin Bialock
*University of Tennessee, USA*

**S1-2** Comprehensive Topological Analyses of Isolated Resonant Converters in PEV Battery Charging Applications
Haoyu Wang and Alireza Khaligh
*University of Maryland at College Park, USA*

**S1-3** Wide Bandgap Device Characteristics for Hybrid Electric Vehicle Applications
Ranbir Singh, *GeneSic Semiconductor Inc., USA*

**S1-4** A Comparative Evaluation of Control Techniques for Grid-Side AC-DC Converter in a Two-Stage Level-two Bidirectional Battery Charger
Noreen Wong, Kun Zhuge and Mehrdad Kazerani
*University of Waterloo, Canada*

**Technical Session 2: Advances in Transportation (Industry Presentation-Only session)**

*Session Chairs:*
John Gibson, Chief Engineer – Chrysler Group LLC
Silva Hiti, Technical Fellow – General Motors

**Monday, June 17, 2013**
4:20 PM – 5:40 PM
Venue: Regency J-K

**S2-1** Hybrid Power Electronics Development Challenges to VDA specifications
*Brian Peaslee*
Magna Electronics, USA

**S2-2** Advanced Solutions and Optimization for Electric Machines
*Emad Dlala*
Ansys Inc., USA

**S2-3** Inverters for HEV/PHEV/BEV
*Steven Kowalec*
Continental Corporation, USA

**S2-4** Magnet Options for Traction Motor Applications
*Steve Constantinides*
Arnold Magnetics, USA
Panel 1: Automotive Technology Roadmap

Monday, June 17, 2013

2:00 PM – 3:20 PM

Venue: Regency C-D

Panel Moderator: Dr. Ali Emadi, Canada Excellence Research Chair in Hybrid Powertrain and Director of MacAUTO, McMaster University

Panelists:
Mengyang Zhang, Senior Technical Specialist, Chrysler Group LLC
Haoran Hu, Chief Scientist, Eaton Corporation
Bob Storc, Robert Storc Consulting LLC
Scott Heywood, Engineering Group Manager, Energy Balance and Strategy Group, GM
Mark Jennings, Technical Leader, Electrified Propulsion Systems Research & Advanced Engineering, Ford Motor Company

Panel Summary: This panel discusses a technology roadmap (short term and long term) for the automotive industry by focusing on advanced vehicle technologies that are expected to be widely adopted by the industry in the coming decades. Panelists will present their own view of the current status and future trends and answer questions including: What are the major technical challenges facing the industry? How cost-effective are various advanced vehicle technologies including electrified powertrains, advanced engines, and lightweight materials? What are the advantages and disadvantages of various powertrain technologies? What are the most promising solutions to improve fuel economy, reduce emissions, and enhance safety and performance? What are the most cost-effective technologies to address the new and emerging requirements including the North American 2025 CAFÉ Standards? What’s the role of electro-mechanical powertrain integration? How do we improve sustainability in transportation? What technical breakthroughs are needed?
Panel 2: Game Changing Technologies in Power Conversion for Electrification of Vehicles (Air, Sea, Ground)

Monday, June 17, 2013
2:00 PM – 3:20 PM
Venue: Regency E-F

Panel Organizer and Moderator: Dr. Bulent Sarlioglu, Assistant Professor and Associate Director of WEMPEC, University of Wisconsin–Madison

Panelists:
Dr. Saeid Habibi, Senior NSERC Industrial Research Chair, McMaster University
Dr. Bulent Sarlioglu, University of Wisconsin–Madison
Dr. John Miller, Oak Ridge National Laboratory
Dr. Robert Chin, ABB Corporate Research

Panel Summary: This panel is for discussing the transformative and incremental technologies from the perspective of electrical and electro-mechanical power conversion for electrification of all vehicles. Panel intends to highlights synergies and contrasts among electrification of various vehicles including more electric airplanes, electric vehicles, and ships. The panel intends to facilitate information exchange and discussion about new power system architectures and new game changing technologies such as wide bandgap devices for power electronics and integrated drive systems using high-speed electric machines. The panel will draw attendees from aerospace, automotive and marine OEMs (Tier 1 and Tier 2), and researchers from the field.
Panel 3: E3 Panel: Educational Programs on Transportation Electrification: Current Status and Future Needs

Monday, June 17, 2013
2:00 PM – 3:20 PM
Venue: Regency G-H

Panel Moderator: Jerry Ku and Steve Salley, Wayne State University

Panelists:
Gary Caille, Colorado State University
James Gover, Kettering University
Jeffrey Naber, Michigan Technology University
Don Siegel, University of Michigan
Angela Rolufs, Director, Missouri University of Science and Technology
Steven O. Salley, Wayne State University
Jerry Ku, Wayne State University

Panel Summary: This panel will discuss the status of programs and courses developed with support by the Department of Energy for the advancement of electric drive vehicle engineering educational programs. Panelists will discuss recent progress of their programs, including enrollment and student demand, student placement and employment, student survey results and other outcome measures. They will also assess the need for additional courses and curricular changes in the area of transportation electrification.
Panel 4: Wireless Charging

Monday, June 17, 2013
4:20 PM – 5:40 PM
Venue: Regency C-D

Panel Moderator: Dr. John Miller, Oak Ridge National Laboratory

Panel Organizers: Dr. John Miller and Dr. Omer C. Onar, Oak Ridge National Laboratory

Panelists:
Rebecca Hough, Co-Founder & CEO, Evatran
David Schatz, VP, WiTricity (or Katie Hall, WiTricity)
Andrew Daga, CEO, Momentum Dynamics
Jeff Muhs, Utah State University
Grzegorz Ombach, VP of Engineering, Qualcomm

