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

Final Program

2012 IEEE Transportation Electrification Conference and Expo (ITEC'12)

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

June 17-20, 2012

Hyatt Regency Dearborn
Dearborn, Michigan, USA

ITEC2012

ITEC Sponsors: IEEE | pels IEEE Power Electronics Society Powering a Sustainable Future | IAS IEEE Industry Applications Society | IEEE PES Power & Energy Society®

Welcome Message from General Chair

It is with great pleasure that I welcome you to the inaugural IEEE Transportation Electrification Conference and Expo (ITEC'12). We have established ITEC as a global brand to lead a major initiative within IEEE on transportation electrification. ITEC's definition of transportation electrification is comprehensive and includes electrification of both propulsion and non-propulsion systems. Electrified vehicles include more electric vehicles (MEVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and electric vehicles (EVs). Electrification level, defined as the percentage of the vehicle's electric power to its total power, varies from less than 10% in MEVs to 100% in EVs. ITEC is at the intersection of all types of electrified transportation from land vehicles including heavy-duty, rail, and off-road vehicles, to airplanes and ships. It is a unique conference and exhibition focused on what industry and their customers need and desire. It has an educational boot camp and a comprehensive tutorials and papers section with active industry interest and participation. In addition, ITEC has a large industry exhibition focused on components, subsystems, and systems for all types of electrified vehicles and transportation systems (land, sea, air, and space).

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 three parallel short courses offered by internationally renowned industry experts. In addition, we have an all-star group of keynote presenters 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.

The Steering Committee and Organizing Committee of ITEC—with active participation of over 80 individuals mostly from the industry—have been working exceptionally hard to organize 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 are enthusiastically looking forward to meeting you at ITEC 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.

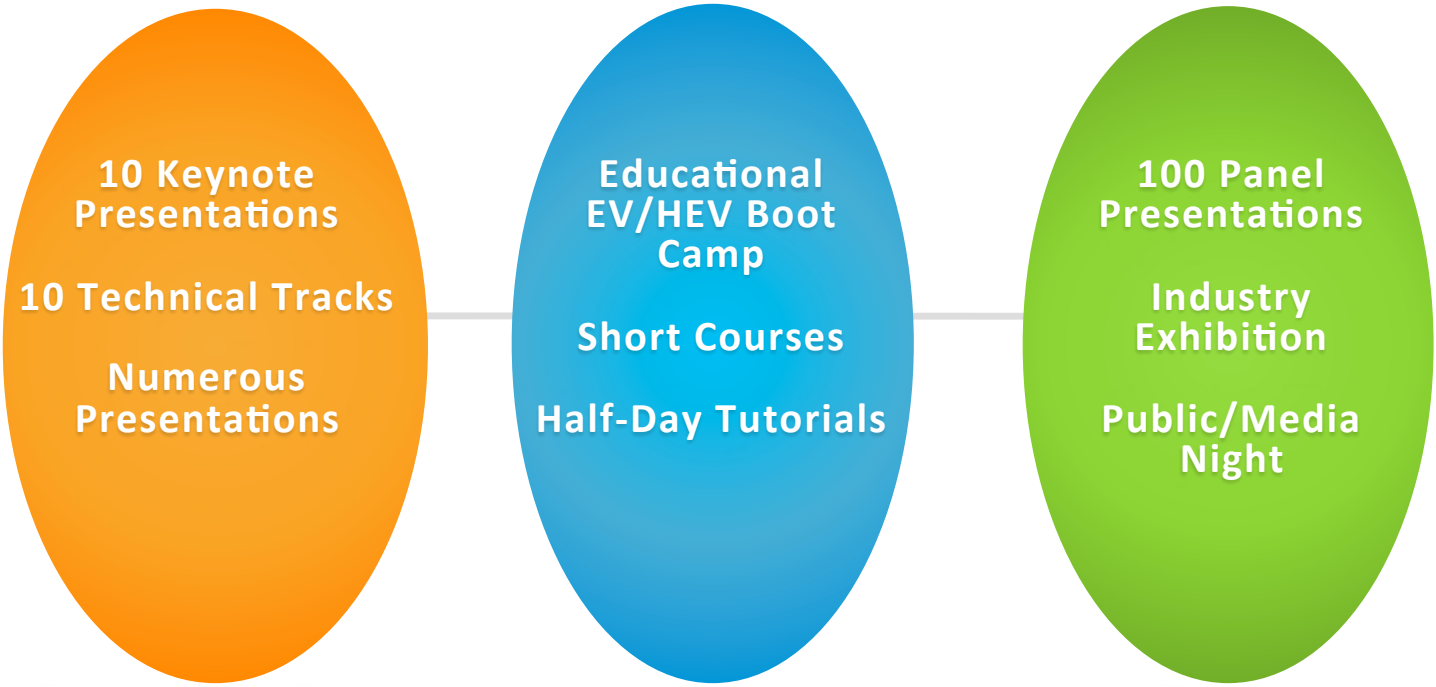
Warmest Regards,

A. Emadi

Ali Emadi
General Chair, ITEC'12

You will experience…

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



We have features for every step of the way…

KEYNOTE PRESENTATIONS

IT'S ABOUT THE KNOWLEDGE SHARED...

Pete Savagian
Engineering Director, Electrification Architecture and Electric Motors
GENERAL MOTORS

Rik De Doncker
Professor and Director ISEA
RWTH AACHEN UNIVERSITY, GERMANY

Lee Slezak
Vehicle Systems Manager, Vehicle Technologies Program
DEPARTMENT OF ENERGY

John Oenick
Power Electronics Director
JOHN DEERE

Subhash Dhar
Founder, Chairman and CEO
ENERGY POWER SYSTEMS

Chuck Gray
Chief Engineer, Core Electrification Engineering
FORD MOTOR COMPANY

Stephen R. Clarke
Chairman and CEO
APPLIED INTELLECTUAL CAPITAL

Dimitri Kazarinoff
President
AVL POWERTRAIN INC.

Vincent G. Dow
Vice President, Distribution Operations
DETROIT EDISON

Leo Casey
EVP of Engineering and CTO
SATCON CORPORATION

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 either 100 minutes or 80 minutes in duration and are scheduled in the afternoons of Monday (June 18, 2012) and Tuesday (June 19, 2012) as well as morning of Wednesday (June 20, 2012).

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
Rare Earth Magnet Alternatives for Electric Motors

Panel 2
Wide-Bandgap Devices in Automotive Power Electronics

Panel 3
Repurposed EV/PHEV Battery Packs

Panel 4
DC Link Film Capacitors for Hybrid and Electric Vehicles

Panel 5
Electrical Infrastructure Issues in PHEV/Grid Integration

Panel 6
Standards

Panel 7
Battery, Battery Management and Infrastructure Issues For Advanced Electrified Vehicles

Panel 8
Aerospace Applications – More Electric Aircraft

Panel 9
Fast Chargers / Smart Grid and Communication Protocols

Panel 10
Battery Management Systems

Panel 11
More Electric Aircraft: Power Management and Stability Issues

Panel 12
On-Board Battery Chargers: Expectations and Challenges

Panels 13 & 14
University Capabilities in Transportation Electrification

Panels 15
Commercial Fleet Technologies: Best Practices

ITEC'12 Organizing Committee

Honorary Chair
Deepak Divan, Georgia Institute of Technology

General Chair
Ali Emadi, McMaster University

General Co-Chair
Mark Zachos, Dearborn Group Technology

Program Chair
Babak Fahimi, University of Texas at Dallas

Program Co-Chair
Alireza Khaligh, University of Maryland at College Park

Assistant Program Chair
Mahesh Krishnamurthy, Illinois Institute of Technology

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

Registration Chair
Anand Sathyan, Chrysler LLC

Publications Chair
Kaushik Rajashekara, Rolls-Royce Corp.

Awards Chair
John Shen, University of Central Florida

Education Chair
Marshall Molen, Mississippi State University

Technical Chair for Electric Machines
Hossein Dadkhah, Chrysler LLC

IEEE Southeastern Michigan Section Liaison Chair
Kevin Taylor

Automotive Industry Liaison Co-Chairs
Michael Degner, Ford
Hong Yang, Chrysler

Commercial Vehicle Industry Liaison Chair
William Batten

Rail Vehicle Industry Liaison Chair
Tim Richter, GE Global Research

Off-Road Vehicle Industry Liaison Co-Chairs
Nader Nasr, Oshkosh Corporation
Haidong Yu, John Deere

Aerospace Industry Liaison Co-Chairs
Waleed Said, Hamilton Sundstrand
Kamiar Karimi, The Boeing Company
Nick Nagel, Triumph Aerospace
Sayeed Mir, Eaton Aerospace

Battery Industry Liaison Co-Chairs
Said Al-Hallaj, All Cell Technologies
Jian Cao, CODA Automotive

Technical Track Chairs and Co-Chairs

Track 1: Power Electronics and Electric Motor Drives
Chair: Burak Ozpineci, Oak Ridge National Laboratory
Co-Chair: Zhong Nie, Chrysler LLC
Co-Chair: Long Wu, John Deere

Track 2: Electric Machines and Actuators
Chair: Narayan C. Kar, University of Windsor
Co-Chair: Leila Parsa, Rensselaer Polytechnic Institute
Co-Chair: Taehyung Kim, University of Michigan-Dearborn

Track 3: Battery and Battery Management
Chair: Francisco Perez-Pinal, Mohawk College
Co-Chair: Morgan Kiani, Texas Christian University

Track 4: Electric, Hybrid Electric, and Plug-in Hybrid Electric Vehicle System Architectures
Chair: Sheldon Willimason, Concordia University
Co-Chair: Anand Sathyan, Chrysler LLC
Co-Chair: Prasad Atluri, GM R&D Center

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

Track 6: Electrification of Heavy-Duty and Off-Road Vehicles
Chair: Jin Wang, Ohio State University
Co-Chair: Haidong Yu, John Deere

Track 7: Fuel Cells and Applications in Transportation
Chair: Benjamin Blunier, University of Technology of Belfort-Montbéliard
Co-Chair: Omer C. Onar, Oak Ridge National Laboratory

Track 8: Electrical Systems and Components for Sea, Undersea, Air, and Space Vehicles
Chair: Chris Edrington, Florida State University
Co-Chair: Bulent Sarlioglu, University of Wisconsin-Madison

Track 9: Modeling, Simulation, and Control
Chair: Ali Davoudi, University of Texas at Arlington
Co-Chair: Ilse Cervantes, Institute for Scientific and Technological Research of San Luis Potosi

Track 10: Standards, Policies, and Regulations for Transportation Electrification
Chair: Sanjaka G. Wirasingha, Chrysler LLC

ITEC Steering Committee

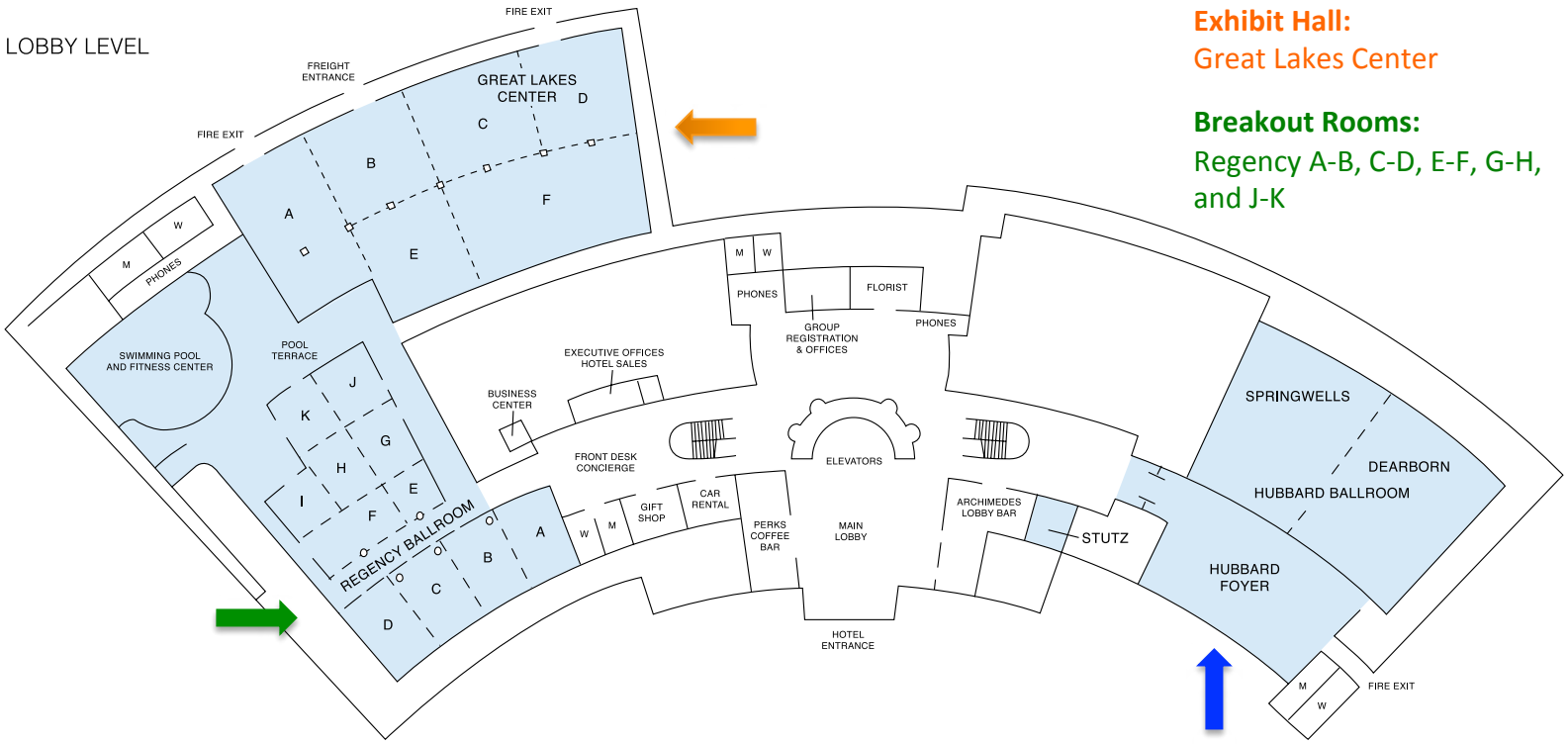
Bogdan Borowy, Satcon Technology Corporation
Rik DeDoncker, RWTH Aachen University
Deepak Divan, Georgia Institute of Technology
Ali Emadi (Chair), McMaster University
Babak Fahimi, University of Texas at Dallas
Silva Hiti, General Motors
Phil Krein, University of Illinois at Urbana-Champaign
John M. Miller, Oak Ridge National Laboratory
Jim Nagashima, Nagashima Advanced Technology Consulting
Kaushik Rajashekara, Rolls-Royce Corporation
John Shen, University of Central Florida
Peter Steimer, ABB Switzerland Ltd.

Meeting Room Floor Plan

Plenary Sessions:
Grand (Hubbard) Ballroom

Exhibit Hall:
Great Lakes Center

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



Program-at-a-Glance

	7:30AM-8:30AM	8:30AM-10:10AM	10:10AM-10:40AM	10:40AM-12:00PM	12:00PM-2:00PM	2:00PM-3:40PM	3:40PM-4:10PM	4:10PM-5:30PM	5:30PM-7:30PM
Sunday June 17, 2012	Conference Registration Open	Educational EV/HEV Boot Camp	Coffee Break	Educational EV/HEV Boot Camp	Lunch (on own)	Educational EV/HEV Boot Camp	Coffee Break	Educational EV/HEV Boot Camp	
Monday June 18, 2012		Plenary Session 1		Plenary Session 1	Poster Session 1 Exhibit Hall Buffet Lunch	Tutorial 1 Session 1 Panel 1 Panel 2 Panel 3		Tutorial 1 Session 2 Panel 4 Panel 5 Panel 6	Public/ Media Night in Exhibit Hall
Tuesday June 19, 2012		Plenary Session 2		Plenary Session 2	Poster Session 2 Exhibit Hall Buffet Lunch	Tutorial 2 Session 3 Panel 7 Panel 8 Panel 9		Tutorial 2 Session 4 Panel 10 Panel 11 Panel 12	Conference Social Event in Exhibit Hall
Wednesday June 20, 2012		Tutorial 3 Session 5 Panel 13		Tutorial 3 Session 6 Panel 14 Panel 15					

Exhibit Hall Open:
Monday, June 18th, 12:00 Noon – 7:30 PM
Tuesday, June 19th, 12:00 Noon – 7:30 PM

Sunday, June 17, 2012

Educational EV/HEV Boot Camp

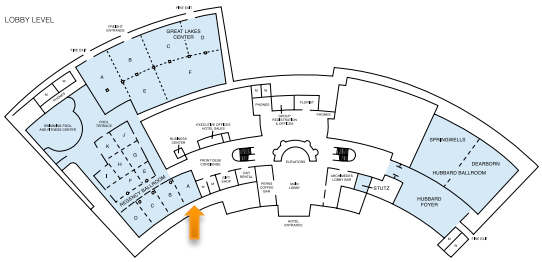
ITEC's Educational EV/HEV Boot Camp includes three parallel short courses (two day-long and one half-day), which are scheduled for Sunday, June 17, 2012. These short courses are offered by industry leaders and are suitable for industry managers and engineers as well as researchers and students. The morning 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 3:40 PM until 4:10 PM.

Short Course 1: Fundamentals of Hybrid Electric Powertrains

Sunday, June 17, 2012

8:30 AM – 12:00 Noon and 2:00 PM – 5:30 PM

Venue: Regency A-B



Instructor: Mengyang Zhang, Chrysler Group LLC

Short Course Description: This short course provides fundamental understanding of modern hybrid electric vehicles from powertrain perspective. It covers fundamental aspects of modern hybrid electric powertrains, from characteristics of subsystems to vehicle level requirements pertaining to powertrains. The technical details about HEV vehicle performance, drivability, fuel economy, emission standards and OBD compliance are elaborated. HEV operating strategies and controls are explained in the light of meeting powertrain requirements. Examples from some of popular HEV models are used to explain the current state of art of HEV powertrains. Potentials and challenges of PHEV and EREV are also discussed.

Instructor Biography: Mengyang Zhang is a Senior Technical Specialist with Chrysler Electrified Propulsion Systems, in areas of powertrain controls and calibrations. He is also responsible for Advanced Technology and Benchmarking for Chrysler Electrified Propulsion Systems. His recent HEV experience includes launching 2009 Chrysler Aspen/Durango HEV, developing Ram pick-up PHEV for DOE/Chrysler funded PHEV demonstration fleet, and developing advanced vehicle controls for Chrysler electrified vehicles. Mengyang has over 16 years in research and development of automotive products including advanced powertrain, electric drive systems, and chassis systems.

Sunday, June 17, 2012

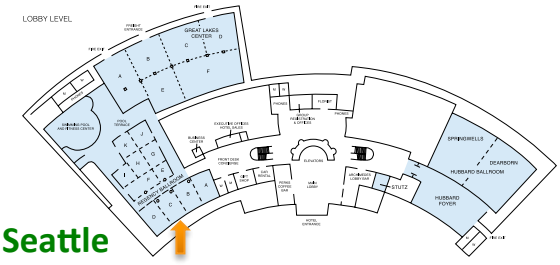
Educational EV/HEV Boot Camp

Short Course 2: Fundamentals of Electric Machines and Drives

Sunday, June 17, 2012

8:30 AM – 12:00 Noon and 2:00 PM – 5:30 PM

Venue: Regency C-D



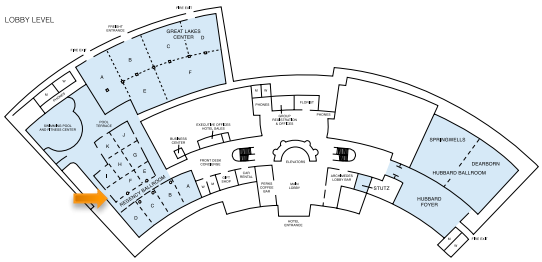
Instructor: Dr. Nicholas J. Nagel, Triumph Aerospace Systems – Seattle

Short Course Description: Electric machines and drives are the backbone of hybrid electric and electric vehicles. This short course will provide an overview of electric machines and drives. The course will be broken up into two parts. Part one will cover the fundamentals of electric machines. We will discuss the physics of machines and modeling techniques to simulate machine behavior. The course will cover permanent magnet AC (PMAC), AC induction, and switched reluctance (SR) machines. Section two will cover the basics of machine drives and inverter control. An overview of four-quadrant torque control for each of the machine types will be presented.

Instructor Biography: Nicholas J. Nagel received a B.S. degree in mechanical engineering from the University of Illinois – Champaign/Urbana in 1989. He received the M.S. degrees in mechanical and electrical and computer engineering and Ph.D. degree in mechanical engineering from the University of Wisconsin – Madison in 1995, 1996, and 1998, respectively, with a focus in control of electric machinery. His Ph.D. thesis was on modeling and control of switched reluctance machines. He is currently employed at Triumph Aerospace systems – Seattle, Washington, where his research is focused on high performance motion and motor control for aerospace applications. His interests include electric machines, machine drives, control systems, power electronics, and electro-mechanics.

Sunday, June 17, 2012

Educational EV/HEV Boot Camp



Short Course 3: Introduction to Power Electronics

Sunday, June 17, 2012
2:00 PM – 5:30 PM
Venue: Regency E-F

Instructor: Dr. Michael Schutten, General Electric Global Research Center

Short Course Description: This short course is a comprehensive introduction to power electronics and development of power converters. Power electronics is a discipline that requires knowledge of semiconductor devices, control theory, magnetics, switching theory, packaging, heat flow, and electromagnetic interference. The purpose of this course is to provide the knowledge to understand the operation and design principles for switch-mode power supplies (SMPS). The presentation initially discusses examples of switching power electronics, and the types of electronic components used in construction and development of a SMPS. An overview of the different type of semiconductor power switches is presented, with a discussion of the advantages and disadvantages of the different switches. A brief overview of new silicon carbide and gallium nitride power devices will be presented. The seminar then discuses the types of capacitive and magnetic devices used in the construction of power electronic systems. Fundamental pulse-width modulation (PWM) methods are presented and shown how PWM is used for regulation. Several different classes of converter topologies (e.g. buck, boost, etc.) are used to demonstrate different applications of power electronics. SPICE circuit examples are presented throughout the seminar to help provide a practical understanding of how to analyze and evaluate the operation of different classes of SMPS. This introductory power electronics course assumes that the student has basic knowledge of circuit theory, calculus, and Fourier transforms.

Instructor Biography: Dr. Schutten received his Ph.D. and Masters degrees in Electric Power Engineering from Rensselaer Polytechnic Institute, and his M.S.E.E and B.S.E.E. from Marquette University. From 1983 to 1987 he worked for General Electric Medical Systems where he developed high frequency X-ray and CT generators. For the last 25 years he has been a member of the technical staff at General Electric Global Research Center in upstate New York. He has developed several key technologies for hard-switched and resonant power converters including advanced small-signal models for the phase-shifted PWM converter, ripple cancellation circuits, and advanced electromagnetic interference solutions. Mike has successfully led programs for multiple high density, low noise power converters for consumer, industrial and military applications. His areas of expertise include power electronics, electromagnetic interference, nonlinear control theory, and analog electronics. Mike has 26 issued patents, with several additional pending. He has taught multiple short courses at universities, government laboratories, and at seven IEEE conferences. Mike has authored several conference and transactions papers.

Monday, June 18, 2012
Keynote Presentations

Plenary Session 1
Monday, June 18, 2012
8:30 AM – 12:00 Noon
Venue: Grand (Hubbard) Ballroom

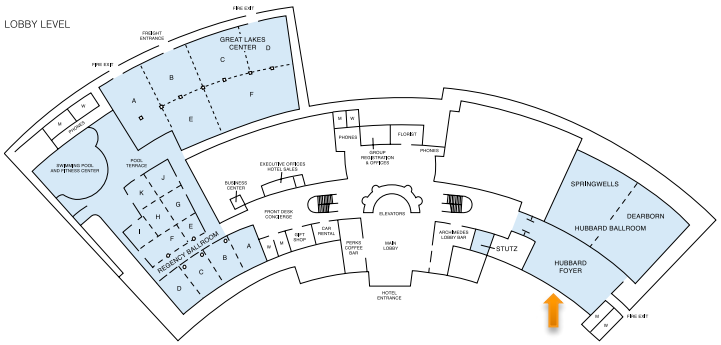
Chair: Dr. Deepak Divan, Georgia Institute of Technology
Co-Chair: Dr. Silva Hiti, General Motors

Welcome and Introduction
8:30 AM – 8:35 AM
Dr. Ali Emadi, General Chair, 2012 IEEE Transportation Electrification Conference and Expo

Keynote Presentation 1: Driving with Electric Grid Energy in the Real World
8:35 AM – 9:10 AM

Speaker: Pete Savagian, Engineering Director, Electrification Architecture and Electric Motors, General Motors

Short Biography: Pete serves as Engineering Director of GM's Electrification Architecture and Electric Motor Release Center. For the past 12 years, in various roles, he has managed product development and advanced engineering for GM's hybrid systems, including hybrid architecture development, electric drive component development, systems engineering, systems analysis, and control algorithm development. Pete has worked on electric vehicle systems since 1990. Prior to his current assignment, Pete was Chief Engineer for GM's EV1 Electric Vehicle Drive Unit and Power Electronics at General Motors and at Delco Electronics. In the past, he has worked at Hughes Aircraft Company and Sundstrand Aviation in various engineering roles. Pete holds a BS in Mechanical Engineering from the University of Wisconsin, a MS in Operations Research Engineering from the University of Southern California, and an MBA from Duke University.



Monday, June 18, 2012

Keynote Presentations

Keynote Presentation 2: Vision, Implementation and System Integration Potentials of Next Generation of Electric Vehicles

9:10 AM – 9:45 AM

Speaker: Dr. Rik W. De Doncker, Director ISEA, RWTH Aachen University, Germany

Short Biography: Rik W. De Doncker (IEEE M'87-SM'99-F'01) received his Ph.D. degree (*summa cum laude*) in electrical engineering from the Katholieke Universiteit Leuven, Leuven, Belgium in 1986. In 1987, he was appointed a Visiting Associate Professor at the University of Wisconsin, Madison, where he lectured and conducted research on high-performance induction motor drives and soft-switching converters. During his stay at UW, he invented the dual active bridge DC-to-DC converter for the NASA space station, which resulted in a WARF patent. In 1988, he was a General Electric Company Fellow in the microelectronic center, IMEC, Leuven, Belgium. In December 1988, he joined the General Electric Company Corporate Research and Development Center, Schenectady, NY, where he led research on drives and high-power soft-switching converters, ranging from 100 kW to 4 MW, for aerospace, industrial, and traction applications. In November 1994, he joined Silicon Power Corporation (formerly GE-SPCO) as Vice President, Technology. He worked on high-power converter systems and MTO devices and was responsible for the development and production of a 15-kV medium-voltage thyristor based transfer switch. Since October 1996, he has been a professor at Aachen University of Technology, Aachen, Germany, where he leads the Institute for Power Electronics and Electrical Drives. In Oct. 2006 he was also appointed director of the E.ON Energy Research Center at RWTH Aachen University, where he leads the Institute for Power Generation and Storage Systems. He has published over 180 technical papers and is holder of 25 patents, with several pending. Currently, Dr. De Doncker is member of the Board of the German engineering Society VDE-ETG. He is an IEEE Fellow and is currently past president of the IEEE Power Electronics Society (PELS). He is member of the EPE Executive Council. He was founding Chairman of the German IEEE IAS-PELS Joint Chapter. Dr. De Doncker is recipient of the IAS Outstanding Achievements Award and the IEEE Power Engineering Custom Power Award (2008). In 2009, he led a VDE/ETG Task Force on Electric Vehicles. In 2010, he became member of the German National Platform for Electromobility.