Panel Summary: Wireless power transfer (WPT) is a convenient, safe, and autonomous mean for electric and plug-in hybrid electric vehicle charging that has seen rapid growth in recent years for stationary applications. WPT does not require bulky contacts, plugs, and wires, is not affected by dirt or weather conditions, and is as efficient as conventional charging systems. When applied in-motion, WPT additionally relieves range anxiety, adds further convenience, reduces battery size, and may help increase the battery life through charge sustaining approach. In the 1990’s there were isolated cases of inductive charging and other non-contacting means proposed, but it was not until the mid-2000’s when DOE took interest, then in 2008 investigated evanescent wave power transfer, that private industry escalated their activities. This panel session covers the insights from leading industry executives and researchers, wireless charging and EV public policy, issues and challenges of vehicle and infrastructure integration, synergies and interactions between roads and vehicles, recent technological advancements, emerging standards, and the broader deployment considerations.
Panel 5: Wide Bandgap Devices

Monday, June 17, 2013
4:20 PM – 5:40 PM
Venue: Regency E-F

Panel Moderator: Patrick McCluskey, University of Maryland and Burak Ozpineci, Oak Ridge National Laboratory

Panelists:
David Grider, Power Program Manager, Cree, Inc.
Madhu Sudhan Chinthavali, Oak Ridge National Laboratory
Ranbir Singh, GeneSiC Semiconductor
Karim S. Boutros, HRL Laboratories LLC
Benjamin Blalock, University of Tennessee

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: E3 Panel: Economy and Workforce Development of Electric Vehicle Industry

Monday, June 17, 2013
4:20 PM – 5:40 PM
Venue: Regency G-H

Panel Moderator: CP Yeh¹ and Doug Fertuck², ¹Wayne State University, ²Macomb County Community College

Panelists:
Douglas Fertuck, Macomb Community College, Associate Director of Center for Advanced Automotive Technology (CAAT)
Robert Feldmaier, Macomb Community College, Director of CAAT
CP Yeh, Wayne State University, Chair of the Division of Engineering Technology
Gene Liao, Wayne State University, WSU, Director of BS-ETT Program
Randall Champagne, GM, co-President of MAGMA
Gregory Moss, Denso, co-President of MAGMA

Panel Summary: The panel will address the following topics: engaging industry in curriculum development in electrified vehicle technology; the impact of future fuel economy improvement technologies on needed workforce skills (for technicians and engineers); strategies for upgrading skills of current employees; and the partnering of OEMs, suppliers, and academia to provide the necessary flow of skilled workers into the auto industry.
Joint PELS/IAS Technical Committee Meeting

Monday, June 17, 2013
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: 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: Iqbal Husain, North Carolina State University

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.).
Keynote Presentations

Plenary Session 2
Tuesday, June 19, 2012
8:30 AM – 12:00 Noon
Venue: Grand (Hubbard) Ballroom

Chair: Dr. Silva Hiti, General Motors
Co-Chair: Dr. Babak Fahimi, University of Texas at Dallas

IEEE IAS Welcome
8:30 AM – 8:35 AM
Dr. Blake Lloyd, President, IEEE Industry Applications Society

Keynote Presentation 1: Tailored to Fit: Customized degree of Powertrain Electrification Solutions
8:35 AM – 9:05 AM

Speaker: Speaker: Juergen Wiesenberger, Director of Continental Automotive

Short Biography: Juergen Wiesenberger is the Director for Continental’s Hybrid Electrical Vehicles (HEV) Business Unit in North America. He has worked in the Automotive Industry for more than 25 years with expertise in Powertrain Control Systems and components. Wiesenberger began his career with Continental (Siemens Automotive in Germany) in 1987 and transferred to Auburn Hills, Michigan in 1994. Previously, Wiesenberger held the company’s Director positions for Gasoline systems in Auburn Hill and Newport News, Va and Diesel systems in and Columbia, SC. overseeing globally all aspects of the Control systems and associated components for all US based customers. Wiesenberger earned a Mechanical Engineering degree from the Technical School in Landshut, Germany and an Electrical Engineering degree from the University of Regensburg, Germany.
Keynote Presentation 2: The Art of The Possible – When 2 Becomes 1 to Meet 2025
9:10 AM – 9:35 AM

Speaker: Noel R. Mack, Product Group Director, Driveline, Transmission & Hybrid Electric Systems, Ricardo, Inc.

Short Biography: Noel Mack holds a bachelor of science in mechanical and aeronautical engineering and masters in engineering management. Noel is currently the Product Group Director for Driveline, Transmission and Hybrid Electric Systems for Ricardo Inc. Since his first position in 1985 as a project engineer in aeronautics and systems technology, he spent over a decade in aerospace before joining the automotive industry. He worked for Magna International for 13 years prior to joining Ricardo. Formerly, Noel was also an Adjunct Professor at the University of Detroit Mercy, where he taught a course in Hybrid Electric Vehicle Performance and Design.

Keynote Presentation 3: Hybrid/Electric Vehicle Power Electronics from Technology to Business to Public Policy
9:35 AM – 10:05 AM

Speaker: Zilai Zhao, Director, Global Product Manager, Power Electronics and Motors, Magna Electronics

Short Biography: Zilai Zhao is currently the Director of Global Product Management, responsible for Power Electronics and Motors, at Magna Electronics. Mr. Zhao has a Bachelor’s degree from Tsinghua University, an MSEE degree from the University of California – Los Angeles and an MBA degree from the University of Michigan – Ann Arbor. Mr. Zhao has been working on vehicle electrification since late 90’s, first as controls engineer and later moving into various engineering and business leadership roles. The 2012 Ford Focus Electric uses inverter and electric motor designed and produced by Mr. Zhao’s team in Magna.

Coffee Break
10:05 AM – 10:25 AM
Welcome from IEEE PES
10:25 AM – 10:30 AM
Dr. Noel Schulz, President, IEEE Power & Energy Society

Keynote Presentation 4: A Report of EVs in High-Utility Service
10:30 AM – 11:00 AM

Speaker: Micheal Austin, Vice President, BYD America

Short Biography: Micheal Austin received his degree in Design Engineering and completed a Masters in Mechanical Engineering from BYU. He worked for Motorola 15 years in functions including ODM Director for the Mobile Devices Business responsible for over $3B in purchases annually and serving as Motorola’s Global Energy Commodity Manager purchasing Motorola’s battery products. He was selected as Motorola’s Distinguished Innovator (with 22 US patents) in 1999. He has considerable Asian International business experience which proves invaluable in his current role as Vice President for BYD America. BYD is a $40B Chinese company listed on the HKE and has over 200,000 employees.

Keynote Presentation 5: Opportunities and Challenges in Propulsion Electrification
11:00 AM – 11:30 AM

Speaker: Michael Harpster, Director - Propulsion Systems Research Lab, General Motors Company

Short Biography: Mike Harpster is the Director of Propulsion Systems Research Lab, GM Global Research and Development. Mike is responsible for leading all research and development globally for conventional and electrified propulsion systems. Mike began his career with General Motors in 1994 as a project engineer with Advanced Engine Engineering in Pontiac, Michigan. He has a diverse background having worked in Advanced Engineering, Advanced Powertrain Vehicle Integration and Powertrain Product Planning. In August 2005, he became Engineering Group Manger, Hybrid Architecture where he was responsible for managing a global team developing next generation electrified propulsion systems and conducting system analysis. His team invented the Chevrolet Volt production drive unit, of which he is a co-inventor. He was appointed Assistant Chief Engineer for Electrification in October 2008, where he was responsible for leading a product engineering team in developing next generation hybrid and EREV systems. He studied Engineering Science and Mechanical Engineering at Penn State, receiving a B.Sc. in 1992 and a M.Sc. in 1994.
Keynote Presentation 6: Mobile Metering – Basis of an Intelligent Charging Infrastructure at Significantly Reduced Cost

11:30 AM – 12:00 Noon

Speaker: Dr. Rupert Stuetzle, CTO, ubitricity, Germany

Short Biography: Rupert Stuetzle holds a diploma in Electrical Engineering and a doctorate in Software Engineering, both from Munich University of Technology. After five years in management consulting with McKinsey & Co. he joined Bosch in 2004. For four years, he managed engine ECU series development for the biggest customer. He then spent four years with the electromobility unit as VP for EV systems engineering and head of development for power electronics components. Rupert joined ubitricity, a Berlin-based start-up, as CTO in 2012.
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<td>Dr. Srdjan Lukic, North Carolina State University</td>
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<td>Dr. Baiming Shao, Technical Specialist – Mercedes Benz R&amp;D</td>
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<td><strong>Venue:</strong> Great Lakes Center (Exhibit Hall)</td>
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| **PS-29** Electric Motor Control for Hybrid Electric Vehicles based on Different Driving Cycles  
Yi Hou¹, Alexandre Ravey², David Bouquain², Fei Gao³, Abdellatif Miraoui³ and Weiguo Liu¹  
¹Northwestern Polytechnical University, China, ²Université de technologie de Belfort-Montbéliard, France |
| **PS-30** Modeling and Simulation of a Photovoltaic (PV) Based Inductive Power Transfer Electric Vehicle Public Charging Station  
Dimko Miskovski and Sheldon Williamson  
Concordia University, Canada |
| **PS-31** Comparison Criteria for Hybrid/Electric Vehicles Traction System Architectures  
Alexandre Battiston¹, Jean-Philippe Martin¹, El-Hadj Miliani¹, Babak Nahid-Mobarakeh¹, Serge Pierfederici¹ and Farid Meibody-Tabar¹  
¹Université de Lorraine, France, ²IFP Energies Nouvelles, France |
| **PS-32** Dynamic Decoupling Control of a Centrifugal Compressor for Fuel Cell Systems for Transportation Applications  
Dongdong Zhao¹, Qing Zheng¹, Fei Gao¹, David Bouquain¹, Bo Li² and Abdellatif Miraoui³  
¹University of Technology of Belfort-Montbéliard, France, ²Gannon University, USA |
Swathi Rao¹, Berthold Florence¹,², Pandurangavittal Koppal¹, Blunier Benjamin², Bouquain David², Sheldon Williamson¹ and Miraoui Abdellatif³  
¹National Institute of Technology, India, ²University of Technology of Belfort-Montbéliard, France, ³Concordia University, Canada |
| **PS-34** Analysis of Electric Vehicle Impacts in New Mexico Urban Utility Distribution Infrastructure  
Brian Arellano¹, Santiag Sena¹, Shahin Abdollahy¹, Olga Lavrova¹, Sara Stratton¹, and Jon Hawkins¹  
¹Public Utility Service Company of New Mexico, USA, ²University of New Mexico, USA |
| **PS-35** Improving the Performance of an Active Power Filter as a Part of a Next Generation, Multifunctional, High Power, Electrical Vehicle Charging Station  
Yongbin Chu, Shuo Wang and Russell Crosier  
University of Texas at San Antonio, USA |
| **PS-36** Development of a Predictive Model for Regenerative Braking System  
Andrea Caratti, Gabriele Catacchio, Carlo Gambino and Narayan Kar  
University of Windsor, Canada |
| **PS-37** Degraded Control Strategy Using State-of-Health in Fuel Cell Hybrid Electric Vehicle  
Sebastien Faivre, Alexandre Ravey, David Bouquain and Abdesslem Djerdir  
University of Technology of Belfort-Montbéliard, France |
| **PS-38** Electric Go-Kart with Battery-Ultracapacitor Hybrid Energy Storage System  
Wellington Avelino¹, Fellipe Garcia¹, Andre Ferreira¹ and Jose Antenor Pomilio¹  
¹University of Campinas, Brazil, ²Ekion Electric Vehicles Technologies, Brazil, ³Federal University Juiz de For a, Brazil |
| **PS-39** Systematic Approach to the Modeling and Control of Hybrid Electric Vehicle Powertrains  
David Taylor  
Georgia Institute of Technology, USA |
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<td>Laith Al-Musawi¹, Rocky Tran¹, Michael Dang² and Nafia Al-Mutawaly¹²³</td>
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<td>¹McMaster University, Canada, ²Hydro One Networks, Canada, ³Mohawk College, Canada</td>
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<tr>
<th>PS-52</th>
<th>Comprehensive Modeling of Electric Vehicles to Analyze their Performance Based on Different Propulsion Profiles</th>
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<tr>
<td></td>
<td>Saeedeh Hamidifar, Mahdi Mousavi and Narayan Kar</td>
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<td>University of Windsor, Canada</td>
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<tr>
<th>PS-53</th>
<th>Cadmium Telluride Solar Cell: From Device Modeling to Electric Vehicle Battery Management</th>
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<tr>
<td></td>
<td>Khalid Nazmus Sakib, Kabir Zahangir and Sheldon Williamson</td>
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<td>Concordia University, Canada</td>
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<th>PS-54</th>
<th>Reliability Evaluation for Traction Drive System of High-Speed Electrical Multiple Units</th>
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<td></td>
<td>Jianqiang Liu¹, Xiuguo Cui¹, Yong Jiang², and Mahesh Krishnamurthy³</td>
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<tr>
<td></td>
<td>¹Beijing Jiaotong University, China, ²Illinois Institute of Technology, USA</td>
</tr>
</tbody>
</table>
### Technical Session 3: Transportation - I