Keynote Presentation 3: Transition to Electric Drive, the Federal Perspective

9:45 AM – 10:20 AM

Speaker: Lee Slezak, Vehicle Systems Manager, Vehicle Technologies Program, Department of Energy

Short Biography: Lee manages the Vehicle Systems Activities within the Department of Energy's Vehicle Technologies Program. His responsibilities include modeling and simulation activities, component and vehicle laboratory and field evaluations, electric drive vehicle codes and standards, and vehicle systems optimization activities. In addition, Lee manages the $400 million American Recovery and Reinvestment Act program for Transportation Electrification. Lee has been at the Department of Energy for over 17 years and previously managed the Federal Fleet AFV Program and the National Alternative Fuels Data Center. Lee has worked on advanced vehicle initiatives for the past 20 years.

Coffee Break

10:20 AM – 10:45 AM

Monday, June 18, 2012

Keynote Presentations

IEEE PELS Welcome

10:45 AM – 10:50 AM

Dr. Dushan Boroyevich, President, IEEE Power Electronics Society

Keynote Presentation 4: The Challenges of Developing Electric Traction Drives For Medium and Heavy Duty Commercial Vehicles

10:50 AM – 11:25 AM

Speaker: John Oenick, Director of Power Electronics for Phoenix International – A John Deere Company

Short Biography: John N. Oenick is the Director of Power Electronics for Phoenix International, a John Deere Company. He has 25 years of experience in vehicle powertrain and hybrid drive development. Mr. Oenick joined John Deere in 2001 while completing his MBA at the Kellogg School of Management, Northwestern University. Since joining John Deere, he has focused on commercialization of new technologies. For the past four years, Mr. Oenick has managed the growth of Phoenix International's Power Electronics business. Phoenix International develops fully integrated power electronic solutions for John Deere platforms and markets standard power inverters to dozens of non-Deere original equipment manufacturers in the heavy duty vehicle industries. Phoenix power inverters are deployed on John Deere's 644 and 944 construction vehicle platforms launched during Con-Expo 2011. Mr. Oenick is a member of the Executive Committee for the Electric Drives Transportation Association Board of Directors.

Keynote Presentation 5: The Pivotal Role of Stored Energy Power in Achieving Vehicle Fuel Economy Standards

11:25 AM – 12:00 Noon

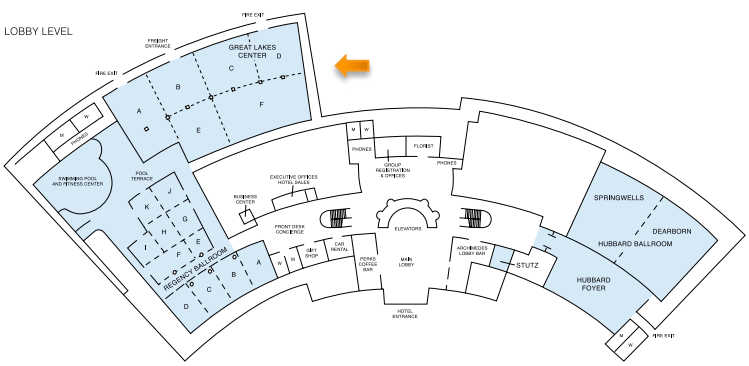
Speaker: Subhash Dhar, Founder, Chairman and CEO, Energy Power Systems

Short Biography: Mr. Dhar is the Founder, Chairman and CEO of Energy Power Systems, a company engaged in commercial development of low cost, high power stored energy solutions for enhanced fuel efficiency for automotive industry and overall energy efficiency in smart grid applications. Mr. Dhar is a 30 year veteran of bringing new technologies and products to automotive industry and emerging markets with extensive experience in operations, strategic planning and new market development on a global basis. Mr. Dhar was President of ECD-Ovonic Battery Company during 1982 through 2003, where he developed and commercialized Nickel Metal hydride battery for consumer applications and today's hybrid electric vehicles on a global basis including setting up business alliances and manufacturing operations in Japan, China, Europe and the US. Mr. Dhar has also served as Vice-Chairman of EnerDel and President of its parent Ener1 Inc. He also served as the CEO of Eletra Hybrid Bus, a company based in Brazil. Mr. Dhar has also been involved in many aspects of alternative and advanced technology including hydrogen generation, hydrogen storage and Fuel Cells. Mr. Dhar is a co-inventor of over 30 US patents and has co-authored more than 35 technical papers and delivered invited key note speeches at numerous global energy and automotive conferences. Mr. Dhar is a member of the Board of Directors of Curtis Instruments. He has a Masters in Engineering Management and Chemical Engineering from University of Detroit and Institute of Technology, India.

MONDAY JUNE 18

Poster Session 1

Poster Session 1: Power Electronics, Motor Drives, and Vehicular Applications Session Chairs: Avoki M. Omekanda, General Motors - Global R&D Center Anand Sathyan, Chrysler Group LLC	
Monday, June 18, 2012 12:00 PM – 2:00 PM *Venue: Great Lakes Center (Exhibit Hall)*	
PS-1	**Comparative Evaluation of Power Converters for 6/4 and 6/10 Switched Reluctance Machines** Jin Ye, Berker Bilgin and Ali Emadi, *McMaster University, Canada*
PS-2	**Range Prediction for a Three-Wheel Plug-in Hybrid Electric Vehicle** N. Denis, M. R. Dubois, K. Angarita Gil, T. Driant and A. Desrochers, *Sherbrooke University, Canada*
PS-3	**Online Parameter Estimation of PMDC Motors using Quantized Output Observations** M. A. Obeidat, L. Y. Wang and F. Lin, *Wayne State University, USA*
PS-4	**Performance Comparison of the Railway Traction IPM Motors between Concentrated Winding and Distributed Winding** Hyung-Woo Lee, Chan-Bae Park and Byung-Song Lee, *Korea Railroad Research Institute, South Korea*
PS-5	**A Study on the Iron-loss Reduction of Interior Permanent Magnet Synchronous Motor for Railway Transit** C.-B. Park[1], H.-W. Lee[1], B.-S. Lee[1] and J. Lee[2] *[1]Korea Railroad Research Institute, South Korea, [2]Hanyang University, South Korea*
PS-6	**Ultra-Capacitor Based Pulse Power Management in Electrical Ships** B. Vural and C. S. Edrington, *Florida State University, USA*
PS-7	**Combined Optimal Sizing and Energy Management of Hybrid Electric Vehicles** A. Ravey, R. Roche, B. Blunier and A. Miraoui, *University of Technology of Belfort-Montbeliard, France*
PS-8	**A Predictive Trip-Based Method for State of Charge Maintanence in Series PHEVs to Boost Cold Weather Efficiency** Luke Engvall[1], Andrew Cook[2] and Alireza Khaligh[3] *[1]University of New Mexico, USA, [2]Michigan State University, USA, [3]University of Maryland, College Park, USA*
PS-10	**FM RDS for Smart Charging of PEVs** S. Berezin[1], D. Nephin[2] and J. Wang[2] *[1]General Motors Canada Limited, Canada, [2]e-Radio Inc., Canada*
PS-11	**On the Suitability of Large Switched Reluctance Machines for Propulsion Applications** Arunava Mitra and Ali Emadi, *McMaster University, Canada*



Poster Session 1

MONDAY JUNE 18

PS-13	**An Isolated Bidirectional Converter Modeling for Hybrid Electric Ship Simulations** Bijan Zahedi, Ole Christian Nebb and Lars Norum, *Norwegian University of Science and Technology, Norway*
PS-14	**Simple Method of Estimating Consumption of Internal Combustion Engine for Hybrid Application** Zainab Asus, Daniela Chrenko, El-Hassane Aglzim, Alan Keromnes and Luis Le Moyne, *University of Burgundy, France*
PS-15	**Artificial Driving Cycles for the Evaluation of Energetic Needs of Electric Vehicles** Daniela Chrenko, Irene Garcia Diez and Luis Le Moyne, *University of Burgundy, France*
PS-16	**A Novel Multiple Input DC-DC Converter for Electric Vehicular Application** Lalit Kumar and Shailendra Jain, *Maulana Azad National Institute of Technology, India*
PS-17	**Experimental Evaluation of Parallel Hybrid Medium-Duty Tactical Truck** Y. Gene Liao[1], Molly O'Malley[2] and Allen Quail, Jr.[2] *[1]Wayne State University, USA, [2]Primus Solutions, Inc., USA*
PS-18	**Electrical Analysis of Proton Exchange Membrane Fuel Cells for Electrical Power Generation On-Board Commercial Airplanes** Karina Munoz-Ramos, Joeseph W. Pratt, Abbas A. Akhil, Benjamin L. Schenkman, Lennie E. Klebanoff and Dita B. Curgus, *Sandia National Laboratories, USA*
PS-19	**Coordination of Multi Charging Station for Electric Vehicles and its Utilization for Vehicle to Grid Scenario** Mukesh Singh, Praveen Kumar and Indrani Kar, *Indian Institute of Technology, Guwahati, India*
PS-20	**Mathematical Modeling of Li-Ion Battery for Charge/Discharge Rate and Capacity Fading Characteristics using Genetic Algorithm Approach** Kannan Thirugnanam, Himanshu Saini and Praveen Kumar, *Indian Institute of Technology, Guwahati, India*
PS-21	**A New Concept for Bidirectional Inductively Coupled Battery Charging System based on AC-DC-AC Converter for PHEV's and EV's using Fuzzy Logic Approach** Ezhil Reena Joy, Kannan Thirugnanam and Praveen Kumar, *Indian Institute of Technology, Guwahati, India*
PS-22	**Fault Detection in 3-Phase Traction Motor using Artificial Neural Networks** Seyed Saeid Moosavi[1], Abdesslem Djerdir[1], Youcef Ait-Amirat[1] and Davod Arab Khaburi[2] *[1]University of Technology of Belfford-Montbeliard, France, [2]University of Franche-Comte, France, [3]Iran University of Science and Technology, Iran*
PS-23	**Approach and Main Results of the G4V Project Analyzing the Impact of a Mass Introduction of Electric Vehicles on the Electricity Networks in Europe** Markus Goedde, Eva Szczechowicz, Thomas Helmschrott, Claas Matrose and Armin Schnettler, *RWTH Aachen University, Germany*
PS-24	**Impact of Different Electric Vehicle Charging Strategies onto Required Distribution Grid Reinforcement** Claas Matrose, Thomas Helmschrott, Markus Goedde, Eva Szczechowicz and Armin Schnettler, *RWTH Aachen University, Germany*
PS-25	**Mathematical Modeling of Proton Exchange Membrane Fuel Cell with Integrated Humidifier for Mobile Applications** Elena Breaz[1], Fei Gao[2], Benjamin Blunier[2] and Radu Tirnovan[1] *[1]Technical University of Cluj Napoca, [2]University of Technology of Belfford-Montbeliard, France*

Poster Session 1

MONDAY JUNE 18

PS-26	**Review of Adaptive Systems for Lithium Batteries State-of-Charge and State-of-Health Estimation** Nicolas Watrin, Benjamin Blunier and Abdellatif Miraoui, *University of Technology of Belfford-Montbeliard, France*
PS-27	**Design and Control of an Ultra High Speed Turbo Compressor for the Air Management of Fuel Cell Systems** Dongdong Zhao[1], Krahenbuhl Daniel[2], Benjamin Blunier[1], Christof Zwyssig[2], Manfeng Dou[3] and Abdellatif Miraoui[3], [1]*University of Technology of Belfford-Montbeliard, France,* [2]*Celeroton Ltd, Switzerland,* [3]*Northwestern Polytechnical University, China*
PS-29	**Integrating Battery Energy Storage with a BMS for Reliability, Efficiency, and Safety in Vehicles** Chet Sandberg, *Altairnano Technologies, USA*
PS-31	**Simulation-based Dynamic Characterization of Transformer-isolated Machine-rectifier Systems** Ali Davoudi[1], Hamid Behjati[1] and Juri Jatskevich[2] [1]*University of Texas at Arlington, USA,* [2]*University of British Columbia, Canada*
PS-32	**Multistate Voltage Dependent Load Model of a Charging Electric Vehicle** Eric Sortomme[1], Ahlmahz Negash[2], Mani Venkata[1] and Daniel Kirschen[2] [1]*Alstom Grid, USA,* [2]*University of Washington, USA*
PS-33	**Traction Inverters in Hybrid Electric Vehicles** Haizhong Ye, Yinye Yang and Ali Emadi, *McMaster University, Canada*
PS-34	**Accelerated Simulation of Ultracapacitors using Waveform Relaxation Technique** Fatih Cingoz, Hamid Behjati and Ali Davoudi, *University of Texas at Arlington, USA*
PS-35	**Evaluation of the Impact of the Different Charging Algorithms on the Lead-Acid Batteries Lifetime** Mori Yatsui[1], Hua (Kevin) Bai[1], Nicholas Cramer[1], Xi Zheng[1], Mohammadhossein Azhinehfar[1] and David Mead[1], [1]*Kettering University, USA,* [2]*Progressive Dynamics, Inc., USA*
PS-36	**A Unified Steady-State Model of Multi-Phase Pulse-Width-Modulation (PWM) DC-DC Converter** Saijun Zhang and Xiaoyan Yu, *USA*
PS-37	**On the Inefficiency of Vehicle-to-Grid (V2G) Power Flow: Potential Barriers and Possible Research Directions** Ebrahim Saeidi Dehaghani and Sheldon Williamson, *Concordia University, Canada*
PS-38	**Order-reduction Techniques for Magnetic Components in Power Electronics** Ali Davoudi, *University of Texas at Arlington, USA*
PS-39	**Sensitivity Analysis of Vehicle Performance to Transmission Parameters in Parallel HEVs with Dynamic Programming Optimization** Lin Lai and Mehrdad Ehsani, *Texas A&M University, USA*
PS-40	**Harmonic Analysis of Traction Networks Based on the CRH380 Series EMUs Accident** Jianqiang Liu, Qilin Yang and Trillion Q Zheng, *Beijing Jiaotong University, China*
PS-41	**A State Space Thermal Model for HEV/EV Battery Using Vector Fitting** Xiao Hu[1], Lalit Chaudhari[1], Shaohua Lin[1], Scott Stanton[1], Saeed Asgari[1] and Wenyu Lian[2] [1]*ANSYS Inc, USA,* [2]*General Motors, USA*
PS-42	**Dynamic Modeling and Stability Analysis of Magnetically Levitated Systems** A. H. Ranjbar, R. Noboa and B. Fahimi, *University of Texas at Dallas, USA*