**Session Chairs:**
- Shashi Velnati, Manager – Chrysler Group LLC
- Dr. Sanjaka Wirasingha, Chrysler Group LLC

**Tuesday, June 18, 2013**
- **2:00 PM – 3:20 PM**
- **Venue:** Regency J-K

#### S3-1 Assessments of Design, Packaging, and Operational Characteristics of Progressing EV, HEV, and PHEV Components
- Tim Burress and Steven Campbell
- *Oak Ridge National Laboratory, USA*

#### S3-2 A Novel Fixed Displacement Electric Hydraulic Hybrid (EH2) Drivetrain for City Vehicles
- Yingguang Sun\(^1\), Jose Garcia\(^2\) and Mahesh Krishnamurthy\(^1\)
  - \(^1\) *Illinois Institute of Technology, USA*
  - \(^2\) *Purdue University, USA*

#### S3-3 PEV Demand Flexibility and its Impact on the Electric Power System
- Mahdi Kefayati and Ross Baldick
- *University of Texas at Austin, USA*

#### S3-4 An Average Modeling approach for Mobile Refrigeration Hybrid Power Systems with Improved Battery Simulation
- Yue Cao and Philip Krein
- *University of Illinois at Urbana-Champaign, USA*

### Technical Session 4: Energy Storage - I

**Session Chairs:**
- Dr. Tae-Kyung Lee, Research and Advanced Engineering – Ford Motor Company
- Dr. Adam Timmons, Technical Specialist – Chrysler Group LLC

**Tuesday, June 18, 2013**
- **2:00 PM – 3:20 PM**
- **Venue:** Regency G-H

#### S4-1 Adaptive Online Battery Parameters/ SOC/ Capacity Co-estimation
- Habiballah Rahimi-Eichi and Mo-Yuen Chow
- *North Carolina State University, USA*

#### S4-2 Sizing of ICE and Lithium-Ion Battery for Series Hybrid Vehicle over Life Cycle with Battery Aging
- Daniela Chrenko, Zul Hilmi Che Daud, Zainab Asus, El-Hassane Aglizim, Luis Le Moyne, and Shiyu Gan
- *University of Bourgundy, France*

#### S4-3 Adaptive Temperature Monitoring for Battery Thermal Management
- Jenkaran Arasaratnam\(^1\), Jimi Tjong\(^2\), Ahmed Ryan\(^1\) Mohammed El-Sayed\(^1\), and Saeid Habibi\(^1\)
  - \(^1\) *McMaster University, Canada*
  - \(^2\) *University of Windsor, Canada*

#### S4-4 Simulation of Internal Short Circuits on Lithium Ion Cells
- Alvin Wu\(^1\), Mahmood Tabaddor\(^2\), Carl Wang\(^2\) and Judith Jeevarajan\(^3\)
  - \(^1\) *UL LLC, USA*
  - \(^2\) *UL LLC, Taiwan*
  - \(^3\) *NASA Johnson Space Center, USA*
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<th>Technical Session 5: Conductive and Inductive Charging</th>
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<td>Session Chairs:</td>
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<td>Richard Scholer, Senior Technical Specialist – Chrysler Group LLC</td>
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<td>Deepak S. Gautam, Lead Power Electronics Engineer – Delta-Q Technologies</td>
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<td>Tuesday, June 18, 2013</td>
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<td>Venue: Regency J-K</td>
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<td>S5-1 Oak Ridge National Laboratory Wireless Power Transfer Development for Sustainable Campus Initiative</td>
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<td>John Miller, Omer Onar, Steven Campbell, Chester Coomer, Cliff White and Larry Seiber</td>
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<td>Oak Ridge National Laboratory, USA</td>
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<td>S5-2 Design of a Zero-Voltage-Switching Large-Air-Gap Wireless Charger with Low Electrical Stress for Plug-In Hybrid Electric Vehicles</td>
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<td>Chen Duan, Chenguang Jiang, Allan Taylor and Kevin (Hua) Bai</td>
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<td>Kettering University, USA</td>
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<td>S5-3 Design Considerations for a Level-2 On-Board PEV Charger based on Interleaved Boost PFC and LLC Resonant Converters</td>
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<td>Haoyu Wang, Serkan Dusmez and Alireza Khaligh</td>
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<td>University of Maryland at College Park, USA</td>
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<td>S5-4 Genetic Algorithm Based Coil System Optimization for Wireless Power Charging of Electric Vehicles</td>
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<td>Puqi Ning, Omer Onar, and John Miller</td>
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<td>Oak Ridge National Laboratory, USA</td>
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<th>Technical Session 6: Power Electronics- II</th>
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<td>Session Chairs:</td>
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<td>Dr. Rashmi Prasad, Staff Research Engineer – General Motors R&amp;D Center</td>
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<td>Dr. Zhong Nie, Technical Specialist – Chrysler Group LLC</td>
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<td>Tuesday, June 18, 2013</td>
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<td>Venue: Regency G-H</td>
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<td>S6-1 Voltage Control of a Single Phase, Single-Stage, Isolated AC-DC Converter</td>
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<td>Nathan Weise and Nathan Reimensnyder</td>
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<td>University of Maine, USA</td>
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<td>S6-2 Efficiency Comparison of SiC and Si-Based Bidirectional DC-DC Converter</td>
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<td>Di Han, Jukkrit Noppakunkajorn and Bulent Sarlioglu</td>
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<td>University of Wisconsin-Madison, USA</td>
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<td>S6-3 A DSP-Based Zero Current and Discontinuous Conduction Mode Detection Method</td>
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<tr>
<td>Colin Clark¹, Wilson Eberle¹ and Fariborz Musavi¹</td>
</tr>
<tr>
<td>¹University of British Columbia, Canada, ¹Delta-Q Technologies Corp., Canada</td>
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<td>S6-4 Energy Efficiency and Fault Tolerance Comparison of DC/DC Converter Topologies for Fuel Cell Electric Vehicles</td>
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<td>Damien Guilbert, Arnaud Gaillard, Abdoul N'Diaye and Abdesslem Djerdir</td>
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<td>University of Technology of Belfort-Montbeliard, France</td>
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Panel 7: Rare Earth Free Magnet Material

Tuesday, June 18, 2013
2:00 PM – 3:20 PM
Venue: Regency C-D

Panel Moderator: Hossein Dadkhah, Manager, Traction Motors, Chrysler Group LLC

Panelists:
Dr. Yucong Wang, Manager of Material Technology Group, GM
V. Anand Sankaran, Executive Technical Leader and Chief Engineer, Ford
John Hayden, Senior Manager, Automotive Systems, Toshiba International Corporation
Dr. Andy Judge, Engineering Manager, ASML
Dr. Keith Klontz, President and CEO, Advanced Motor Tech
Steve Constantinides, Director of Technology, Arnold Magnetic technologies
Dr. Ayman El-Refaie, GE Global Research

Panel Summary: Rare earth elements are used in an ever-growing variety of applications that are the key to our modern technology. Rare-earth magnets are typically two to three times stronger than ferrite or ceramic permanent magnets. In electric motors, the use of rare-earth magnets enables greater performance to be obtained from a smaller, lighter motor. Efficiency and torque density of this type of motors are the highest. Clearly this has its attractions for electric vehicles, where a lighter, more efficient motor reduces the amount of stored energy that has to be transported in the form of petrol, hydrogen or batteries. For industrial applications, the benefits of rare-earth magnets typically relate to the higher performance available from a motor of the same size, or lighter motors for equipment that is in motion.

Rare earth elements are essential for a wide variety of defense technologies that are critical to national security. Global demand for rare earth materials is projected to grow, fueled in part by continued development and deployment of emerging energy technologies, and as a result, a global shortage of rare earths is anticipated in the near future. Although the United States has 13 percent of the world's reserves, nearly all rare earth materials used in the country are imported from China. In contrast, China has only 36 percent of the world’s rare earth reserves, yet accounts for more than 97 percent of global rare earth production. Furthermore, China has been reducing its export quotas in order to satisfy growing domestic demand, and is placing further emphasis on strengthening its vertically integrated supply chain in the rare earth industry by focusing on downstream rare earth products. Manufacturers of motors and products that incorporate motors, as well as government agencies, have started to take the view that this situation is unsustainable and that alternative technologies need to be developed. This panel is aimed at discussing some of these issues and the compromises made in incorporating rare earth free magnet materials.
Panel 8: On-board Chargers for PHEV/EV Application

Tuesday, June 18, 2013
2:00 PM – 3:20 PM
Venue: Regency E-F

Panel Moderator: Dr. Fariborz Musavi
Delta-Q Technologies Corp.

Panelists:
Dr. Wilson Eberle, University of British Columbia
Dr. Lateef A. Kajouke, Engineering Specialist, General Motors
Dr. Gui-Jia Su, Oak Ridge National Laboratory
Deepak S. Gautam, Delta-Q Technologies Corp.

Panel Summary: There are several circuit topology solutions and design concepts proposed for on-board PHEV/EV chargers. The aim of this panel is to further understand the requirements and explore the challenges for each proposed concept and to provide the audience with a possible practical solution for their on-board PHEV/EV chargers concepts selection. Some common questions of interests for discussion are (but not limited to):

- Single-stage vs. Two-stage topology.
- Isolated vs. Non-Isolated topology.
- On-board charging vs. off-board charging.
- Power level: 3.3kW vs. 6.6kW, and the implications on package size, volume, and cost.
- Efficiency.
- Requirement of an auxiliary LV 12V output.
- Cooling system (liquid or air): Is it possible to be flexible?
- Mechanical packaging challenges.
- Common dimension and interface panel.
- Regulatory requirements.
- Challenges in component cost, and final finished product cost.
- Devices, Si devices vs. wide band-gap devices.
- DC link capacitors – Film capacitor vs. AL Electrolytic capacitor.
- Warranty issues. How many years?
- AEC-Q100 and Q101 qualification.
- Manufacturing related challenges.
Panel 9: The Evolution of Heavy Duty Vehicle and Automotive Integrated Electronics Systems

Tuesday, June 18, 2013
4:20 PM – 5:40 PM
Venue: Regency C-D

Panel Moderator: Mark Zachos, President of DG Technologies

Panelists:
Mr. Danial Bartz, US Army TARDEC
Abel Carbonell, IDIADA Group
Dr. Massimo Osella, General Motors
Dr. Jeremy Daily, University of Tulsa
Truck OEM or DOT representative (invited)