Monday, June 18, 2012

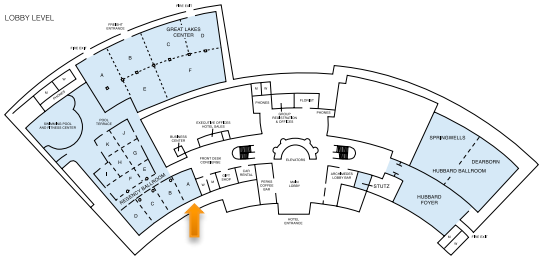
Afternoon Breakout Sessions

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 5:30 PM with a 30-minute break from 3:40 PM until 4:10 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: Introduction to Advanced Automotive Batteries

Monday, June 18, 2012
2:00 PM – 5:30 PM
Venue: Regency A-B



Speaker: Oliver Gross, Chrysler Group LLC

Tutorial Description: This tutorial will introduce the participant to the major electrochemistries utilized in automotive batteries. Battery applications will span low voltage and micro-hybrid systems, up to full electric vehicles. The participant will learn about the major factors determining battery size and configuration for multiple electrified powertrain applications. Materials selection, cell and battery design topologies for the more advanced (Nickel-Metal Hydride and Lithium-ion) technologies will be presented. Key factors governing life and durability, as well as battery control methodologies will be addressed. Finally, the participant will be introduced into battery safety and abuse considerations.

Speaker Biography: Oliver is an Energy Storage Systems Specialist, for High Voltage Energy Storage Solutions, at Chrysler Group, LLC. He holds both a BS and a Master's Degree in Materials Science, for the University of Toronto. Oliver has 20 years' experience in the advanced energy storage industry. Prior to Chrysler Oliver was at Cobasys, where he was responsible for all Nickel Metal-Hydride cell and module development, as well as the development of their lithium-ion battery portfolio. Before Cobasys, Oliver was at Valence Technology, where he was responsible for lithium-ion cell design and development, which included extended-term deployments to Northern Ireland, South Korea, and China. Before Valence, Oliver was at Ultralife, developing lithium primary and secondary cells for extreme environment applications. He currently holds over 10 patents, and more than 20 publications.

Monday, June 18, 2012

Afternoon Breakout Sessions

Technical Session 1: Vehicular Power Electronics Session Chairs: Bogdan Borowy, Satcon Technology Corp. Gui-Jia Su, Oak Ridge National Laboratory	
Monday, June 18, 2012 2:00 PM – 3:40 PM *Venue: Regency J-K*	
S1-1	**Power Electronics Laboratory R-L Load Bank Development for Traction Inverter of Hybrid/ Electric Vehicles** M. Fatema, M. N. Anwar and R. D. Weiss, *General Motors, USA*
S1-2	**A Cost Effective High-Performance Smart Battery Charger for Off-Road and Neighborhood EVs** Fariborz Musavi[1], Murray Edington[1], Wilson Eberle[2] and Willaim G. Dunford[2] *[1]Delta-Q Technologies, Canada, [2]University of British Columbia, Canada*
S1-3	**Design of A Dual Half Bridge DC-DC Converter for An Ultra-Capacitor based Auxillary Power Source in Electric Vehicles** Shenghui Cui[1], Dawei He[2], Mingxuan Li[1], Haifeng Lu[1] and Thomas Habetler[2] *[1]Tsinghua University, China, [2]Georgia Institute of Technology, USA*
S1-4	**A Zero Voltage Switching Full-Bridge DC-DC Converter for An On-Board PHEV Battery Charger** Deepak Gautam[1], Fariborz Musavi[1], Murray Edington[1], Wilson Eberle[2] and William G. Dunford[2] *[1]Delta-Q Technologies, Canada, [2]University of British Columbia, Canada*
S1-5	**An Increased Efficiency Series Hybrid Electric Bus Using Decoupled DC-Link Voltages** C. Rogers and F. Peng, *Michigan State University, USA*

Technical Session 2: Electric Machines and Drives Session Chairs: Hossein Dadkhah, Chrysler Group LLC Bin Wu, Mecedes-Benz R&D North America	
Monday, June 18, 2012 4:10 PM – 5:30 PM *Venue: Regency J-K*	
S2-1	**Optimization of Commutation Angles in SRM Drives using FRM** C. Lin and B. Fahimi, *University of Texas at Dallas, USA*
S2-2	**Switched Reluctance Generator with Higher Number of Rotor Poles than Stator Poles** B. Bilgin[1], A. Emadi[1] and M. Krishnamurthy[2] *[1]McMaster University, Canada, [2]Illinois Institute of Technology, USA*
S2-3	**An Optimal Maximum Torque per Ampere Strategy for Switched Reluctance Machines** F. Fleming, F. Akar and C. S. Edrington, *Florida State University, USA*
S2-4	**Oscillation Mitigation for Sliding Mode Observers in Sensorless Control of IPMSMs** Y. Zhao[1], W. Qiao[1] and L. Wu[2] *[1]University of Nebraska-Lincoln, USA, [2]Phoenix International—A John Deere Company, USA*

Monday, June 18, 2012

Afternoon Breakout Sessions

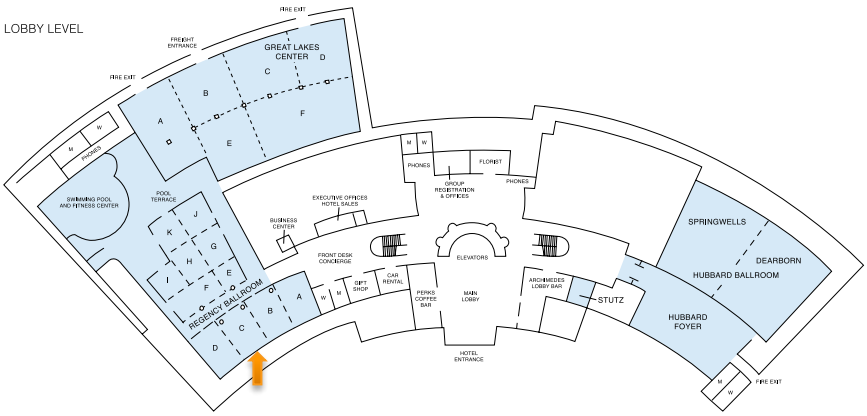
Panel 1: Rare Earth Magnet Alternatives for Electric Motors

Monday, June 18, 2012
2:00 PM – 3:40 PM
Venue: Regency C-D

Panel Moderator: Dr. Babak Fahimi, University of Texas at Dallas

Panelists:
Dr. Philip T. Krein, University of Illinois Urbana-Champaign
Dr. Mark Johnson, Advanced Research Projects Agency - Energy (ARPA-E), DOE
Dr. Scott Coombe, Office of Naval Research (ONR)
Dr. Kaushik Rajashekara, Rolls-Royce Corporation
Dr. Laura Lewis, Northeastern University

Panel Summary: In the past two decades, we have seen vast improvements in electric motors in terms of efficiency, torque, power, and size. This is largely due to the introduction of powerful permanent magnets comprised of NdFeB materials or commonly called rare earth magnets. When first introduced, these magnets were cheap and plentiful costing below $15/kg. They were quickly adopted, not only by motor companies but also used in millions of consumer products such are hard drives, cell phones, and speakers. In recent times the supply of these magnets the cost has skyrocketed to over $90/kg and the Chinese government has restricted exportation, which is causing concerns in major markets. It will take many years for other sources of rare earths to get into production. In the meantime, there is a rush to find alternative motor topologies and/or magnets. This panel will discuss the impact of the rare earth magnet problem on the transportation sector and examine alternative magnet chemistries and motor designs. What are the strategies to migrate from present PM/IPM designs, how can companies mitigate escalating costs, and avoid supply shortages.



Monday, June 18, 2012

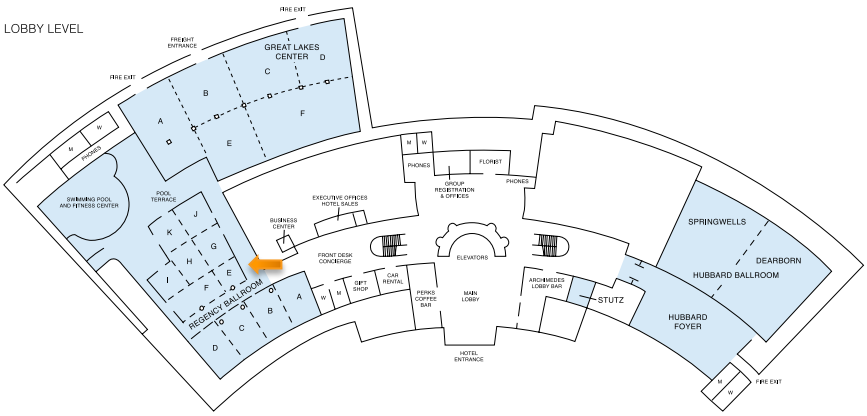
Afternoon Breakout Sessions

Panel 2: Wide-Bandgap Devices in Automotive Power Electronics
Monday, June 18, 2012
2:00 PM – 3:40 PM
Venue: Regency E-F

Panel Moderator: James Nagashima, Global Power Electronics

Panelists:
Dr. David Grinder, Cree
Dr. Sayeed Ahmed, Infineon Technologies
Dr. Han Lee, Delphi
Dr. Chandra Namuduri, General Motors R&D

Panel Summary: Many experts say that the next big change in automotive power electronics will be the introduction of wide band gap devices such as silicon carbide SiC or Gallium Nitride GaN. There are many touted advantages of these devices over conventional silicon devices including, lower switching losses, higher junction temperatures, and faster switching speeds. Past problems with substrate defects are rapidly being addressed and companies are working to develop robust switches for power applications. Meanwhile, IGBTs and Mosfet technologies are progressing to move the performance bar even higher at lower costs. This panel will discuss what is needed for WBG devices to be successful in the automotive market and which applications will be the first to see these devices. The panel will consist of one expert from each of the following areas, OEM, power electronics supplier, device and module manufacturers, and government.



Monday, June 18, 2012

Afternoon Breakout Sessions

Panel 3: Repurposed EV/PHEV Battery Packs

Monday, June 18, 2012
2:00 PM – 3:40 PM
Venue: Regency G-H

Panel Organizer: Dr. Omer C. Onar, Weinberg Fellow, R&D Staff, Energy and Transportation Science Division, Oak Ridge National Laboratory

Panel Moderators:
George P. Andrews, Energy Storage Program Manager, Oak Ridge National Laboratory (invited)
Dr. Imre Gyuk, Energy Storage Program Manager, U.S. Department of Energy (invited)

Panelists:
Ali Nourai, Executive Consultant, KEMA Inc. and Chairman, Board of Directors of the Electricity Storage Association
Pablo Valencia, Senior Manager, Battery Lifecycle Management, General Motors Company (invited)
James Greenberger, Executive Director, National Alliance for Advanced Technology Batteries
Pablo Rosenfeld, Manager, Distributed Energy Storage Program, ABB Inc., PTPK
Jeremy Neubauer, Senior Research Engineer, Advanced Vehicles Energy Storage Group, National Renewable Energy Laboratory

Panel Summary: Original equipment manufacturers (OEM) such as General Motors, Nissan, and Toyota offer long-term warranties for the battery packs in their vehicles. The expectation is that once battery performance (energy storage capacity or peak power) decreases to 80%, the batteries will be replaced by the OEMs. The rationale is that a 20% reduction in the vehicle range, imposed by the decrease in performance, would be unacceptable to consumers. Based on various forecasts for market penetration of plug-in hybrid electric vehicles (PHEVs) and EVs over the next 10 years, it is estimated that a large number of PHEVs and EVs will be approaching the 80% battery performance level by 2020. These batteries can be recycled or used in other less demanding applications provided a business case could be made for their secondary use. The objective of this panel session is to explore the various possible markets for the secondary use of Li-ion batteries removed from electric or hybrid electric vehicles (EVs or HEVs) after they can no longer conform to vehicle specification but still have substantial functional life. The panel will give an overview of how these after vehicle batteries could be deployed in other applications. The major focus will be dedicated to the cost competitiveness of these batteries for power grid applications. The discussions will cover current barriers, technology developments that are critical achieving price and performance characteristics, effects of adding another lifecycle to the vehicular batteries (cost, recycling, and environmental effects), supporting and enhancing micro and smart grid development, and the demonstration projects.