Panel Summary: This panel will focus on evolution of integrated electronics systems for heavy-duty vehicles and contrast them with automotive passenger vehicle advanced electronics. The panel discussion topics include:
• The evolution of heavy duty hybrid vehicle and automotive integrated electronics systems.
• Intelligent vehicle safety systems and advanced driver assistance systems.
• Electronic control systems and industry regulations.
• Standards for diagnostics and communications.
• Electronic controls and system design, development and testing.
• Autonomous and semi-autonomous vehicle electronic control systems.
Panel 10: Aerospace Applications – More Electric Aircraft

Tuesday, June 18, 2013
4:20 PM – 5:40 PM

Venue: Regency E-F

Panel Moderator: Dr. Bulent Sarlioglu,
Assistant Professor and Associate Director of
WEMPEC, University of Wisconsin–Madison

Panelists:
Dr. Hassan Kojori, Honeywell
Brian Dyra, Woodward Inc.
Dr. Hao Huang, GE Aviation
Dr. Bulent Sarlioglu, University of Wisconsin-Madison

Panel Summary: We are witnessing a new beginning for the electrification of commercial aircraft. This electrification of aircraft is also called “More Electric Aircraft.” Recent commercial airplanes that went into the revenue flights are no longer using the constant frequency electrical bus in their electric power system. Rather, the electrical bus frequency proportionally changes as a function of engine speed. This change requires use of power electronic circuitries to convert variable frequency AC power to various AC and DC power types that are needed in the aircraft for different type of loads. Similarly, there is a trend to eliminate the pneumatic and hydraulic systems with electrically driven systems to achieve better reliability and cost advantages. This opens the door for more power conversion equipment using electrical power. Due to all these changes, aerospace is looking at achieving low-weight, low-volume, more-efficient, highly reliable power conversion systems and components. To achieve power quality, normal and transient performances are also very important design considerations that require an in-depth understanding of technologies used. This panel will present the panelists’ view of the More Electric Aircraft from the perspective of the generation, distribution, and utilization of electrical power. The panel will draw attendees from aerospace OEMs, suppliers (Tier 1 and Tier 2), and researchers from the field. Participants from EV/HV OEMs and suppliers will benefit from this panel by assessing the similarities and differences between aerospace and automotive industries.
Panel 11: IEVC Forum: Innovating The Transportation Landscape Via Advanced Vehicle-To-Infrastructure Connectivity

Tuesday, June 18, 2013
4:20 PM – 5:40 PM
Venue: Regency A-B

Panel Moderator: Joachim Taiber, CU-ICAR

Panelists:
Dale Hill, Founder of Proterra
Michael O’Halloran of CH2M-Hill
Marsden Burger, Principal Cabinentaxi LLC
John Bobbitt, CEO Exponent Design Works

Panel Summary: This forum will provide multiple perspectives on how electrified vehicles interact with power and communication infrastructure. The first presentation will demonstrate how an electrical bus can be charged rapidly via a conductive technology. Although this technology is proprietary, the panel will discuss how conductive and wireless charging method for electrical buses can be standardized. Another aspect the panel will refer to is the need to ensure continued funding into the aging US road infrastructure by other means that the gasoline tax. The State of Oregon developed a mileage-based road usage fee model and we will learn in the second presentation how it works by connecting the vehicle with data centers and what it means for owners of electrified vehicles. Personal rapid transit systems have been so far a niche solution in the transportation segment but with the mass-deployment of vehicle electrification and autonomous driving systems they might experience a revival. We will learn in presentation more how PRT systems work and how they interact with power and communication infrastructure. Last but not least the development of the connected vehicle is leading to a growing segment of applications the driver of a vehicle can choose from to support the vehicle operation. The mobile phone acts as a bridge between the vehicle and the communication infrastructure of telecommunication service providers. An example of such an “app” is explained in the final panel presentation.
Tutorial 2: Model Based System Engineering (MBSE): The Rise of the Machines?

Wednesday, June 19, 2013
8:30 AM – 12:00 Noon
Venue: Rolls Royce

Speakers: Aymeric Rousseau and Larry Michaels, Argonne National Laboratory

Tutorial Description: Building hardware is expensive. Traditional design paradigms in the automotive industry often delay control system design until late in the process — in some cases requiring several costly hardware iterations. To reduce costs and improve time to market, it is imperative that greater emphasis be placed on modeling and simulation. Model Based System Engineering (MBSE) approach is meant to increase productivity by maximizing compatibility between systems (via reuse of standardized models), simplifying the process of design (via models of recurring design patterns in the application domain), and promoting communication between individuals and teams working on the system (via a standardization of the terminology and the best practices used in the application domain). The discussion will focus on how Autonomie can be used to support MBSE and some of the remaining challenges. Autonomie is a Plug-and-Play Powertrain and Vehicle Model Architecture and Development Environment to support the rapid evaluation of new powertrain/propulsion technologies for improving fuel economy through virtual design and analysis in a math-based simulation environment. Autonomie is an open architecture to support the rapid integration and analysis of powertrain/propulsion systems and technologies for rapid technology sorting and evaluation of fuel economy improvement under dynamic/transient testing conditions.

Speakers Short Biographies: Aymeric Rousseau is the Manager of the Systems Modeling and Control Group at Argonne National Laboratory. After working for PSA Peugeot Citroen for several years in the Hybrid Electric Vehicle research department, he joined Argonne National Laboratory in 1999 where he is now responsible for the development of Autonomie. Autonomie has been developed in collaboration with General Motors to accelerate the development and introduction of advanced technologies through a Plug & Play architecture.

Larry Michaels is a Principal Vehicle Systems Engineer at Argonne National Laboratory, working on the development and application of Autonomie. Prior to joining Argonne, he was a Technical Fellow in GM Powertrain Engineering, responsible for the institutionalization of modeling and simulation in the Powertrain Control System development process. He also spent five years at The MathWorks, Inc. as Manager of Applications Engineering, and previously had been a Senior Member of the Technical Staff at the Princeton University Plasma Physics Laboratory analyzing and modeling the power supply equipment for experimental fusion reactors.
Panel 12: Role of Entrepreneurship in Transportation Electrification

Wednesday, June 19, 2013
8:30 AM – 9:50 AM
Venue: Desoto A

Panel Moderator: Kevin Taylor, IEEE SE Michigan Section

Panelists:
Mark Zachos, President of DG Technologies
Lee Stogner, IEEE-USA
Dr. Ali Emadi, Canada Excellence Research Chair in Hybrid Powertrain and Director of MacAUTO, McMaster University
Jill Sorensen, BEVI
Mark Zhu, DTE Energy Ventures, Inc.