Monday, June 18, 2012

Afternoon Breakout Sessions

Panel 4: DC Link Film Capacitors for Hybrid and Electric Vehicles

Monday, June 18, 2012

4:10 PM – 5:30 PM

Venue: Regency C-D

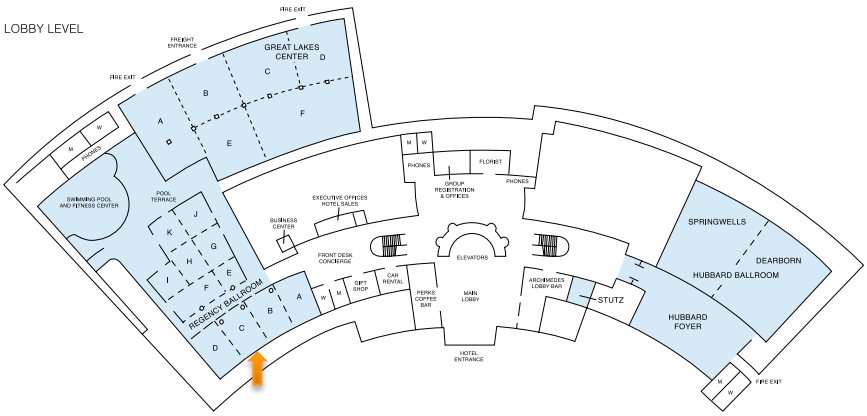
Panel Organizer: Dr. Zhong Nie, Chrysler Group LLC

Panel Moderator: Dr. Mike Brubaker, Chief Technology Officer, SBE

Panelists:

Chris Reynolds, AVX
Ralph Kerrigan, Director, Capacitor Technology, NWL Capacitor
Dr. Zhong Nie, Chrysler Group LLC
Frank Vettrio, Chrysler Group LLC
Prof. Michael Lanagan, Penn State University
Dr. U. (Balu) Balachandran, Argonne National Laboratory

Panel Summary: DC link film capacitor technology is becoming a practical research and development topic for the advancement of inverters in hybrid and electric vehicles. Currently, DC link film capacitor accounts for 25%~33% of inverter weight, volume, and cost. In addition, the operation temperature is around 105°C. The next generation inverters will need to have the smallest possible size, lower inductance, lower ESR, the highest possible voltage and ripple current, the best possible connections, wider temperature range, and longer life expectancy. This panel will discuss: (1) hybrid and electric vehicle's DC link film capacitor special requirements, (2) manufacturer's DC link film capacitor technologies for dielectrics, foil vs. metalized, construction, different manufacturer's film technologies and others, and (3) future development/roadmap of film capacitor in hybrid and electric vehicle applications.



Monday, June 18, 2012

Afternoon Breakout Sessions

Panel 5: Electrical Infrastructure Issues in PHEV/Grid Integration

Monday, June 18, 2012

4:10 PM – 5:30 PM

Venue: Regency E-F

Panel Moderator: Dr. Byeong-Mun Song, Baylor University

Panelists:

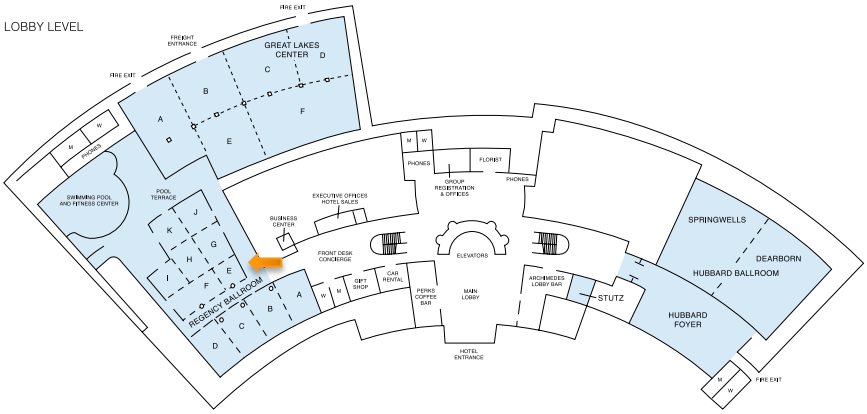
Burak Ozpineci, Oak Ridge National Laboratory

Terry Penney, National Renewable Energy Laboratory

Fariborz Musavi, Delta-Q Technologies

Geun-Hee Rim, KERI

Panel Summary: In this panel session, various electrical infrastructure issues in plug-in hybrid electric vehicle (PHEV) and grid integration will be discussed. As the number of PHEV integrations to the grid increases, grid electricity infrastructures could benefit from a bi-direction charging and discharging with multiple PHEV battery systems. However, if not planned properly, the large-scale adoption of PHEVs would conversely have a negative impact on the power quality, reliability, and security of the utility infrastructure.



Monday, June 18, 2012

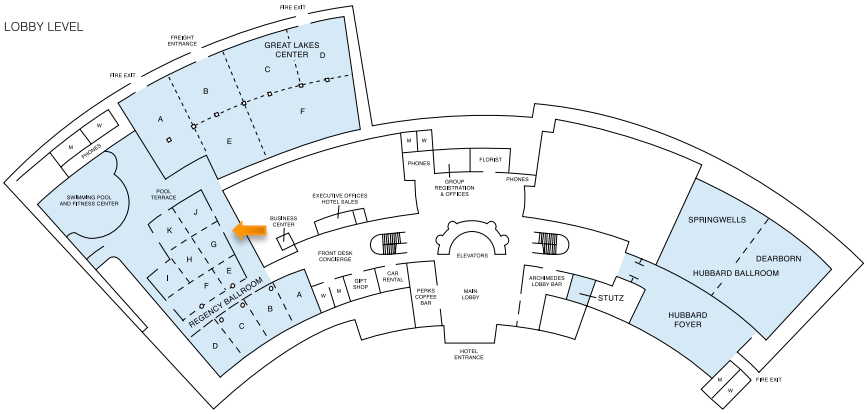
Afternoon Breakout Sessions

Panel 6: Standards
Monday, June 18, 2012
4:10 PM – 5:30 PM
Venue: Regency G-H

Panel Moderator: Paul Bishop, P.E.

Panelists:
Francis Cleveland (invited)
Vishant Shah
M. L. Chan
John Amy (invited)

Panel Summary: The electrification of vehicles is here. Solid-state devices and power electronics have progressed to the point where the needed products are now available. Standards are necessary for technical and economic viability of the products and processes for successful electrification of transportation. This panel will discuss standards and standards development organizations (SDOs) from multiple points of view: (1) why standards? (2) the different SDOs and their types of products; (3) the IEEE standards development cycle; (4) government organizations and their impact; (5) communications requirements and needs; (6) vehicle standards; and (7) supporting infrastructure standards.



Monday, June 18, 2012
Technical Committee Meeting

Joint PELS/IAS Technical Committee Meeting

Monday, June 18, 2012
6:30 PM – 8:00 PM
Venue: Regency C-D

Agenda

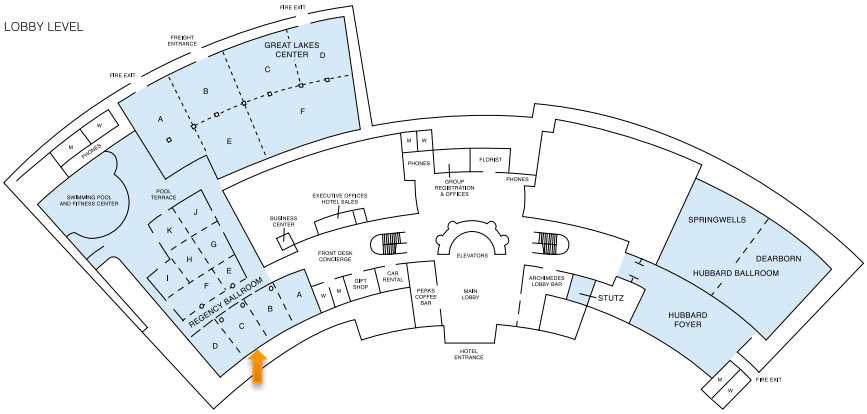
ITEC Strategic Plan, Vision, Progress Report, and 3-Year Plan
6:30 PM – 7:00 PM
ITEC Steering Committee Chair: Ali Emadi, McMaster University

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

Inaugural 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

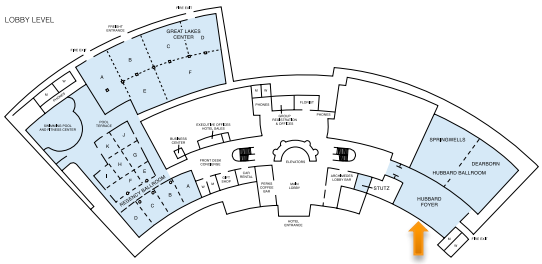
This meeting is open to all conference attendees and will discuss the activities of the technical committees of PELS and IAS related to vehicle and transportation systems, including ITEC.

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.).



Tuesday, June 19, 2012

Keynote Presentations



Plenary Session 2

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

Chair: Dr. Phil Krein, University of Illinois at Urbana-Champaign
Co-Chair: Mark Zachos, Dearborn Group Technology

IEEE IAS Welcome

8:30 AM – 8:35 AM
Dr. Bruno Lequesne, President, IEEE Industry Applications Society

Keynote Presentation 1: Electrified Vehicles – Opportunities and Challenges

8:35 AM – 9:10 AM

Speaker: Chuck Gray, Chief Engineer, Core Electrification Engineering, Ford Motor Company

Short Biography: Chuck has worked in Ford Powertrain and Advanced Vehicle Technology for 20 years. He is leading the Global Core Electrification Engineering activity that is responsible to deliver HEV, PHEV and BEV propulsion & energy storage systems. His prior Ford responsibilities included leading Powertrain Installations, V6 Engine Programs and PT NVH & CAE. His education includes a Bachelors in Mechanical Engineering from GMI Engineering & Management Institute, and a Masters in Mechanical Engineering from University of Michigan, Dearborn.

Tuesday, June 19, 2012

Keynote Presentations

Keynote Presentation 2: Transport Electrification: Comparing and Contrasting the Approaches and Progress of the U.S. and China

9:10 AM – 9:45 AM

Speaker: Dr. Stephen R. Clarke, Chairman and CEO, Applied Intellectual Capital

Short Biography: Dr. Clarke is the CEO of Applied Intellectual Capital, which he co-founded in 1999 to fund, develop and commercialize advanced batteries and related electrochemical technologies. Steve built and leveraged AIC's own research facilities with 3rd party consulting, to build a portfolio of technologies and IP, focused on advanced electrochemistry and supporting materials. Between 2001 and 2005 AIC span off a number of clean tech businesses and Steve raised a total of ~$30MM to support these. In 2007 he took AIC public on the LSE's AIM raising a $40 million "micro-fund" and drove a 300% increase in share price. Following the collapse of the financial markets, he took AIC private again in Jan. 2009. AIC is active and current in a broad range of novel advance battery and supercapacitor technologies including, lithium materials, zinc, vanadium and other flow batteries, metal-air batteries and Bipolar Lead Acid Batteries (BLAB). In early 2010 AIC formed a Joint Venture with East Penn Manufacturing to manufacture and sell batteries in North America based on AIC's BLAB technology. Steve is now leading the JV's drive to establish BLAB manufacturing in PRC, India and elsewhere. He started his career in aerospace, with Rolls Royce in the UK, where he was part of the team, which re-structured and returned Rolls Royce to the public sector in 1985. Steve then moved into international consulting where he contributed to the privatization of the UK's telecommunications and electricity industries.

Keynote Presentation 3: Electrification Soup – Diverse Technology to Treat our Oil/ GHG based Sickness

9:45 AM – 10:20 AM

Speaker: Dimitri Kazarinoff, President, AVL Powertrain Inc.

Short Biography: Dimitri joined AVL Powertrain Engineering Inc. in September of 2011 as Executive Director of Business Development and assumed the role of President in January 2012. Prior to AVL, Dimitri was V.P & GM of Eaton's Hybrid Power Systems Division leading development and sales of hybrid drivetrains to commercial vehicle applications worldwide. Dimitri also spent 7 years with McKinsey & Company providing strategy consulting to a multitude of industrial clients. He began his career in engine development, manufacturing and design for General Motors. Dimitri holds a bachelor's degree in Mechanical Engineering from the Massachusetts Institute of Technology and an MBA from the Kellogg School at Northwestern University.

Coffee Break

10:20 AM – 10:45 AM

Tuesday, June 19, 2012

Keynote Presentations

Welcome from IEEE PES

10:45 AM – 10:50 AM

Dr. Noel Schulz, President, IEEE Power & Energy Society

Keynote Presentation 4: The EV Customer and the Electric Utility - Review of Grid Impact and Results of DTE Energy Customer EV Program

10:50 AM – 11:25 AM

Speaker: Vincent G. Dow, Vice President, Distribution Operations, Detroit Edison

Short Biography: Vincent G. Dow, 51, is vice president of distribution operations at Detroit Edison, one of three major business units of DTE Energy (NYSE:DTE), a Detroit-based diversified energy company involved in the development and management of energy-related businesses and services nationwide. Dow is responsible for overseeing the company's electrical distribution system, including distribution and substation operations, outage restoration, new customer connections, engineering, field and meter services, and all DTE Energy distribution system construction. Dow also oversees asset optimization, resource management, performance management and the Advanced Metering Infrastructure Project. Dow joined Detroit Edison in 1979. He has served in a number of departments, including power delivery operations; customer service, billing and meter reading; energy distribution strategy; field services; construction and maintenance; engineering, and emergency preparedness. Dow earned a bachelor of science degree in electrical engineering from Lawrence Technological University and a master of business administration degree in personnel management from Wayne State University. He is on the board of directors and executive committee of the Better Business Bureau of Southeastern Michigan and the Gleaners Community Food Bank as well as a member of other community organizations.