Panel Summary: This Entrepreneurship panel will address business development issues and resources for start-up companies focused on emerging technologies in the transportation and energy sectors. Panelists representing the entrepreneur, resources to support entrepreneurs and investors in transportation and energy start-ups will share their perspectives on driving innovation management and commercialization success. In addition, the panel will explore the role of entrepreneurship in advancing this transition both through entrepreneurship and intrepreneurship. Furthermore, the panel will focus on the importance of advancing innovation in the dynamic field of transportation electrification, and the opportunities possible from a range of perspectives.
Panel 13: Energy Storage Systems for Hybrid and Electric Vehicles

Wednesday, June 19, 2013
10:40 AM – 12:00 PM
Venue: Desoto A

Panel Moderator: Dr. Dennis Arthur Corrigan, Wayne State University

Panelists:
J.T. Guerin, Engineering Specialist, General Motors
Alvaro Masias, Research Engineer, Ford Motor Company
Dr. Adam Timmons, Technical Specialist, Chrysler LLC
Martin Klein, Engineering Director, LG Chem Power
Carlton Brown, Director of Engineering, Robert Bosch Battery Systems LLC

Panel Summary: This panel will provide a perspective on the status of energy storage systems for hybrid and electric vehicles. What are the key issues today? What battery technologies will predominate going forward? Will lithium-ion batteries dominate HEV applications, or will there be continued opportunities for nickel-metal hydride batteries? What fundamental battery and systems improvements will be needed for widespread introduction of power-assist hybrid vehicles? What are the opportunities for advanced lead-acid batteries and supercapacitors for stop-start micro hybrids? What are the opportunities and technical barriers for high-energy lithium-air and lithium-sulfur batteries for battery electric vehicles? What is the capability of the US R&D community and battery industry to provide technology and products needed for widespread commercialization of electric drive vehicles?
Panel 14: Transportation Electrification Standards Roundtable

Wednesday, June 19, 2013
10:40 AM – 12:00 PM
Venue: Pierce Arrow

Panel Moderator: Paul Bishop, P.E. President & Chief Engineer, The Bishop Group

Panelists:
Lee Stogner, IEEE-USA
Theodore Bohn, Argonne National Laboratory
Richard Scholer, Chrysler LLC
Paul Bishop, P.E. President & Chief Engineer, The Bishop Group

Panel Summary: Electrification as used here addresses the transfer and use of electric power in lieu of mechanical, hydraulic, pneumatic, internal combustion or other means. Electrification is surging in all areas of society. The impact of electrification on society will be at least as great as the personal computer. Most “civilians” will not directly see the applications but instead will benefit greatly in numerous untold ways. Our discussion will focus on transportation especially automotive vehicles. Transfer and use of electrical power and energy in transportation is burgeoning. As the advantages become recognized, the result is an ever-growing list of transportation applications. Operating in a global environment drives standardization on a global scale. This panel will use a roundtable format in an attempt to address standardization issues as viewed from different perspectives. Included will be representatives from industry and standards development organizations. The roundtable format is intended to provoke active participation and discussion among panel members and the audience.
### Technical Session 7: Motor Drives

**Session Chairs:**
Dr. Bin Wu, Manager – Mercedes Benz R&D  
Dr. Young-Joo Lee, Technical Specialist – Chrysler Group LLC

**Wednesday, June 19, 2013**  
8:30 AM – 10:10 AM  
**Venue:** Stearns Knight

#### S7-1 Model Reference Adaptive System-Based Speed Estimators for Sensorless Control of Interior Permanent Magnet Synchronous Machines
Yue Zhao¹, Wei Qiao¹ and Long Wu²  
¹University of Nebraska-Lincoln, USA, ²John Deere Electronic Solutions, USA

#### S7-2 Loss Modeling and Comparison of VSI and RB-IGBT based CSI in Traction Drive Applications
Gui-Jia Su and Puqi Ning  
Oak Ridge National Laboratory, USA

#### S7-3 Electric Motor Control for Hybrid Electric Vehicles based on Different Driving Cycles
Yi Hou¹, Alexandre Ravey², David Bouquain², Fei Gao³, Abdellatif Mirouai² and Weiguo Liu¹  
¹Northwestern Polytechnical University, China, ²University of Technology of Belfort-Montbeliard, France

#### S7-4 Hybrid Model-Based/Data-Based Inter-Turn Fault Detection Methods for PM Drives with Manufacturing Faults
Nicolas Leboeuf¹, Thierry Boileau¹, Babak Nahid-Mobarakeh¹, Noureddine Takorabet¹, Farid Meibody-Tabar¹ and Guy Clerc²  
¹University of Lorraine, France, ²Lyon 1 University, France

#### S7-5 A Novel Design of Electric Tire Concept Incorporating Permanent Magnet Linear Generators Arrangement
Anas Labak, Gholam-Abbas Nazri and Narayan Kar  
University of Windsor, Canada

### Technical Session 8: Energy Storage- II

**Session Chairs:**
Anand Sankaran, Executive Technical Leader & Chief Engineer – Ford Motor Company  
Dr. Hong H. Yang, Manager – Chrysler Group LLC

**Wednesday, June 19, 2013**  
8:30 AM – 10:10 AM  
**Venue:** Pierce Arrow

#### S8-1 Enhanced Battery/Ultracapacitor Hybrid Energy Storage System and Split Powertrain for Next Generation Performance Vehicles
Steven Rogers², Andrew Saul¹, Serkan Dusmez² and Alireza Khaligh²  
¹Genovation Cars Inc., USA, ²University of Maryland at College Park, USA

#### S8-2 High Temperature - High Energy Density Polymer-Coated Glass Capacitors
Mohan Prasad Manoharan¹, Michael Lanagan¹, Shihai Zhang², Douglas Kushner², Chen Zou² and Takashi Murata³  
¹Pennsylvania State University, USA, ²Strategic Polymer Sciences, USA, ³Nippon Electric Glass, Japan

#### S8-3 Optimal Sizing of the Energy Storage System (ESS) in a Battery-Electric Vehicle
Amir Ostadi¹, Mehrdad Kazerani¹ and Shih-Ken Chen²  
¹University of Waterloo, Canada, ²General Motors, USA

#### S8-4 Characterization of a Commercial Automotive Lithium Ion Battery using Kalman Filter
Moemen Daboussy, Daniela Chrenko, El-Hassane Aglizim, Zul Hilmi Che Daud and Luis Le Moyne  
University of Burgundy, France

#### S8-5 Online State of Charge and Electrical Impedance Estimation for Multicell Lithium-Ion Batteries
Taesic Kim, Wei Qiao and Liyan Qu  
University of Nebraska-Lincoln, USA
**Wednesday, June 19, 2013**

**Morning Breakout Sessions**

**Technical Session 9: Transportation- II**

*Session Chairs:*
Michael Runyon, Manager – Chrysler Group LLC
Sheldon Williamson – Concordia University

*Wednesday, June 19, 2013*

**10:40 AM – 12:00 PM**

*Venue: Stearns Knight*

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<th>S9-1</th>
<th><strong>Component Improvements in the Electrification of Passenger Vehicles Drivetrains</strong></th>
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<td>Thomas Devloo, Niels Leemput, Juan Van Roy, Frederik Geth, and Johan Driesen</td>
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<td></td>
<td><em>University of Leuven (KU Leuven), Belgium</em></td>
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<th><strong>A New Parallel-Series Configuration for Hybridization of a Line-Haul Truck</strong></th>
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<td>Fereydoon Diba and Ebrahim Esmailzadeh</td>
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<td><em>University of Ontario Institute of Technology, Canada</em></td>
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<th><strong>Frequency Demodulation-Aided Condition Monitoring for Drivetrain Gearboxes</strong></th>
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<td>Dingguo Lu and Wei Qiao</td>
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<td><em>University of Nebraska-Lincoln, USA</em></td>
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<th><strong>Plug-In Vehicle to Home (V2H) Duration and Power Output Capability</strong></th>
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<td>David Tuttle, Robert Fares, Michael Webber and Ross Baldick</td>
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<td><em>University of Texas at Austin, USA</em></td>
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Babak Fahimi, University of Texas at Dallas
Silva Hiti, General Motors
Phil Krein, University of Illinois at Urbana-Champaign
John M. Miller, Oak Ridge National Laboratory
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Kaushik Rajashekara, University of Texas at Dallas
John Shen, Illinois Institute of Technology
Peter Steimer, ABB Switzerland Ltd.
Call For Papers

IEEE Journal of Emerging and Selected Topics in Power Electronics
Special Issue on Transportation Electrification, 2014

This Special Issue is focused on components, sub-systems, systems, and grid interface technologies related to power and energy conversion for all types of electrified vehicles including electric vehicles, hybrid electric vehicles, and plug-in hybrid electric vehicles as well as heavy-duty, rail, and off-road vehicles and airplanes and ships. Prospective authors are invited to submit original contributions or survey papers for review for publication in this Special Issue. Enhanced papers accepted for presentations at ITEC, APEC, and ECCE are welcome. Topics of interest include (but are not limited to):

• Hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs)
• Electric vehicles (EVs) and range-extended EVs
• Hybrid and electric powertrains and powertrain components
• Vehicular power electronics and motor drives
• Electric machines and actuators in vehicles and transportation systems
• Propulsion systems and Electronic control units
• On-board and off-board chargers, fast chargers, opportunity chargers, and Inductive charging
• Vehicle-to-grid (V2G) interface and grid interface technologies
• Energy storage systems; battery management systems
• Electrification of heavy-duty and off-road vehicles
• Electrification of trains and rail vehicles
• Applications of fuel cells in transportation
• Electrical systems and components for sea, undersea, air, and space vehicles
• Environmental impacts and source-to-wheel analysis

All manuscripts must be submitted through Manuscript Central at http://mc.manuscriptcentral.com/jestpe-ieee.

Submissions must be clearly marked “Special Issue on Transportation Electrification, 2014” on the cover page. When uploading your paper, please also select the “Special Issue on Transportation Electrification, 2014.”

Guest Editor-in-Chief: Ali Emadi, McMaster University, Canada (emadi@mcmaster.ca)

Proposed Timeline:
April 15, 2013 – Call for Papers to IEEE JESTPE Editorial Office
October 1, 2013 – Manuscripts Submission Deadline
March 1, 2014 – Final Acceptance Notification
May 1, 2014 – Manuscripts Forwarded to IEEE for Publication
June 1, 2014 – Special Issue Appears in IEEE JESTPE
2014 ITEC: Call for Papers

June 15-18, 2014
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.
2014 ITEC: Call for Papers

June 15-18, 2014
Dearborn, Michigan, USA
http://itec-conf.com/

Key Dates

Deadline for submission of paper proposals (abstracts/digests): November 15, 2013
Author’s notification of acceptance: February 7, 2014
Deadline for submission of final camera-ready manuscripts: April 4, 2014
Deadline for early registration: April 4, 2014

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: Mahesh Krishnamurthy, Illinois Institute of Technology
General Co-Chair: Silva Hitl, General Motors
Program Chair: Anand Sathyan, Chrysler Group LLC
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
A dedicated booking website has been created for ITEC’13 so ITEC attendees will be able to 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://www.adobadearborn.com/

ITEC’s negotiated Group Rate is:
Single/Double - $135.00

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 Saturday, May 25, 2013 at 8:00 PM (U.S. Eastern) time, on a first come, first served basis.

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