Keynote Presentation 5: Grid Transformation through Power Electronics

11:25 AM – 12:00 Noon

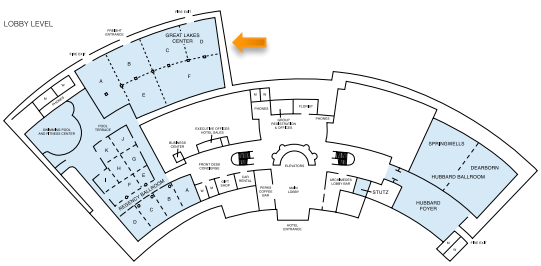
Speaker: Dr. Leo Casey, EVP of Engineering and CTO, Satcon Corporation

Short Biography: Leo Casey received his Doctorate from MIT and Bachelors of Engineering from the University of Auckland, coming to the US as a Fulbright Scholar. He is the EVP of Engineering & CTO of Satcon Corporation, a provider of utility-scale, grid-connected renewable energy solutions for distributed power markets. He is Chairman of the High-Megawatt Power Conversion Program organized by Industry, DOE and NIST. He is an editor of the IEEE PES's Energy Conversion Transactions, serves on NREL's Solar Advisory Panel, and has served as a U.S. Delegate for Renewable Energy to the APEC Forum.

TUESDAY JUNE 19

Poster Session 2

Poster Session 2: Advancements in Vehicular Systems and Components Session Chairs: Heidi Lubin, Hybrid Electric Vehicle Technologies, LLC Sanjaka G. Wirasingha, Chrysler Group LLC	
Tuesday, June 19, 2012 12:00 PM – 2:00 PM *Venue: Great Lakes Center (Exhibit Hall)*	
PS-43	**ITS Based Methodology To Reduce Energy Consumption and Emissions** Mohamad Abdul-Hak, Nizar Al-Holou, Utayba Mohammad, Malok Alamir Tamer and Muhammad Arafat, *University of Detroit Mercy, USA*
PS-44	**Integrated DC Link Capacitor/Bus Structures to Minimize External ESL Contribution to Voltage Overshoot** M.A. Brubaker, H. C. Kirbie and T. A. Hosking, *SBE Inc, USA*
PS-45	**Hierarchical Control and Management of Virtual Microgrids for Vehicle Electrification** Feng Lin[1,3], Michael P. Polis[2], Caisheng Wang[1], Le Yi Wang[1] and Hongwei Zhang[3] [1]*Wayne State University, USA,* [2]*Oakland University, USA,* [3]*Tongji University, China*
PS-46	**Reduced-Parts Three-Phase Inverters: A Comparative Study** Haizhong Ye, Berker Bilgin and Ali Emadi, *McMaster University, Canada*
PS-47	**Development of Energy Management Strategy for Plug-in Hybrid City Bus** Antti Lajunen, *Aalto University, Finland*
PS-48	**A 10kW 97% efficiency LLC Resonant DC-DC Converter with Wide Range of Output Voltage for the Battery Chargers in Plug-in Hybrid Electric Vehicles** Wei Guo[1], Allan Taylor[1], Gyula Szatmari-Voicu[1], Kevin (Hua) Bai[1], Jeff Patterson[1], Larry Deal[2], James Kane[2] and Frank Huang[2] [1]*Kettering University, USA,* [2]*Magna E Car, USA*
PS-49	**Silicon Carbide Based Inverters for Energy Efficiency** A. I. Maswood[1], P. L. A. Vu[1] and M. A. Rahman[2] [1]*Nanyang Technological University, Singapore,* [2]*Memorial University of Newfoundland, Canada*
PS-50	**High Power Multilevel Inverter with Unity PF Front-End Rectifier** A. I. Maswood[1], O. H. P. Gabriel[1] and M. A. Rahman[2] [1]*Nanyang Technological University, Singapore,* [2]*Memorial University of Newfoundland, Canada*
PS-51	**Minimizing Residential Distribution System Operating Costs by Intelligently Scheduling Plug-in Hybrid Electric Vehicle Charging** Nathan Fettinger, Chee-Wooi Ten and Chunxiao Chigan, *Michigan Technological University, USA*
PS-52	**Analysis of Forecasting Algorithms for Minimization of Electric Demand Costs for Electric Vehicle Charging in Commercial and Industrial Environments** Nicholas Jewell, Matthew Turner, John Naber and Michael McIntyre, *University of Louisville, USA*



TUESDAY JUNE 19

Poster Session 2

PS-53	**A Novel Approach Towards Electrical Loss Minimization in Vector Controlled Induction Machine Drive for EV/HEV** Debarshi Biswas, Kaushik Mukherjee and Narayan C. Kar, *University of Windsor, Canada*
PS-54	**Core Shape Analysis for Contactless Transformer of Railway Inductive Power Supply** Joao Victor Pinon Pereira Dias[1], Hyungchul Kim[2] and Donguk Jang[1] [1]*University of Science and Technology, South Korea,* [2]*Korea Railroad Research Institute, South Korea*
PS-56	**Microgrid and Transportation Electrification: A Review** Xiang Eric Yu, Yanbo Xue, Shahin Sirouspour and Ali Emadi, *McMaster University, Canada*
PS-57	**Towards Cognitive Energy Management System of Microgrid in Enabling Transportation Electrification** Yanbo Xue, Shahin Sirouspour and Ali Emadi, *McMaster University, Canada*
PS-58	**A V2G Application using DC Fast Charging and its Impact on the Grid** Hina Chaudhry[1] and Theodore Bohn[2] [1]*Purdue University, USA,* [2]*Argonne National Laboratory, USA*
PS-60	**A Study on the Effects of Motion in Inductively Coupled Vehicular Charging Applications** Matthew McDonough and Babak Fahimi, *University of Texas at Dallas, USA*
PS-61	**Glassy-Carbon Coated Stainless Steel Bipolar Electrodes for PEM Fuel Cell** K. E. Okoye[1] and E. C. Ejiogu[2], [1]*Mirai Denchi Research Laboratory, Japan,* [2]*University of Nigeria, Nigeria*
PS-62	**A Design Method for a Fault-Tolerant Multi-Agent Stabilizing System for DC Microgrids with Constant Power Loads** Pierre Magne, Babak Nahid-Mobarakeh and Serge Pierfederici, *University of Lorraine, France*
PS-63	**Implementation of a Reliable Load Sharing Strategy between Battery and Ultra-capacitor on a Prototype Electric Vehicle** Enes Ugur[1], Serkan Dusmez[2], Bulent Vural[1]and Mehmet Uzunoglu[1] [1]*Yildiz Technical University, Turkey,* [2]*University of Maryland at College Park, USA*
PS-64	**Intelligent Cell Gauge for a Hierarchical Battery Management System** Federico Baronti, Gabriele Fantechi, Roberto Roncella and Roberto Saletti, *University of Pisa, Italy*
PS-65	**Bi-Directional Isolated DC-DC Converters with Reactive Power Loss Reduction for Electric Vehicle and Grid Support Applications** Yongbin Chu and Shuo Wang, *University of Texas at San Antonio, USA*
PS-66	**Analysis of Solar Irradiance Intermittency Mitigation Using Constant DC Voltage PV and EV Battery Storage** Joseph Mossoba[1], Matthew Kromer[1], Peter Faill[1], Stan Katz[1], Bogdan Borowy[1], Nichols Steve[1], Casey Leo[1], Dragan Maksimovic[1], Joshua Traube[2] and Fenglong Lu[2] [1]*Satcon Technology Corporation, USA,* [2]*University of Colorado, Boulder, USA*
PS-67	**Experimental Investigations of Noise and Vibration in Electric Machines** Stefano Baldizzone, Colin J. Novak and Narayan C. Kar, *University of Windsor, Canada*
PS-68	**Torque Sharing between V/F Controlled Vehicular Wheels under Slippery Ground Conditions** Jaishankar Iyer[1], Mehrdad Chapariha[1], Milad Gougani[1], Juri Jatskevich[1] and Ali Davoudi[2] [1]*University of British Columbia, Canada,* [2]*University of Texas at Arlington, USA*

Poster Session 2

PS-69	**DC Power Networks with Very Low Capacitances for Transportation Systems: Dynamic Behavior Analysis** Roghayeh Gavagsaz Ghoachani, Jean-Philippe Martin, Serge Pierfederici, Babak Nahid-Mobarakeh, Bernard Davat, *University of Lorraine, France*
PS-70	**Stator Winding Inter-turn Fault Detection by Control Voltages Demodulation** T. Boileau, N. Leboeuf, B. Nahid-Mobarakeh, F. Meibody-Tabar, *University of Lorraine, France*
PS-71	**Variable Timing Control for ARCP Voltage Source Inverters Operating at Low DC Voltage** Todd D. Batzel and Kipp Adams, *Pennsylvania State University, USA*
PS-72	**Dynamic Modeling and Performance of a Current-Mode Controlled Boost DC-DC Converter with Slope Compensation** Byeong-Mun Song and Mohammadreza Abedi, *Baylor University, USA*
PS-74	**Short Term Power Demand Forecasting in Light- and Heavy-Duty Electric Vehicles Through Linear Prediction Method** Mahdi Mousavi Sangdehi, K. Lakshmi Varaha Iyer, Kaushik Mukherjee and Narayan C. Kar, *University of Windsor, Canada*
PS-75	**A Cuk Converter based Bridegless Topology for High Power Factor Fast Battery Charger for Electric Vehicle Applications** Devendra Patil, Mayank Sinha and Vivek Agarwal, *Indian Institute of Technology–Bombay, India*
PS-76	**Energetic Impedances: Application to Large Signal Stability Analysis of DC Power Systems** Ahmed-Bilal Awan, Jean-Philippe Martin, Babak Nahid-Mobarakeh and Serge Pierfederici, *University of Lorraine, France*
PS-77	**Design and Implementation of a Novel Power Assisted Drivetrain for a Wheelchair** Ruoyu Hou, Xiaodong Shi and Mahesh Krishnamurthy, *Illinois Institute of Technology, USA*
PS-78	**A Signal-Based Fault Detection and Classification Strategy with Application to an Internal Combustion Engine** R. M. Ahmed[1], S. A. Gadsden[1], M. A. El Sayed[1], S. R. Habibi[1] and J. Tjong[2] *[1] McMaster University, Canada, [2] Ford Motor Company of Canada, Limited, Canada*
PS-79	**A Comparative Study of Li-ion Battery Models and Nonlinear Dual Estimation Strategies** Mohammed Farag[1], Ryan Ahmed[1], Stephen Andrew Gadsden[1], Saeid Habibi[1] and Jimi Tjong[2] *[1] McMaster University, Canada, [2] Ford Motor Company of Canada, Limited, Canada*
PS-80	**Trade-off between Different Design Parameters in Hybrid Electrical Vehicles (Presentation-Only)** Dhafar Al-Ani and Saeid Habibi, *McMaster University, Canada*
PS-81	**Performance Evaluation of AC Machines for Propulsion in a Range Extended Electric Auto Rickshaw** Yong Jiang and Mahesh Krishnamurthy, *Illinois Institute of Technology, USA*
PS-82	**Advances in AC-DC Power Conversion Topologies for More Electric Aircraft** Bulent Sarlioglu, *University of Wisconsin-Madison, USA*

Tuesday, June 19, 2012

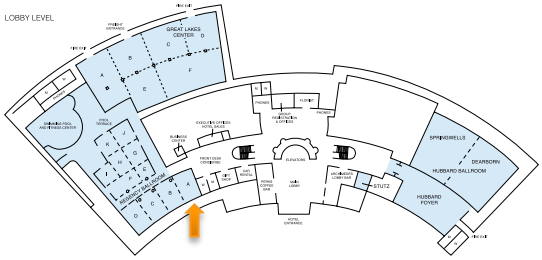
Afternoon Breakout Sessions

Tutorial 2: Emerging Transportation Markets in China

Tuesday, June 19, 2012

2:00 PM – 5:30 PM

Venue: Regency A-B



Speaker: Dr. Chunbo ZHU, Harbin Institute of Technology, Harbin, China

Tutorial Description: While the electric vehicle industry in China has made remarkable progress, more and more investment is put into the field of new energy vehicles from Chinese central government, local governments and industry. The new energy vehicles market is gradually formed. In 2010, the number of demonstration and promotion cities was increased from 13 to 25 from 2009. By the end of 2010, 190 new energy vehicle models from 54 vehicle manufacturers were listed into the "Product Catalog for Energy-Saving and New Energy Vehicle Promotion Project." This tutorial will present the fast growing Chinese new energy vehicle market, including the market characteristics, development of key technologies, companies, and cities. The following subjects will be presented: overview of the development of new energy vehicles in China; Chinese government policy in support of developing new energy vehicles (central government and local governments); companies and research institutes (vehicle manufacturers, batteries, electric machines, vehicle controllers, and vehicle-to-grid); development of new energy vehicles in key cities in China; production and sales statistics; projects of joint investment and cooperation in new energy vehicles; development of standards for new energy vehicles in China; product catalog for energy-saving and new energy promotion project; and suggested parameters for demonstration promotion.

Speaker Biography: Dr. Chunbo Zhu received his B.S. and M.S. degree in Electrical Engineering and Ph.D. in Mechanical Engineering from Harbin Institute of Technology (HIT), Harbin, China in 1987, 1992 and 2001, respectively. He has lectured in the Department of Automation Measurement and Control at HIT since 1987. He worked as a Postdoctoral Research Fellow in PEI Research Center at National University of Ireland, Galway from 2003 to 2004. Currently, he is a full Professor at HIT, and leads the Lab of Energy Management Technology in the Electric Vehicle Research Center in HIT. He also serves as deputy dean at the School of Electrical Engineering and Automation in HIT, and deputy director of the Electric Vehicle Industrial and Technical Alliance for High Latitude Area in Heilongjiang Province. His areas of interest are energy management system for electric and hybrid electric vehicle, and wireless energy transfer technologies. He has managed many projects from national government, local government and industry in the field of electric vehicles since 1998.

Tuesday, June 19, 2012

Afternoon Breakout Sessions

Technical Session 3: Inductive and Conductive Charging Session Chairs: Allan Gale, Ford Motor Company Prasad Atluri, GM R&D Center	
Tuesday, June 19, 2012 2:00 PM – 3:40 PM *Venue: Regency J-K*	
S3-1	**General Design Requirements and Analysis of Roadbed Inductive Power Transfer System for Dynamic Electric Vehicle Charging** M. Yilmaz, V. T. Buyukdegirmenci and P. T. Krein, *University of Illinois at Urbana-Champaign, USA*
S3-2	**Design of A 97%-efficiency 10kW Power Factor Correction for Fast Electric Chargers of Plug-in Hybrid Electric Vehicles** A. Taylor[1], X. Wang[1], H. Bai[1], G. Szatmari-Voicu[1], J. Patterson[2] and J. Kane[2] *[1]Kettering University, USA, [2]Magna E-Car, USA*
S3-3	**Offline and Online Optimization of Plug-in Hybrid Electric Vehicle Energy Usage (Home-to-Vehicle and Vehicle-to-Home)** F. Berthold[1], B. Blunier[1], D. Bouquain[1], S. Williamson[2] and A. Miraoui[1] *[1]University of Technology of Beltford-Montbeliard, France, [2]Concordia University, Canada*
S3-4	**Development of a Bi-directional Off-board Level-3 Quick Charging Station for Electric Bus** X. Lu, K. Lakshmi Varaha Iyer, K. Mukherjee and N. C. Kar, *University of Windsor, Canada*
S3-5	**Peak Shaving and Minimum Cost Operation of an Electric Vehicle Charging Station based on Multi-Port Power Electronic Interface** Mishel Mahmoodi, Matthew McDonough, Pourya Shamsi and Babak Fahimi, *University of Texas at Dallas, USA*

Technical Session 4: Energy Storage Systems Session Chairs: Mohammad Saad Alam, Magna E-Car Systems Omer Onar, Oak Ridge National Laboratory	
Tuesday, June 19, 2012 4:10 PM – 5:30 PM *Venue: Regency J-K*	
S4-1	**A Novel Series-Parallel Reconfigurable Hybrid Energy Storage System for Electrified Vehicles** C.-H. Tu and A. Emadi, *McMaster University, Canada*
S4-2	**Comparative Reliability Study of Hybrid Energy Storage Systems in Hybrid Electric Vehicles** H. Behjati and A. Davoudi, *University of Texas at Arlington, USA*
S4-3	**An Integrated Design of Active Balancing and Redundancy at Module Level for Electric Vehicle Batteries** W. C. Lee, D. Drury and P. Mellor, *University of Bristol, United Kingdom*
S4-4	**A Joint Model and SOC Estimation Method for Lithium Battery Based on the Sigma Point KF** Z. He[1], Y. Liu[1], M. Gao[1] and C. Wang[2] *[1]Hangzhou Dianzi University, China, [2]Wayne State University, USA*

Tuesday, June 19, 2012

Afternoon Breakout Sessions

Panel 7: Battery, Battery Management and Infrastructure Issues For Advanced Electrified Vehicles

Tuesday, June 19, 2012

2:00 PM – 3:40 PM

Venue: Regency C-D

Panel Organizers:

Dr. Michael Polis, Oakland University

Dr. Caisheng Wang, Wayne State University

Panel Moderator: Dr. Michael Polis, Oakland University

Panel Presentations:

- Thermal Management for PHEV/EVs
  Brad Brodie, Manager, Thermal Systems R&D, DENSO International America, Inc.
- Passive Thermal Management for Li-ion Batteries using Phase Change Material
  Dr. Said Al-Hallaj, Chairman/CEO and Co-Founder, All Cell Technologies LLC
- Interconnection between Modeling and Experiments Toward Understanding Li-ion Battery Failures
  Dr. Yue Qi, Staff Research Scientist, GM R&D and Planning
- Battery Research and Development Need for Military Vehicle Application
  Dr. Yi Ding, Ground Vehicle Power & Mobility, US Army RDECOM-TARDEC
- Joint Battery SOC and Parameter Estimation
  Dr. Caisheng Wang, Associate Professor, Wayne State University
- EV Infrastructure
  Sam Scupham, Kansas City Office Manager, Renewables & Energy Efficiency, Black & Veatch's Energy Division
- Robust Multi-Tower Grid Energy Storage Systems
  Peter F. Nortman, Senior VP, Core Technology Development Group, CODA Automotive

Panel Summary: Much recent progress has been achieved on battery, battery management and infrastructure issues which are critical to vehicle electrification. However, great challenges remain unresolved in these areas. On this panel, we will discuss research and development topics on battery management, SOC and parameter estimation, battery thermal management and aging issues, electric vehicle infrastructure, battery R&D for military applications, and grid battery storage applications.

Tuesday, June 19, 2012

Afternoon Breakout Sessions

Panel 8: Aerospace Applications – More Electric Aircraft

Tuesday, June 19, 2012

2:00 PM – 3:40 PM

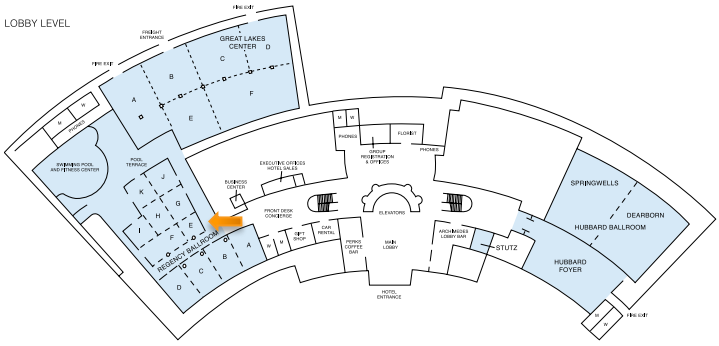
Venue: Regency E-F

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

Panelists:

John Nairus, Chief Engineer, Power Division, Air Force Research Lab
Kamiar Karimi, Ph.D., Senior Technical Fellow, Boeing Company
Hao Huang, Ph.D., Chief Technologist, GE Aviation Systems
Mario Rinaldi, Principal Engineer, Hamilton Sundstrand
Evgeni Ganev, Ph.D., Chief Engineer, Honeywell Aerospace

Panel Summary: We are witnessing a new beginning for the electrification of commercial and military aircraft. This electrification of aircraft is also called "More Electric Aircraft." Modern aircraft are employing a variety of electric power system types. In addition to traditional constant frequency, the electrical bus frequency may change proportionally with engine speed (variable frequency) or distribute high voltage DC power. These changes require the use of power electronics for both power conversion and motor controls. Similarly, there is a trend to eliminate the pneumatic and hydraulic systems with electrically driven systems to achieve reliability, efficiency and cost advantages. This opens the door for more power conversion equipment using electrical power. As a result, aerospace companies are looking at achieving low-weight, low-volume, more efficient, highly reliable power conversion systems and components. Further design constraints involve compatibility with the aircraft physical and electrical environment, including the dynamics of power quality and stability, which requires an in-depth understanding of the 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 the US Air Force. Participants from EV/HEV OEMs and suppliers will benefit from this panel by assessing the similarities and differences between aerospace and automotive industries.



Tuesday, June 19, 2012

Afternoon Breakout Sessions

Panel 9: Fast Chargers / Smart Grid and Communication Protocols

Tuesday, June 19, 2012
2:00 PM – 3:40 PM
Venue: Regency G-H

Panel Organizer: Dr. Sanjaka Wirasingha, Chrysler Group LLC

Panel Moderator: Richard Scholer, Sr Technical Specialist, Chrysler Group LLC

Panelists:
Haukur (Hawk) Asgeirsson, Manager, Power Systems Technologies, DTE Energy
Ted Bohn, Electrical Engineer, Argonne National Laboratory
Charles Zhu, Director, Automotive product Development, Delta Products Corporation
John Wirtz, Business Unit Manager, Vehicle Charging Business Unit, Eaton Corporation – Vehicle Group
Slav Berezin, Energy Systems, General Motors
Brendan O'Donnell, Sr. Systems Engineer - Power Conversion, Fisker Automotive

Panel Summary: We are witnessing a new beginning for battery electric vehicles (BEVs), plug-in hybrids, and range extended electric vehicles (REEVs). Major car companies have exciting vehicles such as the Volt and Leaf. Smaller startup companies offer exciting new cars such as the Tesla roadster and Fisker Karma. Toyota has a plug-in hybrid Prius. New cars are being introduced at an increasing rate. Advances in battery technologies have greatly improved range and costs and are starting to come down with volume manufacturing. As the population of these vehicles increases, there will be a demand for more EV charge stations. Estimates are that 5-10 charge stations are needed for each EV and there are sales predictions of millions of EVs in the next years. While almost all owners will install a home charger for short trips, there will be a need for deployed charge stations at public facilities, work, and along highways. This panel will give a brief overview of Smart Grid with a clear description of how and why the vehicle will need to communicate to this grid. An update on the standards and the communication protocol development necessary for this Vehicle to Grid interface will be provided. Discussion will include the Reverse Power Flow development and the net effects this may have on the Electrical Grid, with a primary focus on the communications and architecture needed during these events.

Fast Charging: Moving from gasoline vehicle, we are now used to 5 minute fill-ups and it is unlikely that consumers will tolerate 2-4 hour EV charge times away from home or the office. This is the area where fast charging makes sense, promising a charge in approximately 15 minutes. But is it an economic or business reality with the high cost of these installations, lack of standards, small numbers of Level 3 cars, and poor return on investment. Additionally, there are scientists working now on wireless charging which could compete with today's conductive methods. This panel will discuss the technical, political, and business issues involved with Level 3 fast charging. It will examine the competing AC and DC technologies, fast charging standards, issues with deployment, siting, and revenue. The panel will draw from EV OEMs, charge station companies, power companies and advocates, and government groups.

Tuesday, June 19, 2012

Afternoon Breakout Sessions

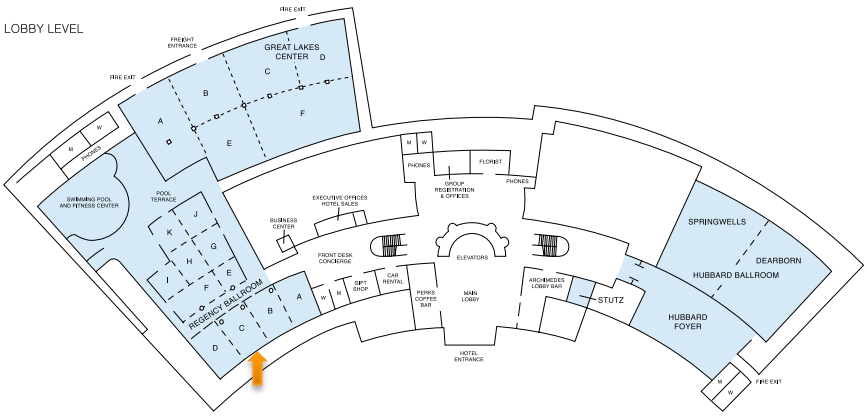
Panel 10: Battery Management Systems

Tuesday, June 19, 2012
4:10 PM – 5:30 PM
Venue: Regency C-D

Panel Moderator: Dr. Jian Cao, CODA Automotive Inc.

Panelists:
Jian Lin, Battery Control Specialist, Chrysler Group LLC
Peter F. Nortman, SVP of Core Technology Development, CODA Automotive Inc.
Dr. Philip T. Krein, Professor, University of Illinois Urbana-Champaign

Panel Summary: As electrified propulsion has become the new pursuit in the automotive industry, battery management systems (BMS) are needed to ensure the safe, reliable and long lasting operation of the expensive on-board battery pack. A BMS is one of the most complex subsystems in electrified vehicles including electric, hybrid electric and plug-in hybrid electric vehicles. Several key BMS technologies including active balancing topologies, battery state estimation algorithms and BMS hardware architectures have been attracting a lot of research effort in order for the advancement of BMS. In this panel, we will examine and identify the most notable developments in BMS design, and discuss about cutting edge BMS technologies in the purpose of providing not only BMS professionals but also electrified propulsion engineers with a better view of BMS for electrified propulsion applications. More specifically, this panel will discuss: (1) BMS soft and control algorithms, battery state estimation methods and their limitations for different battery chemistries; (2) high voltage BMS design challenges and its applications for hybrid buses and industrial cranes and hoists; design of BMS for grid energy storage systems; (3) battery cell balancing topologies including passive and active balancing methods; balancing strategies; and (4) BMS hardware architectures; major BMS Application Specific Integrated Circuit (ASIC) chip manufactures and their current and future BMS ASIC products.



Tuesday, June 19, 2012

Afternoon Breakout Sessions

Panel 11: More Electric Aircraft: Power Management and Stability Issues
Tuesday, June 19, 2012
4:10 PM – 5:30 PM
Venue: Regency E-F

Panel Moderator: Babak Nahid-Mobarakeh, GREEN, ENSEM, University of Lorraine, Nancy, France

Panelists:
Regis Meuret, Head of Safran Power Electronics Center (SPEC), Hispano-Suiza, Safran Group, France
Jean-Philippe Martin, GREEN, ENSEM, University of Lorraine, Nancy, France
Jean-Charles Swierczek, L2EP, HEI, Lille, France
TBA

Panel Summary: An important issue in the development of the next generation of aircraft is on-board energy management and implementation of local DC micro-grids is a way to optimize the power distribution in the more electric aircraft. By this way, hydraulic actuators are replaced by electric ones (inverter-motor drive systems), particularly in the landing gear system and the flight control system. In each system, these electric loads are supplied by a common DC-bus whose voltage may be controlled or not. The use of storage elements for this purpose and for regenerative braking operating mode may be considered. So, different architectures optimizing different criteria can be proposed and for each case, an appropriate power management law should be developed. On the other hand, it is well known that tightly regulated inverter-motor drives may affect the stability of the DC micro-grid supplying them. It is because of their behavior known as "constant power load" leading to a "negative resistance" effect on the DC-bus, which reduces the damping factor of the entire system. This effect is more critical in more electric aircraft because of small DC-bus capacitances and/or large line inductances. Indeed, in aerospace industry, designers are looking for small and light systems whereas DC-bus capacitors are generally big and heavy. So, to maximize the weight saving, optimization of the bus capacitors is one of the main objectives in aeronautics. Of course, in this case, it is necessary to provide active stabilization techniques for improving the stability margins of the DC micro-grid. This panel will focus on power management and stability issues in two future electric subsystems: landing gear and flight control. At first, different potential electrical architectures for each subsystem will be presented and their advantages and drawbacks will be discussed briefly. Discussion will also include the interest of controlling, or not, the DC-bus voltage. Then, two power management laws for two typical architectures will be presented. For each case, the impact on the stability of the micro-grid will be evaluated. After that, active stabilization of the micro-grid with a major emphasis on practical requirements will be debated. Standards on measurements and communications between power and control devices will be overviewed.

Tuesday, June 19, 2012

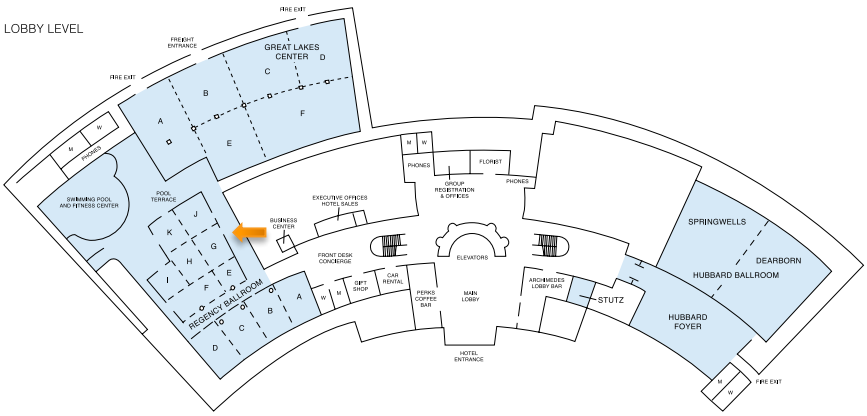
Afternoon Breakout Sessions

Panel 12: On-Board Battery Chargers: Expectations and Challenges
Tuesday, June 19, 2012
4:10 PM – 5:30 PM
Venue: Regency G-H

Panel Moderator: Dr. Zhonghui (Max) Bing, Lear Corporation

Panelists:
Allan Gale, Technical Expert, Ford Research & Advance Eng.
Mohamad Abdul-Hak, Senior System Engineer, E-Drive & Powertrain Mercedes Benz RDNA Inc.
Richard Hampo, Director, Power Electronics and Controls, Lear Corporation
Charles Zhu, Director, Delta Automotive (invited)
TBA, Chrysler
TBA, General Motors

Panel Summary: The plug-in/EV vehicles distinguish from others in terms of main energy source: the grid power is converted by battery chargers and then stored into the HV battery. Thus the battery charger performance dominates how much time it takes to get a full charge and how much the vehicle owner pays for the 'gas'. Generally, battery chargers are expected to be of high efficiency, compact size (even flexible), and low cost in order to make the vehicles competitive in the market. However, a common target that is practical at the current level of technology must be identified. It takes effort of all parties in the automotive industry to achieve. Some common questions of interests for discussion (not limited to): (1) Power level: 3.3kW vs. 6.6kW, and the implications on package size, volume, and cost. (2) Is an auxiliary LV 12V output necessary? (3) Cooling system (liquid or air): Is it possible to be flexible? (4) Common dimension and interface panel? (5) On-Board charging vs. off-board charging.



Wednesday, June 20, 2012

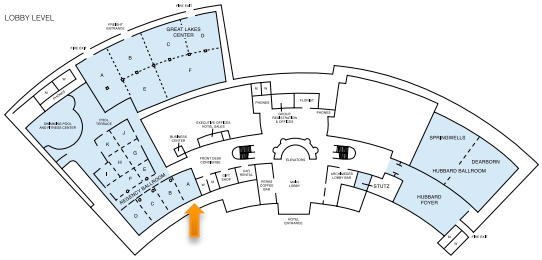
Morning Breakout Sessions

Tutorial 3: Advanced Modeling and Simulation of Power Electronic Systems

Wednesday, June 20, 2012

8:30 AM – 12:00 Noon

Venue: Regency A-B



Speaker: Kristofer Eberle, Plexim, Inc.

Tutorial Description: The goal of this tutorial is to provide insight into the operation of the continuous variable-step solvers that are used for simulating power electronic systems. The solver is often viewed as a 'black box' since this is typically not a topic that is taught in electrical engineering courses. The idea is to shed light on the inner workings of the solver so that the user can understand better how to configure the solver for the problem at hand. The solver operation will be presented within the context of power electronic system simulation and real-life examples will be given in order to reinforce the presented concepts. The second objective is to explain practical techniques for speeding up a large system model that comprises dozens of states. The correct simulation approach can make the difference between a simulation that takes several minutes or several hours. Averaged converter modeling will be discussed since this can speed up the simulation by over an order of magnitude. Thermal modeling will also be discusses because simulating a combined electrical-thermal model can be problematic due to the large thermal time constant.

Speaker Biography: Kristofer Eberle attended Northeastern University in Boston, MA and graduated summa cum laude with a B.S. in electrical engineering. He completed some research in the area of power systems under Dr. Ali Abur and has taken graduate coursework in power electronics. He joined Plexim, Inc. in the summer of 2010 as an Applications Engineer. His work at Plexim has included interpreting customer requirements, making technical presentations, and providing product education to individual customers and larger prospective audiences. His interests include sustainable energy generation and use, including photovoltaic and wind power extraction and electric vehicles.

Wednesday, June 20, 2012
Morning Breakout Sessions

Technical Session 5: Control and Power Management for Vehicular Systems Session Chairs: Pawel Malysz, MacAUTO Zhong Nie, Chrysler Group LLC	
Wednesday, June 20, 2012 8:30 AM – 10:10 AM *Venue: Regency G-H*	
S5-1	**Control Strategy of Fuel Cell Hybrid Electric Vehicle Based on Driving Cycle Recognition** A. Ravey[1], B. Blunier[1], S. Lukic[2], and A. Miraoui[1] *[1]University of Technology of Beltford-Montbeliard, France, [2]North Carolina State University, USA*
S5-2	**Design of an Energy Management Scheme for a Series-Hybrid Powertrain** M. Liukkonen and J. Suomela, *Aalto University, Finland*
S5-3	**Modeling, Controls, and Applications of Community Energy Storage Systems with Used EV/PHEV Batteries** O. C. Onar, M. Starke, G. P. Andrews and R. Jackson, *Oak Ridge National Laboratory, USA*
S5-4	**A Simple Control Scheme for Active Power Filtering in Ultracapacitor Assisted Plug-in Hybrid Vehicles** S. Dusmez[1], B. Bilgin[2], A. Khaligh[1] and M. Krishnamurthy[3] *[1]University of Maryland at College Park, USA, [2]McMaster University, Canada, [3]Illinois Institute of Technology, USA*
S5-5	**Electric Vehicle-Intelligent Energy Management System (EV-IEMS) for Frequency Regulation Application** M. Sandoval and S. Grijalva, *Georgia Institute of Technology, USA*

Technical Session 6: Vehicular Power and Energy Systems Session Chairs: Jian Cao, CODA Automotive Suntharalingam Piranavan, MacAUTO	
Wednesday, June 20, 2012 10:40 AM – 12:00 PM *Venue: Regency G-H*	
S6-1	**Design of an Electric Powertrain for a Ford F150 Crew Cab Truck Utilizing a Lithium Battery Pack and an Interior PM Synchronous Machine Drive** P. J. Kollmeyer, W. Lamb, L. W. Juang, J. D. McFarland, T. M. Jahns and B. Sarlioglu, *University of Wisconsin-Madison, USA*
S6-2	**Sensitivity Analysis of Traction Drive Motor Cooling** K. Bennion and J. Cousineau, *National Renewable Energy Laboratory, USA*
S6-3	**High-Fidelity FEA-based Models for Real-Time Test (Presentation-Only)** B. Black, *National Instruments, USA*
S6-4	**Investigating the Effects of Power Split PHEV Transmission Gear Ratio to Operation Cost** Y. Li and N. C. Kar, *University of Windsor, Canada*

Wednesday, June 20, 2012
Morning Breakout Sessions

Panels 13 and 14: University Capabilities in Transportation Electrification
Wednesday, June 20, 2012
8:30 AM – 10:10 AM and 10:40 AM – 12:00 Noon
Venue: Regency C-D

Panel Organizer: Dr. Anand Sathyan, Chrysler Group LLC

Panel Moderators:
Brian Peaslee, Propulsion Systems Product Manager, Magna E-Car Systems
Dennis A. Krozek, Chrysler Group LLC

Panelists (Panel 13):
Dr. Ali Emadi, McMaster University, Canada
Dr. Babak Fahimi, University of Texas at Dallas, USA
Dr. Bulent Sarlioglu, University of Wisconsin–Madison, USA
Dr. Srdjan Lukic, North Carolina State University, USA
Dr. Narayan Kar, University of Windsor, Canada

Panelists (Panel 14):
Dr. Rik De Doncker, RWTH Aachen University, Germany
Dr. Alireza Khaligh, University of Maryland at College Park, USA
Dr. Mahesh Krishnamurthy, Illinois Institute of Technology, USA
Dr. Sheldon S. Williamson, Concordia University, Canada

Panel Summary: Our transportation system remains more than 90% dependent on petroleum. Oil consumption rates and greenhouse gas emissions are projected to grow globally in the decades to come. The most practical way to reduce the dependence on oil in transportation is electrification. Few leading universities around the world are engaged in top research activity related to transportation electrification. The urgency to get this problem tackled and with very few people having the technical know-how, it becomes absolutely necessary to bring together the academic and industry experts in this field. Hence, it is proposed to have a panel to discuss about university capabilities in transportation electrification. This panel will (1) present capabilities (both research and education) of top universities in the field and (2) explore research collaborations between universities and industry/government.

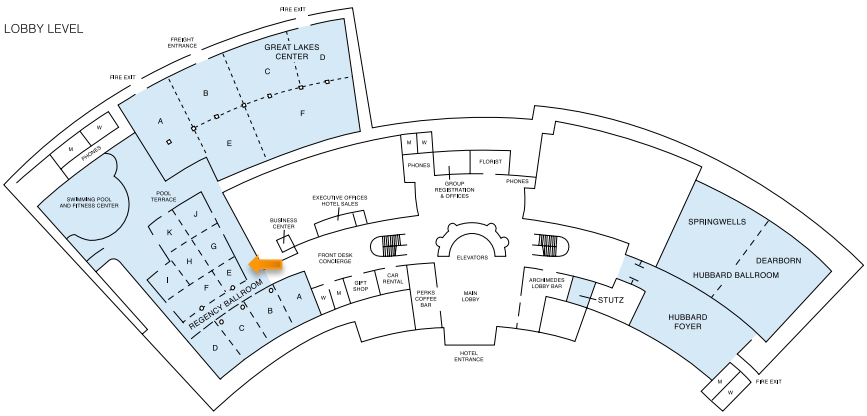
Wednesday, June 20, 2012
Morning Breakout Sessions

Panel 15: Commercial Fleet Technologies: Best Practices
Wednesday, June 20, 2012
10:40 AM – 12:00 Noon
Venue: Regency E-F

Panel Moderator: Heidi Lubin, HEVT

Panelists:
Sam Ori, Electrification Coalition
John Thomas, ALTe
Steve Hanson, Frito Lay
GE Capital

Panel Summary: Due to their oft-predictable routes, shared infrastructure, and common maintenance and data collection schedules, commercial fleets present an optimal first step for broad vehicle electrification. Please join us for a discussion of best practices in electrified commercial fleet technology, planning, roll-out and management.



2013 ITEC: Call for Papers

June 16-19, 2013
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.

2013 ITEC: Call for Papers

June 16-19, 2013
Dearborn, Michigan, USA
http://itec-conf.com/

Key Dates

Deadline for submission of paper proposals (abstracts/digests):	November 9, 2012
Author's notification of acceptance:	February 1, 2013
Deadline for submission of final camera-ready manuscripts:	April 5, 2013
Deadline for early registration:	April 5, 2013

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:	Alireza Khaligh, University of Maryland at College Park
General Co-Chair:	Burak Ozpineci, Oak Ridge National Laboratory
General Co-Chair:	Bulent Sarlioglu, University of Wisconsin-Madison
Program Chair:	Mahesh Krishnamurthy, Illinois Institute of Technology
Program Co-Chair:	Anand Sathyan, Chrysler Group LLC

Conference Venue and Contacts

Conference Site and Hotel Reservation

Hyatt Regency Dearborn
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'12 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:
https://resweb.passkey.com/go/ITEC2012

ITEC's negotiated Group Rate is:
Single/Double - $129.00

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 Friday, June 8, 2012 at 5:00 PM (U.S. Eastern) time, on a first come, first served basis.

Conference General Chair
Professor Ali Emadi
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